Plymouth Municipal Airport Master Plan

This is the first Airport Master Plan for the Plymouth Municipal Airport located in Plymouth, New Hampshire

Prepared for:
Town of Plymouth, NH

Prepared by:
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September 2016

PLYMOUTH MUNICIPAL AIRPORT MASTER PLAN

September 2016

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Prepared by 
(signature)

Jason Gass, Aviation Planner

Approved by 
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Ervin Deck, Sr. Aviation Planner / Project Manager

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

This document is the first master plan prepared for the Plymouth Municipal Airport. The airport is owned and operated by the town of Plymouth, who is recognized by the Federal Aviation Administration as the airport's "sponsor."[1] The work that went into preparing this document was funded through the Airport Improvement Program (AIP) and by a state block grant issued by the New Hampshire Department of Transportation (NHDOT). The state of New Hampshire, through its Department of Transportation Bureau of Aeronautics, was selected by the Federal Aviation Administration's (FAA) New England Region to be a member of FAA's Airport Block Grant Program in 2008. This program has been in existence in the United States since Congress authorized the pilot program in 1990.

1.1 WHAT IS AN AIRPORT MASTER PLAN?

An airport master plan is a comprehensive study of the airport's current facilities and potential future needs. It assesses the current situation against future market and other demands so as to develop a detailed plan for the airport's future. The plan is typically broken down into short-, medium-, and long-term actions, so the airport can plan for and practically meet the future needs of the community. This master plan includes the following elements:

- **Pre-planning.** This pre-planning process determined the initial needs for the study and created an outline for what the study would include. During this process, the consultant fee and contract were negotiated, and an application submitted for a grant to finance the study. As a result, this master plan is funded through a planning grant with the Federal Aviation Administration (FAA) and the Airport Improvement Program (AIP), which is covering 90% of the total project cost. The remaining costs were borne equally through a grant from the New Hampshire Department of Transportation (NHDOT) and the town of Plymouth.
- **Public Involvement.** The public involvement program for this study includes the selection and appointment of an Airport Planning Advisory Committee (APAC) to give detailed feedback on the study process and findings. The APAC consisted of users of the airport, community members who live near the airport and others who have a stake in the airport's plans. Over the course of the study, the public involvement program will encourage information sharing and collaboration among the APAC members and the public. To encourage additional public input, a Public Information Meeting (PIM) will be held toward the end of the process to solicit advice, ideas, and feedback from the community to ensure the airport plan will serve community needs. Minutes from the APAC and PIM are in **Appendix A.**
- **Existing Facilities.** The existing facilities section is a snapshot of how and what the airport looks like at the beginning of the study. The existing facilities assessment provides a baseline of data for use in subsequent plans.

[1] The FAA refers to recipients of Airport Improvement Program (AIP) grants as "sponsors."

- **Aviation Forecasts.** Aviation forecasts are calculated at five, ten and twenty years into the future. The forecasts are broken down into how many aircraft might consider the airport as the home field (based aircraft), how many aircraft will be local (regularly operate within 20 miles of the airport), and all others (itinerant aircraft).
- **Facility Requirements.** The facility requirements chapter assesses the ability of the existing airport's facilities, both airside (serving the aviation needs) and landside (serving non-aviation needs); to support the future forecasted demand. The chapter also identifies the point at which demand will trigger the need for facility additions or improvements and estimates any new facilities and infrastructure that may be required to meet that demand.
- **Alternatives Development and Evaluation.** This chapter identifies the airport's growth options. Based on potential market demand, a series of options (alternatives) are developed that would meet that demand through facility upgrades. The chapter looks at the expected performance of each proposed alternative against a wide range of evaluation criteria, including the operational, environmental, and financial impacts each would generate. A recommended alternative, called the preferred alternative, will emerge from this process and be further refined in subsequent tasks.
- **Environmental Considerations.** The environmental chapter will provide an understanding of any environmental requirements for each alternative, such as avoiding wetlands. This chapter also identifies any permitting requirements that would need to take place as part of implementing the preferred alternative(s).
- **Airport Layout Plans**. The Airport Layout Plan (ALP) is one of the core products of a master plan. The ALP is a set of drawings showing the long-term development plan for an airport. The ALP includes the location or changed position of new buildings, parking lots, runways or any other physical aspect of the airport. The primary drawing in this set is the Airport Layout Plan, which becomes the airport's official blueprint.
- **Facilities Implementation Plan.** The facilities implementation plan provides a summary of the recommended improvements and associated costs of the preferred alternative. It also includes a schedule of when improvements would occur. This schedule is in large part, based on market demand, which triggers any need for expansion. These recommended facility improvements are presented for short-, medium- and long-term planning periods and include estimated costs of construction and likely funding sources. The recommended short-term improvements (0-5 years) typically become the airport's capital improvement program (CIP) and are incorporated into the regulatory agencies' budgetary process.
- **Financial Feasibility Analysis**. The financial feasibility chapter creates the financial plan for the airport, describes potential funding sources for the proposed improvements and demonstrates the financial feasibility of the program.

1.2 WHAT IS THE PURPOSE OF THIS PLAN?

The purpose of this master plan was to identify and examine several forthcoming issues for Plymouth: The Town's decision to join the National Plan of Integrated Airport Systems (NPIAS), the feasibility of paving the runway, and the decision on how to best utilize the plot of land north of Quincy Road. Also, an implementation schedule was prepared that includes cost estimates and environmental impacts for any recommended improvements.

1.3 BACKGROUND OF THE STUDY

As previously mentioned, this is the first master plan prepared for Plymouth. It is an exciting venture for all stakeholders involved in this project, as the airport is essentially a "blank slate," primed for improvements and growth that would benefit the surrounding communities.

This master plan addresses several issues. The APAC is interested in the benefits and potential impacts of joining NPIAS, which would most likely lead to a paved runway at Plymouth. Also identified are adjacent land use issues for the parcels of land surrounding the airfield. Because this master plan is the first of its kind for Plymouth, a detailed history of the airport will be included in this study.

In the process of developing the scope of work for this study, Stantec Consulting Services (Consultant) met with the Town of Plymouth to understand their goals and objectives for the airport. The Town's recent work on the airport, such as the runway drainage corrections, is evidence of how serious they are about improving and maintaining the airport.

1.4 WHAT IS THE PLAN'S FOCUS?

The two key areas where the Town wants to direct the focus of this master plan is first, economic development and second, whether the airport should request NPIAS status.

1.4.1 Economic Development

The three key areas of economic development include potential paving of the runway, identifying excess land the airport cannot use or does not need; and evaluating land issues, if any, around adjoining private property impacted by the airport

- **Paving the Runway.** Plymouth currently has a well-maintained turf runway. Paving the runway will be discussed in length within this master plan. This decision largely hinges on the question of whether or not the airport will join NPIAS. Given the recent growth of the surrounding communities, paving the runway at Plymouth is certainly a topic worth discussing.
- **Excess Airport Land.** The airport owns a plot of land adjacent to Quincy Road, just north of the airfield. The APAC is interested in alternative uses for this currently unused land, mainly non-aeronautical, revenue-producing uses. This study will (1) determine if this land is in fact "in excess" of future aviation needs, (2) determine which areas are in fact "in

excess" of future aviation needs, and, (3) determine what is the best and most profitable use of this area.

- **Land Use.** This master plan will also address land use issues around current and future use of adjacent land parcels.

1.4.2 National Plan of Integrated Airport Systems (NPIAS)

The NPIAS identifies nearly 3,400 existing and proposed airports that are significant to national air transportation and thus eligible to receive Federal grants under the Airport Improvement Program (AIP). It also estimates the amount of AIP money needed to fund infrastructure development projects that will bring these airports up to current design standards and add capacity to congested airports. The FAA is required to provide Congress with a five-year estimate of AIP eligible development every two years.

The NPIAS contains all commercial service airports, all reliever airports, and selected general aviation airports. There are two key elements that this master plan will address which are the feasibility and impacts of Plymouth joining the national system.

- **Feasibility of Joining.** This master plan will take a close look at whether or not it is beneficial for the airport to join NPIAS.
- **Impacts of Joining.** A portion of this master plan will be to determine the impacts to the airport, from infrastructure improvements to financial issues, if the Town determines that it is in the airport's best interest to join NPIAS.

1.5 WHAT IS THE FINAL PRODUCT OF THE MASTER PLANNING PROCESS?

The products of this master planning process will include two deliverables: a technical report and the Airport Layout Plan (ALP).

1.5.1 Technical Report

The Master Plan Technical Report illustrates the systematic process of this study from start to finish.

- The master plan examines the airport as it exists today;
- Forecasts what is possible through a 20-year planning cycle;
- Assesses what facilities required in the next two decades;
- Analyzes options (alternatives) about how to meet any future requirements; and then;
- The report provides the Town of Plymouth and funding agencies with a plan that will implement the process in a fiscally conservative manner.
- The final product of the Report is the Airport Layout Plan.

When complete, this document will contain the following Chapters and Appendices:

- Chapter 1 – Introduction
- Chapter 2 – Inventory of Existing Conditions
- Chapter 3 – Forecasts of Aviation Activity
- Chapter 4 – Facility Requirements
- Chapter 5 – Alternatives Analysis
- Chapter 6 – Airport Layout Plan
- Chapter 7 – Implementation Plan
- Appendix A – Meeting Minutes
- Appendix B - Terms and Abbreviations
- Appendix C – Environmental Correspondence
- Appendix D – Wildlife Hazard Assessment Site Visit
- Appendix E – Wetland Analysis Report
- Appendix F – Airport Sponsor Assurances

1.5.2 Airport Layout Plan (ALP) Drawing Set

The ALP presents the Town's final vision of the airport graphically. The final ALP will consist of several pages (sheets) and is considered the single most important document the airport has: the blueprint of the airport.

1.6 HOW IS THE MASTER PLAN REVIEWED AND APPROVED?

NHDOT only reviews, comments upon, and accepts airport master plans that are from their sponsors, in this case, the Town of Plymouth. NHDOT may state their opinions regarding various aspects of the plan, but they have no statutory authority or responsibility to approve or deny master plans or any plan elements. The ultimate authority of NHDOT lies in their agreement or disagreement to participate in the funding of particular elements included in a master plan.

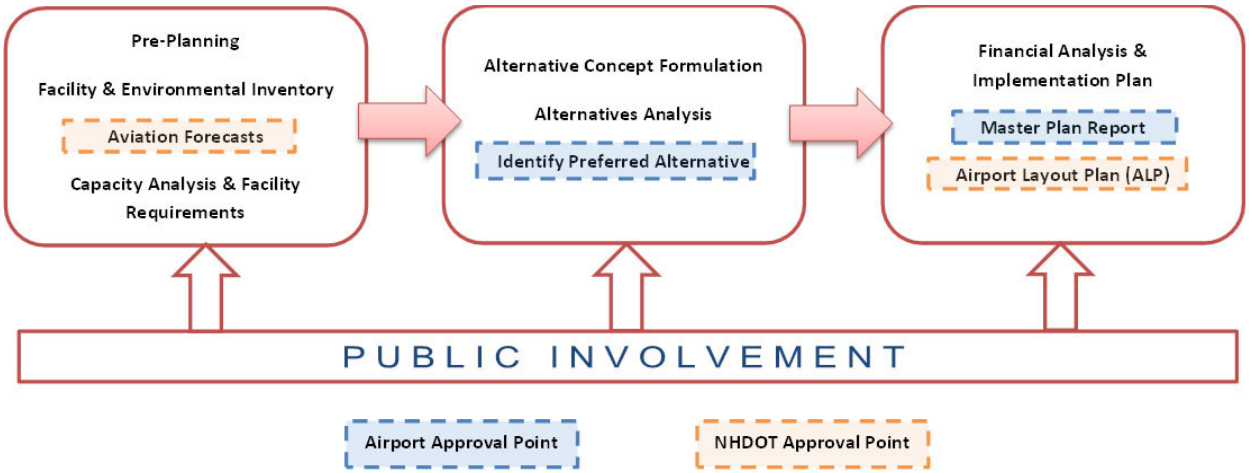
The recommendations contained in this airport master plan represent the views, policies, and development plans of the Town of Plymouth and do not necessarily represent the views of NHDOT or Stantec. Acceptance of the master plan by either agency does not constitute a commitment on the part of the United States or the State of New Hampshire to participate in any development depicted in the plan, nor does it indicate that the proposed development is environmentally acceptable by appropriate public law. The FAA and NHDOT will review all elements of this master plan to ensure that sound planning techniques are applied. However, NHDOT does approve two key elements of airport master plans:

- **Aviation Forecasts.** The master plan forecasts will be reviewed to ensure that the underlying assumptions and forecast methodologies are appropriate. Also, NHDOT

should approve the master plan forecasts before proceeding with subsequent planning work.

- **Airport Layout Plan.** An FAA-approved ALP is mandatory for all federal-obligated airports. Any proposed development must be shown on an approved ALP to be eligible for AIP funding. NHDOT approval of the ALP indicates that the existing facilities and proposed development depicted on the ALP conforms to the FAA airport design standards in effect at the time of the approval. Such approval also indicates that NHDOT finds the proposed development to be safe and efficient.

Figure 1.1: Planning Process



1.7 TERMS AND ABBREVIATIONS

Throughout this document, the reader will find countless terms and abbreviations common to the aviation industry, in particular to the FAA. While every effort is made to clarify what each term (and abbreviation) means, the reader will find **Appendix B** helpful in understanding the report. Contained within this Appendix are most, if not all, terms and abbreviations used in this technical report.

2.0 INVENTORY OF EXISTING CONDITIONS

The first step in the airport master planning process involves gathering information about the airport and its surroundings. An inventory of current conditions is essential to the success of a master plan since the information also provides a foundation for subsequent future evaluations. It is a snapshot of the airport as it appears at that particular time and serves as a benchmark for measuring changes.

The inventory of existing conditions for the Plymouth Master Plan includes the following:

- Information about airport ownership and management, the general airport setting, transportation access, i.e., is the airport accessible by train or by bus, the airport's size about the federal airport system, and airport history;
- Population and socioeconomic information for the airport's geographic area;
- A review of historical and current airport activity, i.e., what is flying in and out of the airport, including general aviation and military flight activity;
- An overview of the area's airspace and obstructions, i.e., trees or other safety hazards;
- Descriptions of facilities and services now provided at the airport. Included is a general description of all airside, landside, terminal, and support facilities, as well as utilities and other infrastructure;
- A summary of environmental conditions at the airport; and
- A financial overview, including a review of past revenue and expenses.

The information gathered for this portion of the master plan, to the extent possible, is current as of January 2015. However, an update was collected throughout the development of the project and is included in subsequent chapters so that the final Technical Report is as current as possible.

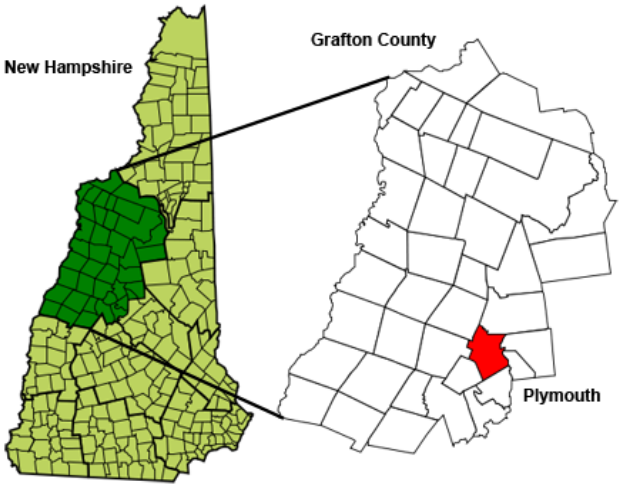
2.1 AN OVERVIEW OF PLYMOUTH MUNICIPAL AIRPORT

The Plymouth Municipal Airport, FAA identifier 1P1, is a small municipal airfield that caters primarily to small general aviation[1] aircraft; primarily recreational, with an occasional business flight. Located three miles northwest of the Town of Plymouth, in Grafton County, the airport is at an elevation of 505 feet. Plymouth Municipal Airport has a single turf runway that serves as a ski runway during those months when sufficient snow covers the surface (usually from January through March). There is usually a two to three week period in the spring when the runway is unusable while the ground finishes thawing before the surface can once again support an aircraft. Refer to Figure 2.1 - Plymouth Area Map (Grafton County) and Figure 2.2 - Location of Airport to Village.

[1] General aviation, or GA, is the term for all civil flying except commercial air service. See the article "Ready to Start" for additional information (http://www.aopa.org/letsgoflying/ready/steps/whatis.html).

As illustrated on Figure 2.3 - NH Airports, Plymouth is one of 24 public use airports in the state and one of five in Grafton County. The Grafton County airports include Franconia, Newfound Valley, Dean Memorial, and Lebanon Municipal. Only one, Lebanon, is currently part of NPIAS. Table 2.1 - Airports in Grafton County, NH, lists the five airports for comparison.

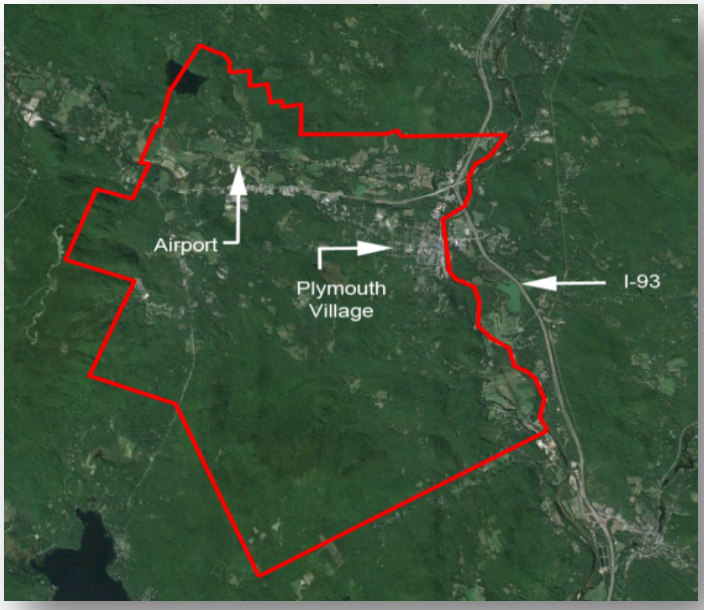
Figure 2.1. Area Map (Grafton County)



2.2 HISTORY OF THE AIRPORT

Since 1941, the Plymouth Municipal Airport has served pilots and aviation enthusiasts from land sold to the Town by Hattie Trow and Helena Spaulding, both well-known family names in Plymouth. However, the airport's first hangar was constructed even before that, (the exact date is unknown) and still stands just west of the terminal building. A grass strip has served as the airport's primary runway for the entirety of its existence, with various improvement projects completed over the years. In 1943, the runway was properly graded to handle precipitation runoff; in 1946, a study was conducted to clear the runway's flight approach paths; and in 1950 the runway was graded a second time to correct some drainage issues not identified earlier.

Figure 2.2. Location of Airport to Village



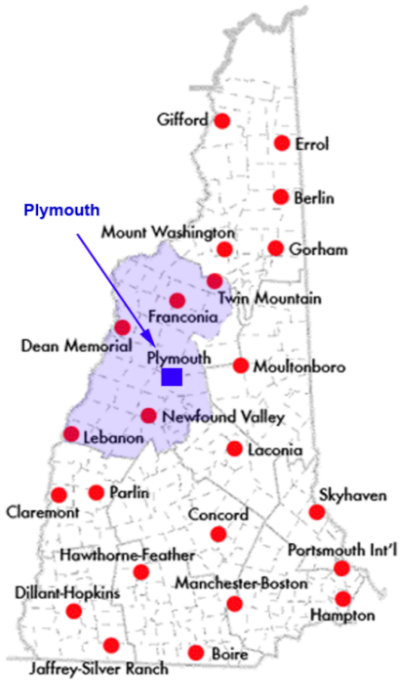
Since its inception, the airport has always been an integral part of the Plymouth community. This amalgamation was first noted as far back as 1946 when the Town voted to "appoint an Airport Committee consisting of three members to be designated by a vote. This vote authorized the Committee to act for the Town in all matters about the establishment, construction and operation of aircraft landing areas and to confer and consult with State and Federal officials and to execute in the name of the Town any and all necessary

or desirable instruments and agreements in connection in addition to that." The new Airport Commission[2] quickly began work enlisting the airport's first Airport Layout Plan survey the following year (1947).

The terminal building was constructed in 1969, providing pilots and other airport users a more comfortable place for flight planning. There have been two renovation projects associated with the terminal building. In 1973, heat was added to the building. In 2008, volunteers from the community updated the terminal building's flooring and paneling. The volunteers also added several amenities for visiting pilots: a snack bar, a coffee maker, a gas grill, a full restroom and a patio.

By the commissioning of this Master Plan, it is evident that the Plymouth Municipal Airport remains relevant not only to the surrounding community but the entire region.

Figure 2.3. New Hampshire Airports



2.3 WHAT ARE BASIC AIRPORT DESIGN FACTORS?

The Federal Aviation Administration (FAA) provides aviation professionals with guidance for airport design through a series of Advisory Circulars (AC). These circulars promote guidelines for specific improvements to airport safety and smoother operations based on whatever types of aircraft typically use the airport on a regular basis. Major design factors considered include the airport's role, its classification by FAA, wind coverage, instrument approach procedures, and the capacity of its airfield.

Table 2.1. Airports In Grafton County

AIRPORT	ID	PUBLIC	NPIAS	LONGEST RUNWAY
Plymouth	Plymouth	Yes	No	2,350 (Turf)
Franconia	1B5	No	No	2,300 (Turf)
Dean Memorial	5B9	Yes	No	2,511 (Asphalt)
Newfound Valley	2N2	No	No	1,900 (Asphalt))
Lebanon	LEB	Yes	Yes	5,496 (Asphalt)

[2] The Commission no longer exists.

2.4 AIRPORT ROLE

Plymouth Municipal Airport is a general aviation airport in the basic category.[3] The basc category means it has a low to moderate level of activity and serves a critical aeronautical function within its local market. By definition, a low activity basic category airport averages about ten propeller-driven aircraft and no jets.[4]

2.5 AIRPORT CLASSIFICATION

The FAA uses a set of airport classifications known as Airport Reference Codes (ARC) to make sure the design of the airport relates to the size and other characteristics of the airplanes operating at the airport. The ARC has two components relating to the design aircraft: aircraft approach category (speed) and airplane design group (size).

- Aircraft Approach Category (AAC) – Designated by a letter (A– E), this component relates to the aircraft approach speed, with 'A' being the slowest and 'E' being the fastest.
- Airplane Design Group (ADG) – Designated by a Roman numeral (I–VI), the second component relates to the size of airplane wingspan, with 'I' being the smallest and 'VI' being the largest.

2.6 DESIGN AIRCRAFT

By definition, the design aircraft is the most important regarding the wingspan and the fastest approach speed, and one that conducts at least 500 annual operations.

The Airport Reference Code (ARC) also establishes minimum design standards for an airport. These standards include such features as runway and taxiway widths, the size of safety areas, in addition to the distances between the runways, taxiways, and parking areas, among other airport characteristics.

Figure 2.4. Existing Design Aircraft
Cessna 172 Skyhawk

The design aircraft selected for Plymouth is the Cessna 172 – a single engine piston aircraft (see Figure 2.4 – Design Aircraft). Therefore, given this plane's wingspan and approach speed, the ARC for Plymouth is A-I.

[3] The FAA classifies civil airports as either commercial or general aviation.
[4] FAA General Aviation Airports: A National Asset (http://www.faa.gov/airports/planning_capacity/ga_study/)

Table 2.2 – Existing versus Required FAA Design Standards, compares FAA design standards for an airport with an ARC of A-I to the existing conditions at Plymouth.

Table 2.2. Existing Conditions versus Required FAA Design Standards

AIRPORT STANDARD	CURRENT CONDITION	REQUIRED STANDARD
Airport Reference Code	A-I	A-I
Runway Width	90’	60’
Runway Centerline to Taxiway Centerline	N/A	N/A
Runway Centerline to Parking Apron	140’	200’
Approach Visibility Minimums	Visual	Visual
Runway Protection Zone	Length: 1,000’ Outer Width: 700’ Inner Width: 500’	Length: 1,000’ Outer Width: 700’ Inner Width: 500’
Runway Safety Area (RSA)	Width: 120’ Length: 240’	Width: 120’ Length: 240’
Obstacle Free Zone (OFZ)	Width: 250’ Length: 200’	Width: 250’ Length: 200’
Object Free Area (OFA)	Width: 400’ Length: 240’	Width: 400’ Length: 240’

Source: FAA Advisory Circular 5300-13A, Design Manual

2.7 EXISTING FACILITIES AT PLYMOUTH AIRPORT

This section provides details on the airport’s airside and landside facilities, including the runway, the quantity, and type of hangars, transient aircraft parking apron areas, tie down positions, general aviation terminal facilities fixed based operators and the number and mix of based aircraft. Also, this section includes a description of the main elements of the infrastructure service including utilities such as water, sanitary sewer needs, communications, and power. Finally, an assessment of how the existing airport meets FAA design criteria - based on the current design aircraft - is examined. As noted earlier, this information will provide a benchmark for all future reports.

The airport, which consists of 116± acres, is divided into two separate parcels that are separated by Quincy Road. The north parcel spans 69± acres and is primarily wooded and undeveloped. The airport infrastructure is located entirely in the south parcel, which consists of 47± acres. The airport property boundary is outliined on Figure 2.5 – Existing Facilities Plan. Additional airport data is provided in Figure 2.6 – Airport Master Record (page 2.7).

Figure 2.5. Existing Facilities Plan

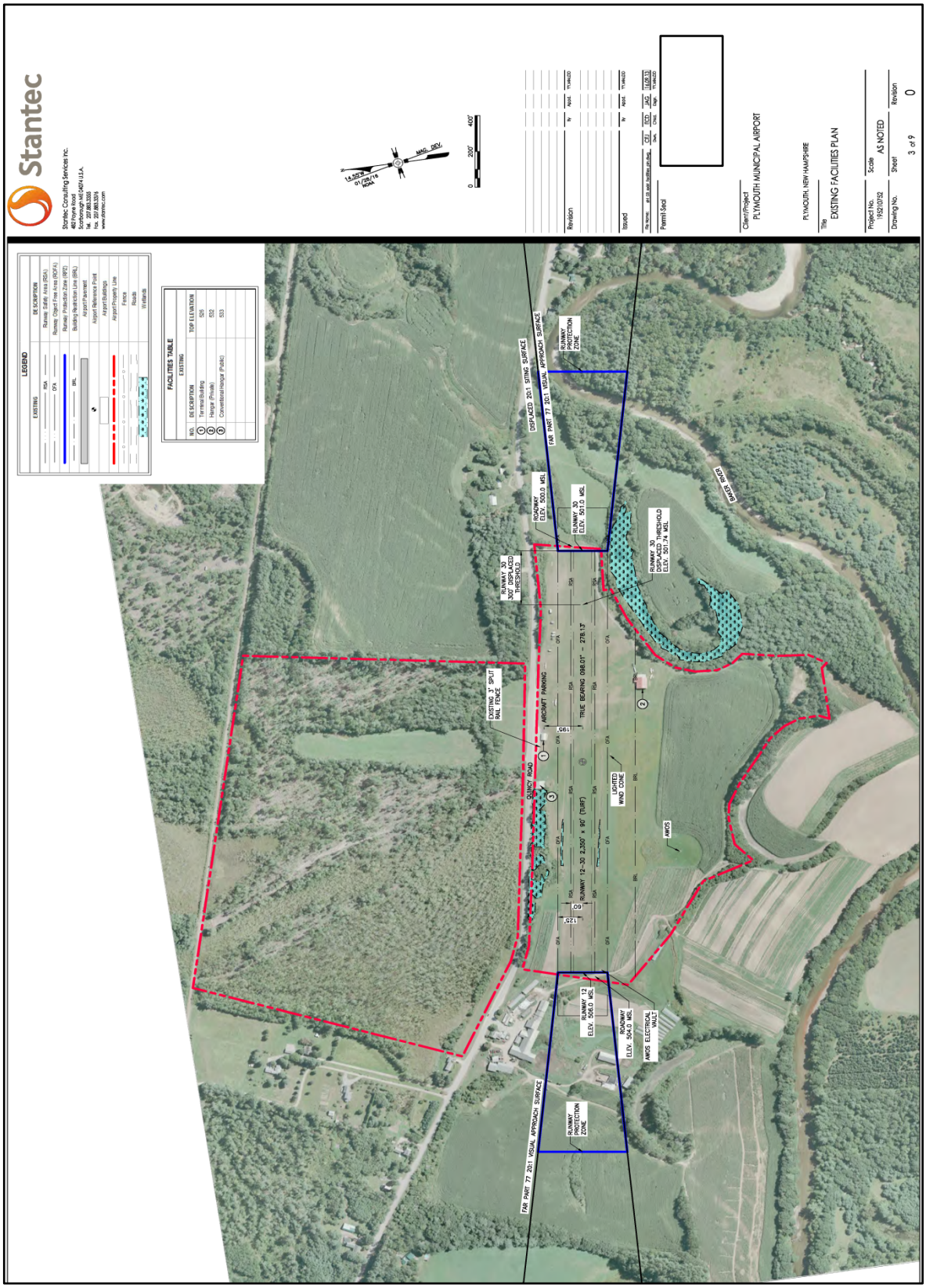


Figure 2.6. Plymouth Municipal Airport Master Record (FAA Form 5010-1)
Source: GCR & Associates, June 2016)

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

AIRPORT MASTER RECORD

PRINT DATE: 6/15/2016
AFD EFF 05/26/2016
FORM APPROVED OMB 2120-0015

> 1 ASSOC CITY:	PLYMOUTH	4 STATE:	NH	LOC ID:	1P1	FAA SITE NR:	13383.*A
> 2 AIRPORT NAME:	PLYMOUTH MUNI			5 COUNTY:	GRAFTON NH		
3 CBD TO AIRPORT (NM):	03 NW	6 REGION/ADO:	ANE/NONE	7 SECT AERO CHT:	NEW YORK		

GENERAL

10 OWNERSHIP:	PUBLIC
> 11 OWNER:	TOWN OF PLYMOUTH
> 12 ADDRESS:	TOWN HALL, MAIN STREET PLYMOUTH, NH 03264
> 13 PHONE NR:	603-536-1731
> 14 MANAGER:	COLIN MCIVER
> 15 ADDRESS:	6 POST OFFICE SQUARE PLYMOUTH, NH 03264
> 16 PHONE NR:	(603) 536-5818
> 17 ATTENDANCE SCHEDULE:	
	IREG

SERVICES

> 70 FUEL:	
> 71 AIRFRAME RPRS:	
> 72 PWR PLANT RPRS:	
> 73 BOTTLE OXYGEN:	NONE
> 74 BULK OXYGEN:	NONE
75 TSNT STORAGE:	TIE
76 OTHER SERVICES:	

BASED AIRCRAFT

90 SINGLE ENG:	14
91 MULTI ENG:	1
92 JET:	0
TOTAL:	15
93 HELICOPTERS:	0
94 GLIDERS:	1
95 MILITARY:	0
96 ULTRA-LIGHT:	3

FACILITIES

> 80 ARPT BCN:	
> 81 ARPT LGT SKED :	
BCN LGT SKED:	
> 82 UNICOM:	122.800
> 83 WIND INDICATOR:	YES
84 SEGMENTED CIRCLE:	NONE
85 CONTROL TWR:	NO
86 FSS:	BANGOR
87 FSS ON ARPT:	NO
88 FSS PHONE NR:	
89 TOLL FREE NR:	1-800-WX-BRIEF

OPERATIONS

100 AIR CARRIER:	0
102 AIR TAXI:	0
103 G A LOCAL:	2,000
104 G A ITNRNT:	1,000
105 MILITARY:	30
TOTAL:	3,030
OPERATIONS FOR 12 MONTHS ENDING:	12/21/2014

18 AIRPORT USE:	PUBLIC
19 ARPT LAT:	43-46-45.2570N ESTIMATED
20 ARPT LONG:	071-45-13.2860W
21 ARPT ELEV:	505.0 SURVEYED
22 ACREAGE:	111
> 23 RIGHT TRAFFIC:	NO
> 24 NON-COMM LANDING:	NO
25 NPIAS/FED AGREEMENTS:	N
> 26 FAR 139 INDEX:	

RUNWAY DATA

> 30 RUNWAY INDENT:	12/30
> 31 LENGTH:	2,380
> 32 WIDTH:	90
> 33 SURF TYPE-COND:	TURF-G
> 34 SURF TREATMENT:	
35 GROSS WT:	S
36 (IN THSDS)	D
37	2D
38	2D/2D2
> 39 PCN:	

LIGHTING/APCH AIDS

> 40 EDGE INTENSITY:	
> 42 RWY MARK TYPE-COND:	- / -
> 43 VGSI:	/
44 THR CROSSING HGT.:	/
45 VISUAL GLIDE ANGLE:	/
> 46 CNTRLN-TDZ:	N - N / N - N
> 47 RVR-RVV:	- N / - N
> 48 REIL:	N / N
> 49 APCH LIGHTS:	/

OBSTRUCTION DATA

50 FAR 77 CATEGORY	A(V) / A(V)
> 51 DISPLACED THR:	/ 300
> 52 CTLG OBSTN:	TREE / TREES
> 53 OBSTN MARKED/LGTD:	/
> 54 HGT ABOVE RWY END:	30 / 16
> 55 DIST FROM RWY END:	114 / 93
> 56 CNTRLN OFFSET:	134L / 20L
57 OBSTN CLNC SLOPE:	4:1 / 5:1
58 CLOSE-IN OBSTN:	N / N

DECLARED DISTANCES

> 60 TAKE OFF RUN AVBL (TORA):	/
> 61 TAKE OFF DIST AVBL (TODA):	/
> 62 ACLT STOP DIST AVBL (ASDA):	/
> 63 LNDG DIST AVBL (LDA):	/

- NOTE -
This document was provided by GCR & Associates as part of the FAA's Master Record process and is provided to provide a snapshot of the airport and its facilities as of the print date listed above. The accuracy of this form was not verified. Stantec Consulting Services is not responsible for its contents.

(>) ARPT MGR PLEASE ADVISE FSS IN ITEM 86 WHEN CHANGES OCCUR TO ITEMS PRECEDED BY >

> 110 REMARKS

A 013	AIRPORT PHONE 603-536-5818
A 017	ARPT ATNDD IREG. CALL (603) 536-1731.
A 042	RWY 12 RY 12 /30 EDGES AND ENDS MKD BY YELLOW CONES. RY 30 DSPLCD THRSHLD MRKD BY THREE YELLOW CONES ALIGNED PERPENDICULAR TO EACH RY EDGE.
A 052	RWY 12 FARM ACCESS ROAD 30 FT FROM THLD.
A 057	RWY 12 RWY 30 CONTROLLING OBSTRUCTION SLOPE TO DISPLACED THRESHOLD 30:1.
A 110-001	RY 12/30 STRIP SOFT IN SPRING. NOT MAINTAINED IN WINTER BUT OPEN TO SKI CRAFT. PLEASE CALL AHEAD.
A 110-003	ULTRALIGHT AND PARAGLIDER ACTIVITY ON & INVOF ARPT.
A 110-004	NUMEROUS NON-RADIO EQUIP ACFT OPERATING FM AFLD.
A 110-005	1161' MSL MTN 1.5 NORTH RY 30 LEFT CNTRLN.
A 110-007	WILDLIFE ON & INVOF ARPT.
A 110-008	+3 FT DRAINAGE SWALES LOCATED 15 FT FROM EDGE, BOTH SIDES OF RWY BEGINNING AT MIDFIELD THEN WEST FOR 700 FT.
A 110-009	TWY &TRANSIENT PARKING ON NORTH SIDE OF RY.

111 INSPECTOR: (S) 112 LAST INSP: 10/07/2015 113 LAST INFO REQ:

FAA FORM 5010-1 (3/96) SUPERSEDES PREVIOUS EDITION

2.8 AIRPORT FACILITIES

There are two main elements of every airport, the airside and the landside. The following sections address each of these.

2.8.1 Airside Facilities

The airside area includes the parts of the airport that accommodate the movement of aircraft, such as runways, taxiways, parking aprons, and hangars. The airside also includes the navigation and communication equipment needed for safe aircraft operations, such as navigation aids, lighting systems, antennae, and other related infrastructure. Landside facilities, which are assessed further on in the report, include support buildings, such as the terminal building, fuel terminal, automobile parking, access roads and support facilities.

Figure 2.7. Ski Plane Operation at 1P1
Photo by C. McIver (February 2014)

2.8.1.1 Runway

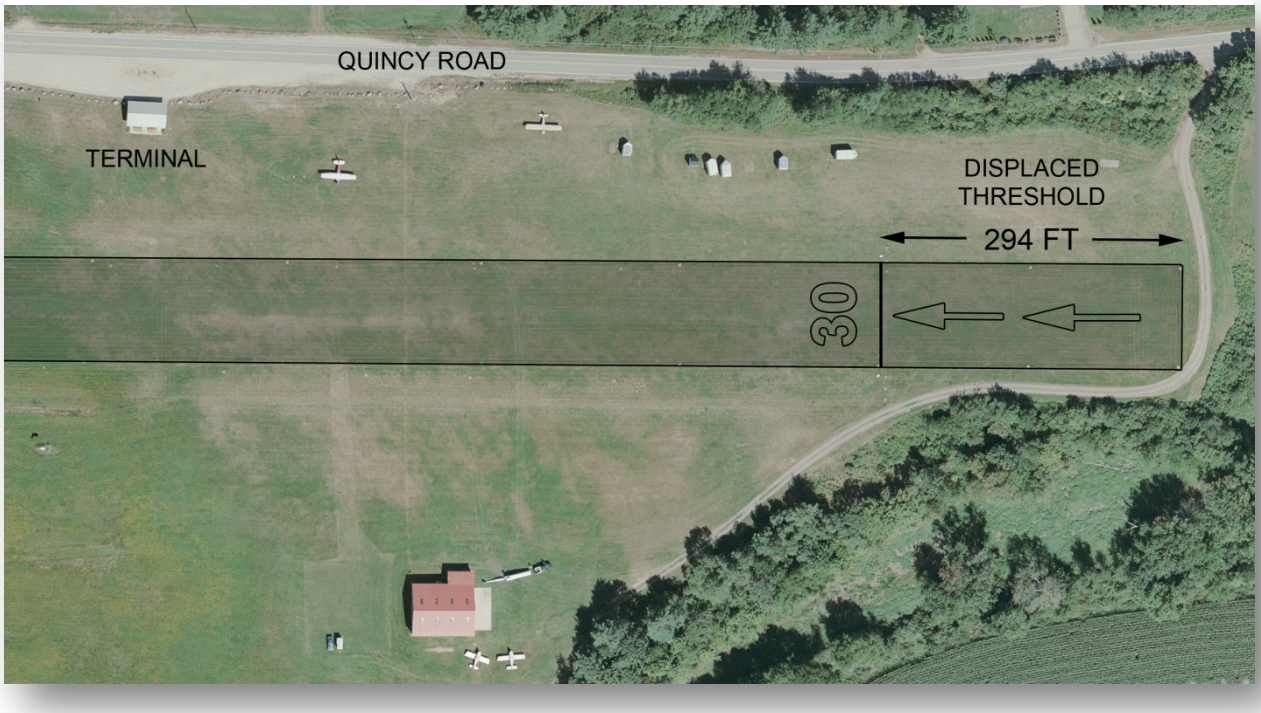
Plymouth has one turf runway oriented west-northwest and east-southeast. The runway is in good condition and is 2,350 feet long by 90 feet wide.[5] The runway's edges are marked by FAA-approved yellow cones spaced approximately 200 feet apart, with cones also marking the runway thresholds.

The runway is not maintained in the winter months; however as shown in Figure 2.7 - Ski Plane Operations at Plymouth, the turf runway readily serves ski-equipped aircraft. In the spring, the turf becomes soft and unusable as the ground thaws. The runway does not provide any electronic navigational aids such runway edge or threshold lights.

[5] The FAA Master Record (Form 5010-1) lists the runway as 2,380 feet long. However, using aerial and ground survey data, Stantec determined that the runway is actually 2,350 feet long.

Because of trees in the Runway 30 approach surface, the landing threshold was displaced 294 feet. Figure 2.8 – Runway 30 Displaced Threshold illustrates the displaced threshold on the Runway 30 approach end. The landing threshold is marked with three yellow cones on each side of the runway.

Figure 2.8. Runway 30 Displaced Threshold
Graphic by Stantec



2.8.1.1.1 Surface Gradient

The Runway 12/30 gradient is 0.5%, with the Runway 12 end 12 feet higher than at the 30 end. The line-of-sight from threshold to the threshold is within FAA standards.

2.8.1.1.2 Types of Turf

Soil and climate determine the selection of grasses that may be grown. Grasses used for airport turf should have a deep, matted root system that produces a dense, smooth surface cover with a minimum top growth. Grasses that are long-lived, durable, strong creepers and recover quickly from dormancy or abuse should be selected in preference to short-lived, shallow-rooted alternatives. Wherever practical, seeding should be timed so that a period of at least six weeks of favorable growing conditions follows the time of germination before frost or drought occurs.

The turf at Plymouth appears in good shape. A summer inspection indicates that it is smooth with no visible ruts or soft spots, and the grass was maintained at about 3-4 inches. The edges are marked approximately every 200 feet with a yellow turf marker.

2.8.1.1.3 Safety Areas

The RSA and Runway End Safety Area (RESA) are defined as "the surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway." The RSA is required by FAA design standards to be properly graded and adequately drained. The RSA must be able to protect an aircraft from further damage should the pilot land short of or overrun a runway.

The RESA on a turf runway is designed differently from a paved runway in that the end of the RSA is also the end of the runway.[6] The logic is that unlike an asphalt runway where the RESA is turf, adding additional turf safety area here would only become part of the runway itself, resulting in an infinite runway length. As shown in Figure 2.5 (page 2.6), the RSA width at Plymouth is 120' (60' either side of the runway centerline).

2.8.1.1.4 Object Free Area

FAA design standards for an ARC A-I (small aircraft airport) require a 250-foot wide Object Free Area (OFA) extending the full length of the runway and 240 feet beyond each runway end. Except for a small area on both ends (about 0.02 acres each), both runway end OFAs are off airport property, and both have incompatible objects (in the form of trees and brush) inside the surface. The ROFA is shown in Figure 2.5 (page 2.6).

2.8.1.1.5 Protection Zones

The Runway Protection Zone (RPZ) is a trapezoidal-shaped area extending outward into the approach area beyond each runway end. The purpose of the RPZ is to improve safety for people and property by clearing these areas of incompatible objects and activities.

Land uses prohibited within these areas include residences, places of public assembly, fuel storage facilities, and uses that can potentially attract wildlife or generate dust/smoke. The size of the RPZ is determined by the Runway Design Code and by visibility minimums. As illustrated in Figure 2.5 (page 2.6), the RPZs at Plymouth cover an area of 8.035 acres with an inner width of 250', and an outer width of 450' and a length of 1,000.'

As shown in Figure 2.5 (page 2.6), Plymouth has three separate RPZs. Each runway end has an approach RPZ that begins at the edge of the runway[7], and because of the displaced threshold, Runway 12 also has a departure RPZ located at the end of the runway.

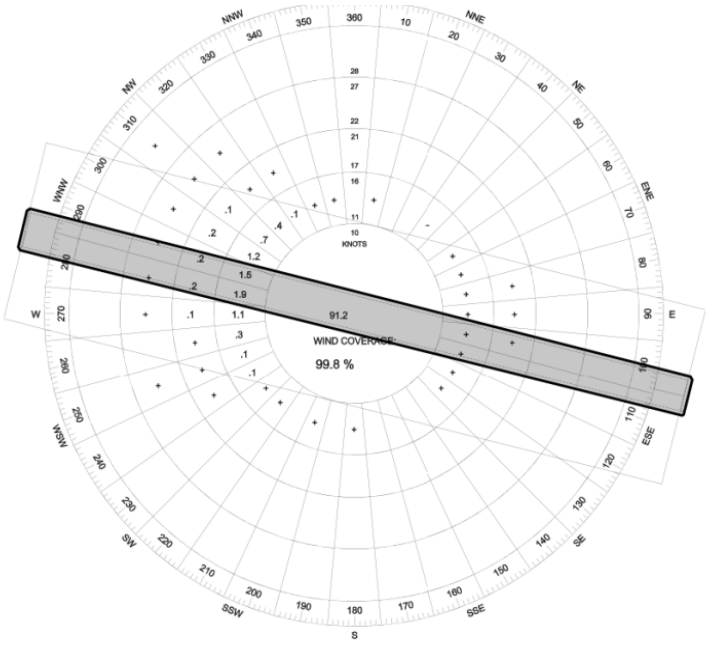
[6] A conventional Runway End Safety Area or RESA extends beyond the runway between 240' and 1,000', and the RSA width can vary from 120' to 500'; both are consistent with FAA design standards based on a number of factors including the type of runway, landing minimums and other related characteristics.
[7] The Runway Protection Zone for a paved runway begins 200' from the threshold and at the threshold for turf runways.

Wherever practical, the land within the confines of an RPZ should be under the control of the airport. However, as illustrated in Figure 2.5 (page 2.6), all three RPZs are almost entirely off airport property in Plymouth. The Zones on the east end are primarily over wooded and otherwise uninhabited land; however, there are permanent agriculture and farming structures inside of the Runway 12 Approach RPZ.

2.8.1.1.6 Wind Coverage

One of the primary factors influencing runway orientation and the number of runways needed is wind. Ideally, a runway should be aligned with the prevailing wind direction to minimize crosswinds for aircraft landing and taking off. Smaller airplanes are more affected by wind and have greater difficulty compensating for crosswinds. The desirable wind coverage for an airport is 95 percent usability, based on the total number of weather observations. This wind patternmeans that the runway is aligned so that excessive crosswinds do not make it unsafe very often, that is, 5% or less of the time.

Figure 2.9. All Weather Wind Rose for 1P1
Source - Data: National Climatic Data Center, Ashville, NC; Windrose: Stantec analysis



Wind data for this report were obtained from the Plymouth AWOS via the National Climatic Data Center in Ashville, NC. The data were analyzed and produced wind coverage for the airport. As shown in Figure 2.9 – Plymouth All Weather Wind Rose, at 99.8%, "all weather" coverage for Runway 12-30 exceeds the FAA criteria[8]. Also, the wind predominantly favors Runway 30.

2.8.1.2 Taxiways & Taxilanes

Plymouth does not have a taxiway on the airfield. There is an undefined taxilane between the runway and aircraft parking area.

[8] The FAA and NWS recognize three different types of windrose data: all weather, which takes into account every observation regardless of weather conditions; an IFR (or instrument flight rules) windrose that considers the wind only during instrument weather conditions; and a VFR (visual flight rules) windrose, which considers wind only during non-instrument conditions (or visual).

2.8.1.3 Visual Navigational Aids

Plymouth does not have runway lighting approach aids such as Precision Approach Path Indicator (PAPI) lights or a rotating beacon. However, the airport does employ a windsock, located in the south-central region of the airfield and places cones on the field to distinguish the runway location.

2.8.1.4 Weather Monitoring System

Plymouth has an Automated Weather Reporting System (AWOS). The system is a type III – PT, which provides a significant amount of meteorological information, such as wind speed/gusts, barometric pressure, wind direction, visibility and sky condition, cloud ceiling height, precipitation type, and thunderstorm detection. Data is provided to users by tuning to frequency 118.45. The AWOS was constructed in 2005 with funding from Plymouth State University (PSU) and the National Oceanic and Atmospheric Administration (NOAA). PSU maintains the system with assistance from the school's student body. The location of the AWOS is shown earlier on the Existing Facilities Plan (Figure 2.5, page 2.6).

2.8.1.5 Aircraft Parking

Plymouth has a grass aircraft parking area directly adjacent to the terminal building. The parking area runs parallel to and sits in-between Quincy Road and Runway 12/30. The tie-down area is approximately 1.3 acres in size and can accommodate 11-13 small aircraft. The airport does not charge a tie-down fee to itinerant users. The tie-down apron is depicted on Figure 2.5 (page 2.6).

2.8.1.6 Hangars

Plymouth has two privately owned aircraft hangars. The newest hangar, which was built in 2000, is located in the southeastern portion of the airfield and can accommodate three aircraft. The original hangar is located 221 feet west of the terminal building and is in fair condition. The original hangar was built pre-1941 and can accommodate two aircraft. Both hangars, which are depicted in Figure 2.5 (page 2.6), are currently at capacity.

2.8.2 Landside Facilities

Landside facilities are those that do not involve the active operation of aircraft during flight. These include aircraft parking, ground vehicle access roads, parking aprons, hangars and terminal facilities.

2.8.2.1 Administration Building

Figure 2.10. Airport Administration Building
Photo by Stantec (February 2014)

The airport's administration building (Figure 2.10) was originally constructed in 1969. It is a concrete and glass structure centrally located north of Runway 12/30. The 40' x 30' building has a computer for flight planning, a two-way communication radio, weather information relayed from the AWOS-III-PT and offers public Wi-Fi access. The building was updated in 2008 with new flooring and paneling. Utilities include electricity, water, sewer and telephone. Figure 2.5 (page 2.6) shows the location of the terminal building in relation to the runway.

2.8.2.2 Automobile Parking and Access

Vehicle parking is available nearest the terminal building and Quincy Road. The dirt parking area is approximately 1,300 square yards and is bounded by Quincy Road to the north and large rocks to the south. The dirt area has the capacity for approximately 10-13 vehicles, depending on their size. The automobile parking space is sufficient for the current peak activity level at the airport.

2.9 AVIATION ACTIVITY

This section is divided into two parts: based aircraft and aircraft operations. This information serves as a benchmark for measuring growth leading up to this point and then forecasting changes for future planning.

2.9.1 Based Aircraft

The number of based aircraft at Plymouth has remained steady since 2000 when there were a reported 16 based aircraft at the airport. The number has varied little since that time. As of the summer of 2015, there were 17 based aircraft. This figure drops off considerably in the winter to as low as 4 or 5 aircraft. Because Plymouth is an airport affected by tourism and seasonal use - and the turf runway is not plowed in the winter - the based aircraft counts for this report were taken in the summer, when the number is at its highest.

2.9.2 Operations

Aircraft operations are reported at 3,030[9]. This number includes 2,000 local (including powered parachute training), 1,000 itinerant, and 30 military aircraft operations. This figure, according to all accepted sources, is accurate and recent. Therefore, this count will serve as the baseline quantity for Plymouth's master plan.

Several factors at Plymouth have an effect on the operations count. Tourism is an economic force in the region, and tourism is at its highest during the summer months. The operations count affects the airport's Peak Hour Operations, which are detailed in the next section. Furthermore, as mentioned above, the airport's runway is not maintained during the winter months. An aircraft can only land at Plymouth during snowy conditions if it is equipped with landing skis. The airport also hosts two organized fly-ins throughout the year. Both fly-ins bring approximately 50 aircraft to the field at one time.

2.9.2.1 Operations per Based Aircraft

An easy way of tracking operations is to compare the number of takeoffs and landings to the number of based aircraft. This method, known as Operations per Based Aircraft, or OPBA, is a simple equation calculated as operations over based aircraft.

$$OPBA = \frac{Operations}{Based\ Aircraft} = \frac{3{,}030}{17} = 178$$

OPBA helps determine if data reported at non-towered airports such as Plymouth passes the "straight face test," that is, are the numbers reported consistent with other similar airports. Stantec has tracked this data at both towered airports (where air traffic control personnel records operational data) and at airports using electronic tracking data, such as the General Audio Recording Device (G.A.R.D.) system in use at numerous airports throughout Maine and Massachusetts.[10]

Our assessment is that the reported 3,030 annual operations at Plymouth (or 178 OPBA) are consistent with other airports in New England. As a result, this OPBA is the baseline data we used later when developing the airport's short-, intermediate-, and long-term forecasts.

2.9.2.2 Fleet Mix and Operations

The airport's fleet mix identifies the classes of aircraft that are based at the airport as well as the aircraft that contribute to the operations count at Plymouth. Table 2.3 (Fleet Mix Operations) breaks out aircraft operations by fleet mix, as well as local and itinerant takeoffs and landings.

[9] 2014 NH State Aviation Systems Plan (Draft report)
[10] http://www.invisibleintelligencellc.com/

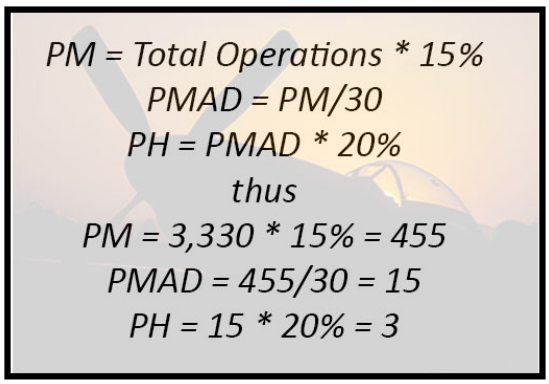
Table 2.3. Fleet Mix Operations and Based Aircraft

SEGMENT	COUNT	SEGMENT	COUNT
Based Aircraft		Fleet Mix Local Operations	
Single Engine Piston	14	Single Engine Piston	1,640
Ultralight	2	Ultralight	240
Multiengine Piston	1	Multiengine Piston	120
Turboprop	0	Helicopter	0
Helicopter	0	Turboprop	0
Total	17	Total	2,000
Operations		Fleet Mix Itinerant Operations	
Local	2,000	Single Engine Piston	930
Itinerant	1,030	Ultralight	100
Total	3,030	Multiengine Piston	0
		Helicopter	0
Operations Per Based Aircraft	178	Turboprop	0
		Total	1,030

2.9.2.3 Peak Hour Operations

Peak Hour operations (PH) are calculated to help determine facility requirements such as transient aircraft parking and passenger and pilot facility spatial needs. The months of July and August are typically the busiest period at most general aviation airports in the northern latitudes. For airports such as Plymouth, where aircraft operations are based on broad assumptions due to lack of recorded data, the calculations for determining PH involve some calculations based on standard planning guidelines.

Figure 2.11. Peak Hour Calculation



Standard planning guidelines suggest that 15 percent of all annual operations occur in the peak month (PM) and that the peak month's average day (PMAD) is 1/30 of the PM. The PH is assumed 20 percent of PMAD. Given this, the PH for Plymouth is 3.03 operations. The calculation used in determining peaking data shown in Figure 2.11 – Peak Hour Calculation.

2.10 REGIONAL SETTING AND LAND USE

This master plan study examines the regional setting of the airport and the land use patterns around it. The regional setting is an important task because the impact of airport planning

decisions can extend well beyond the airport property line. This assessment includes adjacent land uses as well as the airport's setting on other airports, as well as vehicle traffic in the vicinity of the airport.

The town of Plymouth is a diverse mix of traditional New England residences, with the culture of a college town. It is home to Plymouth State University, a full service four-year university. Plymouth is also located at the gateway to the White Mountain National Forest. The town is strategically placed within an hour's drive of the state capital in Concord and is only 30 minutes from Franconia Notch, one of the more popular tourist sites in New Hampshire.

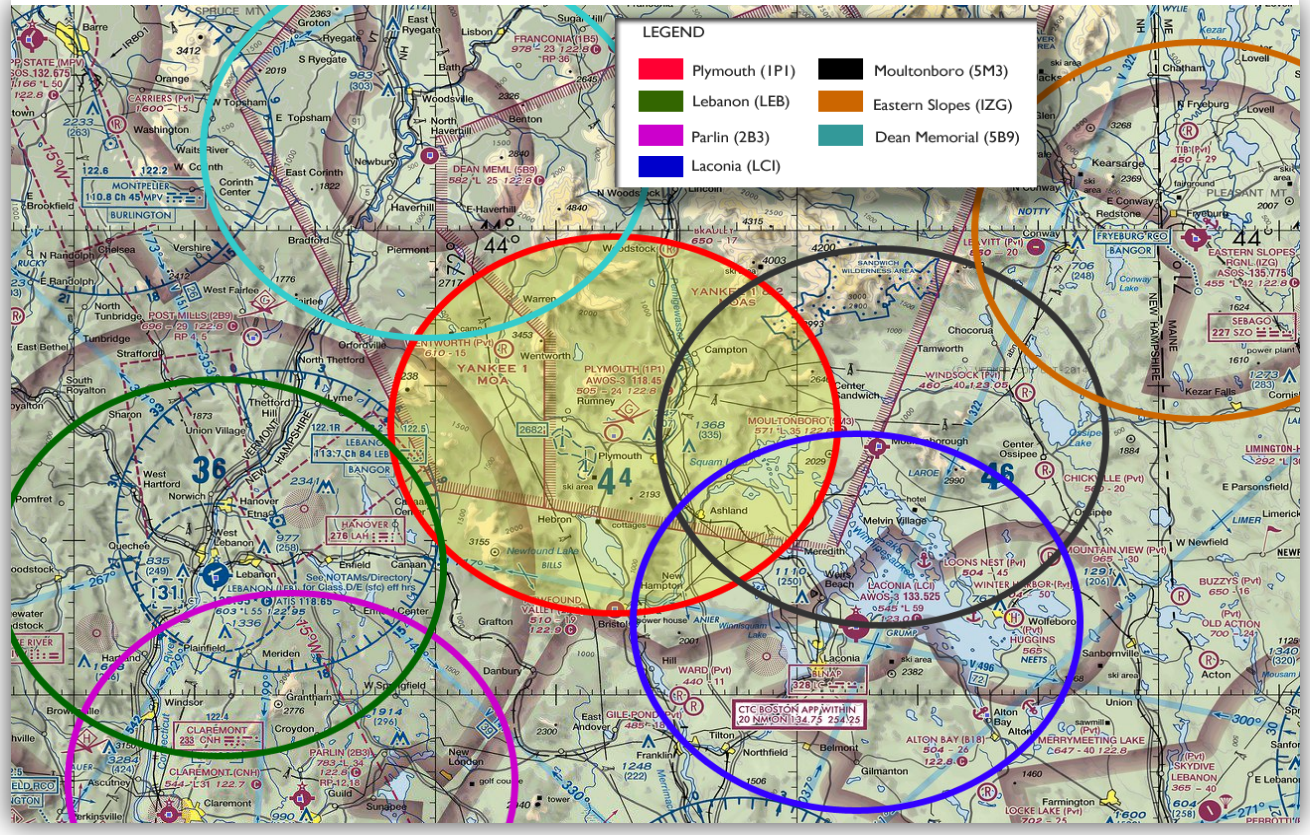
The airport is located off Quincy Road. Quincy Road turns into Smith Bridge Road, which connects to Tenney Mountain Highway (State Route 25). From there, Highland Street takes airport users and other interested parties directly into downtown Plymouth. To gain access to the airport from the Town of Plymouth, users must cross the historic Smith Millennium Bridge; the strongest covered bridge in the world[11].

2.10.1 Service Area

FAA guidelines suggest that a general aviation airport service area is the area that lies within a 30-minute drive from the airport. Figure 2.12, Airport Service Area, shows the approximate 30-minute driving time for Plymouth as well as for six other public use airports in the region[12]. As shown, the service areas for Dean Memorial to the northwest, Laconia to the southeast and Moultonboro directly east all overlap the Plymouth area. Other airports that neighbor Plymouth includes Lebanon Municipal and Parlin Field to the southwest, as well as Eastern Slopes Airport in Maine. To what extent each airport influences activity at Plymouth is unknown. However, it is known that a good number of the Plymouth-based aircraft do not remain at Plymouth during the winter, opting to move them to a warmer climate or another regional airport with hangar facilities. An assessment of each of the seven airports shown on the map above is presented in Table 2.4, page 2.18.

[11] As described by the article entitled 'Smith Millennium Bridge' at www.newhampshire.com
[12] The service area is an approximate calculation used to determine, among other things, the population and other demographics around the airport.

Figure 2.12. Airport Service Area



Our estimates indicate that approximately 20,000 people reside in the service area. Grafton County has a population of 89,818[13], or 6.8% of the entire state of New Hampshire's population. Scaling down, the population of Plymouth is 7,027[14], which represents 7.8% of Grafton County's population. In other words, the service area demographic for Plymouth is relatively unpopulated. However, these numbers can be deceiving as the North Country area of New Hampshire is known for seasonal tourism, which increases the regional population at specific times of the year.

[13] United States Census Bureau, (2010 census)
[14] Economic and Labor Market Information Bureau, NH Employment Security, *February 2014*

Table 2.4. Regional Airports
Data Source: FAA; Google Maps

Airport (ID)	County	Driving Distance	NPIAS Service Level (Number)[15]	Based Aircraft[16]
Laconia (LCI)	Belknap	31 miles (0:39)	General Aviation (33-0009)	202
Lebanon (LEB)	Grafton	42 miles (1:01)	Primary (Non-Hub) (33-0010)	55
Moultonboro (5M3)	Carroll	30 miles (0:30)	Non-NPIAS (Privately Owned)	18
Parlin Field (2B3)	Sullivan	55 miles (1:14)	General Aviation (33-0013)	28
Plymouth (Plymouth)	Grafton		Non-NPIAS (Publically Owned)	17
Dean Memorial (5B9)	Grafton	33 miles (0:45)	General Aviation (33-0018)	10

2.10.2 Socioeconomic Patterns

Socioeconomic characteristics such as population and economic conditions provide insights concerning an area's historic and future growth. As a result, we collect socioeconomic data to derive an understanding of the potential growth within the geographic area served by the airport. This information is typically used in forecasting aviation demand.

2.10.2.1 Demographics

The State of New Hampshire has seen steady population growth since 1990. According to the last U.S. census, completed in 2010, the state has grown 15.7%, from 1,109,252 people to its current population of 1,316,470. Grafton County's population of 89,118 is the most recent count of a steadily increasing population since 1990 (15.9% increase). The Town of Plymouth has a population of 7,027 citizens including the college population; as a result, the median age for the Town is 24 years old[17], which is significantly lower than the state's median age of 41 years. Since 1990, Plymouth's population has increased from 5,815, a 19.8% change.

2.10.2.2 Economics

Businesses within the Town of Plymouth are predominantly small, with very few having over 100 employees. The largest employers in the Town (industry; employment number) are Plymouth State University (higher education; 487), Speare Memorial Hospital (healthcare; 220), NH Electric Cooperative (utility; 206), Hannaford Brothers (food; 187), and Plymouth Regional High School (education; 135). No other entity employs more than 100 employees.

[15] FAA 5010 Master Records
[16] Based aircraft includes helicopters and ultralights
[17] This number should be considered the Town's seasonal average age. It takes into account the University's student body, which does not adequately reflect the true average age of Plymouth's residents.

To summarize, state, county and town populations have all increased since 1990. This steady growth over a 30-year period bodes well for the Plymouth Municipal Airport's potential impact on the community.

2.11 ENVIRONMENTAL OVERVIEW

The objective of an environmental overview is to document environmental conditions that must by law be considered as an airport evaluates future changes. All the airport's future planning efforts will use this report's environmental data as a baseline. As a result, this master plan will guide any possible follow on environmental documentation, including development of a purpose and need statement[18] for an environmental assessment or possible environmental impact statement that forms the basis of future planning,

The evaluation of the natural environment in the Plymouth vicinity is a major first step in planning the most feasible alternatives for required airport-improvement projects. Many natural resources are protected by laws and regulations at the federal, state, and local levels and improvements often require a permit before beginning land-altering activities. Many of these permits require the completion of construction according to specific sequences and methods. Also, the natural environment of a site often dictates the location and layout of improvement projects because both construction costs and permitting can be prohibitive when the proposed development plan directly impacts protected natural resources. Elements such as soil characteristics, rare species habitat, surface and subsurface hydrology, water bodies, wetlands, floodplains and topography all affect the degree to which a parcel of land can be developed and how the development can proceed.

2.11.1 Compatible Land Use

The compatibility of existing and planned land uses near an airport is most often based on potential aircraft-noise impacts. Sometimes there are also safety concerns with the land located beneath the protected airspace. In Plymouth, land uses occurring adjacent to airport property include rural residential and agricultural developments. The Town's *Industrial and Commercial Development* zoning district is located to the south of airport property. These land uses are considered compatible with airport operations. Additionally, the Town has established an *Airport Overlay District* in their zoning ordinance. This overlay district prohibits land uses that may interfere with the safe functioning of the airport. Building and vegetation height restrictions that apply to new construction and plantings within adjacent zones are intended to manage airspace around the airport safely and efficiently.

2.11.2 Air Quality

An assessment of air quality at the airport is sometimes required for compliance with NEPA, the Clean Air Act (CAA) and other environmental regulations.

[18] The purpose and need statement is part of The National Environmental Policy Act (NEPA) process. It explains the reason the [organization] is proposing the action and what the [organization] expects to achieve.

The *Aviation Emissions and Air Quality Handbook Version 3* assists in assessing air quality impacts of FAA projects and provides guidance, procedures, and methodologies for conducting such assessments. The Handbook identifies criteria pollutants to be analyzed about National Ambient Air Quality Standards (NAAQS). Regions in which one or more of the criteria pollutant levels exceeds air quality standards are referred to as nonattainment or maintenance areas. However, there are no towns or regions within Grafton County that are in nonattainment or maintenance status due to exceeding the criteria for pollutant air quality standards. As a result, an air quality assessment is not necessary as part of this study.

2.11.3 Historical, Architectural, Archeological, and Cultural Resources

Federal and state laws require that before initiating an airport improvement project at Plymouth Municipal Airport, consultation with the New Hampshire Division of Historical Resources (NHDHR) and the State Historic Preservation Officer must be undertaken to determine if there is any potential for impacts to historical or archaeologically sensitive resources. This communication helps protect culturally significant resources and historic properties that are on or may become eligible in the future for listing on the National Register of Historic Places.

2.11.4 Plant and Wildlife Communities

The U.S. Fish and Wildlife Service (USFWS) was consulted to determine the presence of threatened or endangered species within the boundaries of Plymouth Municipal Airport or adjacent properties. Similarly, the New Hampshire Natural Heritage Bureau (NHB) has also been consulted using their on-line Data Check tool regarding the status of state-listed species and exemplary natural communities occurring within the vicinity of activities proposed at the airport. According to the USFWS, the Northern long-eared bat (*Myotis septentrionalis*), is listed as a "Threatened" species statewide. USFWS has adopted the Final 4d rule, which prohibits the "taking" of the Northern long-eared bat through the removal of a known, occupied maternity roost tree, or any trees within a 150-foot radius of a maternity roost tree between the dates of June 1-July 31. The removal of trees within a quarter mile of a known hibernaculum (caves or mines where the bats hibernate during winter) is prohibited at any time. Consultation with the USFWS early in the airport improvement project planning process will be necessary to ensure that impacts to bat habitat or accidental takings of the protected species do not occur. Consultation with the New Hampshire NHB via the on-line Data Check tool has indicated there are two state protected species, the spotted turtle (*Clemmys guttata*)and the wood turtle (*Glyptemys insculpta*), within the vicinity of the airport. Although impacts to either turtle species are unlikely, coordination with the New Hampshire Fish and Game department before the start of any project at the airport is highly recommended. NHB findings are valid for one year. Correspondence from USFWS and New Hampshire Natural Heritage Bureau are included in Appendix C.

2.11.5 Soils

The soils occurring at Plymouth Municipal Airport were identified utilizing the US Department of Agriculture Natural Resources Conservation Service's Web Soil Survey tool. Soils at the airport typically consist of Croghan loamy fine sand, Kinsman sand, and Chocorua mucky peat. The

majority (approximately 75%) of the soils at the airport include Croghan loamy fine sand, which is a moderately well drained soil derived from granite, gneiss, and schist and is listed as a farmland soil of statewide importance. Kinsman sand accounts for approximately 20% of the soil at the airport, and is a poorly drained soil due to the high water table level in the area of this soil series typical of outwash terraces. Chocorua mucky peat accounts for approximately 5% of the soils on airport property. This soil type is very poorly drained and is found in the wetlands located at the airport. Chocorua mucky peat is comprised of organic material over outwash sands and sandy loams. A soils map of the airport vicinity has been prepared and is included in Appendix C

2.11.6 Wetlands and Adjacent Water bodies

The Plymouth Airport site consists of approximately 116 acres. The turf airstrip, agricultural fields, and wooded hedgerows make up about 48 acres, which are located south of Quincy Road. Airport property also includes approximately 69 acres of land located opposite the airport parcel, to the north of Quincy Road. This parcel consists of wooded uplands, wetlands and agricultural fields. The soils in this section can typically be described as well-drained sandy loams and loamy sands, with mucky peat occurring in an adjacent bog. The Baker River borders the property to the south and east.

Surveys for wetland and waterbody resources were completed between October 15 and October 20, 2014, under seasonally appropriate field conditions. The wetlands are shown graphically on the Existing Facilities Plan (Figure 2.5, page 2.6). The boundaries of wetlands that are under federal and state jurisdiction were determined (on the southern parcel) using the technical criteria described in the 1987 *Corps of Engineers Wetlands Delineation Manual*[19] and the 2012 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regional Supplement*[20]. Wetland boundaries were marked with pink, alphanumeric-coded flags. These limits and stream locations were recorded using global positioning system (GPS) survey equipment. Refer to Appendix D for more information.

The location of any possible jurisdictional streams and potential vernal pools were determined based on the criteria outlined in the New Hampshire Department of Environmental Services (NHDES) Wetlands Bureau Administrative Rules. The identification of potential vernal pools and streams was limited to observable conditions within the study area as well as available background information. No vernal pools were discovered within the identified airport parcels.

Formal wetland and waterbody delineations were not conducted on the parcel north of Quincy Road, however, a general natural resource reconnaissance survey of the parcel was completed and resources observed in the field were noted and "sketched."

[19] Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS.
[20] S. Army Corps of Engineers. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0), ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Wetlands identified on the southern parcel consist of forested, scrub-shrub, and emergent habitats. Dominant tree species include red (*Acer rubrum*) and silver maple (*Acer saccharinum*). Prominent wetland shrubs inventoried include nannyberry (*Viburnum nudum*) and meadowsweet (*Spiraea alba*). Lamp rush (*Juncus effuses*), sensitive fern (*Onoclea sensibilis*), and canary reedgrass (*Phalaris arundinacea*) are the dominant herbaceous species documented within airport wetlands.

The 69 acre parcel to the north of Quincy Road consists of a combination of forested uplands, agricultural fields, forested and emergent wetland areas (including a bog on the western portion of the parcel), and two streams. The forested upland habitat is dominated by red oak (*Quercus rubrum*), white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), and American beech (*Fagus grandifolia*). Five potential wetland areas were identified; as well as one perennial stream and one intermittent stream. See Appendix 4 for approximate locations of these natural resource features.

2.11.7 Floodplains

Floodplains[21] are the lowland and relatively flat areas adjoining inland and coastal waters including, at a minimum, any area subject to one percent or greater chance of flooding in any given year. Floodplains are described as the area that would be inundated by a 100 year flood. By law, federal agencies must "take action to reduce the risk of flood loss, to minimize the impacts of floods on human safety, health, and welfare, and to restore and preserve the beneficial natural values served by floodplains."

A review of the Federal Emergency Management Agency (FEMA) flood insurance rate maps was conducted on the FEMA website (www.fema.gov, Town of Plymouth panel no. 330072). This review ensured that Special Flood Hazard Areas (100-year flood) and other floodway areas associated with the Baker River do not infringe upon airport property.

2.11.8 National Environmental Policy Act (NEPA)

The National Environmental Policy Act of 1969 (NEPA) requires federal agencies to disclose to decision-makers and the interested public a clear and accurate description of any potential environmental impacts that could result from proposed federal actions. Because federally funded airport improvements are a "Federal Action", these are subject to this requirement. The NEPA process monitors any impact a federal action may have on the human environment, and these impacts can include changes in noise, socioeconomic conditions, land uses, air quality, and water quality. Before FAA approval of an AIP funded project, the project must undergo a NEPA review.

According to NEPA, federal actions fall into one of three categories:

1. Those normally requiring an Environmental Impact Statement (EIS). Projects requiring an EIS are those that are *likely* to affect the environment significantly.

[21] As defined in Executive Order 11988.

2. Those normally requiring an Environmental Assessment (EA). Projects requiring an EA are those that have the *potential* to affect the environment.; and
3. Those that are normally categorically excluded (from the comprehensive environmental review). Projects that are categorically excluded are those projects that are *unlikely* to affect the environment

The NEPA review process as it relates to the development alternatives that are presented in this Airport Master Plan is covered in more detail in Chapter 5.

2.11.9 Wildlife Hazard Site Visit

Verdanterra, LLC[22] and Stantec Consulting Services, Inc. (Stantec) performed a Wildlife Hazard Site Visit at the Plymouth Municipal Airport between July 7 and July 8, 2015.

Airports that hold Airport Operating Certificates issued under Title 14, Code of Federal Regulations (C.F.R.), Part 139, Certification of Airports, Subpart D, must use the standards, practices, and recommendations contained in Draft Advisory Circular (AC) 150/5200-XX to comply with the wildlife hazard management requirements in 14 C.F.R. §139.337. All other airports that have received federal assistance and that have authority to impose and use a Passenger Facility Charge must use the standards practices and recommendations contained in AC 5200-XX during the conduct and preparation of Site Visits, Assessments, and Plans. Per Federal Aviation Administration (FAA) recommendation, Verdanterra used a Qualified Airport Wildlife Biologist (as defined in 14 C.F.R. §139.337) to perform this Site Visit.

The Qualified Airport Biologist was assisted by a Stantec Certified Wildlife Biologist. The intent of this Site Visit was to provide an abbreviated analysis of the Airport's wildlife hazards, determine if a Wildlife Hazard Assessment is warranted, and, if necessary, and provide actionable information that allows the Airport to expedite the mitigation of these hazards. While many species of wildlife can pose a threat to aircraft safety, they are not equally hazardous. This Site Visit weighs the overall risk of the existing wildlife that poses a threat to aircraft operations along with ongoing airfield management procedures to determine whether more in depth study and planning is warranted.

In general, there are very few wildlife attractants on and near the Airport that warrant management and the conditions at 1P1 do not meet the conditions specified in 14 C.F.R. §139.337 for requiring a Wildlife Hazard Assessment. It is important to note that Plymouth would only fall under this requirement if the airport becomes a part of NPIAS.

The complete report is contained in Appendix D.

2.11.10 Wetland Analysis

A field survey was conducted in early October 2014, and the results of this survey are contained in Appendix E. Data collected in this survey will be analyzed and incorporated into existing

[22] Contracted by Stantec.

wetland data. Precise identification of wetland locations (called delineation) take place where appropriate to assist with determining future wetland impacts and to facilitate future airport development. Only wetlands on the airport side of Quincy Road were delineated[23].

2.11.11 Wetland Function and Value Assessment

A field survey was conducted in early October 2014 (see Appendix E for more information). As part of this survey, Stantec provided a description of on-airport wetlands. The description includes an assessment of wetland functions and values prepared by the Federal Highway Methodology. Descriptions include dominant vegetation, approximate size, and overall wildlife habitat value. Wetland areas are presented on various plans and figures, including the existing airport layout plan. A certified wetland scientist, as certified by the New Hampshire Board of Natural Scientists, stamped the plans.

2.12 OBSTRUCTION ANALYSIS

Developing this Master Plan also included looking at obstructions that are both on and off airport property. As part of this analysis, we evaluated obstructions (objects extending up and into any one of several imaginary surfaces) for two specific types of imaginary surfaces: Threshold Siting and FAR Part 77.

The purpose of this analysis is to enable us to see the effects of possible future alternatives, such as extending (or shortening) the runway, or shifting the runway by moving one or both thresholds.

Threshold Siting Surfaces are analyzed when the landing threshold is offset from the normal end of the runway (departure threshold) because of obstructions in the common approach area, which is the case at Plymouth for the Runway 30 displaced threshold, as discussed earlier (see Runway, page 2.8). By rule, the siting surface should clear all obstructions.

FAR Part 77 refers to United States Code, Title 14, Part 77. Among other things, this federal statute defines the location and size of five different imaginary surfaces that encompass a runway and airport. In theory, Part 77 is used to assist communities in developing height restrictions and land use on and around an airport.[24]

In the context of the inventory analysis, we examined the location of the existing threshold siting surface, which for planning purposes we assumed was at the location noted on the Existing Facilities Plan (see Figure 2.5, page 2.6 and Figure 2.8, page 2.9). Also, we calculated the Part 77 surface dimensions. Somewhat similar to Airport Design Surfaces, the size of civil airport imaginary (Part 77) surfaces are based on the runway category according to the type of approach available or planned for the runway. Runways such as the one at Plymouth, with only visual procedures and no jet operations, result in the smallest possible Part 77 surfaces. A

[23] As contractually agreed on during the project scoping process.
[24] A good video to view to help understand imaginary surfaces, produced by WSDOT, can be found at https://www.youtube.com/watch?v=bYor0A3pu50.

Figure 2.13, Typical Part 77 Surface Schematic is a cut away graphic depiction of a normal Part 77 surface plan. The full Part 77 plan for Plymouth was prepared and discussed later in the study. For now, a plan that shows the primary surface and the approach surface to both runway ends was drawn up and is presented as Figure 2.15 – Existing Part 77 & Threshold Siting Plan. Table 2.5 lists the five Part 77 surfaces and their dimensions.

This plan shows the various surfaces just discussed which include the Threshold Siting Surface, Part 77 Primary Surface, Part 77 Approach Surface and Part 77 Transitional Surface.

Figure 2.13. Typical Part 77 Surface Schematic

Source: Stantec

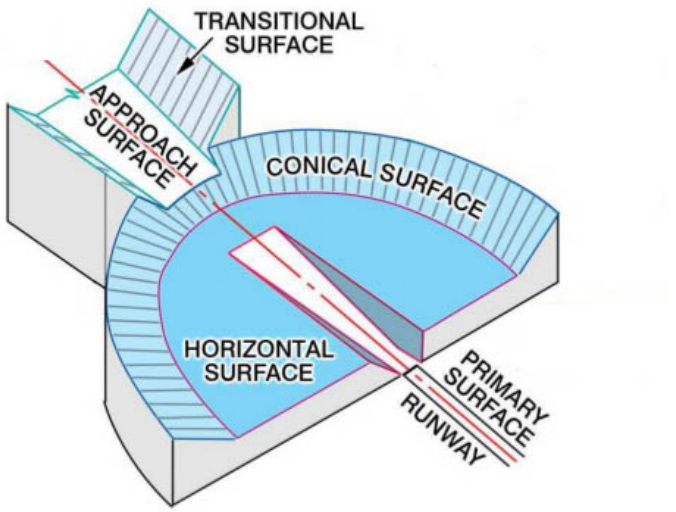


Table 2.5. Part 77 Surfaces and Dimensions at 1P1

SURFACE	DEFINITION	DIMENSIONS (1P1)
Primary	A surface longitudinally centered on a runway. When the runway has no prepared hard surface (such as Plymouth), the primary surface begins at each end of the runway.	250 feet wide (125 feet either side of the turf runway centerline)
Approach	A surface longitudinally centered on the extended runway centerline and extending outward and upward at a 20:1 slope (20 feet vertical for each 1 foot horizontal) from each end of the primary surface.	Inner edge: 250 feet Outer edge: 1,250 feet Length: 5,000 feet Slope: 20:1
Transitional	These surfaces extend outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7:1 (7 feet vertical for each 1 foot horizontal) from the sides of the primary surface and the sides of the approach surfaces.	7:1 slope to join the approach, primary and horizontal surfaces
Horizontal	A horizontal plane 150 feet above the established airport elevation (505 feet)	5,000 foot wide oval based on an arc drawn from each runway end
Conical	A surface extending outward and upward (20:1 slope) from the periphery of the horizontal surface	20:1 slope x 4,000 foot wide oval

Source: 14 CFR, Part 77; Stantec analysis.

Data collected during the ground and aerial survey were analyzed and converted into the plan presented as the scheme shown in Figure 2.14 (previous page). As illustrated by the various

colored markers on Figure 2.14, obstructions (red and yellow tags) occur in all of the six surfaces listed above. Also, numerous "near" objects (green, blue and white labels) are close to penetrating one of the surfaces.[25]

The following is offered to assist in understanding Figure 2.14.

- The colored tags represent either a single object or a cluster of objects that were detected as part of the aerial photogrammetric and obstruction data collection process.
- Each different color represents a height by which an object (or objects) lies above or below one of the defined imaginary surfaces. Red and yellow are above the surface, while green, blue and white are below (by the limits noted on the plan).
- The photograph that bears the graphics is an orthophoto,[26] meaning it is corrected for the natural curvature of the earth and therefore represents a very real presentation of actual conditions.
- The graphic is split, with Part 77 and Airport Design Surfaces shown in the top half and the displaced threshold in the lower half. The dimensions of each surface were analyzed based on the current conditions at Plymouth.
- Table 2.6 – Amount of Vegetative Obstructions in Part 77 Surfaces, breaks out the level of obstructions in acres of land covered with vegetation. As noted, there are just under 50 acres of obstructions within the airport's Part 77 primary, approach and transitional surfaces. Of this 49.85 acres, 36.11 acres are on airport property, with the vast majority of obstructions (trees) in the large parcel north of Quincy Road. The off-airport impact totals 13.74 acres, with most of the obstructions (trees and large shrubs) located in the parcel north and east along Quincy Road and the Runway 30 approach and transitional surfaces. Ninety-two percent of the obstructions are in uplands and the remaining 8% in wetlands.
- In addition to obstructions in the primary, approach and transitional surfaces, there are multiple ground obstructions in the Part 77 Horizontal and Conical Surfaces. These are all because of rising terrain (hilltops) that rim the airport. The Airport Airspace Plan in Chapter 6 illustrates their locations as well as areas where hazard beacons may be required. Note that the obstruction data in the Horizontal and Conical surfaces is based on Stantec's analysis using topographic charts[27].

[25] An object is any manmade or nature feature (tree, shrub, tower, building, etc.). An obstruction is an object that penetrates an imaginary airport surface.
[26] An orthophoto, orthophotography or orthoimage is an aerial photograph geometrically corrected ("orthorectified") such that the scale is uniform: the photo has the same lack of distortion as a map.
[27] The obstruction data collected for this project did not include these areas. A detailed analysis and subsequent FAA Aeronautical Study and Determination per 14 CFR Part 77 will be required to understand the exact impact of the terrain and placement of hazard beacons.

Figure 2.14. Obstructions in 1P1 Part 77 & Runway 30 Threshold Siting Surface

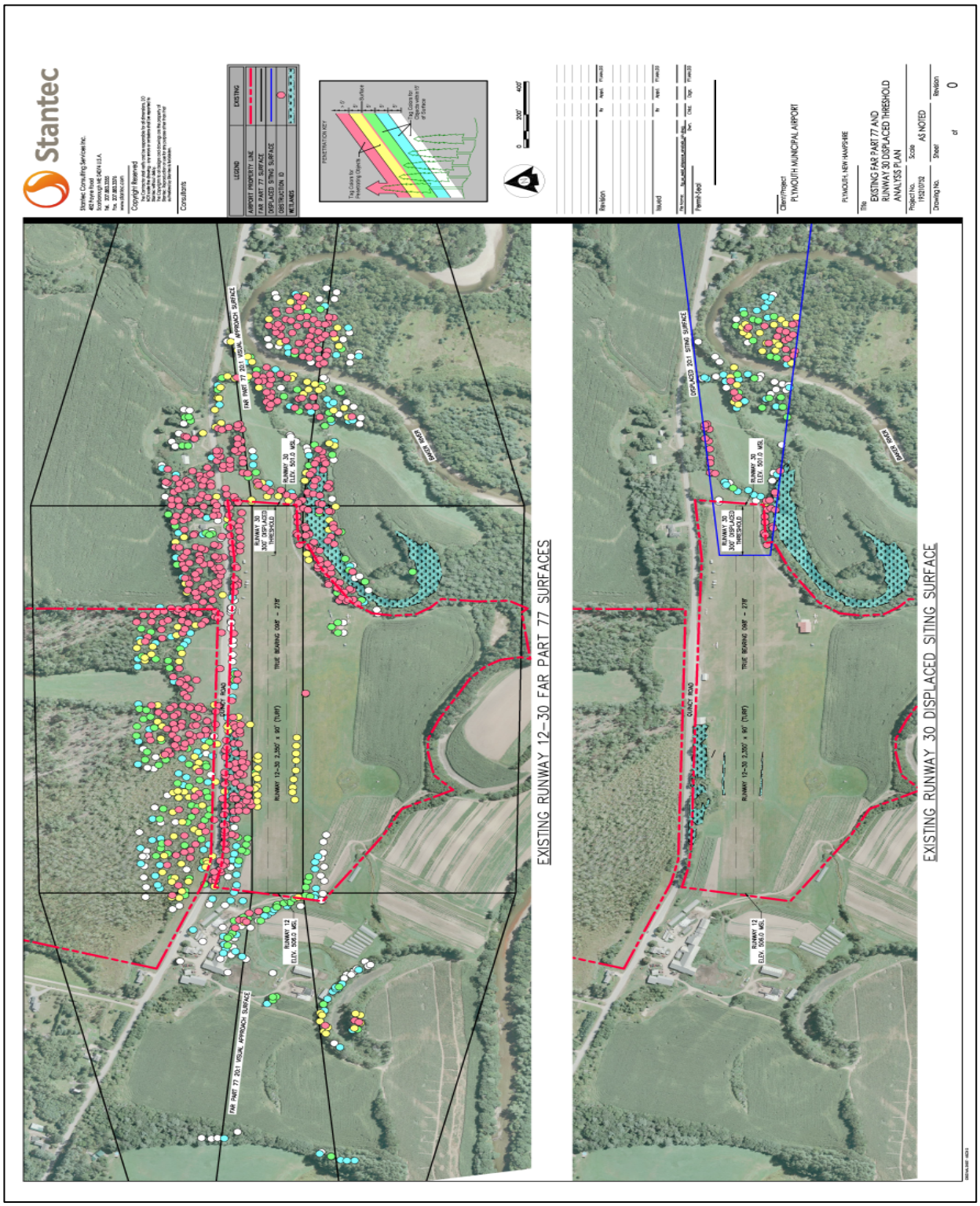


Table 2.6. Vegetative Obstructions in Part 77 Surfaces (in acres)

SURFACE	ON AIRPORT		OFF AIRPORT		TOTAL
	UPLAND	WETLAND	UPLAND	WETLAND	
Primary	0.89	0.03	0.00	0.00	0.92
Approach	0.06	0.00	4.95	0.61	5.62
Transitional	31.93	3.20	8.18	0.00	43.31
Total by Area	**32.88**	**3.23**	**13.13**	**0.61**	**49.85**
Total On/Off Airport	**36.11**		**13.74**		**49.85**

Source: Data from Col-East, Inc.; Analysis by Stantec

2.13 INVENTORY SUMMARY

Table 2.7, summarizes the quantity of aircraft, type of operations and other relevant data at Plymouth Airport. Along with other statistics, it provides the basis for the airport's forecasts, facility requirements, and other elements of this master plan. Some significant findings of the field investigations and preparation of the inventory section include the following:

- According to historical data and interviews, operations at Plymouth have remained steady and consistent, and visits to the airport in the summer of 2014 indicate that the airport is quite active, which is notable for an airport with a turf runway.
- The based aircraft count has not varied significantly. Ultralights and small, single-engine aircraft dominate airport usage, accounting for nearly all of the takeoffs and landings at the airport.
- The population of the state, Grafton County, and the Town of Plymouth are consistent in that each has been steadily growing since 1990. In that 30-year period, each entity has increased at least 15%.
- Both the RPZ and ROFA on both runway ends are almost entirely off airport property with non-conforming activity and issues on both runway ends.

Obstructions to Part 77 surfaces are a concern, in particular, vegetation, which will only continue to grow. Most vegetation is off airport property. Also, the vast majority of obstructions also occur off airport property.

Table 2.7. Inventory Summary

ELEMENT	MEASUREMENT
Runway 12/30	2,350' x 90'
Design Aircraft	Cessna 172
Airport Reference Code	A-I
Fleet Mix (Aircraft / Operations)	
Single Engine Piston	16
Multiengine Piston	1
Turboprop	0
Helicopter	0
Total Based Aircraft	**17**
Population In Service Area	20,000
Based Aircraft to Population Ratio	1: 1,176
Operations	
Local (66%)	2,000
Itinerant (33%)	1,030
Total	**3,030**
Operations Per Based Aircraft	**178**
Peak Operations	
PM	455
PMAD	15
PH	3
Hangar Space (aircraft capacity)	2 - 4
Apron Space (aircraft spaces)	11 - 13
Fuel Storage	Not Available
Automobile Parking	10 – 13 spaces

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3.0 FORECASTS OF AVIATION DEMAND

Forecasts are the basic building blocks of an airport master plan. Passenger forecasts are used to determine the needed size and configuration of terminals and ancillary uses, i.e., short-term and long-term parking lots, rental car lots, curb and terminal roadway layouts, and so forth. Operations forecasts, which project the number of aircraft that operate at the airfield, are used to project the total area needed to park these aircraft, the demand for fuel (which translates into the sizing of the fuel farm), the size of hold areas on taxiways, and so forth. Since there is no commercial service at Plymouth and none is contemplated in the foreseeable future, passenger forecasts play no role here.

While typically forecasts are made for a 20-year period in a master plan, the reliability of these projections decreases over the longer time horizons. In the forecast field, only one thing is certain: the forecasts will invariably differ from the actual event numbers in future years. It is impossible to forecast such events as the terrorist events of September 11, 2001, or the Gulf War in 1991, both of which sent fuel prices soaring and passenger volumes tumbling, or the Great Recession in the late 2000s. While such shocks are somewhat rare, they do wreak havoc with forecasts. Accordingly, forecasts should i) entail a variety of techniques and assessments, ii) encompass a range of values, iii) be constantly reviewed by airport management, and iv) be adjusted where necessary and appropriate.

The forecasts prepared for this master plan describe the effects of expected growth over the course of the next 20 years. These growth projections are used to determine if there is the need for new or improved facilities. In general, forecasts should be realistic, based on the latest available data, be supported by information in the study, and therefore, provide an adequate and accurate justification for airport planning and development. This planning process will eventually result in a range of facility development recommendations, and these are directly tied to the market demand projected within each respective forecast period.

This master plan started with the preparation of a reliable activity benchmark, which was reported in Chapter 2. We then took the baseline data and projected it out 20 years, which is the typical timeframe for aviation forecasting in the development of a master plan. In developing the forecasts, we first examined national and state trends and then compared these to local factors such as population and demographics, geographic attributes and other factors that could influence the direction the local aviation community might be expected to change over the course of the next two decades.

3.1 WHAT IS INCLUDED IN THE FORECAST ELEMENTS?

To establish the demands likely to be placed on Plymouth, forecasts includes all elements of relevant aviation demand, including the type and level of aviation activity expected at the airport over the planning horizon of 20 years. This master plan includes forecasts for four general aviation related types of activity.

- Number and type of based aircraft
- Aircraft operations
- Peak activity (both aircraft and operations
- Identification of the forecasted design aircraft

3.2 HOW LONG IS AN AVIATION FORECAST PERIOD?

Forecasts are prepared for short-, intermediate-, and long-term periods and specify what the existing and future design aircraft will be for each. Short-term forecasts (for years 2016-2020) are used to justify near-term development and support operational planning and environmental improvement programs. In the case of Plymouth, this forecast will provide a strong argument for or against the airport joining NPIAS. The intermediate-term forecasts (for years 2012 - 2025) are typically used in planning capital improvements. Long-term forecasts (for years 2026 - 2035) are helpful in general planning (to prepare for the community's long-term vision for the airport).

Given the above, the forecast horizons for this master plan are as shown in Figure 3.1 – Forecast Periods.

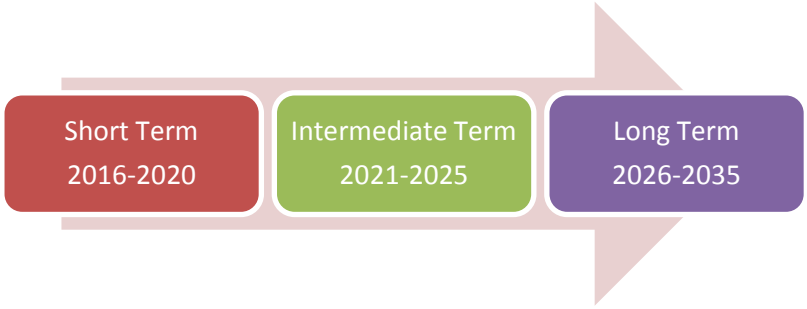


Figure 3.1: Forecast Periods

3.2.1 Short-Term

The short-term planning period is the first five years, in this case from 2016 through 2020. During this time, the airport and the Town will focus on correcting safety-related issues and other immediate concerns identified in this study. This period is the most critical because it establishes local, state and federal budgeting parameters. It is in this term that fiscal requirements and limitations are determined by NHDOT as they establish aviation budget needs

3.2.2 Intermediate-Term

The second five-year period is the intermediate term, from 2021 to 2025. During that time, the airport and the Town should focus on capital improvements, including any major construction projects. It is important to note that any projects still considered viable and not completed in the short-term are carried over to this period.

3.2.3 Long-Term

The long-term planning phase is for years 2026 - 2035. This timeframe is the general planning period. Assuming all short and intermediate-term projects are successfully implemented, at this point the airport and the Town should undertake a master plan update while concentrating on

how to best position the airport for the third and fourth decades. This final planning period focuses on the community's long-term vision for the airport.

3.3 WHAT FACTORS AFFECT AVIATION FORECASTS?

The factors used to develop a prediction include socioeconomic data, demographics, disposable income, geographic attributes, and other factors such as fuel costs and local attitudes towards aviation. To the extent data is available; we will address each of these.

3.3.1 Economics

The economic characteristics of a community will affect the demand for airport facilities. Regions that are experiencing strong economic growth normally show increases in business travel. Higher disposable income translates to higher volumes of personal and vacation air travelers. In addition to national and regional economic trends, local activities that distinguish the geographic area served by the airport must also be considered. If an airport serves a major recreational area, peak seasonal demands should be assessed. In the case of Plymouth, there is a significant seasonal demand, with traffic peaking in the summer months. A hotel was recently constructed on Tenney Mountain, however Tenney Mountain Ski area developers have begun the process of revitalizing that property, which may make the Airport property a viable asset year round.

3.3.2 Demographics

The demographic characteristics of an area's population also affect the demand for aviation services. Demographics refer to such qualities such as age, income and education of a specific group of people.

Demographic characteristics influence the level, composition, and growth of both local air traffic and traffic from other areas. Factors such as leisure time and recreational activity are important in estimating activity, but can be difficult to measure. Another important demographic characteristic is the level of disposable income, usually measured on a per capita basis. Income is a good indicator of people's ability to travel and purchase or use general aviation services.

3.3.3 Population

The simplest measurement of change used in forecasting aviation growth is the projected change in population within a given market area. That is, aviation activity will increase or decrease proportionate to the change in population. As noted in Chapter 2, the state, county, and town all saw an increase in population between 1990 and 2013. We then correlated this to the potential population of 20,000 people within the airport's service area (see Figure 3.2). The number of people in the service area was linked to the airport's based aircraft inventory, which produced a ratio of one aircraft for every 1,176 people residing in the service area. This correlation signals that because the population in the service area matched the growth rate of the state and U.S., the airport could see a similar growth rate as the U.S. as a whole. The question becomes how the population will change in the next 20 years within the service area.

The New Hampshire Office of Energy and Planning produced county population projections in 2013 through the year 2040.[1] The NH study projects that the overall state population will increase to 1,427,098, (8.4%) over this 27-year period, or 0.31% per year (assuming a linear growth rate). During the same period, the population in Grafton County is projected to mirror the state's growth (Figure 3.2). Given that, we feel it is safe to assume that the same growth rate will occur within the airport's service area.

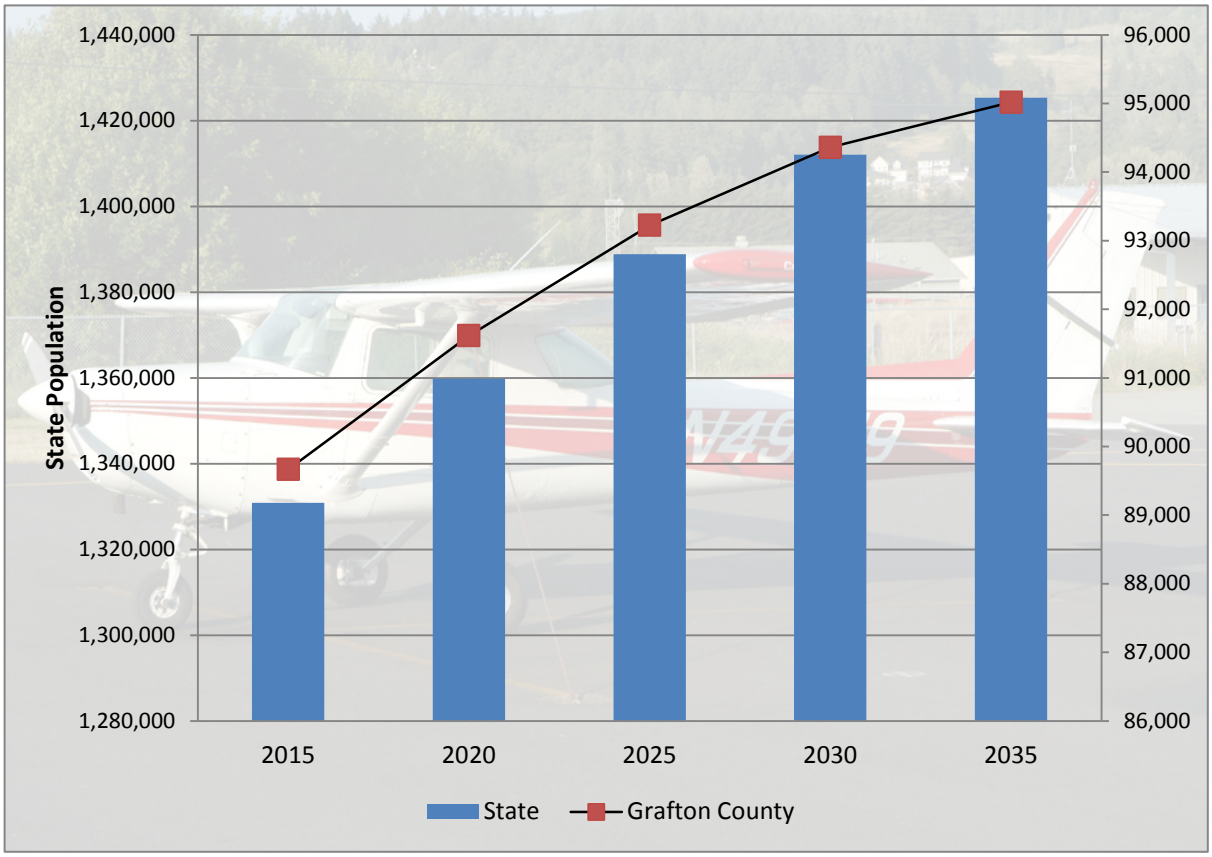


Figure 3.2. Projected Population Changes in New Hampshire and Grafton County

3.3.4 Geographic Attributes

Several factors here may have an effect on airport demand. One factor is the distances between residential populations and centers of commerce within the airport's service area. Additional populations and centers of commerce beyond an airport's service area may indicate the need for additional airport facilities. The physical characteristics of the area and the local climate may also be important since they may stimulate tourism and holiday traffic. The

[1] State of New Hampshire, Office of Energy and Planning, Regional Planning Commissions, County Population Projections, 2013 by Age and Sex. Prepared by RLS Demographics, Inc., Rensselaerville, NY.

airport's role within the airport system and its relationship to other airports may also have an effect on the services that are neede at the airport.

Plymouth is outside of the main population areas of New Hampshire. Plymouth Airport has experienced increased demand for air traffic, but this requirement is low by any measurement. As shown in Table 3.1 – Distances to Major Population Centers, Plymouth is somewhat secluded from large population areas but has easy access to Interstate 93, which takes users directly to the state's capital of Concord and Manchester, the state's largest city regarding population. The driving time from Plymouth to these metropolitan centers is reasonable. This factor can reduce the need for airport services from a purely transportation-related perspective.

Table 3-1. Distances to Major Population Centers

City	Distance (miles)	Driving Time (HH:MM)
Concord, NH	43	0:39
Manchester, NH	60	0:57
Montpelier, VT	73	1:41
Boston, MA	110	1:42

3.3.5 Other Factors

External factors may also influence the demand for airport services. These include economic actions such as fuel price changes, availability of aviation fuels, currency restrictions and modifications in the level and type of aviation taxes. Political developments, including rising international tensions, changes in the regulatory environment and shifting attitudes toward the environmental impacts of aviation, may also affect future demand and should be considered in developing or updating airport forecasts.

3.4 NATIONAL AND STATE FORECASTS

We relied on two specific datasets in developing forecasts for Plymouth. These data include information from the FAA and NHDOT. The FAA statistics was derived from two sources, FAA Terminal Area Forecasts and Aerospace Forecasts, while the state data came from NHDOT forecasts. In developing the forecasts for Plymouth, the FAA, and NHDOT data was used to produce a "top-down" method; meaning this method looks at the national forecasts and trends and applies them in a pro-rated manner to a specific region or airport.

3.4.1 FAA Forecasts

The FAA produces a variety of forecast data at both the national and international level. Two specific data sets include the FAA Terminal Area Forecasts (TAF) and the FAA Aerospace Forecast. The TAF includes forecasts for individual airports, but only those within NPIAS, in which Plymouth is not included. However, the Aerospace Forecasts are relevant because they include national trends in aviation, including general aviation and are therefore quite relevant to Plymouth. This dataset provides annual detailed aviation forecasts of some parameters, i.e., domestic and international passenger enplanements, revenue passenger miles, load factors, numbers of active GA aviation and air taxi aircraft and GA aircraft fuel consumption, among others. Data from FAA Aerospace Forecast – Fiscal Years 2015-2035 were used in developing the Plymouth fleet forecasts.

3.4.1.1 FAA Terminal Area Forecasts

The Terminal Area Forecasts (TAF) are created 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. As noted, the FAA TAF is prepared for individual airports within the national system. However, because Plymouth is not in NPIAS, no TAF data is available.

3.4.1.2 FAA Aerospace Forecasts

The FAA develops assumptions and forecasts consistent with the emerging trends and structural changes taking place within the aviation industry. The purpose of the projections, which are updated every year, is to predict future demand accurately. The FAA develops the forecasts and assumptions from statistical (econometric) models that explain and incorporate emerging trends for the different segments of the industry.

3.4.2 NH Department of Transportation Forecasts

NHDOT produces a state aviation systems plan update about every 10 years. For this blueprint, we used the draft version of the 2014 update. Unlike the FAA forecasts, the update provides current information and future estimates specific to Plymouth.

3.5 NATIONAL TRENDS

FAA projections of some aviation parameters were analyzed, including hours flown, total aircraft and fuel consumption. We only analyzed FAA data pertinent to Plymouth, which means we excluded all turbine activity from the dataset.

The first data analyzed were the number of active general aviation aircraft, which included piston aircraft, rotorcraft, experimental, light sport, and a general grouping (other) that includes activity such as paragliders and ultralights). Figure 3.3 – FAA Aerospace Forecast Growth shows the FAA Aerospace forecasted growth in the number of general aviation aircraft. As shown, the overall increase in the number of general aviation aircraft over the next 20 years is estimated to be 7.8%.[2]

[2] The largest projected growth in GA aircraft is in the turbine category, which is not included in this data.

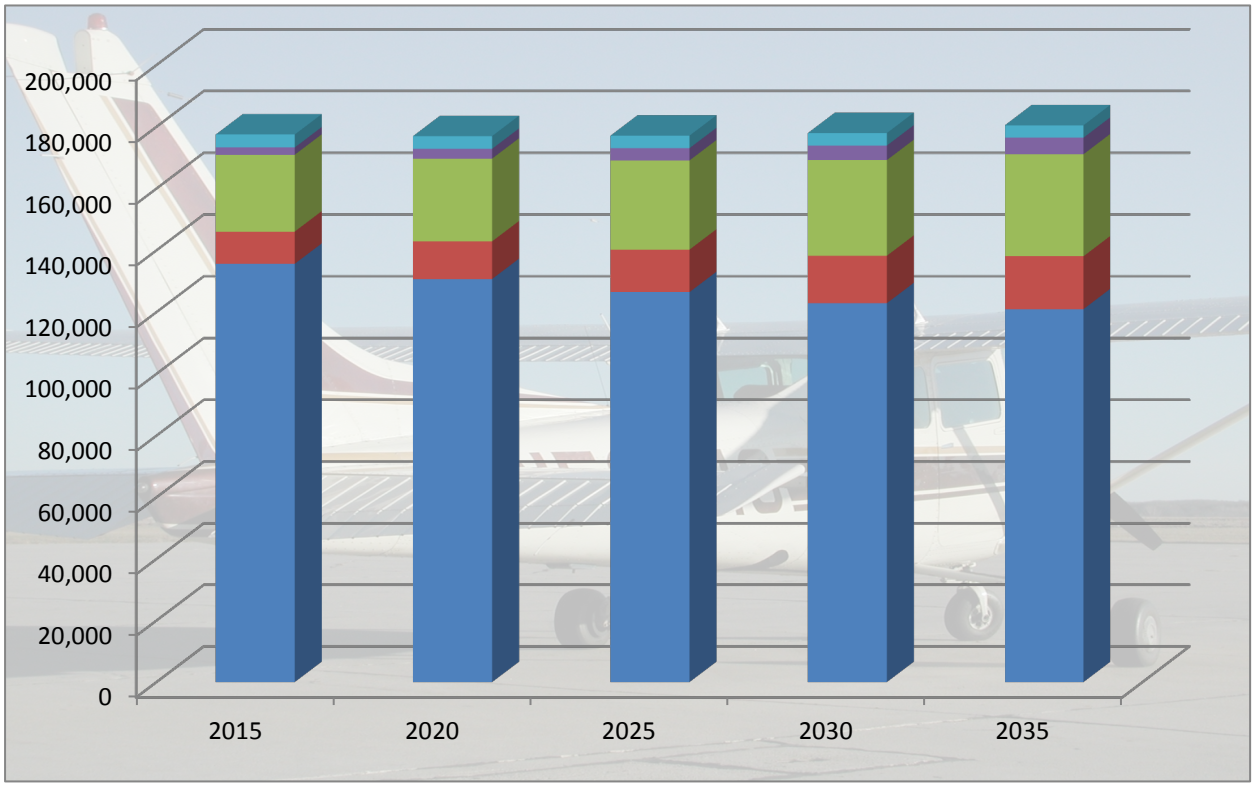


Figure 3.3. FAA Aerospace Forecasted Growth in the Number of GA Aircraft

The second dataset analyzed were for the *number of projected hour's* general aviation aircraft are expected to fly in the next 20 years. Moreover, unlike the number of general aviation aircraft, the projected hour's pilot's fly (as presented in Figure 3.4) will continue the two-decade old decline in this fragile segment of aviation. As illustrated, the number of times GA aircraft will fly is forecasted to decrease by 12% between now and the year 2035. This decline is attributed to many things, but the biggest decline is the continued high cost of learning to fly, resulting in fewer new pilots, and the cost of aviation fuel, which today averages $4.62/gallon in the region[3].

3.6 WHAT ARE THE PLYMOUTH MUNICIPAL AIRPORT FORECASTS?

To assess the future of general aviation activity at Plymouth, we took a second look at its historic performance levels, particularly during the past 10 – 20 years. We also evaluated the airport's potential to attract more business, especially given the amount of available land around the airport and the community's willingness to support (invest) in the airport. As previously mentioned, Plymouth has seen a near flat line in both based aircraft and operations. This is not necessarily a negative attribute, but rather a possible function of capacity; that is, does the airport have room under its current configuration for more aircraft?

[3] Average self-service prices on June 15, 2016 for Laconia ($3.95), Keene ($4.99), Claremont ($4.30), Parlin Field ($3.95), Skyhaven ($4.15) and Dean Memorial ($4.85).

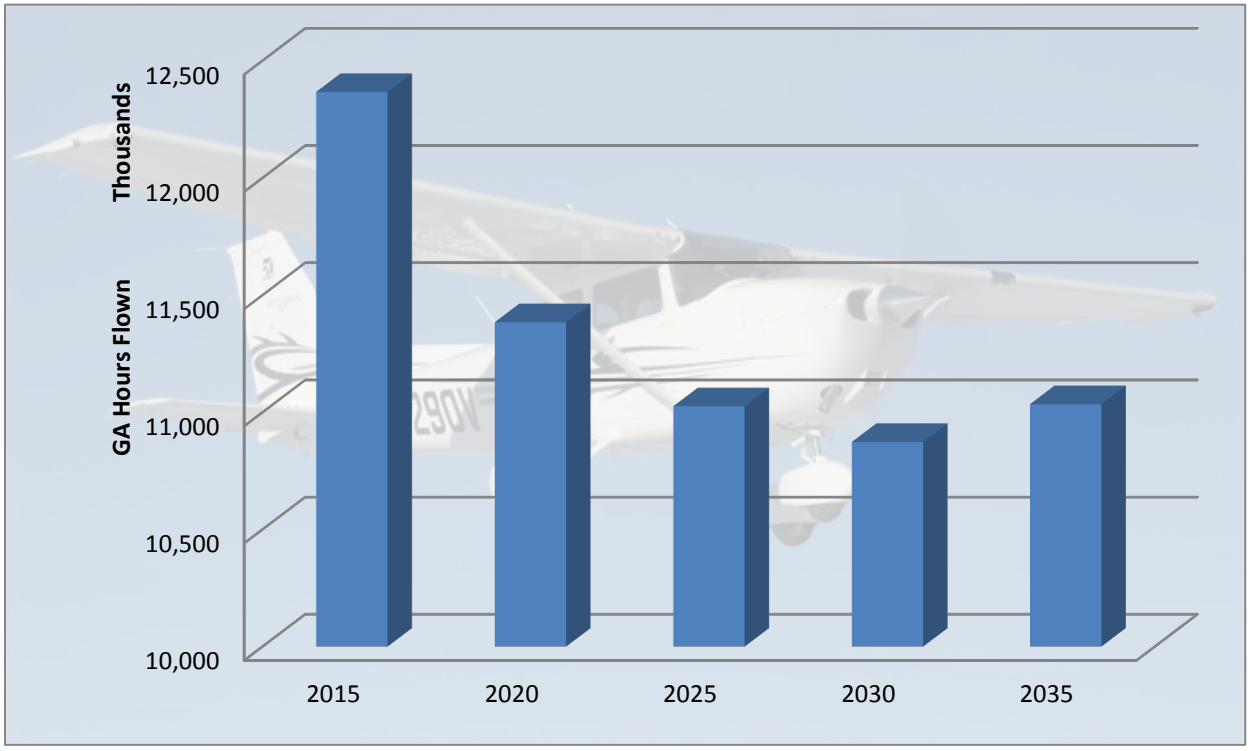


Figure 3.4. Projected National GA Hours Flown

Forecasts for Plymouth could depend on the decision to join NPIAS. It is entirely possible that the additional funding that might come from joining NPIAS could provide significant upgrades at the airport, such as a paved and longer runway, paved and larger parking areas, and more hangars. These upgrades would potentially attract more itinerant and based users. Therefore, the challenge is to define the role and importance of the airport in the community. Steady market demand is essential to building justification for eligibility for federal funding and to secure local and state political support for public expenditures on an airport. However, after discussing this approach with the Town and NHDOT, we decided that the NPIAS factor would not have a significant impact on the airport's growth rate.

We feel that overall growth will occur with or without federal investment in the airport. Demand is based on national aviation trends as adjusted by local and regional factors discussed earlier (see, What Factors Affect Aviation Forecasts? on page 3.3).

3.6.1 We Considered Three Forecast Scenarios

We examined and prepared three possible growth scenarios for the airport. These include a no growth, low growth and high-growth options, all of which were prepared irrespective of whether the town elects to join NPIAS. Originally, we felt this decision might affect future growth with the sense that the added federal and state funding of a NPIAS airport might attract more business. However, this is a difficult, if not impossible scenario to forecast because of a lack of

measureable data. While forecasting is largely the practice of making an educated guess, the NPIAS component is too complex to measure, and therefore, we elected to take a different approach in evaluating potential changes at the airport. Figure 3.5, Growth Scenario Ranges, shows the three possible growth ranges. Details on these three scenarios are below.

3.6.1.1 No-Growth Environment

The no-growth scenario assumes the airport will pretty much stay the way it is today. While based aircraft will fluctuate up and down with the passing seasons and the economy, the number of aircraft that call Plymouth their home base, as well as the number of aircraft operations and visiting (itinerant) aircraft, will not change by any measurable degree.

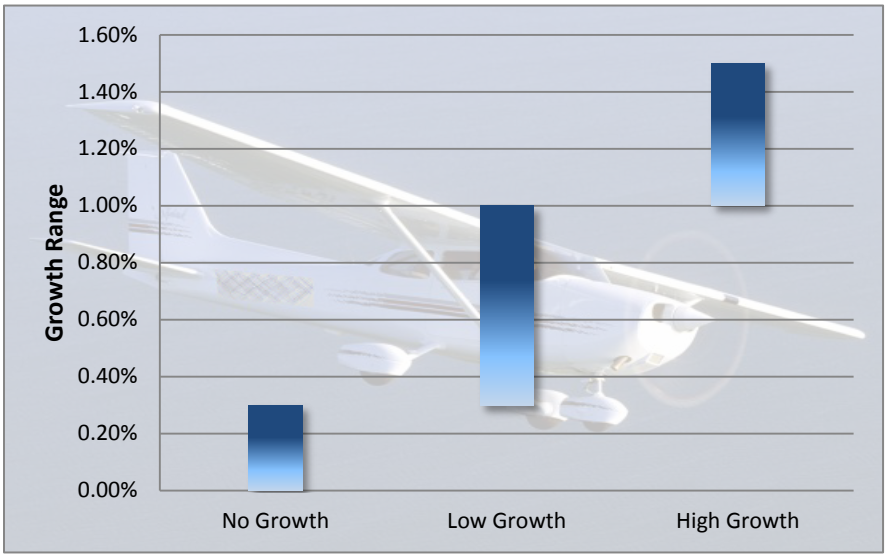


Figure 3.5. Growth Scenario Ranges

Under this setting, growth will range from zero to 0.3% per year, and will not exceed 5% cumulative growth over the course of the next two decades.

3.6.1.2 Low-Growth Development

The low-growth scenario is probably more consistent with both federal and state projections for the aviation industry. Under this setting, the airport could realize about 20% growth in the next 20 years, or about 1% per year. This type of growth would be dependent on the airport providing some development opportunities for additional hangars and possibly fuel service, which are two of the significant driving forces in the growth of general aviation segment of the industry. With the escalating cost of aircraft ownership, hangar rental space is the first thing pilots consider when deciding where to locate their investments. Having reasonably priced fuel, particularly at their home field, is the second most sought after amenity.

3.6.1.3 High-Growth Opportunity

The high-growth opportunity assumes that regional and national economic opportunities emerge with no significant international or national events that would stifle economic growth. Events that trigger volatile fuel shortages or unstable price increases, as well as events that trigger insurance price increases above normal inflation have historically caused major instability

in general aviation. If on the whole, the world and national economies gain and sustain some momentum for the next 10-15 years with overall positive growth, then some of this positive change would likely result in greater demand for aircraft, which triggers a need for parking, storage and fuel. Assuming this happens, Plymouth could see growth as high as 1.0 to 1.5% per year, resulting in a 20-30% growth rate over the course of the next two decades.

3.6.2 Forecast Accuracy

It is important to understand that experience demonstrates that forecasts about airport traffic are always wrong. Comparisons between what a projection indicated for a given period and what occurred almost invariably show a significant discrepancy. This is especially true when one considers forecasts that are 10 to 20 years out, that is, beyond the normal time periods for the planning of airport facilities. As a rule of thumb, intermediate term forecasts differ from what occurs in more than 20 percent of the time. One reason for this is because of the periodic and natural swings of the economy, and the other reason is unknown future world and national events, such as 9/11 or a major hurricane that disrupts fuel supplies. Because of this, we anticipate the possibility that our forecasts could easily swing by 20± percent.

3.6.3 Plymouth Municipal Airport Forecasts - The Preferred Scenario

As discussed in the previous section, three growth scenarios were studied. The circumstances ranging from no-growth (zero to 0.3% growth rate); low-growth (0.3 to 1.0% change); and an overly positive high-growth rate with a 1.0 to 1.5% per year change in aircraft and operations (see Figure 3.6– Possible Range of Growth). The challenge is to select the growth rate that is not only realistic but also plausible.

We believe that Plymouth offers unique opportunities in the community that will continue to benefit the airport. The town has a very positive outlook toward its future potential. Moreover, as an academic community, its future is relatively secure because of the high economic foundation Plymouth State University brings, regarding the number of both school-related and other businesses in the area.

General aviation at small remote airfields, particularly those not directly tied to business activity, is highly dependent on discretionary spending by both individuals and businesses, with the former tied firmly to demographics such as higher income and education. These demographics

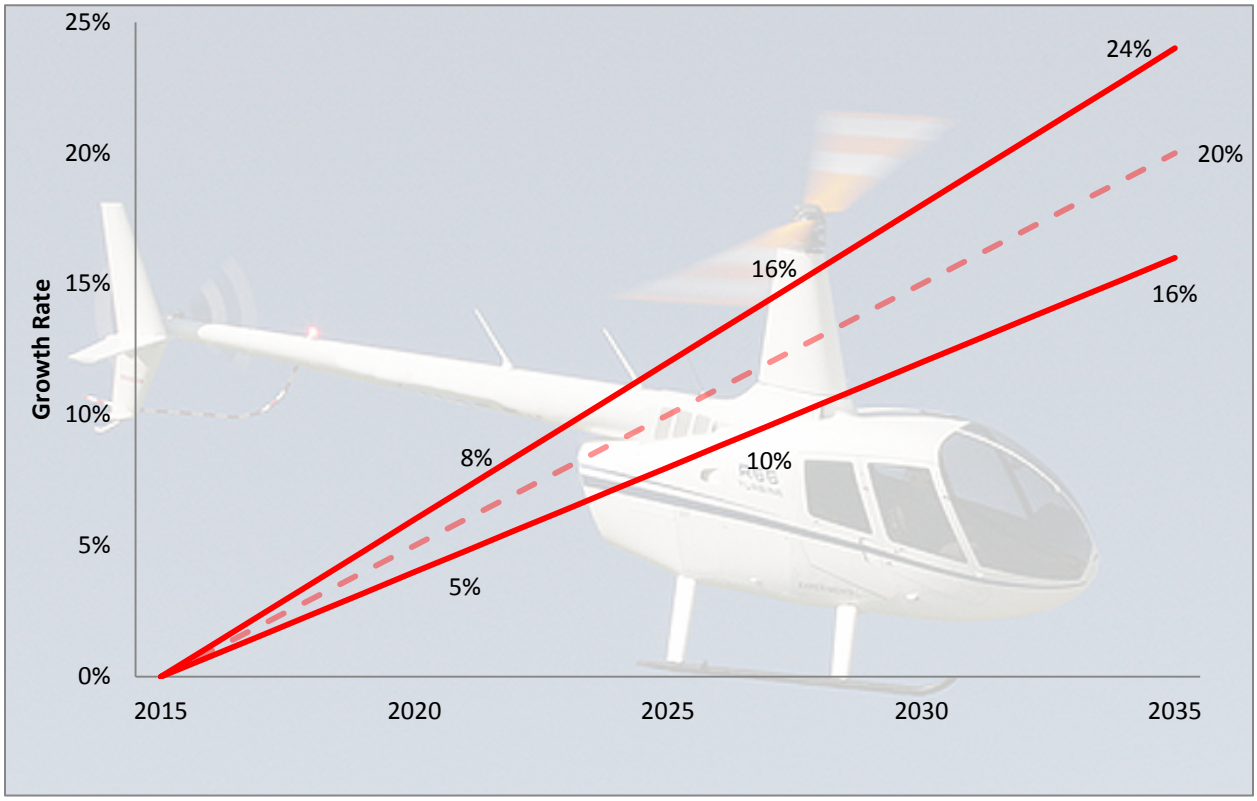


Figure 3.6. Possible Range of Growth

are common to this area and have the potential to promote flying and the use of the airport. There are some other factors that could sway the growth potential of the airport upward, such as paving the runway, which would make the airport more viable by offering a more stable year-round facility. However, as noted earlier, quantifying this is next to impossible. Therefore, we feel that it is best to plan conservatively; projecting that Plymouth will probably realize an annual growth rate of 1.0% per year, plus or minus 20% (see the previous section). With this "cone of uncertainty", the airport's aviation growth could range from between 0.8% and 1.2% (see Figure 3.5, page 3.16). This is consistent with the low growth scenario described earlier. While the low-growth scenario is considered the preferred scenario, we also include actions for the high-growth scenario should conditions change.

For planning purposes, we assume a 1% per year growth rate, on average, in based aircraft. We apply this first to the number of based aircraft, and this, in turn, drives all other aviation activity at the airport, including operations and potential fuel sales. This growth then drives the

need for facilities, including hangars, aircraft tie downs, terminal space and a potential fuel delivery system.

This increase is consistent with national and regional forecasts for an airport of the size and nature of Plymouth; small, turf fields with no immediate demand by local businesses or other entities that might rely on general aviation. Instead, Plymouth will remain primarily a recreational airfield that supports people who are interested in learning how to fly and those with aircraft used almost exclusively for recreational reasons. These people are not dependent on aviation for anything other than having fun and an occasional trip where the airplane offers an opportunity to fly instead of using another form of transportation. That is, they fly if they can, but the urgency to do so does not replace other more pressing needs.

The number of hours flown (operations) will not increase at the same rate, in fact, operations per aircraft will decline as a percentage of aircraft; again, consistent with national forecasts. As noted earlier, the number of general aviation operations has decreased nationwide, and no data indicates Plymouth will be any different. Currently, the airport records about 178 operations for every based aircraft (see Operations per Based Aircraft, page 20). This number is consistent with industry norms for this type of airport and there is no reason to believe it will change significantly up or down. It may in fact decline by a small percentage, perhaps as low as 150 OPBA in the next 5-8 years and then level off. Again, this is consistent with national trends.

3.6.4 Based Aircraft Forecast

Based aircraft will increase at the average annual rate of 0.5% per year, or about 10% during the 20-year planning period. With a current inventory of 17 aircraft, the numbers of aircraft based at Plymouth are projected to increase to 21 aircraft (compounded) by 2035.

3.6.5 Operations Forecast

In 2015, OPBA was 178:1 (178 operations for every one based aircraft). While this number could drop slightly, we believe recent trends in lower fuel prices and the very real possibility that alternative fuel prices will remain stable, the OPBA at Plymouth is projected to remain at or around 178:1. This assessment results in around 3,500 operations per year in 2035. The split of local versus itinerant aircraft operations would remain the same as it is today, 66% - 33% respectively.

3.6.6 Fleet Mix Forecast

Regardless of the future status of Plymouth, the fleet mix will remain primarily single-engine reciprocating aircraft. Other than changes in the general aviation market (trending away from reciprocating aircraft and more toward jets and ultralights), there is no indication that the changes that occur at Plymouth will be significant. Therefore, the fleet mix is likely to remain the same.

3.6.7 Peak Hour Operations

Peak Hour (PH) activity was addressed in Chapter 2 (see Peak Hour Operations, page 21). Using the same PH methodology, operations are projected throughout the 20-year planning period (see Table 3.2. Peak Hour Activity).

Table 3.2. Peak Hour Activity

Activity	Existing	For Period Ending		
		2020	2025	2035
Annual Operations	3,030	3,150	3,270	3,520
Peak Month	454	472	490	528
PMAD	15	16	16	18
PH	3.0	3.2	3.3	3.5

3.6.8 Design Aircraft and ARC Forecast

For planning purposes, the Cessna 172 makes sense for use in both current and long-term airport design.

3.6.9 Fuel Sales

Given the existing and forecasted operations, there appears to be justification to consider this revenue source, but only if federal and state funding through a grant is available. Otherwise, the cost of installation could not be recovered in a reasonable period (during the systems normal serviceability.

For planning purposes, we assume that a typical general aviation airport could sell, on average, five gallons of aviation fuel per year for every aircraft operation. This consmption rate would equal about 15,000 gallons per year given today's market, increasing to almost 18,000 in 2035, with the majority of sales occurring in the summer months.

3.7 SUMMARY OF AVIATION FORECASTS

Table 3.3 presents the aviation forecasts for the Plymouth Municipal Airport. The based aircraft numbers are tied to average seasonal activity and do not assume any substantial changes in the way the airport appears today or any shifts in the way it currently operates. That is, the field will remain a turf runway airport with a turf parking area. It also assumes that aviation fuel will be available by 2018. A change to any of the facilities will invariably alter the data.

Table 3.3. Forecast Summary for Plymouth Municipal Airport

Element	Existing	For Period Ending		
		2020	2025	2035
Design Aircraft	Cessna 172	Cessna 172	Cessna 172	Cessna 172
Airport Reference Code	A-I	A-I	A-I	A-I
Aircraft Fleet Mix				
Single Engine	16	16	17	18
Multiengine	1	1	1	2
Turboprop	0	0	0	0
Helicopter	0	1	1	1
Total Based Aircraft	**17**	**18**	**19**	**21**
Operations (per year)				
Local	2,000	2,079	2,158	2,323
Itinerant	1,030	1,071	1,112	1,197
Total	**3,030**	**3,150**	**3,270**	**3,520**
OPBA	178	178	178	178
Peak Hour	3.0	3.2	3.3	3.5
Fuel Sales (gal/year)	0	15,750	16,350	17,600

4.0 FACILITY REQUIREMENTS

Chapter 4 investigates the ability of the airport to meet current demand and, thus, the facilities required to meet forecasted needs as established in Chapter 3 – Forecasts of Aviation Demand. The objective of this analysis is to determine how adequate existing facilities are and to determine whether improvements are needed to satisfy future requirements. In short, this chapters provides some insight into what the airport needs (and possibly not need) to meet forecasted changes.

Facility requirements were based on issues not related to capacity and demand. FAA design standards, safety, and services for airport users were considered in this master plan.

The airside and landside capacity needs are determined by comparing the ability of the existing facilities to forecasted demand for them. In cases where demand exceeds capacity, additional facilities are recommended. Conversely, if capacity exceeds demand, methods for managing the excess are discussed.

4.1 STATUS OF EXISTING FACILITIES

The Airports assets are generally in good condition. However, some airport facilities will require attention to correct safety deficiencies. Primarily, issues involving obstructions and non-conforming activity in the Runway 12 RPZ should be addressed. These are discussed later in this section.

4.1.1 Adequate Facilities

The airport adequately serves the needs of the aviation community that frequents the airport. The facility provides a well-maintained turf runway, ample aircraft parking space during most days, and a terminal building that meets the basic needs of most visitors. The airport's turf runway is well maintained and properly drained.

4.1.2 Safety Related Issues

The biggest concerns the airport has, regardless of which approach they decide to take, are trees and small shrubs in the airport's protected airspace. This problem is primarily in the Part 77 approach surfaces on both runway ends. Also, activity in the Runway 12 protection zone (RPZ) does not conform to FAA standards. However, both the trees and RPZ issues are tricky problems because the airport is currently under no legal obligation to remove or otherwise mitigate them, meaning as a non-NPIAS airport, the Town has not agreed to any Federal assurances[1] and is under no duty to clear the obstructions. The only other concern is the historic hangar, which is in fair condition[2].

[1] FAA Airport Sponsor Assurances (see http://www.faa.gov/airports/aip/grant_assurances/).
[2] Based on the consultants visual and professional assessment.

4.2 RUNWAY REQUIREMENTS

Plymouth has a single 2,350-foot-long by 90-foot-wide turf runway. The required runway width and its length are a function of two different parameters. Width is merely a function of the Runway Design Code (RDC) and approach visibility minimums. The higher the RDC and the lower the visibility, the wider a runway should be.

The required length of a runway is a function of many factors, the most notable of which is the selection of the appropriate design aircraft and how much runway it requires for takeoff and landing operations. Larger, faster aircraft require more runway surface for takeoffs and landings.

4.2.1.1 Design Aircraft and ARC Requirements

The existing and forecast design aircraft at Plymouth is the Cessna 172 Skyhawk. This plane falls within the ARC group: A-I.

4.2.1.2 Runway Width

The runway width is a function of FAA design criteria, and for Plymouth, based on ARC A-I, the width requirement is 60 feet. As a caveat, the current runway is much wider than 60 feet. However, it would not have to be reconstructed to a narrower width unless it was being paved using federal funds.

4.2.1.3 Runway Length

The length is a function of aircraft operational characteristics, specifically the airport design aircraft. As noted in Chapters 2 and 3, the existing and future design aircraft is the Cessna 172 Skyhawk (or an aircraft of similar size and operating specifications). The analysis for Plymouth indicates that a C172 requires about 1,400 feet of runway for a takeoff while operating at maximum gross takeoff weight on a warm summer day (worse case conditions with a 10-knot headwind). The smaller Cessna 152 (two seats versus four) requires a little more than 1,000 feet, and a Piper Aztec (PA-32) would need almost 2,350 feet under the same conditions.

Figure 4.1 shows the takeoff length analysis of the aircraft discussed in the previous paragraph as well as several other typical general aviation aircraft, some of which would not, or do not, operate from Plymouth[3], [4]. Again, the distances discussed and shown are based on operating at Plymouth under the conditions listed.

[3] Aircraft data comes from manufacturers and other related sources, including FAA AC 5300-13A (Airport Design). Airport runway data is from Airnav.com/airport/1P1. Temperature data from National Climatic Data Center. Calculations by Stantec.

[4] The distances shown are based on aircraft operating at 1P1 under the following conditions: aircraft operating at maximum gross takeoff weight, on a dry grass runway, 0.2% gradient, no wind, 75°F. Distance based on the distance traveled from start of takeoff to the point where the aircraft reaches 50 feet AGL.

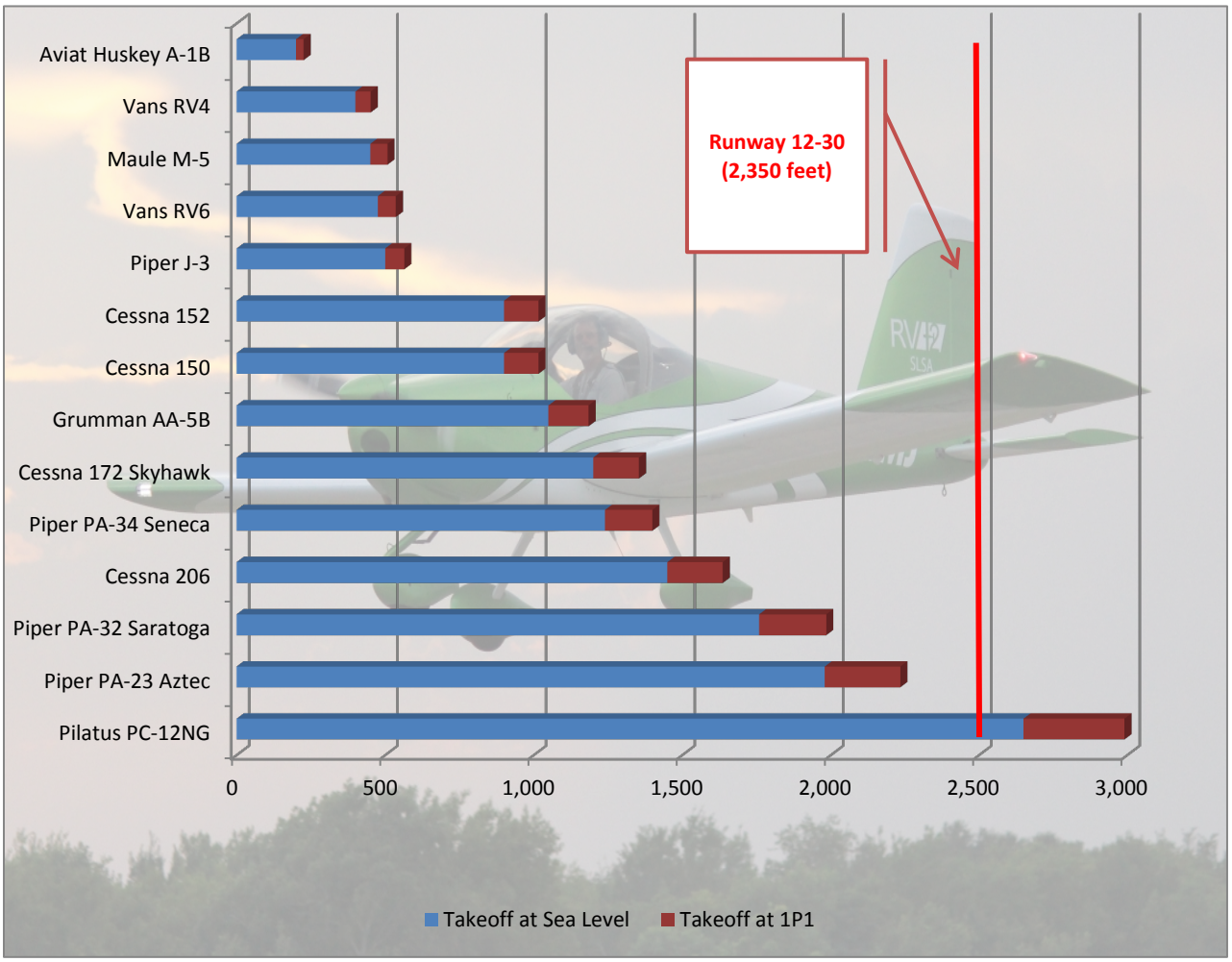


Figure 4.1. Takeoff Length Analysis for 1P1

The data indicate that the 2,350-foot runway is adequate for both the design aircraft and many other small general aviation aircraft that typically operate at Plymouth. However, the Runway 30 landing threshold is displaced 294 feet. This displacement is because of trees growing in the runway approach surface. This shift in the landing threshold reduces the available landing length to 2,086 feet. Because aircraft typically require less distance when landing, this shorter distance is not an issue. The landing analysis is presented in Figure 4.2 shows that all of the aircraft listed, which are typical at 1P1, can operate at Plymouth Municipal Airport under the conditions used in the analysis[5],[6].

[5] Aircraft data comes from manufacturers and other related sources, including FAA AC 5300-13A (Airport Design). Airport runway data is from Airnav.com/airport/1P1. Temperature data from National Climatic Data Center. Calculations by Stantec.

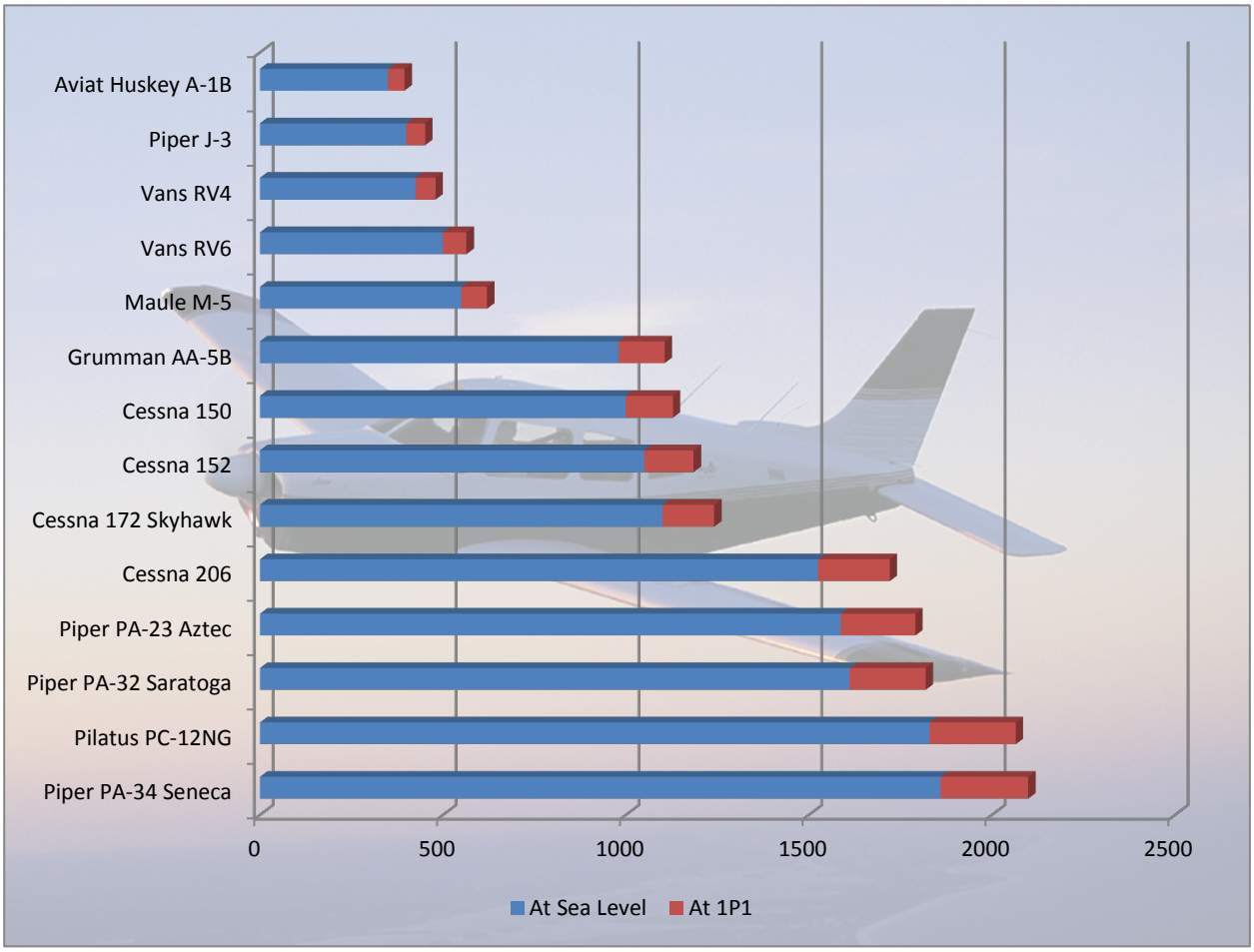


Figure 4.2. Landing Length Analysis for 1P1

The current Plymouth runway does not meet FAA design criteria. This design shortcoming is because of non-conforming issues with the runway object free area and as noted above, obstructions in the Runway 30 approach. Also, if the runway were to be paved using federal funds, it would require standard graded safety areas at each runway end. The RSA on a turf runway is inclusive of the operating surface; however, an RSA on a paved runway is exclusive, and so the length is added to each paved end. This topic will be discussed further later in this chapter.

4.2.2 Options for Paving the Runway

Paving the runway at Plymouth is not something considered necessary, even if the Town decides to request and is granted entry into NPIAS. While there are few airports in the NPIAS with turf runways, they do exist and are considered an important part of general aviation. However, if the Town elected to pave the runway, there are several options available. Howver, before the

[6] Calculations by Stantec based on aircraft operating at maximum gross takeoff weight, on a dry grass runway, 0.2% gradient, no wind, 75°F. Distance based on the requirement to cross a 50-foot object, land and stop.

runway is paved, the Town should understand the design differences between a turf and a paved runway.

On a turf runway, the RSA ends at the edge of the turf runway. However, for paved runways, the RSA starts at the end of the pavement and extends a set distance[7] beyond the runway end. Figure 4-3 illustrates the difference in how a runway safety area is configured on the runway ends of a turf and paved runway.

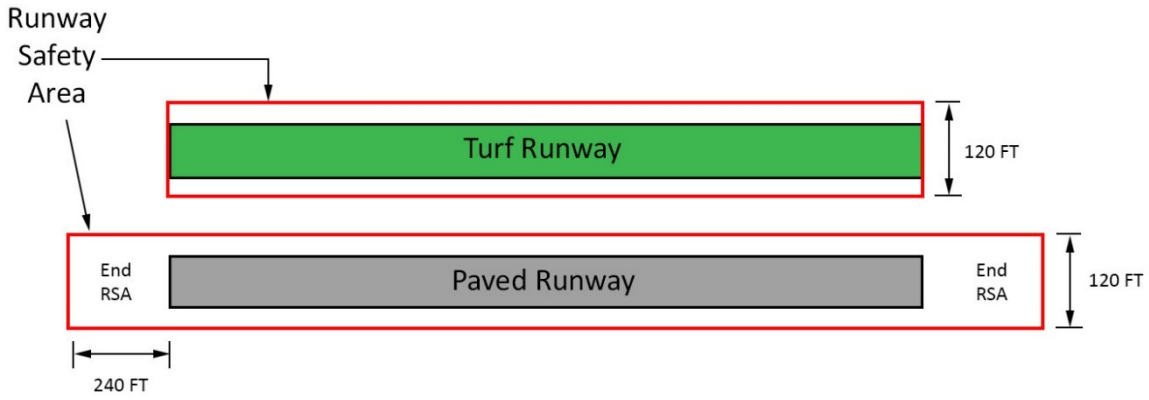


Figure 4.3. Paved versus Turf Runway Safety Area Example

Two basic options are avaible that would accommodate a paved runway at Plymouth. One option keeps the runway and RSA within the airport's existing property and the second extends the RSA (and possibly the runway) off of airport property (on one or both runway ends). The second option would require the acquisition of property in fee simple. An easement might be possible, however, if funding is through the AIP program, ownership of the land under the runway and RSA must be outright (easements are not a viable option).

There is a second but somewhat lesser concern that involves Part 77. On a turf runway, the Part 77 approach surface begins at the end of the runway. However, for a paved runway, it begins 200 feet from the end of a paved runway. Obviously, the latter has the potential of impacted more land off one or both runway ends. In both instances, the area affected by both safety areas and Part 77 expands further off of airport property.

A brief look at the impacts of both options is examined.

4.2.2.1 Paving Runway - Option One: No Property Acquisition

In this alternative, the runway is shortened to allow placement of the runway safety areas on both runway ends, the runway and associated RSA remain within the airport's existing property

[7] The RSA dimensions are based on the airport's design aircraft and subsequent ARC and are listed in AC 5300-13A, Airport Design (see paragraph 307 and Table 3-5).

limits (no property is acquired for this option). Plymouth Municipal Airport requires a 120-foot-wide by 240-foot-long RSA. The RSA extends 60 feet on both sides of the runway and extends 240 feet beyond each end (see Figure 4.3 on the previous page). Give the constraints of the runway in the limited existing space, adding 240 feet of safety area at both ends effectively reduces the current runway length by 480 feet. This results in an ultimate runway length of 1,870 feet (2,350 – 480). If the trees in the Runway 30 approach surface are not cleared, the Runway 30 displacement will remain, but would be reduced from the current 300 feet to approximately 70 feet, further reducing the available Runway 30 landing length to 1,800 feet.

4.2.2.2 Paving Runway - Option Two: Acquire Property

Option Two offers several opportunities to pave the runway and retain all or some of the existing runway length. In these scenarios, the Town would acquire land on one or both ends of the runway, which is then paved with a full 240 foot RSA on both ends. This option obviously has an unlimited number of options concerning the final runway length. For example, the existing turf runway could be paved and 240 foot RSAs added to both ends. This concept results in a 2,350 foot long paved runway and fully compliant safety areas. Alternatively, the town could acquire land on one end only and then pave the runway to a length of approximately 2,110 feet with a 240 RSA on both ends. The RSA would extend off of existing airport property on one and and remain on airport property on the opposite end.

In summarizing Options 1 and 2, the farm near the approach end of Runway 12 will create several issues with obstructions and protection-area regulations. Currently, three structures are penetrating the runway's approach surface. Those will need to be lighted (if approved by the FAA) or removed. Moreover, the runway's RSA would need to extend 240 feet beyond the runway threshold. At this distance, the RSA will be in the middle of a crop field. Therefore, property acquisition would be needed to mitigate these issues. Also, the RPZ for Runway 12 has multiple standing structures located within its boundaries. The FAA clearly states that a runway's RPZ must be "kept free of structures and any development that would create a place of public assembly[8]." Once the approach surfaces are cleared, the obstructions in the runway's transitional surface will need to be lighted or cleared. This task could be accomplished by acquiring an easement from the property owner or by outright purchase of the property.

4.2.3 Taxiway Requirements

The airport has no requirements for a taxiway system unless the runway is paved, and then any taxiway requirements would be minimal. When and if paved, then the airport will need a taxiway network to feed traffic to and from the landside facilities.

4.3 NAVIGATION AIDS

Navigation aids include lighted and unlighted markings, lights, and signage. Current aids include unlit runway marker cones; a lighted wind cone and an AWOS. These are satisfactory under existing conditions. If night operations are anticipated, then at a minimum, the airport

[8] FAA AC 150/5300-13A, Airport Design (paragraph 310).

should install lighted runway markers to outline the edges of the turf runway and an airport beacon. Another condition is whether the airport falls under federal guidance (NPIAS), in which case some of the elements addressed in Table 4.1 – Required Navigation Aids, are required.

Table 4.1. Required Navigation Aids

NAVIGATION AIDS	EXISTING	DAY OPERATIONS	NIGHT OPERATIONS	INSTRUMENT OPERATIONS
Runway Markers	Unlit Cones	Unlit Cones	Lighted Cones/Edge Lights	Edge Lights (Low Intensity)
Wind Cone	Lighted	Unlit	Lighted	Lighted
Segmented Circle	None	Recommended	Recommended	Recommended
AWOS	AWOS	AWOS	AWOS	AWOS
Rotating Beacon	None	Not Required	Required	Required
Signage	None	Nice to have	Nice to have (lighted)	Nice to have (lighted)
PAPI	None	Nice to have	Highly Recommended	Highly Recommended
REIL	None	Not Required	Highly Recommended	Highly Recommended

4.4 OBSTRUCTION REMOVAL REQUIREMENTS

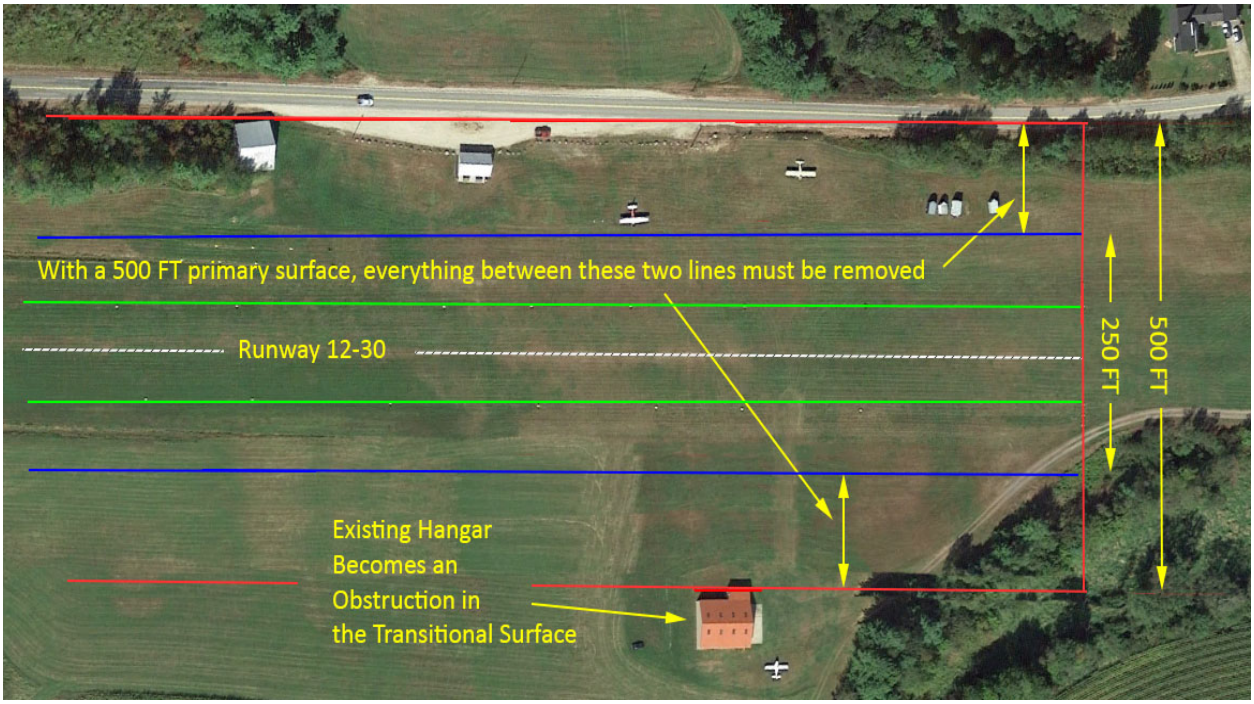
The land adjacent to the Plymouth Municipal Airport has multiple trees and shrub obstructions to the runway's' Part 77 surfaces and the airport's Threshold Siting Surface. Of these various imaginary surfaces, the biggest issues at Plymouth will be on the approach, primary, and threshold siting surfaces. The current obstructions identified in Chapter 2 total 49.85 acres of obstructions. Table 2.6, (page 2.28) identifies the obstruction acreage in each Part 77 surface.

4.4.1 Instrument Approach Procedures

Instrument Approach Procedures (IAP) refer to a system of navigation that provides pilots with the means of transitioning from the enroute phase of flight to final approach. This process is accomplished using electronic means, such as radar, ground based navigation aids, or the modern equivalent using satellite based navigation (Global Position System, or GPS for short). The process of developing an IAP is complicated and technical and is not addressed in this report.

Regarding developing an IAP at Plymouth, the issue is not so much the development of a procedure, but rather issues related to the physical airport itself. In addition to the technical process, airports must meet certain criteria, which include a lack of obstructions, such as trees, hills, towers, etc. that would impede an arriving aircraft's ability to navigate safely from the enroute phase to the landing phase. A clear Part 77 primary surface at 1P1 is essential. Part 77 was addressed earlier in Chapter 2 (see Obstruction Analysis, page 2.24). The analysis

completed for this section used a 250-foot-wide primary surface, which is the smallest (narrowest) surface permitted by Part 77, and is used for airports with visual runways (see Figure 2.23 on page 33). For airports with non-precision runways, the primary surface expands to 500 feet in width, which for many airports is not an issue. However, for Plymouth, it is a major problem because the primary surface must be clear of all objects except for those that must be there because of their function, such as runway lights and signage. As illustrated in Figure 4.4, a 500-foot-wide primary surface would enclose most of the existing airport infrastructure. The existing buildings between the runway and Quincy Road would become "obstructions" in Part 77 primary surface and would have to be removed. The hangar on the south side, while outside the primary surface, would fall within the transitional surface and would become an obstruction as well. Thus, as illustrated, there are no reasonable means of establishing an IAP into Plymouth without undertaking a major infrastructure change. Given the relatively small amount of land available, it is our recommendation that the airport remains a "visual" facility.



Note: The Part 77 primary surface is a flat plane and the distances shown are based on the surface irrespective of the terrain. The terrain does have an impact on obstructions with in the primary surface because objects, other than those required to be there (such as runway markers, lights, etc.) cannot project above the runway elevation.

Figure 4.4. Part 77 250 vs. 500-foot-wide Primary Surface

4.5 AIRCRAFT PARKING

Today, 12% of the airport's based aircraft fleet use hangars and the remaining 88% park outside on turf tie downs, although many leave the airport during winter periods for either other airports in the region, or out of state to warmer climates. Historically, this ratio is usually the reverse, meaning a majority of based aircraft will utilize hangar space, if available, and particularly in the winter. Therefore, we believe that if hangars or hangar space is made available, this typical New England ratio of 80% hangar and 20% apron can be realized.

4.5.1 Hangar Parking

Additional hangar space must be identified if the 12% hangar/88% apron ratio is going to be reversed. The demand for hangar space is probably suppressed, but will slowly reverse itself once land is identified for development. Demand will gradually increase from the current 12% to 80% over the course of the next 15-20 years as identified in Table 4.2. As noted, the number of aircraft parked in hangars would be projected to increase from two aircraft today to 17 aircraft in 20 years, which translates to a current deficit of 15 spaces.[9]

Table 4.2. Hangar Space Requirements

CONDITION	EXISTING	FOR PLANNING PERIOD ENDING		
		2020	2025	2035
Based Aircraft	17	18	19	21
Percent in Hangars	12%	25%	50%	80%
Based Aircraft in Hangars	2	4	9	17
Existing Hangar Space	2	2	2	2
Surplus (Deficit)	0	(2)	(7)	(15)

4.5.2 Apron Parking

Currently, 5 out of 17 based aircraft at Plymouth use a hangar for aircraft parking). The low-growth forecast predicts that four additional aircraft will be based at Plymouth by the end of the 20-year planning period (21 in total). However, if hangar development occurs as discussed earlier (see Hangar Parking), the number of based aircraft parking in the open on an apron will decrease from the current 88% to around 20% or a total of four aircraft (Table 4.2). When combined with projected itinerant apron requirement (see Table 4.3), the total number of aircraft requiring apron space results in a requirement of around 3,200 square yards of parking space (Table 4.4). This results in a surplus of about 3,000 SY of parking space (see Table 4.5).

[9] A space refers to the allotted number of aircraft per hangar and not actual hangar units because some hangars can hold more than one aircraft.

Table 4.3. Itinerant Apron Requirements

CONDITION	EXISTING	FOR PLANNING PERIOD ENDING		
		2020	2025	2035
Annual Operations	3,030	3,150	3,270	3,520
Peak Month (15% of annual operations)	455	473	491	528
Peak-Month Average Day (PMAD)	15.2	15.8	16.4	17.6
115% of PMAD	17.4	18.1	18.8	20.2
Busiest Day Itinerant Operations	8.7	9.1	9.4	10.1
Planned Apron Size (230 SY/ACFT)	**2,004**	**2,083**	**2,162**	**2,328**

Table 4.4. Based Aircraft Apron Requirements

CONDITION	EXISTING	FOR PLANNING PERIOD ENDING		
		2020	2025	2035
Based Aircraft	17	17	19	19
Percent of Based Aircraft Using Apron	88%	82%	53%	21%
Based Aircraft on Apron	15	14	10	4
Apron Size Requirements (230 SY/ACFT)	**3,450**	**3,220**	**2,300**	**920**

Table 4.5. Total Apron Requirements

CONDITION	2015	FOR PLANNING PERIOD ENDING		
		2020	2025	2035
Itinerant Needs	2,004	2,083	2,162	2,328
Based Aircraft Needs	3,450	3,220	2,300	920
Total Apron Requirements	5,454	5,303	4,462	3,248
Existing Apron Size	6,292	6,292	6,292	6,292
Surplus (Deficit) (in SY)	**838**	**989**	**1,830**	**3,044**

Figure 4.5 shows the existing and future apron requirements broken out by based and itinerant aircraft needs.

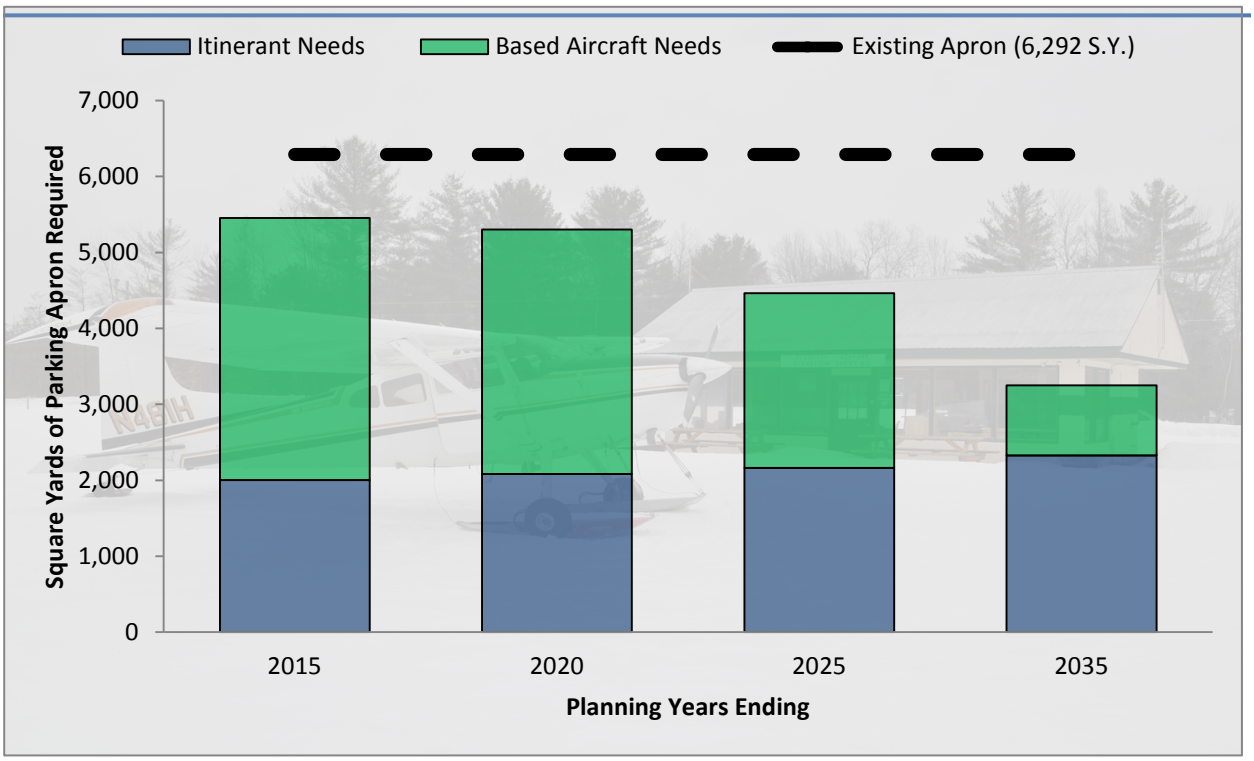


Figure 4.5 – Aircraft Parking Apron Requirements with Assumed Hangar Development

4.6 AVIATION FUEL SYSTEM

Installation of a fueling system at Plymouth would be a supplementary form of income for the town of Plymouth and should be considered. There is an existing demand for aviation fuel at the Plymouth Municipal Airport, and demad for aviation fuel will increase over the next two decades. Measuring this requirement is difficult because of several market variables, the largest of which is understanding the pricing structure the town would follow. Pilots of small general aviation aircraft, such as those at 1P1 are highly sensitive to the price of fuel. Many pilots will bypass one airport for another because of a few cents difference in price, and this includes pilots locally based at an airport. If the price is set too high, sales will decline and vice versa.

The second variable involves storage capacity. A larger fuel storage tank allows the airport to buy in bulk. In the existing market, the buyer pays not only the wholesale cost of the fuel plus taxes but also the delivery fee. A typical fuel tanker truck carries 8,000 gallons of fuel and will rarely leave the loading point with a partial load. Moreover, the delivery fee is the same regardless of the load size. Thus, the larger the load, the small the overall price per wholesale gallon the airport has to pay. This situation means a large tank is better than a small tank.

A 12,000 gallon tank is considered the minimum necessary if the ultimate retail price is a concern. For example, every tank regardless of size has a maximum safe capacity (usually about 80% of the tank size). A 12,000 gallon tank can safely hold 9,600 gallons (12,000 x 80%). If

the airport wants to maximize savings by taking delivery of 8,000 gallons of fuel, the tank level would have to be down to 1,600 gallons or less. If for example, the airport has a 10,000 gallon tank, its safe capacity is 8,000 gallons; meaning to take a full load of fuel, the tank must be empty or close to it.

An airport must consider fuel "on hand" between the time an order is placed and the day delivery takes place. It is seen as poor marketing and management to run out of gas. Once or twice might be acceptable, but if it happens on a regular basis, pilots will bypass the airport in search of a more reliable source of fuel.

4.7 SUMMARY

As a summary, the airport improvements discussed in this section will allow the airport to keep up with forecasted demand. As discussed, we evaluated facility requirement for the preferred growth alternative addressed in the previous chapter.

The airport should mitigate all obstructions to the airport's approach surface. Once complete, the airport can remove the displaced threshold for Runway 30, allowing aircraft to utilize the entire length of the turf strip. Removing the obstructions creates a safer aviation environment for airport users. Safety is a catalyst for the majority of improvement projects at airports around the country, and Plymouth is no different. Once the safety issues are corrected, the airport can focus its resources on expanding the aircraft parking area near the terminal building.

Table 4.6 lists the development recommendations, which includes installing an aircraft fueling system in the next 5-10 years and plan on expanding the system by the end of the 20-year planning period. The long term recommendations include paving the runway to a width of 60 feet and adding paved taxiway stubs to one or two paved aprons (one on each side of the runway). The paved runway should be equipped with Low Intensity Runway Edge Lights (LIRL), Runway End Indicator Lights (REIL) and a Precision Approach Path Indicator Lights (PAPI) on one or both ends. Installation of a rotating beacon should be considered in the next 10-15 years if night operations are anticipated.

Table 4.6. Summary of Facility Requirements

AIRPORT ASSET	EXISTING	FOR PLANNING PERIOD ENDING		
		2020	2025	2035
Runway Length & Width	2,350' x 90'	2,350' x 90'	2,350' x 90'	2,380' x 60'
Runway Threshold Displacement	300'	300'	0	0
Runway Surface	Turf	Turf	Turf	Paved
Runway Lighting	None	Lighted Cones	Lighted Cones	LIRL
PAPI	None	None	Yes	Yes
REIL	None	None	Yes	Yes
Rotating Beacon	None	None	Yes	Yes
Taxiways	None	None	None	2 stubs
Hangar Spaces	2	4	9	17
Apron Space Type (SY)	Turf (5,454)	Turf (5,303)	Turf (4,462)	Paved (3,248)
Obstruction Clearing (Acres)	None	10.2	27.7	27.7
Fueling System Tank Size	None	3,000 gallon	3,000 gallon	10,000 gallon

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5.0 ALTERNATIVES ANALYSIS

The purpose of this section is to identify and evaluate reasonable development alternatives for Plymouth Municipal Airport that not only meet the demand levels outlined in Chapter 4, but also are constructible, minimize environmental impacts and are financially feasible. The underlying objective is to meet the identified needs for both capacity and safety requirements and recommendations for the entire airfield operation and infrastructure. This Chapter reviews airport land available for future development and evaluates realistic airport layouts that incorporate recommended facilities identified in Chapter 4.

5.1 WHY WE PREPARED DIFFERENT OPTIONS

Various alternatives are presented, each covering a series of proposed concepts that focus on the preferred forecasts (Chapter 3) and recommendations (Chapter 4). It is important to note that no single alternative addressed in this chapter is a stand-alone option. In fact, ideas and concepts can be mixed and matched to produce the town's preferred or recommended alternative. In short, this chapter provides the airport stakeholders with ideas about what can be accomplished at the Plymouth Municipal Airport, what the various options would cost and what types of impacts each alternative would have.

5.2 WE MADE SOME ASSUMPTIONS

It is important to address several key assumptions and project needs that were developed in earlier parts of this study before any alternatives can be analyzed. These assumptions are part of the foundation upon which the alternatives are developed.

- Alternatives were developed irrespective of the town's decision whether to seek entry into NPIAS;
- The airport will remain a public-use, general aviation airport during the entire 20-year planning period;
- The existing types of aircraft using the airport are not expected to change significantly throughout the planning period, and the current mix of operations is forecasted to remain primarily single-engine aircraft;
- Available runway length meets the needs of a majority of the current fleet and existing critical aircraft; and
- The Airport Reference Code (ARC) of A-I for "small aircraft" will remain the same throughout the 20-year planning period.

5.3 HOW TO IMPLEMENT MASTER PLAN RECOMMENDATIONS

This subsection identifies alternatives for implementing the recommended facility improvements throughout the long term. Improvements identified throughout the 20-year planning period in

Chapter 4 of this master plan (see Table 4.6, page 62). Many of the recommendations discussed in this chapter are based on entry into NPIAS and the availability of federal and state funding through grants in kind. The proposed development ideas include the projects listed below.

- Obtain Avigation easements, then clear obstructions
- Remove the 294-foot runway displacement
- Retain the existing runway length, and consider paving it to 60 foot in width
- Add runway edge lighting, PAPI and REILs
- Install a rotating beacon
- Develop a short paved taxiway system (when the runway is paved)
- Add upwards of 15 new hangar spaces, or expand aircraft parking apron
- Expand aircraft parking apron by 700 square yards
- Identify space for additional hangars
- Install an aircraft fueling system
- Install fencing to discourage airport trespassing

5.4 ALTERNATIVES EXAMINED

We examined three options for the airport: a No-Growth, Low-Growth, and High-Growth Scenario. However, first, we examined safety issues that, regardless of how slow or fast the airport grows should be addressed.

5.4.1 Safety First

As part of the development of this master plan, a thorough examination of the airport was undertaken. This review included not only the collection of data needed for this report (as well as the wetland survey, preparation of the airport property map, a wildlife hazard site visit/assessment, and an obstruction analysis), but also an inspection of the facility regarding safety. However, it is noted that this evaluation was done from the perspective of a compliant airport as part of the NPIAS and in meeting FAA Airport Sponsor Assurances. NPIAS is addressed in Chapter 1 and it, along with Sponsor Assurances is discussed in Chapter 7 (see Federal Obligations, page 7.6). This examination was not completed regarding the town's liability as far as its municipal insurance is concerned.

One area that was readily apparent was the presence of obstructions in the form of trees growing with the airport's Part 77 surfaces (see Obstruction Analysis, Chapter 2, page 2.24). Removal of the trees would create a safer operating environment and could eliminate the Runway 30 displaced threshold (see Figure 2.8, page 2.9). However, before the trees can be removed, easements may be required (mandatory if funded by the FAA). For airports, these are referred to as "Avigation Easements." The following addresses the easement acquisition and obstruction removal alternatives.

5.4.1.1 Easement Acquisition

Before the airport can begin to clear most of the more restrictive obstructions, the town will want to obtain clearing rights on at least eight separate parcels of land. Again, if the clearing is completed using AIP funds, then an Avigation easement over each parcel is mandatory.[1]

Our analysis indicates that there is a total of 13.85 acres of obstructions in the Part 77 approach (5.67 acres) and transitional surfaces (8.18 acres). The nearly 6 acres of obstructions in the two approach surfaces (as well as the additional 1.0 acres on airport) are the primary concern because they have a direct impact on aircraft approach and departure operations, and are considered high on the FAA's safety priority for mitigation. Obstructions in the transitional surfaces at general aviation airports are of less concern and are usually either lit with obstruction lights or cleared, depending on which approach costs less.

The almost 14 acres of obstructions lie within the property limits of both the airport and eight privately owned lots. The eight parcels identified are listed in Table 5.1 and shown graphically in Figure 5.1.

Table 5-1. Adjacent Property with Obstructions to Part 77 Surfaces

MAP – LOT	TOTAL LOT SIZE (ACRES)	PART 77 SURFACES IMPACTED (ACRES)		
		APPROACH	TRANSITIONAL	TOTAL
205-001	77.0	0.12	0.55	0.67
205-002	20.0	0.70	0.08	0.78
206-012	1.1	0.15	0	0.15
206-013	33.0	1.65	3.10	4.75
206-016	1.18	0	1.18	1.18
206-017	1.09	0	1.09	1.09
206-018	1.13	0	1.13	1.13
213-034	44.0	3.05	1.05	4.10
Total Acres	**178.5**	**5.67**	**8.18**	**13.85**

[1] Avigation Easements obtained using Federal funding must comply with 42 U.S. Code Chapter 61 - Uniform Relocation Assistance and Real Property Acquisition Policies for Federal and Federally Assisted Programs.

Given the location and estimated land value associated with the private property, the approximate cost of obtaining an Avigation easement is approximate $5,000 to $10,000 per acre, or about $25,000 to $60,000 total to purchase the eight easements.

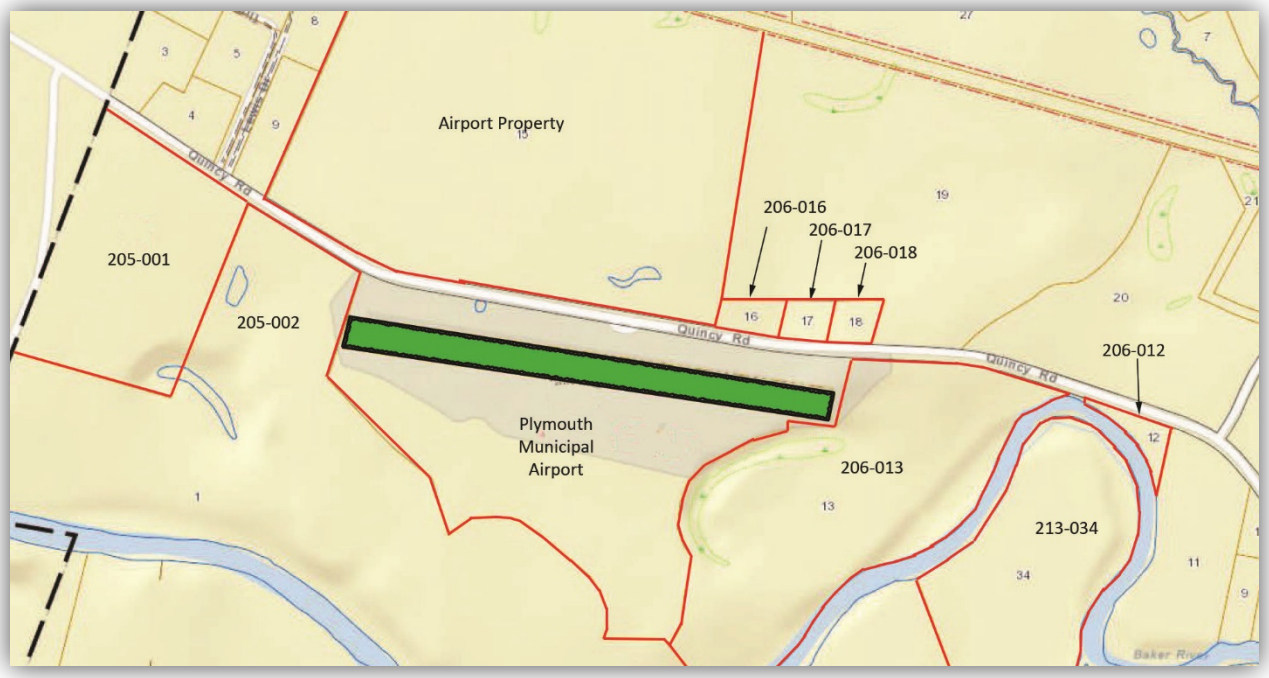

Figure 5.1. Adjacent Property by Lot with Obstructions to Part 77 Surfaces

5.4.1.2 Clear Obstructions to Part 77 Surfaces

The major concern for airside development at Plymouth is mitigating the obstructions to Part 77 surfaces surrounding the airport. The Part 77 surfaces affected include the 20:1 visual approach surface, the primary surface, and the 7:1 transitional surface. These imaginary surfaces are intended to protect pilots from hazards. In this case, it is not required that the airport mitigates these safety concerns because the airport does not receive funding by the FAA, and thus enter into binding sponsor assurances. However, Plymouth is still considered a public-use airport and should take steps to mitigate safety issues. It is recommended that the airport clear all obstructions on airport and those within the two runway approach surfaces, which total 5.7 acres. Exclusive of the cost of Avigation easements (see the previous section); the estimated cost of clearing these obstructions is $5,000 per acre, for a total cost of $28,500.

5.4.1.3 Remove the Runway 30 Displacement

Runway 30 has a 300-foot displaced threshold (see Chapter 2) because of trees growing in the approach to the runway (defined as a threshold siting surface). The displacement shifts the standard aircraft approach surface further down the runway, which in turn decreases the amount of available landing surface. Once the trees on the east side of the airport (Runway 30 approach) are cleared, the runway displacement can be removed.

Table 5.2 lists the estimated costs of completing the safety related issues.

Table 5.2. Summary of Safety Related Costs

Project	Estimated Cost
Obtain Avigation Easements	$25,000 - $60,000
Obstruction Removal (Part 77 Approach Surfaces)	$28,500
Remove Displaced Threshold	$0
Total Cost Range	**$53,500 – $113,500**

5.4.2 Three Growth Alternatives

Three growth alternatives are discussed in this section. These are the No-Growth (NG), Low-Growth (LG) and High-Growth (HG) options. The NG option assumes that the town of Plymouth may not elect to undertake any major changes at the airport. The LG alternative adopts the notion that the town will consider some development at the airport, using both private and public funding (with or without the aid of NPIAS). The HG scenario includes the acquisition of Avigation easements on both ends of the runway and an obstruction removal project that will improve safety and eliminate the displaced threshold on the Runway 30 end. Also, the LG development alternative considers the installation of security fencing, the addition of an aircraft fueling system, the installation of runway edge lighting, and a rotating beacon. The HG framework expands on the LG alternative by adding a paved runway and taxiway system.

At the end of this chapter, five pull out plans are presented that illustrate the various development options addressed in the LG and HG alternatives discussion.

5.4.2.1 No Growth (NG) Alternative

The NG alternative assumes no further improvements from a safety and capacity standpoint. With no improvements made to the airport over the course of the 20-year planning period, it is assumed the airport will remain about what it is today; a small general aviation airstrip with a turf runway available for daytime use most of the year, except during periods when the airport is unusable during the spring thaw.

5.4.2.2 Low Growth (LG) Alternatives

This section analyzes recommended improvements for Plymouth under an LG scenario. This approach assumes basic safety issues addressed in the previous section (Safety First, page 64) are dealt with. Also, growth will advance in a natural order based on real demand, meaning development such as new hangars are built based on real time needs of the aviation community (i.e., an aircraft owner or developer wants to construct a hangar and the town makes available space for such development). Other improvements considered are the installation of a fueling system, security fencing, and airport lighting, with the assumption that night operations are considered. Otherwise, there are no requirements for runway edge lights or a rotating beacon.

5.4.2.2.1 Hangar Development

In addition to apron improvements, the airport must plan to accommodate upwards of 15 additional aircraft hangar spaces throughout the 20-year planning period. This recommendation is based on the assumption that hangars, if available, will be in greater demand than outside parking apron space. This concept also assumes that all hangar development will be privately funded.

5.4.2.2.2 Fuel System

As a supplementary source of revenue, the sponsor should consider constructing a fueling system for the purpose of selling either Aviation Gas[2] (Avgas) or Mogas[3]. In the low-growth scenario, a 2,000 – 3,000-gallon tank is recommended, although a larger tank may have long term benefits (see Chapter 4, page 4.11). However, the actual tank size is not as important as having a supply of fuel to sell. A larger tank permits the buyer to order larger quantities, which helps reduce the wholesale price of fuel.

The proposed 3,000 gallon 100LL fuel system will be constructed 320 feet southwest of the Terminal Building between the runway and the historical hangar. A self-serve, credit card system with an above ground tank is recommended. The upfront investment for this fueling system is projected to be $175,000.

5.4.2.2.3 Fencing

To secure the airport from any future vandalism, particularly if a fuel system is installed, a partial-perimeter fence is proposed. This security feature will require approximately 1,500 feet of fabric at a height of 8 feet with barbed wire lining the top. A manual vehicle gate is proposed for access to the perimeter road near the end of Runway 30. Also, one pedestrian gate is proposed

[2] Avgas is the industry standard 100 octane low lead (100LL) fuel used in most piston powered general aviation aircraft.
[3] Motor Gas, or Mogas for short is a low compression 80/87 octane fuel used in a limited number of piston powered general aviation aircraft with a special STC (supplemental type certificate) which allows these aircraft to operate on a lower octane fuel, which in many cases, is less expensive than 100LL.

near the Terminal Building. Entry through both gates shall be code-restricted. Design and construction of a partial-perimeter fence is estimated to cost $53,000.

5.4.2.2.4 Turf Runway Edge Lighting

Lighting the runway is also a safety concern for airport users. The proposed edge lights can be solar-powered, which avoids trenching and high-powered voltage regulators, and could ease the maintenance costs for the Sponsor. The FAA requires spacing of runway edge lights at 200± feet intervals. Given this, the airport would need to install 24 edge lights plus threshold lights on both ends of the runway. The cost for lighting the runway for night operations with solar power lights is projected to be $30,000. Conventional runway edge lights, which operate on DC, would cost approximately $120,000, including the cost of cable trenching and a regulator.

5.4.2.2.5 Rotating Beacon

Night operations require the installation of an airport rotating beacon. The airport beacon is designed for night operation as an identification and location marker for airports. The typical beacon for general aviation airports is an L-810 style on a fiberglass tip-down pole. The cost of installing this type of beacon, assuming installation close to an existing power source, is approximate $50,000.

5.4.2.2.6 Expanded Aircraft Parking

This alternative proposes a relocation of the current based aircraft apron parking area. The new location will be south of the runway. The itinerant parking will remain adjacent to the Terminal Building. This concept provides an additional safety barrier between Quincy Road and parked aircraft. No new areas will need to be cleared, however some area may need to be graded to provide access to the runway from the new parking location. The approximate cost of this project is expected to be $15,000.

5.4.2.3 Summary of LG Alternative

The estimated cost of completing each of the projects listed in the LG alternative section ranges between $323,000 and $413,000 (see Table 5.3). Notice that there are no costs associated with hangar development because it is assumed that this would be 100% private funding, including the cost of developing the infrastructure, such as access roads, electricity, water, and other required features.

Table 5-3. Summary of Low Growth Costs

Project	Estimated Cost
Construct Security Fence	$53,000
Install Fuel System	$175,000
Runway Edge and Threshold Lights (Solar – Conventional DC Circuit)	$30, 000 - $120,000
Rotating Beacon	$50,000
Expand Aircraft Parking (Turf)	$15,000
Total Cost Range	**$323,000 - $413,000**

5.4.2.4 High Growth (HG) Full Build Plan

This section analyzes recommended improvements for Plymouth under an HG Full Build-Out Scenario. This approach assumes that the airport will convert from a turf to a paved airport. As with the LG plan, basic safety issues addressed earlier are dealt with, and the development discussed in the LG scenario is considered as well as the concepts discussed in this section. Some development, such as hangars, will take place in a natural order (demand driven). Under this Plan, the following projects are addressed:

- All safety issues addressed earlier (Safety First)
- Most LG projects are either completed or in progress;
- Acquire property rights on both runway ends to accommodate the RSAs and RPZs
- Pave (and possibly light) Runway 12-30 to 2,350 x 60 feet
- Develop a full-length parallel taxiway (25 feet wide)
- Establish and pave aircraft parking aprons on both sides of the runway.

5.4.2.4.1 Acquire Property Rights for RSAs

Earlier we addressed the need to acquire property rights in the form of Avigation easements for obstruction removal purposes. To accommodate the full build out scenario, and to maintain the existing runway length with a paved surface, a fully compliant runway safety area (RSA) must be constructed on each runway end. This concept was discussed earlier in Chapter 4. To briefly recap, the RSAs on a turf runway end at the end of the designated runway; whereas, the RSA on a paved runway begins at the end of the runway and extends (in this case) 240 feet. Land must be aquired on both runway ends to fit the runway and safety areas in the allotted space. Instead of an easement, the town should consider purchasing the required land in fee simple. In fact, if the airport falls under NPIAS, the FAA will require outright ownership of the land. The property in question here are parcels 205-002 and 206-013. In each case, approximately 35,000 square feet of land will be required (120 x 240 foot RSA plus an additional 20% for grading). The estimated costs are about $5000-$10,000 per acre or about $10,000 to $20,000 for a piece of both parcels.

5.4.2.4.2 Pave Runway 12-30 (2,350 feet by 60 feet)

Whereas the LG plan maintains turf surfaces, this alternative proposes the construction of paved airside and landside infrastructure. This option includes the runway, a new taxiway, and the existing and a new aircraft parking apron.

Paving Runway 12-30 is of course a major undertaking, not to mention expensive. The runway would be paved to Airport Reference Code (ARC) A-I (small aircraft) standards (see Design Aircraft, page 10), meaning 60 feet in width. The length, however, is not a function of the ARC but rather based on operating characteristics of the design aircraft, in this case, a Cessna 172. As discussed in Chapter 4 a Cessna 172 operating at peak efficiency requires approximately 1,400 of runway for takeoff under the conditions typical at 1P1. However, this length leaves little room for error, such as a pilot landing further down the runway than planned, landing at a higher approach speed, abnormally warm and humid weather conditions, a strong crosswind, and other related conditions. Therefore, increasing the required runway length by 25-30% is not unusual. This safety margin results in a runway length of between 1,750 and 1,820 feet long.

The estimated cost of paving Runway 12-30 at 15,670^{2YD} (2,350 x 60/9), is about \$240^{2YD} (including design and contingency costs) resulting in an approximate cost of \$3.8 million (rounded).

- Construction Cost (\$180^{2YD}) \$2,820,600
- Contingency (20%) \$564,120
- Engineering (15%) \$423,090
- **Total \$3,807,810**

5.4.2.4.3 Install Low Intensity Runway Edge Lights

The installation of runway edge lights is dependent on whether the airport wants to offer nighttime capabilities. While this increases the viability of the airport it is in no way an obligation. However, if lights are considered, the airport would most likely install Low Intensity Runway Lights (LIRL) along the pavement edges and thresholds. Considering there are no edge lights now, installation of a standard runway light system would require an entire electrical infrastructure, including stake mounted lights, cables and trenching, and regulators.

An alternative would be to install solar powered lights. However, the caveat is that as of today, the FAA will not fund solar powered edge lights. Nevertheless, the advancement of solar power lights and their use in aviation in the United States is changing rapidly, and there's always the chance that the FAA would fund such a project in the future.

The cost for lighting the runway for night operations with solar power lights is projected to be \$30,000. Conventional runway edge lights, which operate on DC, would cost approximately \$120,000, including the cost of cable trenching and a regulator.

5.4.2.4.4 Construct a Full Length Paved Parallel Taxiway

Another aspiration of the airport is the development of a parallel taxiway along Runway 12-30; either full length or partial. Like the runway, a paved taxiway at 1P1 would be designed and constructed to ARC A-1 (small aircraft) standards, meaning it would be 25 feet wide. For planning purposes and cost estimating, a paved taxiway would cost about 240^{2YD}. A full length parallel taxiway running the full length of the runway (2,350 feet x 25 feet in width, or $6,528^{2YD}$) would cost about $1.6 million.

- Construction Cost (180^{2YD}) $1,175,000
- Contingency (20%) $235,000
- Engineering (15%) $176,250
- **Total $1,586,250**

5.4.2.4.5 Develop Paved Aircraft Parking Aprons

To complete the airport transformation from turf to paved surfaces, the existing and one additional parking apron should be paved. The existing apron, along Quincy Road covers about $7,500^{2YD}$ (900 feet long by 75 feet wide). Assuming this area is paved, the cost would be about 135^{2YD}, or $1.02 million.

- Construction Cost (100^{2YD}) $750,000
- Contingency (20%) $150,000
- Engineering (15%) $112,500
- **Total $1,012,500**

5.4.2.4.6 High Growth Summary

The estimated cost of completing each project listed in the HG Full Build Out scenario is $6.55 million (see Table 5.4). This concept does not include the cost of safety related or LG projects. Also, no cost data is provided for hangar development under the assumption that this type of construction would be privately funded.

Table 5-4. Summary of High Growth Costs

Project	Estimated Cost
Acquire Additional Land in Fee Simple for RSA Development	$20,000
Pave Runway 12-30	$3,807,810
Install Low Intensity Runway Lights	$120,000
Construct Full Length Paved Parallel Taxiway	1,586,250
Construct Paved Aircraft Parking Apron	$1,012,500
Total Estimated Cost	**$6,546,560**

5.5 FOUR DIFFERENT IDEAS

Starting on page 5.X is a series of four development concepts (Figures 5.2 through 5.5). Each figure presents a series of increasingly more complex models. Common on all four models is the location of the existing AWOS and a 300-foot radius critical area. This sphere around the center of the instrument cluster represents the minimum area that should remain clear of objects that protrude above the sensors. This clear area helps ensure minimal interference.

- Figure 5.2 (page 5.14) shows the addition of two hangars on the south side of the airport next to the existing hangar. The theory behind this alternative is the ease at which additional hangars and adjoining turf taxilane can be developed parallel to the runway. This plan also shows the proposed location of the fuel system and an additional aircraft parking space can be made through the clearing of 1,600^{2YD} of vegetation near the approach end of Runway 30 along Quincy Road.
- Figure 5.3 (page 5.15) expands on the first alternative (Figure 5.2) by developing a turf apron as well as additional hangars south of the runway. The drawback to this concept is added vehicular traffic to/from this area, and the need to relocate the existing lighted wind cone and segmented circle.
- Figure 5.4 (page 5.16) takes the previous alternative to a higher level by illustrating potential development along the south side of the runway. However, as noted earlier, this concept will infringe on the AWOS clear zone. However, Plymouth State University has a 30-year lease[4] for the AWOS system; thus, this alternative is not feasible.

[4] Lease extended in 2016.

- Figure 5.5 (page 5.17) is the fourth and final alternative studied, and by far, the most aggressive. This concept converts a turf airfield into a paved airport. It paves the runway to 2,350 feet in length and 60 feet wide (the recommended runway width for an FAA category A-I airport. As noted earlier, a paved runway will require a safety area that extends "beyond" the runway threshold (see *Options for Paving the Runway*, page 55). To maintain the existing runway length, which is about the minimum required for most operations at 1P1, the safety areas must be constructed off airport property, which in turn would require some land acquisition (mandatory if funded by the FAA). This alternative adds a full length parallel taxiway and paved aprons on both the north and south side of the runway. Note that the AWOS critical area does infringe on the taxiway and a small part of the apron, however, the pavement alone should have no impact on the weather sensors.

THE VARIOUS IDEAS PRESENTED IN THIS CHAPTER ARE OFFERED AS A MEANS OF STIMULATING DISCUSSION

5.6 SUMMARY OF PROPOSED DEVELOPMENT ALTERNATIVES

This chapter examined development alternatives that would meet both the projected growth of the airport as well as the development aspirations of the airport. While there is no expectation that any of the projects discussed will come to fruition, in whole or in part, they are presented as a means for the community to address the original concepts of this study considering economic development and whether or not to request entry into NPIAS. Also, the airport does not have to select any one particular scenario, including the safety related issues. The town can select individual ideas gradually.

As a matter of FAA and NHDOT mandated policy, development using AIP funding follows a programmed process that deals with safety first, followed by capacity related issues, and then other development concepts. For the Plymouth Municipal Airport, the obstructions on and around the airport, particularly those in the Part 77 Primary and Approach Surfaces have a very high priority and must be mitigated before any capacity related project will be considered. Before a large percentage of obstructions can be removed, the town must first acquire the rights to clear trees on private property.

Table 5.5 is a summary of the costs related to each of the four alternatives discussed in this chapter.

Table 5-5. Summary of Alternative Costs

Project	Estimated Cost
Safety Related Alternatives	
Obtain Avigation Easements	$25,000 - $60,000
Obstruction Removal (Part 77 Approach Surfaces)	$28,500
Remove Displaced Threshold	$0
Total Safety Related Costs	**$53,500 – $113,500**
Low Growth Related Alternatives	
Construct Security Fence	$53,000
Install Fuel System	$175,000
Runway Edge and Threshold Lights (Solar)	$30, 000
Rotating Beacon	$50,000
Expand Aircraft Parking (Turf)	$15,000
Total Low Growth Costs	$323,000
High Growth Related Alternatives	
Acquire Additional Land in Fee Simple for RSA Development	$20,000
Pave Runway 12-30	$3,807,810
Install Low Intensity Runway Lights (standard DC circuit)	$120,000
Construct Full Length Paved Parallel Taxiway	1,586,250
Construct Paved Aircraft Parking Apron	$1,012,500
Total High Growth Costs	**$6,546,560**

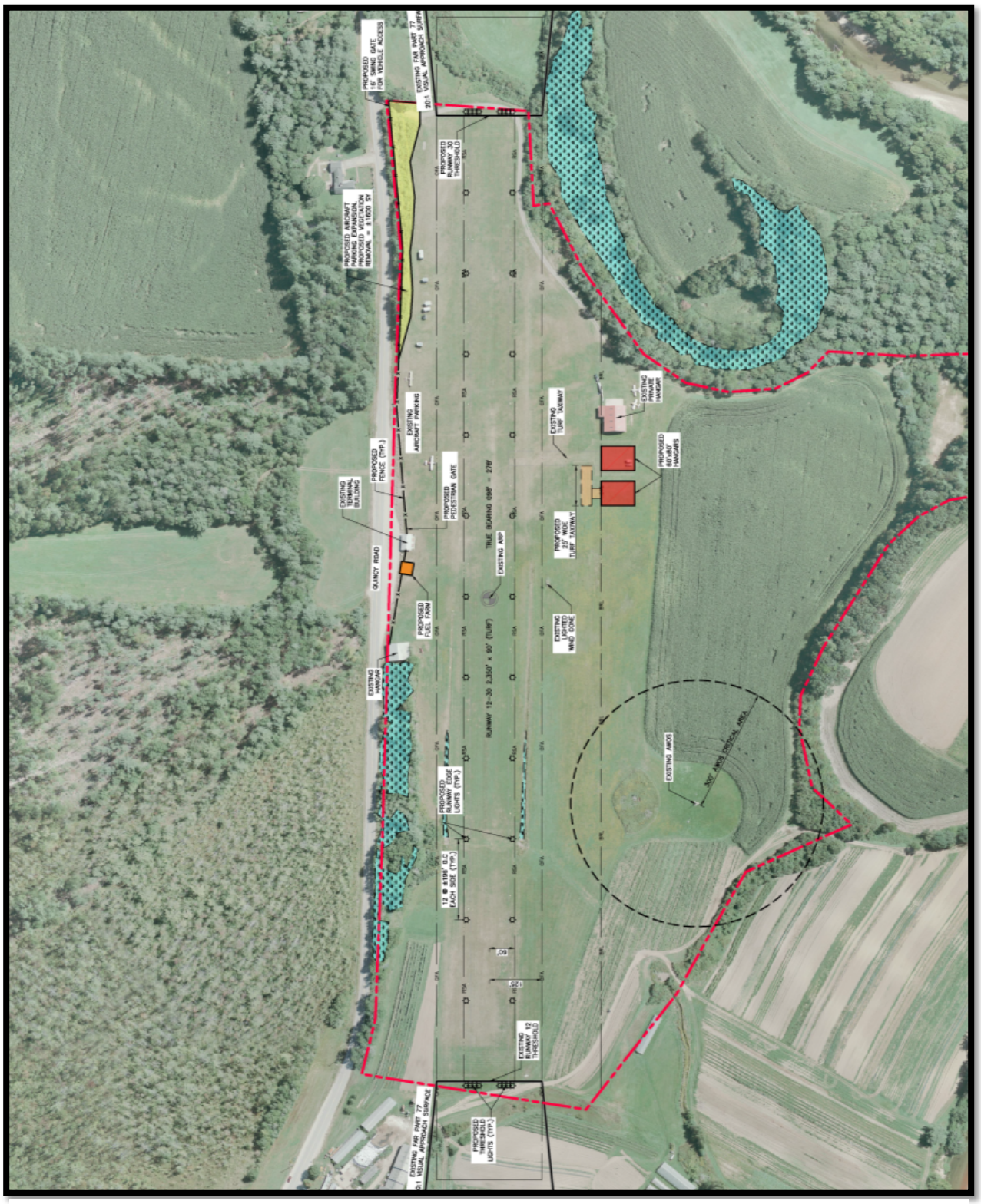

Figure 5.2. Turf Runway, No Taxiway, Add Hangars on South Side

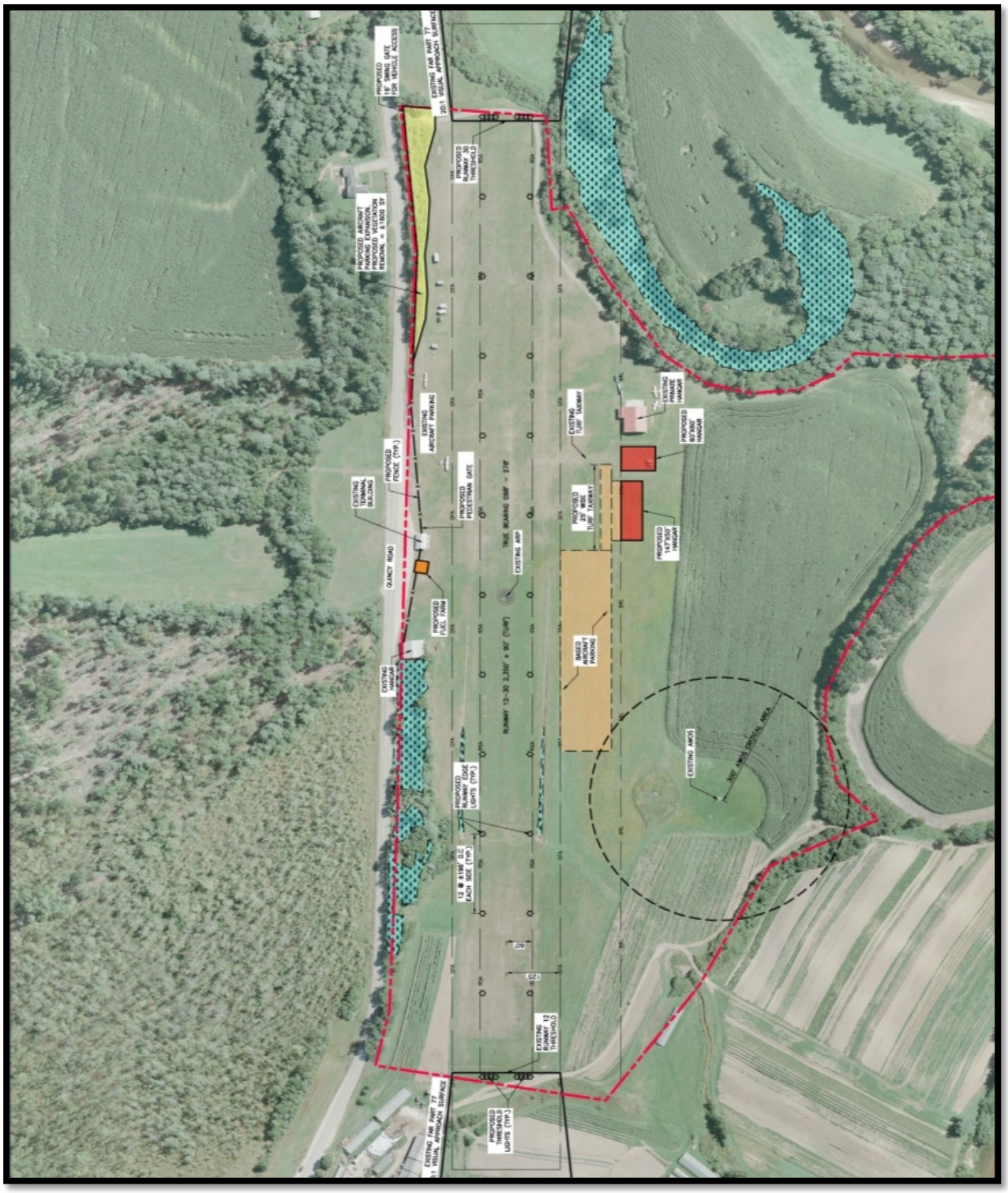

Figure 5.3. Turf Runway, No Taxiways, Add Turf Apron and Hangars on South Side

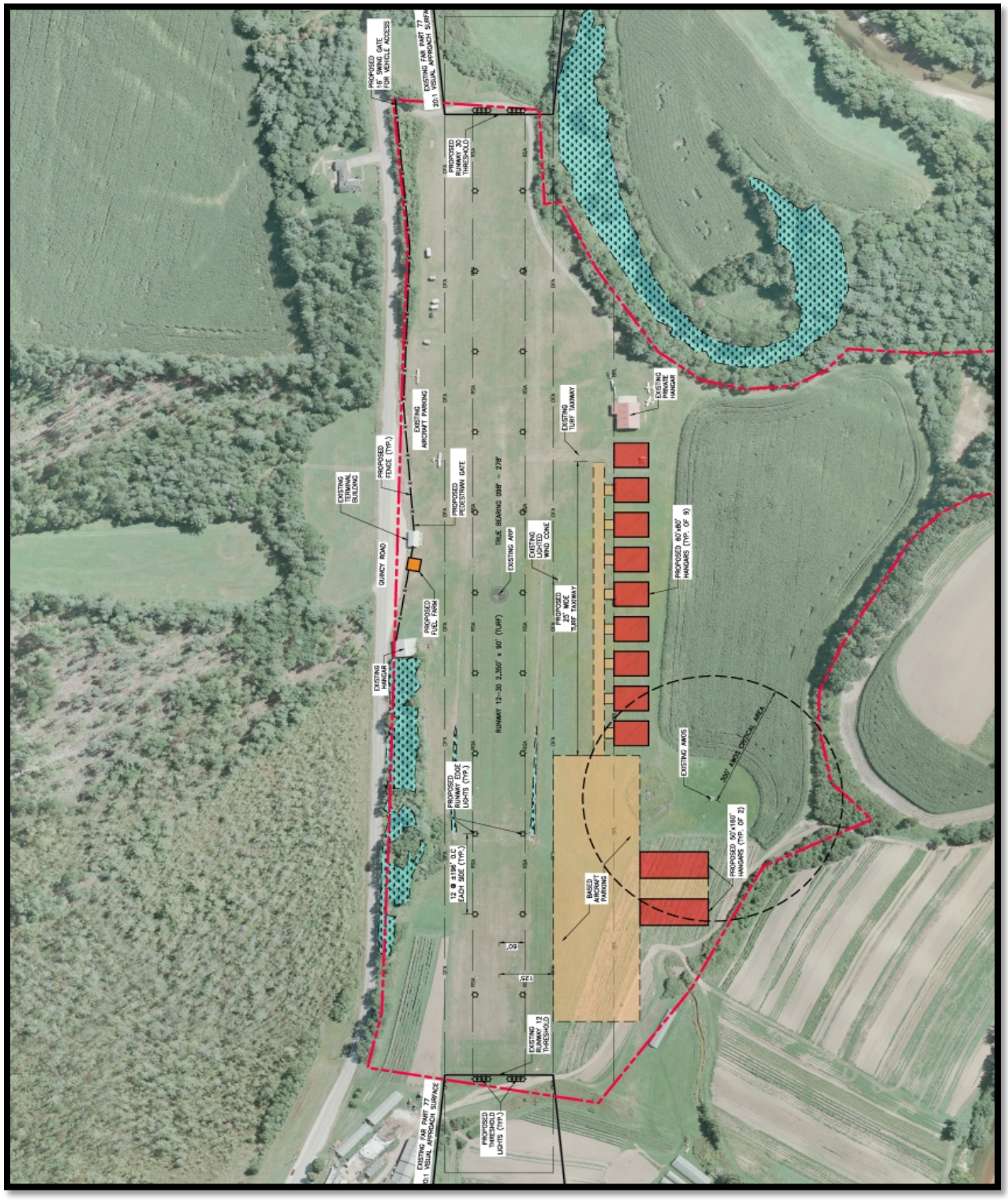

Figure 5.4. Turf Runway, No Taxiways, Expand Turf Apron and Hangars (Impacts AWOS)

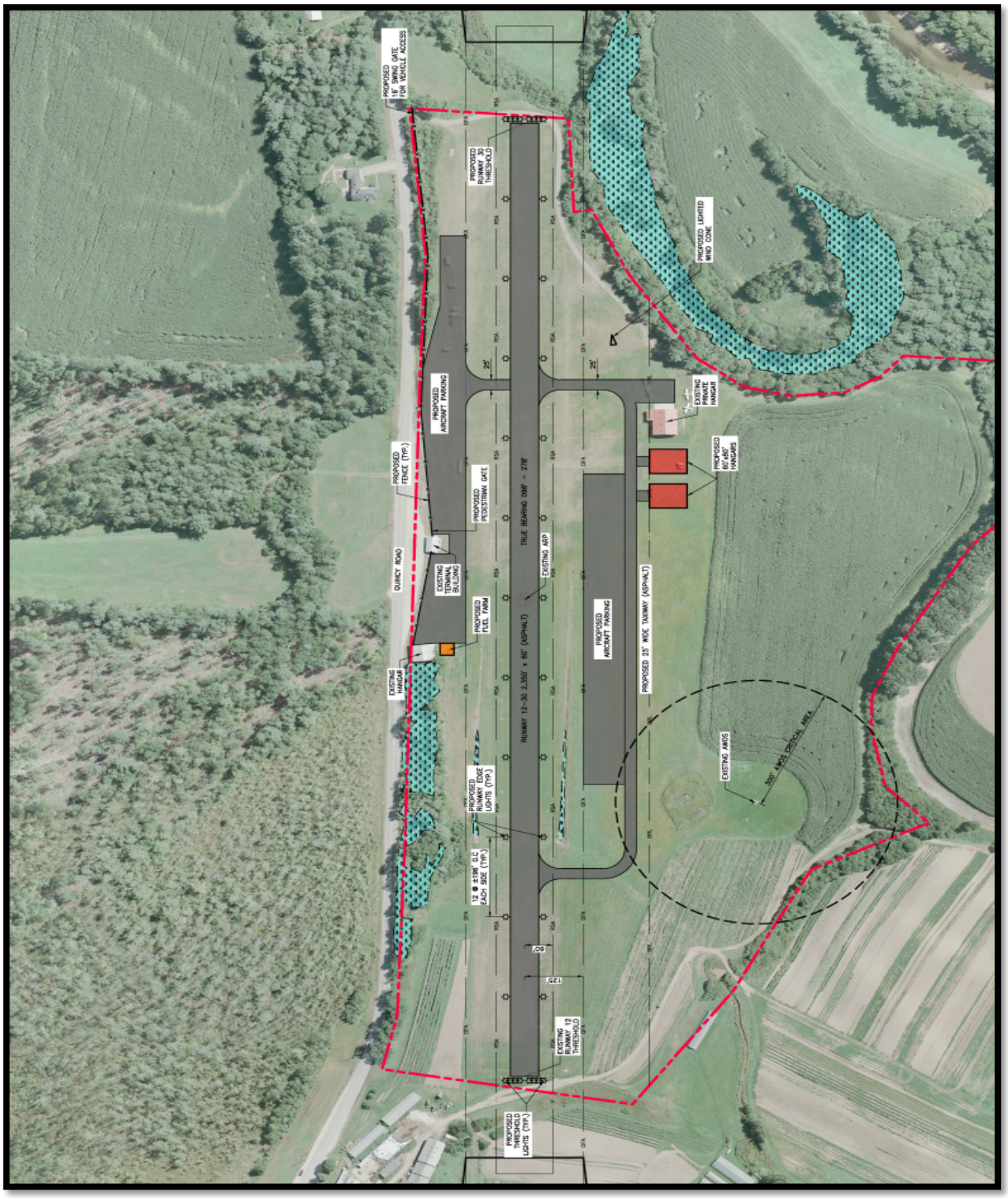

Figure 5.5. Paved Runway, Single Partial Parallel Taxiway, Paved Aprons

5.7 PREFERRED ALTERNATIVE

The alternatives discussed in this chapter were presented to the APAC on April 2, 2015. During that meeting, the town indicated that they would like to move forward with a full build out the concept, one that included a paved runway and taxiway, as well as paved aircraft parking areas. In consideration of this vision, a preferred alternative merged; one that would include a 2,600-foot-long by 60-foot-wide paved runway, with a paved parallel taxiway on both sides of the runway.

The 2,600-foot-long runway would require the addition of graded RSAs on both ends, each extending 240 feet beyond the ends of the runway. This runway length in combination with 480 of safety areas would require the acquisition of property on both runway ends. Also, obstructions in the Part 77 Primary and Approach Surfaces would have to be removed, which would increase the amount of private property needed for this plan to develop. The runway would be designed to Airplane Design Group (ADG) I (small aircraft) standards.

The inclusion of a taxiway system was also analyzed and was concluded that because of the limited land available, a taxiway on both sides of the runway would be needed to serve the airport best. In addition to providing safe and efficient access to both runway ends, the taxiways would serve as a means of providing access for apron and hangar development. The taxiways would be constructed to Taxiway Design Group (TDG) 1A standards, which requires a 25-foot-wide taxiway separated from the runway (centerline to centerline) by 150 feet. Because of land restrictions and wetlands on the south side of the runway, between the existing private hangar and the approach end of Runway 30, the taxiway on this side of the runway will be a "partial" parallel. It would extend from the approach end of Runway 12 to a point close to the existing private hangar.

A small aircraft parking apron can be included on both sides of the airport's administration building. While space is limited, there is sufficient room for a single row of aircraft parking spots parallel to Quincy Road. The parking spots would include in-pavement tie down anchors.

Because of space limitation, hangar development is restricted to the south side of the runway. However, considering the vast number of hangar layout possibilities, no definitive plan is offered. Instead, an area measuring approximately 52,000 square yards of land was identified as a suitable location for both future hangars and additional aircraft parking. This area will be noted as "Reserved for Aviation Development." Development in this area is limited because of the AWOS, which is considered a vital resource for the airport, town, and Plymouth State University. However, the AWOS electrical vault, which is located near the Runway 12 threshold will be relocated outside the ROFA.

Navigation aids include runway and taxiway edge lighting (solar LED or conventional LED lights); standard runway and taxiway signage; a PAPI and REIL system on both runway ends; and a rotating beacon. The existing lighted wind cone will be relocated (with a new segmented circle) to an area close to the AWOS.

The dirt access road near the approach end of Runway 30 will be closed, with vehicle traffic diverted to a new access road near the approach end of Runway 12. This road must be gated to prevent unauthorized access to the airport. Also, to minimize unauthorized access to the airport, and to limit vandalism, the boundary along Quincy Road should be fenced in, with adequate entry gates.

Areas not required for aviation development were identified. These areas include a small parcel near the approach end of, and just north of the Runway 12 threshold. This area would be ideal for a concession or other related business, and if required, this area is also suitable for hangar or apron development. The large parcel north of Quincy Road is also identified as an area suitable for development that is compatible with aeronautical activity and will be noted as "Reserved for Non Aeronautical Development Compatible with Aviation Activities." Incompatible land use at or near airports may result in the creation of hazards to air navigation and reductions in airport utility resulting from obstructions to flight paths or noise-related incompatible land use resulting from residential construction too close to the airport.

Airport fencing for security purposes is considered a good policy. While the entire airport could be encircled with wildlife fencing, the cost of this type of development may not be justified giving the relatively low activity level. While a price cannot be placed on safety, enclosing the entire airport with a wildlife fence (10 feet high with barbwire) would total over 8,000 linear feet, plus gates. Instead, a much shorter 6 or 8-foot security fence (without barb wire) would better serve the airport at a much lower cost. This fence would runway the length of the airport property line along Quincy Road.

Figure 5-6 (on page 5.20) illustrates the prefer layout and forms the basis for the rest of this technical report as well as the ALP.

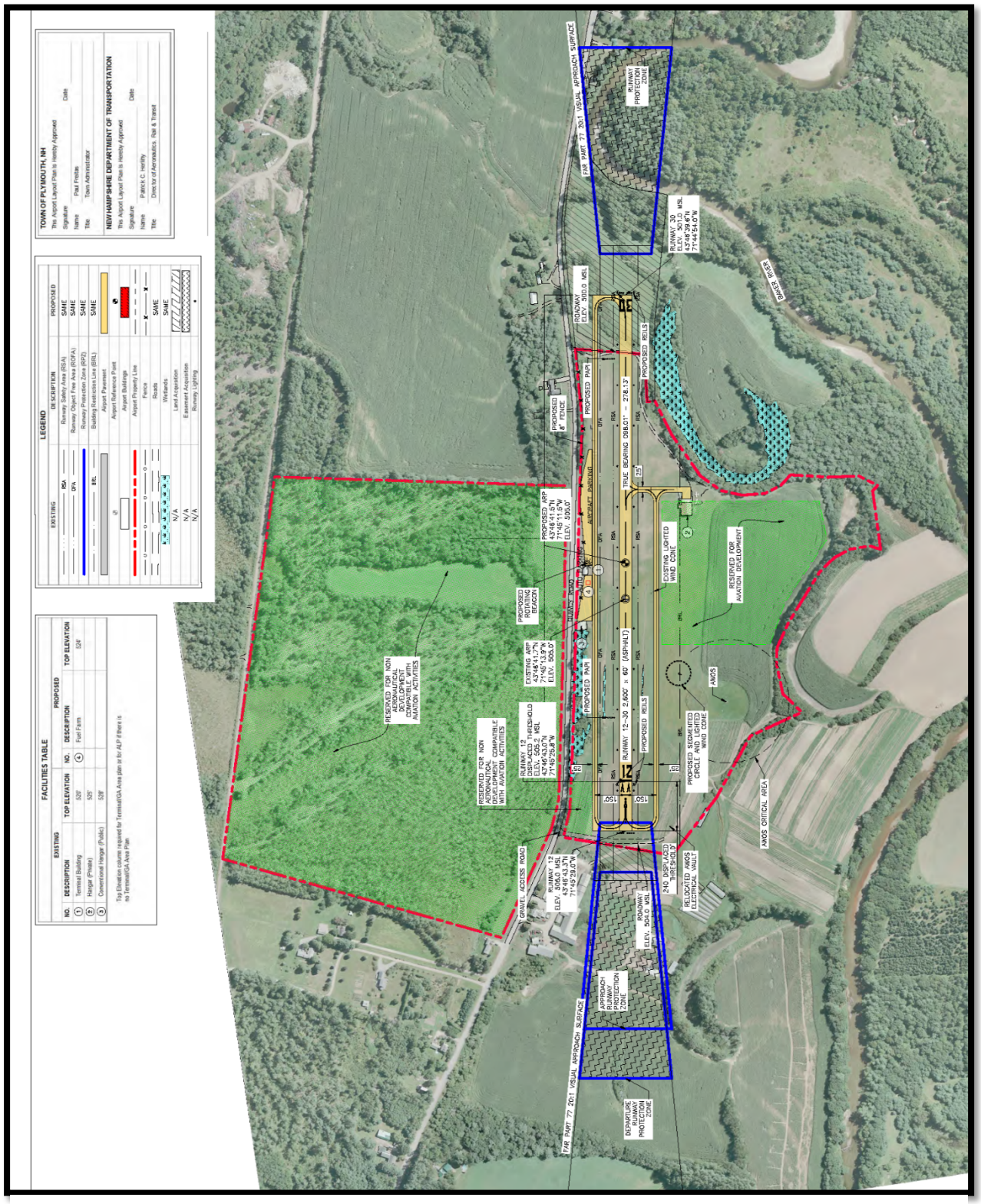

Figure 5.6. Preferred Alternative

6.0 AIRPORT LAYOUT PLAN

Chapter 6 expands on the selected preferred alternative from Chapter 5 by presenting the chosen plan in a series of technical drawings.

6.1 WHAT IS AN AIRPORT LAYOUT PLAN?

The Airport Layout Plan (ALP) is a drawing used to depict current and future airport facilities graphically. Standards for ALPs are in AC 5070-6B, Airport Master Plans. The term Airport Layout Plan typically refers to a single document or drawing covering the entire airport. It also refers to the set of drawings which typically consists of some or all of one of the 14 drawings listed below.

1. Cover Sheet
2. Data Tables Plan
3. Existing Facilities Plan
4. ALP Drawing
5. Terminal Plan (as needed)
6. Runway Plan and Profile
7. Airport Airspace Plan
8. Airport Land Use Plan
9. Airport Property Map / Exhibit A
10. Off-Airport Land Use Drawing (as needed)
11. Runway Departure Surface Drawing
12. Utility Drawing
13. Airport Access Plans
14. Other Plans as required

As determined early in the contractual phase of this project, only the first nine drawings (1 - 9) are part of this master plan development process.

6.2 OVERVIEW

The ALP serves as a critical planning tool that depicts both existing facilities and planned development for an airport. Sponsors of airport development carried out at federally obligated airports must accomplish the improvement by an FAA-approved ALP.

By definition, the ALP is a plan for a specific airport that shows:

- Boundaries and proposed additions to all areas owned or controlled by the sponsor for airport purposes

- The location and nature of existing and proposed airport facilities and structures
- The location on the airport of existing and proposed non-aviation areas and improvements thereon.

6.3 AIP FUNDING

A current FAA approved ALP is a prerequisite for issuance of a grant for airport development. Any sponsor who has received a grant for airport development is obligated by grant assurance to "keep the ALP up-to-date at all times."

6.4 KEEPING THE ALP CURRENT

- ALP's become "out-of-date" when they:
- Do not adequately provide for future needs
- Do not conform with current airport design standards
- Do not accurately reflect existing features
- Do not reflect airport and critical land use changes which may affect the navigable airspace or the ability of the airport to expand

An ALP that has not been "updated" for several years is usually deficient in all four respects.

When the FAA advises a sponsor that they need to update their ALP, it simply means that the sponsor needs to review their plan for airport development for currency in all areas and revise as necessary. In actual practice, sponsors may accomplish the updating by revising the original reproducible drawings, Computer Aided Graphics (CAD) file, or by preparing an all-new set of drawings[1].

The decision for which method to use is the sponsors. A consulting firm with airport planning experience can normally provide reliable counsel in this regard, but if in doubt, sponsors may also contact the FAA Planner for advice. The updated ALP needs FAA approval before the issuance of any grant for an airport development project addressed by the ALP update.

It is important to understand that the physical completion of an airport development project will normally trigger the need to "as-built" their ALP to reflect work accomplished under the grant. Projects may require an ALP update before grant issuance and an update after project completion to reflect "as-built" conditions.

6.5 ALP REQUIREMENTS AND OBJECTIVES

An ALP is required by statute to be up-to-date. This requirement derives directly from Title 49 U.S.C. 47107(a)(16). Grant Assurance No. 29 obligates an airport sponsor to "keep up to date at

[1] The ALP set prepared for 1P1 were done in CAD.

all times a layout plan of the airport," and also to receive FAA approval of any ALP update, revision, or modification. Further, any proposed AIP funded projects must be on an approved ALP. The AIP Handbook (FAA Order 5100.38C, Paragraph 300.c.) states, "A current airport layout plan (ALP) that depicts the proposed project and which has FAA approval from the standpoint of safety, utility, and efficiency of the airport shall be required before a development project is approved."

6.6 THE PLYMOUTH MUNICIPAL AIRPORT ALP

As noted on page 6-1, the Plymouth Municipal Airport ALP consists of nine drawings.

6.6.1 Cover Sheet

The cover sheet (Sheet 1) bounds the ALP Drawing Set and includes the following information.

- Airport name and location (Town, State)
- FAA Grant Number
- Location and Vicinity Map
- Wind Rose Data
- Name of the Airport Sponsor (Town of Plymouth)
- Preparer Information
- Sheet Index
- Date Prepared

6.6.2 Data Tables Plan

Sheet 2, the Data Sheet contains basic airport and runway data tables. Tables note the existing and proposed conditions.

6.6.3 Existing Facilities Plan

The Existing Facilities Plan (Sheet 3) is provided as both a reference document to identify existing facilities (including the runway, taxiway, buildings, aprons, and other structures) and a presentation document to identify a beginning point for this study.

6.6.4 Airport Layout Plan

Sheet 4, the Airport Layout Plan is the graphical presentation of the recommended airport-improvement projects for Plymouth Municipal Airport. The ALP is a pictorial representation and summarization of the efforts made in this planning process. The previous chapters supply the basis for the Airport's future airport layout as shown in the drawing set.

Descriptions of the improvements and costs over the next 20 years are included in Chapter Seven, the Implementation and Financial Plans. The Master Plan Concept, as selected by the

Town in consultation with the Planning Advisory Committee, was the basis for determining the proposed improvements at the Airport. The ALP is a development guide that presents the theoretical improvements possible. The timing of development depends on when it is needed and can be funded. The Master Plan Concept, as detailed on the ALP, includes – but is not limited to – the following items:

- Construction of a 2,600-foot-long by 60-foot-wide paved runway.
- A full north side parallel taxiway that extends the full length of the proposed 2,600-foot-long runway.
- A partial south side parallel taxiway that extends about two-thirds the length of the runway.
- Runway and taxiway edge lighting, either solar or DC.
- A paved aircraft parking apron.
- Land reserved for future aviation development, such as hangars and aircraft parking.
- Acquisition of property in fee simple to accommodate the runway extension
- Acquisition of easements to aid in the removal of trees that are or may in the future create a hazard to air navigation.
- Security fencing.
- Design standards of runway safety area, runway protection zone, obstacle free zone, and object free area.

All recommended airport improvements shown on this Plan are representative and may be modified as necessary to meet the needs of the community and airport users or the future design requirements of the FAA or NHDOT

6.6.5 Terminal Plan

The Terminal Plan (Sheet 5) focuses on the aviation service facilities by simply providing a larger view sheet focused on the airport's terminal area, including parking aprons.

6.6.6 Runway 12-30 Plan and Profile

Sheet 6 depicts the plan and profile view of the inner portion of the approach surface to the runway. The drawings will depict the obstacle identification approach surfaces contained in 14 CFR Part 77.

6.6.7 Airport Airspace Plan

Sheet 7 is the Airport Airspace Drawing. The FAA describes imaginary surfaces on and around an airport in 14 CFR Part 77 - *Safe, Efficient Use, and Preservation of the Navigable Airspace*. These surfaces, when kept clear, protect aircraft from manmade and natural obstructions in the airspace around the airport. Sheet 7 depicts the surfaces surrounding Plymouth Municipal Airport.

Part 77 surfaces are utilized in zoning and planning adjacent to the airport to protect the navigable airspace from encroachment by hazards, such as the development of buildings, antennas, and towers, etc., that would potentially affect the safety of the airport and violate the federal grant assurances, if applicable.

6.6.8 Airport Land Use Plan

Sheet 8 is the Land Use Plan, which depicts existing on and off-airport land use and noise contours.

6.6.9 Airport Property Map (Exhibit A)

Sheet 9 is the Airport Property Map. This plan is submitted as part of an application for entry into NPIAS, at which time the property map will be classified as the Airport's Exhibit A. Essentially, it is a drawing depicting the airport property boundary, the various tracts of land that were acquired to develop the airport, and the method of acquisition. This sheet was prepared separate from the ALP (and master plan update) and tacked on as a reference for future use. In this case, the airport never had an Exhibit A. Thus a major part of this project was the creation of a new property map. Sheet 9 is the airport's first official Property Map and will be an essential document should the town move forward with entry into NPIAS.

Sponsors must submit an Exhibit "A" property map as part of the project application for land acquisition projects and development projects.

The Exhibit 'A' is a snapshot of the inventory of parcels that make up dedicated airport property. The Exhibit 'A' indicates how the owner acquired the land, the funding source for the land and whether the land was Federal surplus land or Government Property previously conveyed to the airport. The exhibit must also indicate other detached parcels owned by the Airport Sponsor that are dedicated to airport purposes.

The Exhibit 'A' must show all dedicated airport property regardless of the type of funds (AIP, state, local, etc.) used to acquire that property. All land described in a project application and shown on an Exhibit 'A' constitutes the airport property federally obligated for compliance with the terms and covenants of a grant agreement.

6.7 PLAN SET

The ALP drawing set for this update includes nine sheets, which include:

Full size (24-inch x 36-inch) sheets of the ALP set are available in the Plymouth Town Office.

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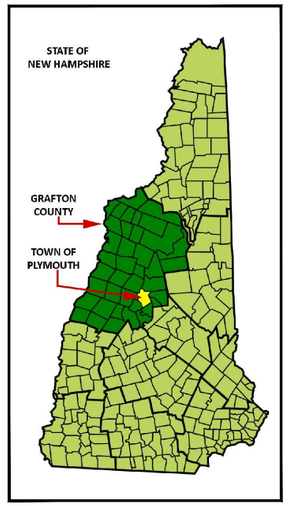
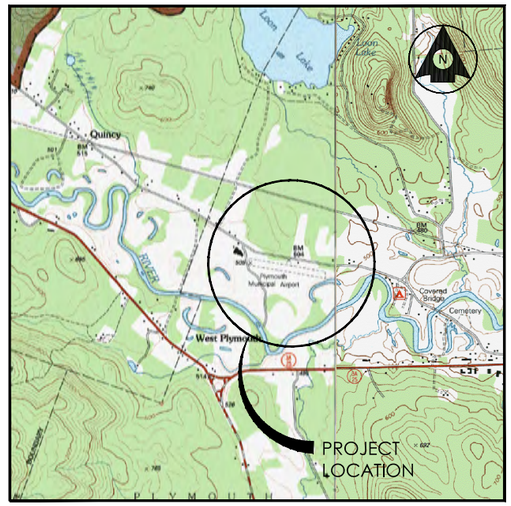
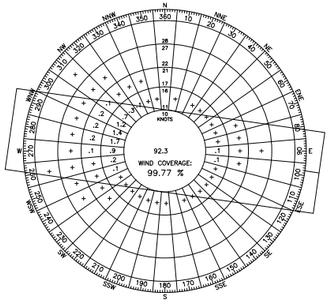
PLYMOUTH MUNICIPAL AIRPORT
PLYMOUTH, NEW HAMPSHIRE

AIRPORT MASTER PLAN

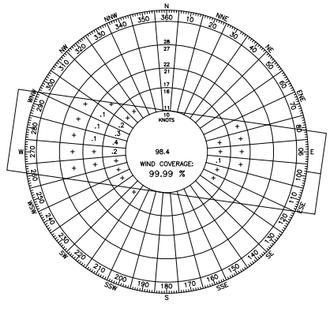




VICINITY MAP
NOT TO SCALE



ALL WEATHER WINDROSE
COVERAGE 99.77% AT 10.5 KTS.



IFR WINDROSE
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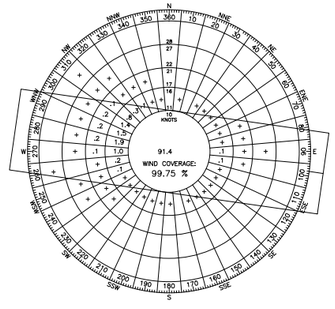

VFR WINDROSE
COVERAGE 99.75% AT 10.5 KTS.

OBSERVATIONS FROM 2006 - 2015
SOURCE: AWOS SITE 742078
FEDERAL AVIATION ADMINISTRATION
NATIONAL CLIMATIC DATA CENTER
(HTTP://ARP-govcloud.JVS.AERO)
MAY 23, 2016

SEPTEMBER 2016
A.I.P PROJECT NO. SBG-14-01-2014

INDEX OF SHEETS

ORIGINAL SHEET - ARCH D

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RUNWAY 12-30 DATA TABLE

RUNWAY DATA	EXISTING		PROPOSED	
	RUNWAY 12	RUNWAY 30	RUNWAY 12	RUNWAY 30
Utility Runway (YES/NO)	YES		YES	
Runway Design Code (RDC)	A-1 SMALL AIRCRAFT		A-1 SMALL AIRCRAFT	
Pavement Strength & Material Type	TURF		PAVED ASPHALT	
Strength by Wheel Loading	N/A		12,500 SW	
Pavement Classification Number (PCN)	N/A		TBD	
Surface Treatment	N/A		NO	
Effective Runway Gradient	0.5%	0.5%	0.5%	0.5%
Percent Wind Coverage (VFR 10.5 knots)	99.75%		99.75%	
Runway Length (feet)	2,350		2,600	
Runway Width (feet)	90		60	
Displaced Threshold Coordinates	N/A	43° 46' 40.46" N 71° 45' 02.06" W	43° 46' 43.3" N 71° 45' 25.8" W	N/A
Displaced Threshold (Distance/Elevation)	NO	294' / 501.7'	240' / 505.2'	NO
Runway End Coordinates				
Latitude	43° 46' 43.40" N	43° 46' 40.03" N	43° 46' 43.3" N	43° 46' 39.6" N
Longitude	71° 45' 29.71" W	71° 44' 58.01" W	71° 45' 29.0" W	71° 44' 54.0" W
Elevation (MSL)	506'	501'	506'	501'
Runway Lighting Type	NONE		LIRL	
Approach Lighting	NO	NO	NO	NO
Vertical Glide Slope Indicator Lights (VGSI)	NO	NO	PAPI	NO
Runway Marking Type	NONE	NONE	BASIC	BASIC
14 CFR Part 77 Approach Category	VISUAL UTILITY	VISUAL UTILITY	VISUAL UTILITY	VISUAL UTILITY
Approach Type	VISUAL	VISUAL	VISUAL	VISUAL
Visibility Minimums	3 SM	3 SM	3 SM	3 SM
Type of Required Aeronautical Survey	NONE	NONE	NONE	NONE
Runway Departure Surface (Y/N)	NO	NO	NO	NO
Runway Safety Area (RSA)				
Length Beyond Departure End	0'	0'	240'	240'
Length Prior to Threshold	0'	0'	240'	240'
Width	120'		120'	
Object Free Area (OFA)				
Length Beyond Departure End	240'	240'	240'	240'
Length Prior to Threshold	240'	240'	240'	240'
Width	250'		250'	
Obstacle Free Zone (OFZ)				
Length	N/A	N/A	200'	200'
Width	N/A		250'	
Threshold Siting Surface (TSS)	NO	20:1	20:1	NO
Visual and Instrument NAVAIDs	AWOS-III LIGHTED WIND CONE	AWOS-III LIGHTED WIND CONE	AWOS-III, PAPI LIGHTED WIND CONE, LIRL	AWOS-III LIGHTED WIND CONE, LIRL
Runway Markings	N/A	N/A	Visual	Visual
Taxiway Width	N/A	N/A	30'	30'
Taxiway/Taxilane Safety Area Dimensions	N/A	N/A	49'	49'
Taxiway Object Free Area (TOFA)	N/A	N/A	89'	89'
Taxilane Object Free Area	N/A	N/A	79'	79'
Taxiway/Taxilane Separation	N/A	N/A	70'	70'
Taxiway Lighting	N/A	N/A	LITL	LITL
Touchdown Zone Elevation	506'	501'	506'	501'
Taxiway Design Group	N/A	N/A	A-I	A-I

AIRPORT DATA TABLE

AIRPORT DATA	EXISTING	PROPOSED
FAA Site Number	13383.*A	13383.*A
Airport Elevation (MSL)	506.0'	506.0'
Airport Reference Point (NAD 83)		
Latitude	43° 46' 41.7" N	43° 46' 41.5" N
Longitude	71° 45' 13.9" W	71° 45' 11.5" W
Mean Max Temperature of Hottest Month	80°	80°
Airport Navigation Aids	LIGHTED WIND CONE RWY EDGE MARKERS	LIGHTED WIND CONE LIRL
Miscellaneous Facilities	TERMINAL BUILDING HANGARS	TERMINAL BUILDING HANGARS, FUEL
Declination	14.55°	14.55°
Source (Date)	NOAA (01/29/2016)	NOAA (01/28/2016)
NPIAS Service Level	N/A	NP - GENERAL AVIATION
State Service Level	LOCAL	LOCAL
Airport Reference Code	A-I (Small)	A-I (Small)
Runway Reference Code	A-I-VIS	A-I-VIS
Taxiway Design Group	N/A	A-I

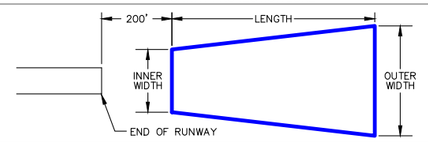
LEGEND

EXISTING	DESCRIPTION	PROPOSED
RSA	Runway Safety Area (RSA)	SAME
OFA	Runway Object Free Area (ROFA)	SAME
	Runway Protection Zone (RPZ)	SAME
BRL	Building Restriction Line (BRL)	SAME
	Airport Pavement	
	Airport Reference Point	
	Airport Buildings	
	Airport Property Line	SAME
	Fence	x x
	Roads	SAME
	Wetlands	SAME
N/A	Land Acquisition	
N/A	Easement Acquisition	

WIND DATA TABLE

RUNWAY	VFR	IFR	ALL	CALMS
12	56.7%	95.0%	61.8%	Unknown
30	88.2%	86.3%	88.0%	
Combined	99.8%	100.0%	99.8%	
Source:	National Climatic Data Center, Ashville, NC			
Station:	Plymouth, NH (742078)			

RUNWAY PROTECTION ZONE



EXISTING						
RUNWAY	APPROACH TYPE	VISIBILITY	INNER WIDTH	OUTER WIDTH	LENGTH	ACRES
12	Visual	3 SM	250'	450'	1,000'	8.035
30	Visual	3 SM	250'	450'	1,000'	8.035
PROPOSED						
RUNWAY	APPROACH TYPE	VISIBILITY	INNER WIDTH	OUTER WIDTH	LENGTH	ACRES
12	Visual	3 SM	250'	450'	1,000'	8.035
30	Visual	3 SM	250'	450'	1,000'	8.035

FACILITIES TABLE

EXISTING			PROPOSED		
NO.	DESCRIPTION	TOP ELEVATION	NO.	DESCRIPTION	TOP ELEVATION
1	Terminal Building	520'	4	Fuel Farm	524'
2	Hangar (Private)	525'			
3	Conventional Hangar (Public)	528'			

Top Elevation column required for Terminal/GA Area plan or for ALP if there is no Terminal/GA Area Plan

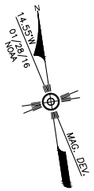
FAA's approval of this Airport Layout Plan (ALP) represents acceptance of the general location of future facilities depicted. During the preliminary design phase, the airport sponsor is required to resubmit for approval the final locations, heights and exterior finish of structures. FAA's concern is obstructions, impact on electronic aids or adverse effects on controller view of aircraft approach and ground movement areas which could adversely affect the safety, efficiency or utility of the airport.

There are existing threshold siting surface object penetrations.

The Building Restriction Line shown assumes a height of 20' above the ground level (AGL). Buildings less than 20' could be positioned closer to the runway and buildings taller than 20' will be required to be further from the runway.

There are OFZ penetrations other than frangible NAVAIDs.

To protect operational safety and future development, all proposed construction on the airport must be coordinated by the airport owner with the Airports District Office prior to construction. FAA's review takes approximately 60 days.



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Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

File Name:	Dwn.	Chkd.	Dsgn.	
str_02_data_tables_pln.dwg	CEJ	ECD	JAG	16.04.26 YY.MM.DD

Permit-Seal

Client/Project
PLYMOUTH MUNICIPAL AIRPORT

PLYMOUTH, NEW HAMPSHIRE

Title
AIRPORT DATA SHEET

Project No.	Scale	
195210752	AS NOTED	
Drawing No.	Sheet	Revision
	2 of 9	0

ORIGINAL SHEET - ARCH D

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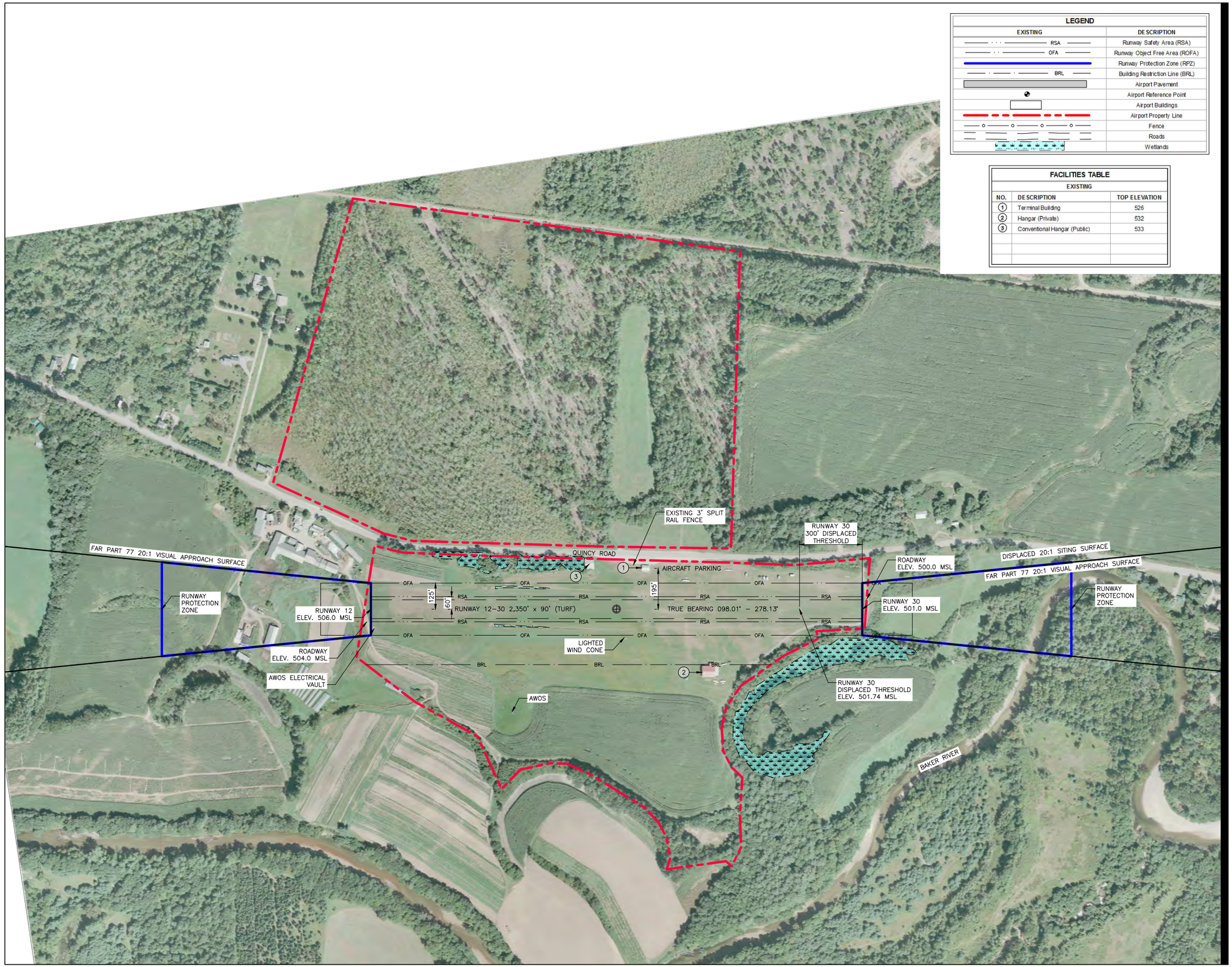

LEGEND

EXISTING	DESCRIPTION
RSA	Runway Safety Area (RSA)
OFA	Runway Object Free Area (ROFA)
	Runway Protection Zone (RPZ)
BRL	Building Restriction Line (BRL)
	Airport Pavement
	Airport Reference Point
	Airport Buildings
	Airport Property Line
	Fence
	Roads
	Wetlands

FACILITIES TABLE

EXISTING

NO.	DESCRIPTION	TOP ELEVATION
1	Terminal Building	526
2	Hangar (Private)	532
3	Conventional Hangar (Public)	533

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MAG. BRG.

0 200' 400'

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

File Name: sht_03_exist_facilities_plh.dwg | CEJ Dwn. | ECD Chkd. | JAG Dsgn. | 16.09.13 YY.MM.DD

Permit-Seal

Client/Project
PLYMOUTH MUNICIPAL AIRPORT

PLYMOUTH, NEW HAMPSHIRE

Title
EXISTING FACILITIES PLAN

Project No.
195210752

Scale
AS NOTED

Drawing No.

Sheet
3 of 9

Revision
0

ORIGINAL SHEET - ARCH D

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FACILITIES TABLE					
EXISTING			PROPOSED		
NO.	DESCRIPTION	TOP ELEVATION	NO.	DESCRIPTION	TOP ELEVATION
①	Terminal Building	520'	④	Fuel Farm	524'
②	Hangar (Private)	525'			
③	Conventional Hangar (Public)	528'			

Top Elevation column required for Terminal/GA Area plan or for ALP if there is no Terminal/GA Area Plan

LEGEND		
EXISTING	DESCRIPTION	PROPOSED
RSA	Runway Safety Area (RSA)	SAME
OFA	Runway Object Free Area (ROFA)	SAME
	Runway Protection Zone (RPZ)	SAME
BRL	Building Restriction Line (BRL)	SAME
	Airport Pavement	
	Airport Reference Point	
	Airport Buildings	
	Airport Property Line	
	Fence	
	Roads	SAME
	Wetlands	SAME
N/A	Land Acquisition	
N/A	Easement Acquisition	
N/A	Runway Lighting	

TOWN OF PLYMOUTH, NH

This Airport Layout Plan Is Hereby Approved

Signature ____________ Date ________

Name Paul Freitas

Title Town Administrator

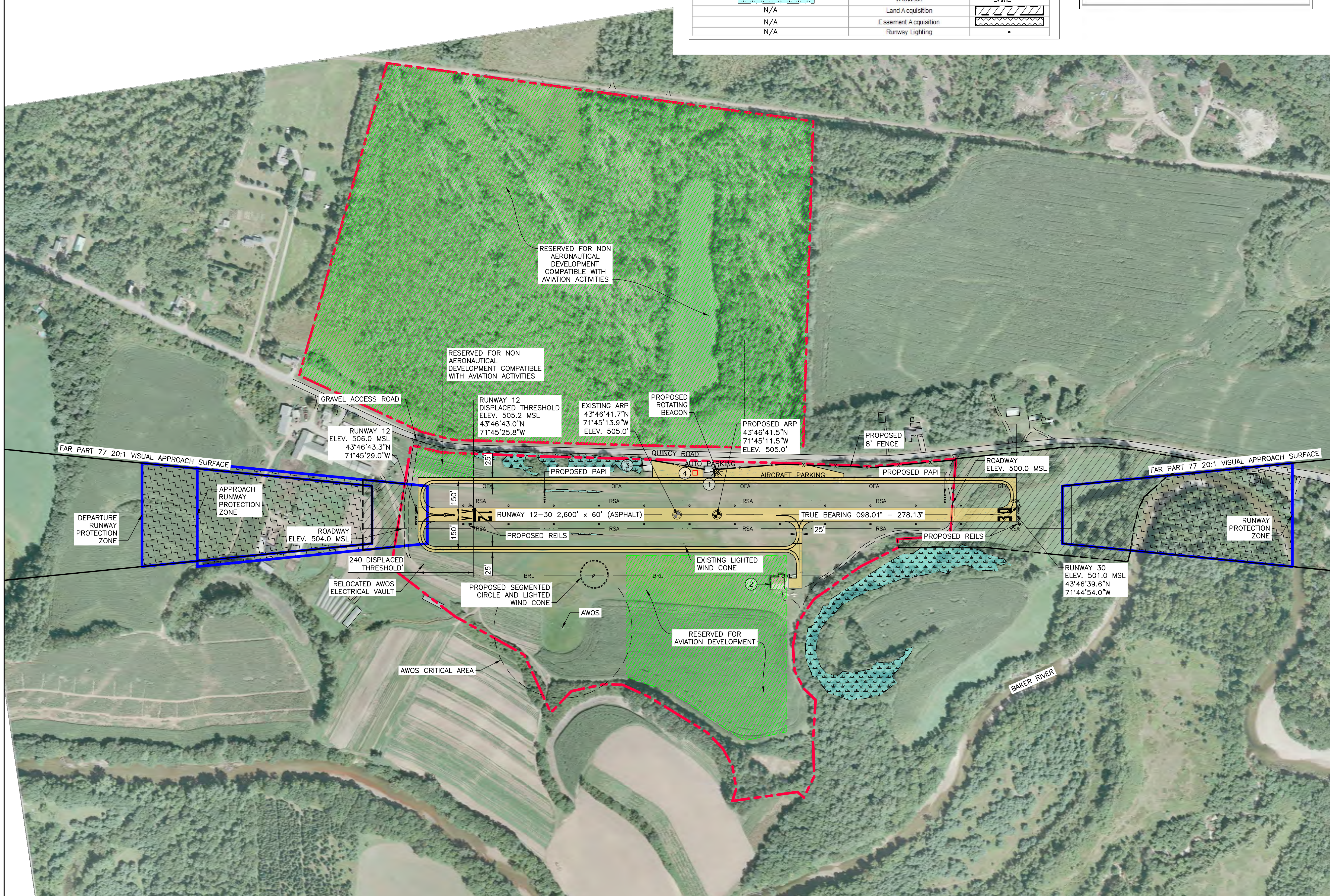
NEW HAMPSHIRE DEPARTMENT OF TRANSPORTATION

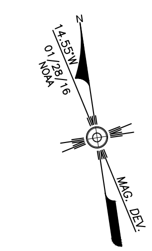
This Airport Layout Plan Is Hereby Approved

Signature ____________ Date ________

Name Patrick C. Herlihy

Title Director of Aeronautics, Rail & Transit





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Revision	By	Appd.	YY.MM.DD
Issued	By	Appd.	YY.MM.DD
File Name: sht_04_airport_layout_pln.dwg	CEJ (Dwn.)	ECD (Chkd.)	JAG (Dsgn.) 16.04.26 (YY.MM.DD)

Permit-Seal

Client/Project
PLYMOUTH MUNICIPAL AIRPORT

PLYMOUTH, NEW HAMPSHIRE

Title
AIRPORT LAYOUT PLAN

Project No.	Scale	
195210752	AS NOTED	
Drawing No.	Sheet	Revision
	4 of 9	0

ORIGINAL SHEET - ARCH D

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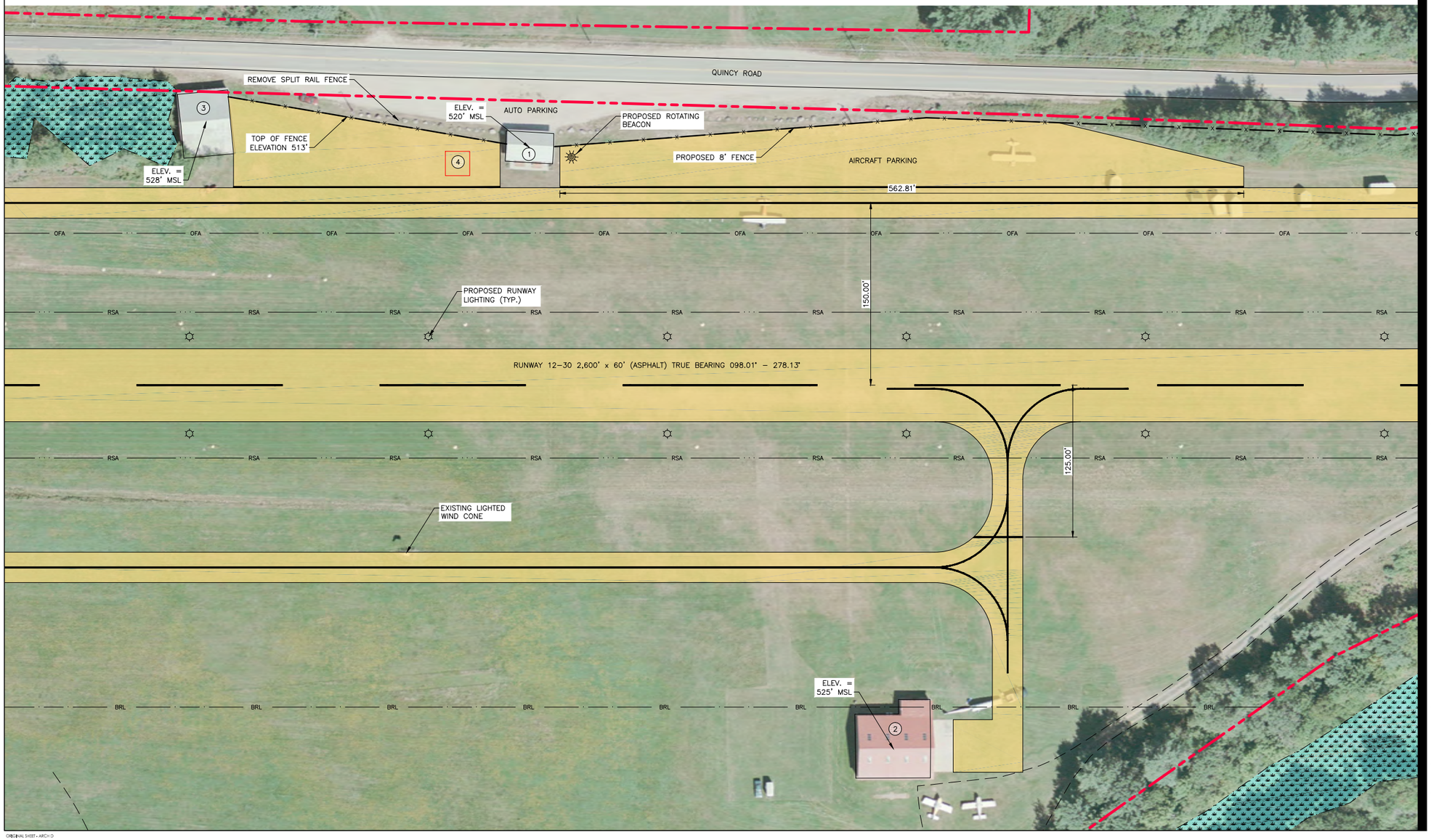
FACILITIES TABLE

EXISTING			PROPOSED		
NO.	DESCRIPTION	TOP ELEVATION	NO.	DESCRIPTION	TOP ELEVATION
1	Terminal Building	520'	4	Fuel Farm	524'
2	Hangar (Private)	525'			
3	Conventional Hangar (Public)	528'			

Top Elevation column required for Terminal/GA Area plan or for ALP if there is no Terminal/GA Area Plan

LEGEND

EXISTING	DESCRIPTION	PROPOSED
RSA	Runway Safety Area (RSA)	SAME
OFA	Runway Object Free Area (ROFA)	SAME
	Runway Protection Zone (RPZ)	SAME
BRL	Building Restriction Line (BRL)	SAME
	Airport Pavement	
	Airport Reference Point	
	Airport Buildings	
	Airport Property Line	
	Fence	
	Roads	SAME
	Wetlands	SAME
N/A	Land Acquisition	
N/A	Easement Acquisition	



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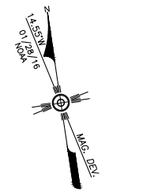

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Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

File Name: sht_05_terminal_plh.dwg	Dwn.	Chkd.	Dsgn.	YY.MM.DD
	CEJ	ECD	JAG	16.04.26

Permit-Seal

Client/Project
PLYMOUTH MUNICIPAL AIRPORT

PLYMOUTH, NEW HAMPSHIRE

Title
TERMINAL PLAN

Project No.	Scale	
195210752	AS NOTED	
Drawing No.	Sheet	Revision
	5 of 9	0

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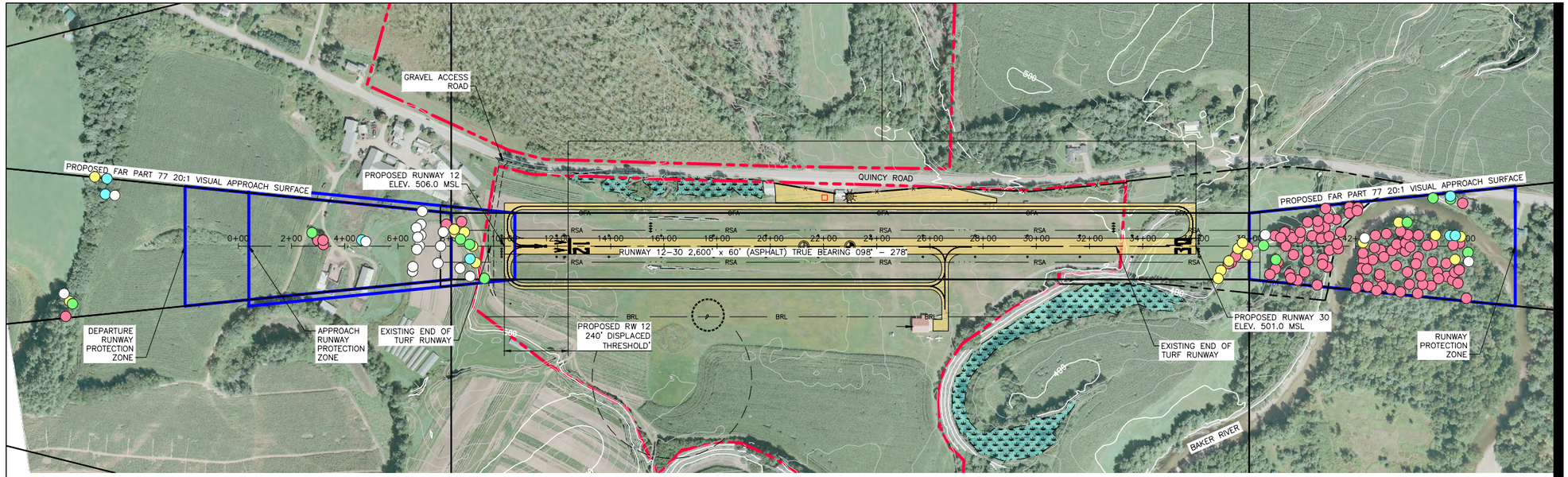

RUNWAY 12-30 PLAN

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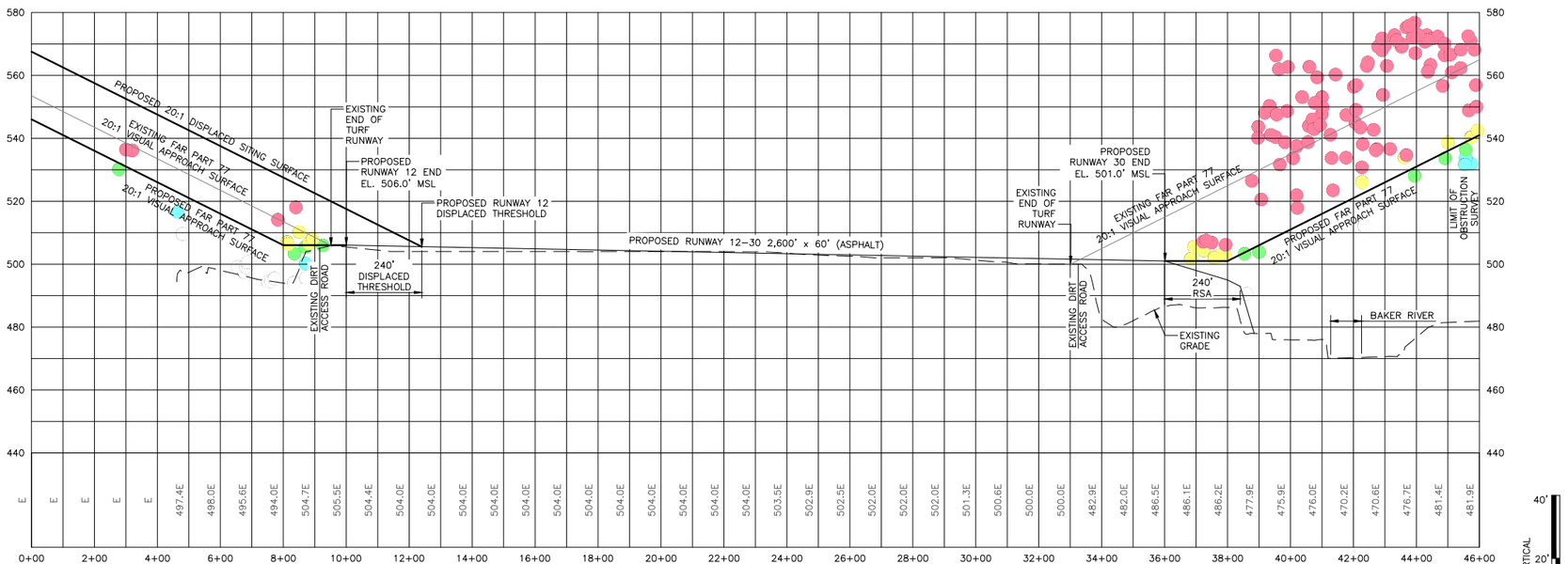

RUNWAY 12-30 PROFILE

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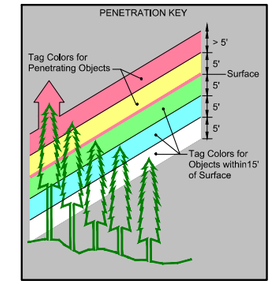

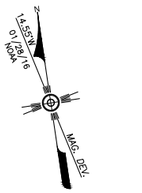

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Issued		By	Appd.	YY.MM.DD

File Name: sht_06_rw_pln_profile.dwg	Dwn. CEJ	Chkd. ECD	Dsgn. JAG	16.04.26 YY.MM.DD

Permit-Seal

Client/Project
PLYMOUTH MUNICIPAL AIRPORT

PLYMOUTH, NEW HAMPSHIRE

Title
RUNWAY 12-30
PLAN AND PROFILE

Project No.
195210752

Scale
AS NOTED

Drawing No.

Sheet
6 of 9

Revision
0

ORIGINAL SHEET - ARCH D

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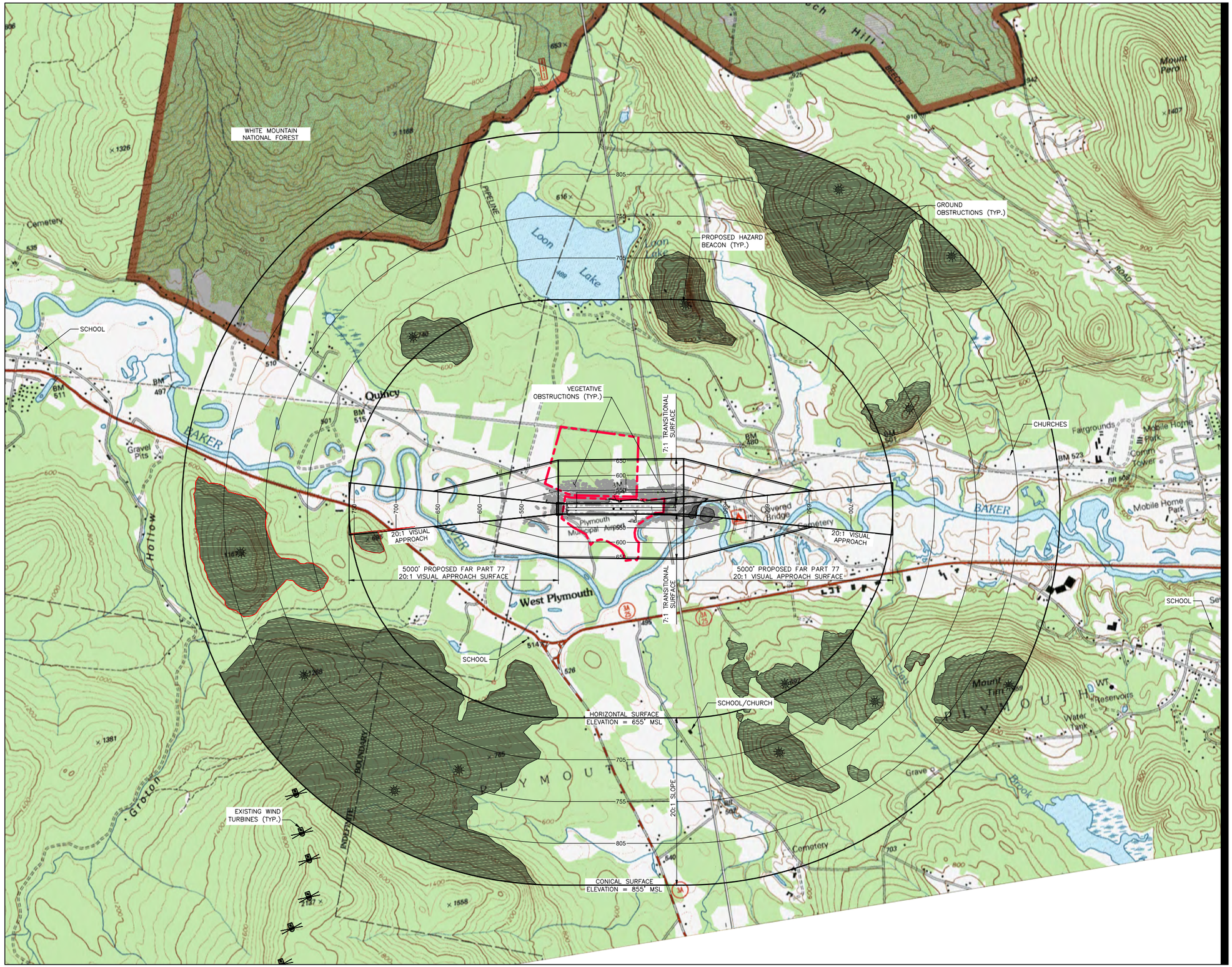

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LEGEND

- PROPOSED HAZARD BEACON
- EXISTING WIND TURBINE

14.55°W (2016) MAG. DEC.

0 1000' 2000'

SOURCE: USGS QUAD MAP

Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

File Name: shl_07_airport_airspace_plh.dwg | Dwn. CEJ | Chkd. ECD | Dsgn. JAG | 16.04.26

Permit-Seal

Client/Project
PLYMOUTH MUNICIPAL AIRPORT

PLYMOUTH, NEW HAMPSHIRE

Title
AIRPORT AIRSPACE PLAN

Project No.	Scale	
195210752	AS NOTED	
Drawing No.	Sheet	Revision
	7 of 9	0

ORIGINAL SHEET - ARCH D

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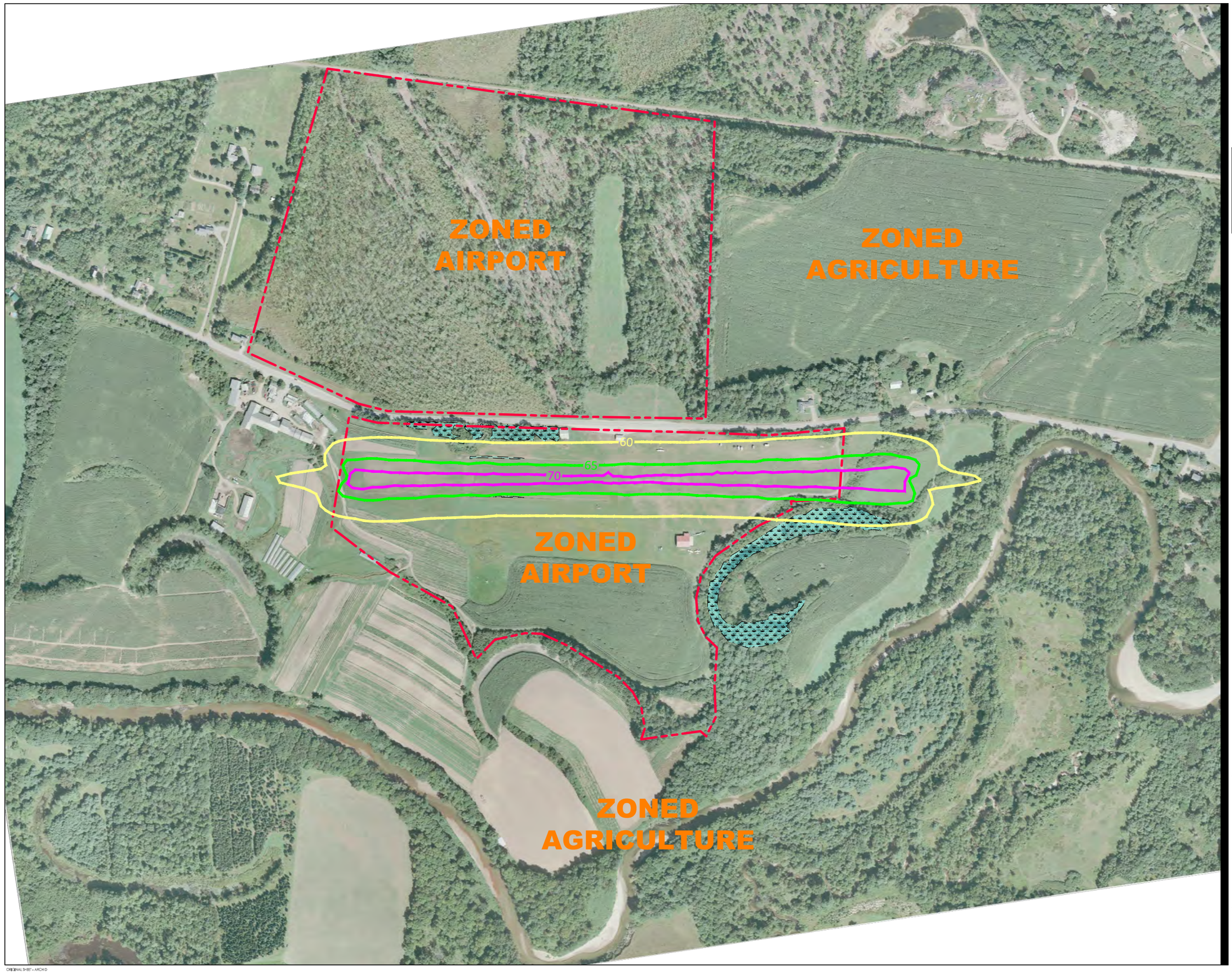

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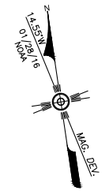
LEGEND

- 60 — 60 LDN CONTOUR
- 65 — 65 LDN CONTOUR
- 70 — 70 LDN CONTOUR



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Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

File Name: sht_08_land_use_pln.dwg	CEJ Dwn.	ECD Chkd.	JAG Dsgn.	16.04.26 YY.MM.DD

Permit-Seal

Client/Project
PLYMOUTH MUNICIPAL AIRPORT

PLYMOUTH, NEW HAMPSHIRE

Title
LAND USE PLAN

Project No.	Scale	
195210752	AS NOTED	
Drawing No.	Sheet	Revision
	8 of 9	0

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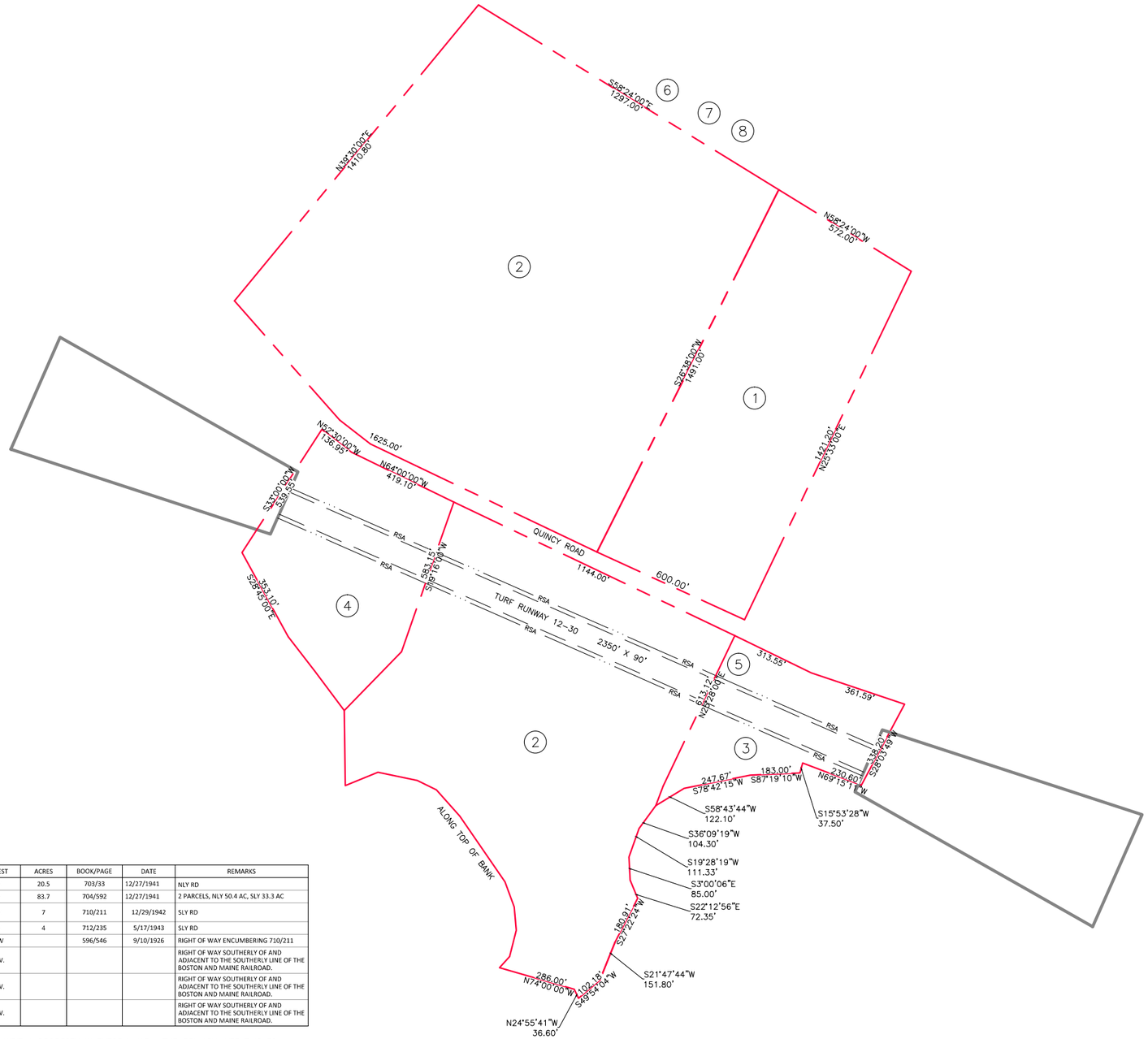

PARCEL	GRANTOR	GRANTEE	INTEREST	ACRES	BOOK/PAGE	DATE	REMARKS
1	HATTIE G. TROW	TOWN OF PLYMOUTH	FEE	20.5	703/33	12/27/1941	NLY RD
2	HELENA SPALDING	TOWN OF PLYMOUTH	FEE	83.7	704/592	12/27/1941	2 PARCELS, NLY 50.4 AC, SLY 33.3 AC
3	ROBERT E. & ELIZABETH H. FULLER	TOWN OF PLYMOUTH	FEE	7	710/211	12/29/1942	SLY RD
4	HELENA SPALDING	TOWN OF PLYMOUTH	FEE	4	712/235	5/17/1943	SLY RD
5		UTILITIES POWER CO.	R.O.W		596/546	9/10/1926	RIGHT OF WAY ENCUMBERING 710/211
6		PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE	R.O.W.				RIGHT OF WAY SOUTHERLY OF AND ADJACENT TO THE SOUTHERLY LINE OF THE BOSTON AND MAINE RAILROAD.
7		WHITE MOUNTAIN POWER COMPANY	R.O.W.				RIGHT OF WAY SOUTHERLY OF AND ADJACENT TO THE SOUTHERLY LINE OF THE BOSTON AND MAINE RAILROAD.
8		NEW ENGLAND TELEPHONE COMPANY	R.O.W.				RIGHT OF WAY SOUTHERLY OF AND ADJACENT TO THE SOUTHERLY LINE OF THE BOSTON AND MAINE RAILROAD.

1. THIS IS NOT A BOUNDARY SURVEY. THIS IS AN FAA EXHIBIT A PROPERTY INVENTORY MAP. THE PRIMARY INTENT IS TO IDENTIFY ALL LAND THAT IS DESIGNATED AIRPORT PROPERTY AND TO PROVIDE AN INVENTORY OF ALL PARCELS THAT MAKE UP THE AIRPORT. PHYSICAL SURVEY OF BOUNDARIES IS GENERALLY NOT REQUIRED. REFER TO AC 150/5100-17.
2. DEED BOOK AND PAGES REFER TO DEEDS RECORDED AT THE GRAFTON REGISTRY OF DEEDS, NORTH HAVERHILL, NEW HAMPSHIRE.
3. REFERENCE IS MADE TO A PLAN ENTITLED "PLYMOUTH AIRPORT LAND, SOUTHERLY OF QUINCY ROAD, PLYMOUTH, N.H., BELONGING TO TOWN OF PLYMOUTH" SURVEYED 1974, REVISED FEBRUARY 2000, BY FRENCH LAND SERVICES INCORPORATED.
4. AREAS LISTED IN THE PROPERTY INVENTORY TABLE AND BEARINGS AND DISTANCES SHOWN ON THE PLAN WERE RECITED IN THE DEEDS OR TAKEN FROM THE AFORE MENTIONED SURVEY PLAN.

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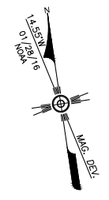
LEGEND	EXISTING
AIRPORT PROPERTY LINE	
ABUTTERS' PROPERTY LINE	
RUNWAY SAFETY AREA (RSA)	RSA



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Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD

File Name: sht_09_property_map.dwg	CEJ	ECD	CBK	16.04.26
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project
PLYMOUTH MUNICIPAL AIRPORT

PLYMOUTH, NEW HAMPSHIRE

Title
PROPERTY MAP
EXHIBIT 'A'

Project No.	Scale	
195210752	AS NOTED	
Drawing No.	Sheet	Revision
	9 of 9	0

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Federal Aviation Administration

September 19, 2016

TO:
Town of Plymouth
Attn: Colin McIver
Airport Manager
6 Post Office Square
Plymouth, NH 03264
colinmciver@yahoo.com

CC:
Stantec Consulting Services
Attn: Ervin Deck
482 Payne Road
Scarborough, ME 04074
ervin.deck@stantec.com

RE: *(See attached Table 1 for referenced case(s))*
ALP 7460 No Objection Letter
FINAL DETERMINATION

Table 1 - Letter Referenced Case(s)

ASN	Prior ASN	Location	Latitude (NAD83)	Longitude (NAD83)	AGL (Feet)	AMSL (Feet)
2016-ANE-72-NRA		PLYMOUTH, NH	43-46-41.50N	71-45-15.50W	1	506

Description: First ever ALP

The proposed change to your currently approved Airport Layout Plan (ALP) submitted, has been reviewed under the authority of Part 77 and under the requirements of the Terms and Conditions of Accepting Airport Improvement Program Grants dated September 1, 1999. This review has considered the safety and utility of aircraft operations and planned navigational aids as related to this proposal.

The proposal does not exceed any federal obstruction standard, however the following conditions need to be met for the Federal Aviation Administration (FAA) to have no objections to the proposed development.
All SBG comments previously sent must be incorporated into the final ALP.

It should be noted that this study did not consider the height of construction equipment. This information needs to be coordinated with this office via an "Airspace Study Checklist" before construction begins.

This study did not evaluate the plans for operational safety during construction. Those plans should be submitted to this office for coordination and review prior to construction.

This determination does not include any environmental analysis or environmental approval for this proposal. All local and state requirements and/or permits must be obtained to prior to construction of this proposal.

This determination does not include approval of any lease, does not release any surplus or grant agreement acquired airport property, nor does it relieve the airport owner or the proponent of compliance with Part 155, or any other law, ordinance, or regulation of federal, state, or local government body or organization. Furthermore, the design and location of any stormwater retention/detention facilities on or near the airport must comply with FAA Advisory Circular 150/5200-33 "Hazardous Wildlife Attractants on or Near Airports", and must be approved on the ALP prior to construction.

We look forward to working with you in the continued development of your airport. If you have any questions, please contact me at rhunt@dot.state.nh.us.

Tracey Mcinnis
Specialist

7.0 IMPLENTATION & FINANCIAL PLANS

The last chapter in the Plan, details the costs associated with the preferred alternative and explains how the town can implement this Plan. Also, this chapter explains how the National Plan of Integrated Airport Systems (NPIAS) can offset a major part of the costs. This section also explains the NPIAS process and the benefits and, of course, the ramifications for the town and the airport of accepting federal funding through the Airport Improvement Program (AIP).

Finally, a Capital Improvement Plan is presented, which describes the steps required to reach the development discussed in Chapter 5, *Alternative Analysis,* and illustrated in Chapter 6, *Airport Layout Plan*. Where applicable, it will include suggestions on how to phase in the projects that require multiple steps and multiple fiscal years to implement fully.

7.1 A UNIQUE PLAN

The Plymouth master plan is a special case because the airport has not yet been incorporated into NPIAS and therefore does not receive federal funding for airport improvement projects. Aside from the financing of this master plan, all airport improvement projects up to this point have been funded by the town of Plymouth, various private entities, or a combination of both.

A major purpose of this master plan was to serve as a guide to the comunity in making the critical decision on whether to seek entry into NPIAS. As a result, this report did not follow the standard master plan process. Under traditional conditions, a master plan or master plan update is prepared for an airport that is already incorporated into NPIAS. Thus, a major goal in the project's preparation is to aid the FAA (and state) in creating they're own federal and state financial development plans. Once both agencies accept the plan, the proposed development concepts are added to the federal and New Hampshire lists for funding consideration. But as noted in this document, Plymouth is unique because the airport is not part of NPIAS. This process leads to three questions. First, will the town seek entry into the program; second will it be accepted; and three, what next? For example, what direction will the town take if accepted and, what direction will the town take if not accepted into the program?

At this point in a "traditional" master plan process, we prepare a schedule of projects, sorted by three priorities: safety, then capacity, and finally, other (miscellaneous) projects. We would then break out each into a timeline by years. The safety critical projects (such as obstructions) are dealt with first. Next, are the capacity related projects, like expanding apron space, or development areas for hangars. Finally, the miscellaneous projects, like paving the runway or adding a taxiway or an aircraft fuel system are considered.

After weighing the many factors in this report, and the unique status of Plymouth, we elected to proceed from this point forward as if the town were in NPIAS. That is, we have prepared a traditional Airport Capital Improvement Program (ACIP) under the assumption that regardless of what approach the town takes, they will have a viable schedule to follow, and more importantly, one that would fit nicely into the federal and state funding programs. However,

first, it is important to have a discussion about the benefits NPIAS can bring to the town and what the town's responsibilities are if they enter the System.

7.2 THE NATIONAL PLAN OF INTEGRATED AIRPORTS SYSTEM

The NPIAS is essentially an inventory of U.S. aviation infrastructure. It is developed and maintained by the FAA. It identifies existing and proposed airports that are significant to national air transportation in the U.S., and thus eligible to receive federal grants under the AIP. It also includes estimates of the amount of AIP money needed to fund infrastructure development projects that will bring these airports up to current design standards and add capacity to congested airports.

Today, airports across the country function as an interrelated system. To coordinate and fund this system, the FAA developed and annually updates the NPIAS. The NPIAS now consists of a system of more than 3,300 existing and proposed airports. When first established, one of the goals of the NPIAS was to provide convenient access to air transportation to as many people as possible, typically not more than 20 miles or 30 minutes to the nearest NPIAS airport.

The goals of the NPIAS today have been refined and are more defined. It strives for the system to foster permanency regarding its airport structures but also looks to be flexible, expandable, and compatible with surrounding communities. (More detail on this can be found below in the NPIAS Guiding Principles.) The NPIAS categorizes airports into three broad groups: commercial (which are further classified as primary or non-primary), reliever and general aviation.

- **Commercial Service Airports –** Commercial airports are airports with scheduled airline service (United, Delta, Southwest, etc. to name a few) and are further classified as either primary or non-primary as explained below.
  - **Primary Commercial Service Airports** – are airports that experience more than 10,000 annual airline passenger enplanements[1]. As an example, with nearly 1.4 million annual passenger enplanements, Manchester Airport is a primary airport.
  - **NonPrimary Commercial Airports –** are airports that experience at least 2,500 annual airline passenger enplanements, but less than 10,000. Lebanon Municipal Airport, with just under 8,000 annual enplanements, is a non-primary airport.
- **Reliever Airports** – these are airports that are designed by the FAA for the purpose of providing congestion relief for non-commercial traffic to a congested primary commercial service airport. Nashua's Boire Field is a reliever airport for Manchester.
- **General Aviation Airports** – Airports that do not fall into any of the above categories (as well as military airports) are classified as general aviation airports. Plymouth Municipal Airport would belong to this category.

7.3 GENERAL AVIATION AIRPORTS: A NATIONAL ASSET

[1] An enplanement is a paying passenger boarding an aircraft.

In May 2012, the FAA published General Aviation Airports: A National Asset[2]. In this report, the FAA produced another categorization system for all non-primary airports, calling them all General Aviation (GA) airports.[3] The report states that a GA airport provides "a variety of functions, ranging from access to emergency medical services, disaster relief, aerial firefighting, law enforcement and border control to agricultural functions, flight training, charter passenger and time-sensitive air cargo services, among others." The report also includes an in-depth analysis that highlights the pivotal role non-primary airports (or GA airports) play in our society, economy, and the aviation system. The report details four new categories for GA airports— national, regional, local, and basic—based on their existing activity levels:

- **National** – "A national airport supports the national and state system by providing communities with access to domestic and international markets in multiple states and throughout the United States."
- **Regional** – "Regional airports support regional economies by connecting communities to statewide and interstate markets."
- **Local** – "Local airports supplement local communities by providing access primarily to intrastate and some interstate markets."
- **Basic** – "a basic airport supports general aviation activities such as emergency service, charter or critical passenger service, cargo operations, flight training, and personal flying." Plymouth Municipal is considered a "basic" airport (Figure 7.1).

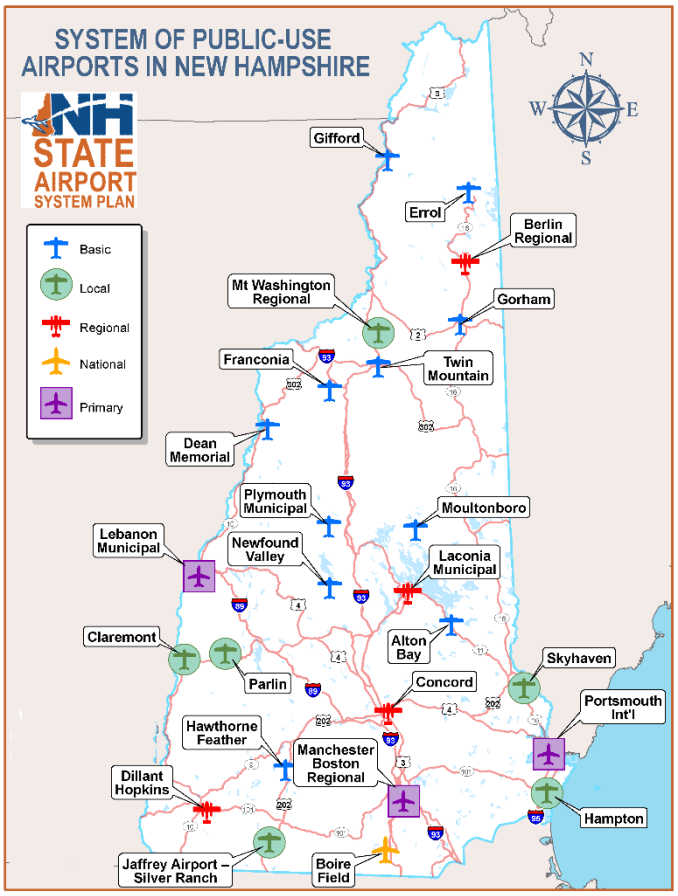

Figure 7.1. NH Airports

[2] http://www.faa.gov/airports/planning_capacity/ga_study/
[3] The original study was unable to categorize a number of airports. In 2014, ASSET 2: In-Depth Review of the 497 Unclassified Airports was published, which documents the results of a 2014 follow-on study of these facilities.

7.4 GUIDING PRINCIPLES OF THE NPIAS

The general principles guiding federal involvement have remained relatively unchanged since a national airport system was envisioned in the Federal Airport Act of 1946. The airport system should have the following attributes to meet the demand for air transportation:

a. Airports should be safe and efficient; located at optimum sites, and developed and maintained to appropriate standards.

b. Airports should be affordable to both users and government, relying primarily on user fees and placing minimal burden on the general revenues of local, state, and the federal government.

c. Airports should be flexible and expandable, able to meet increased demand and to accommodate new aircraft types.

d. Airports should be permanent, with the assurance that they will remain open for aeronautical use over the long term.

e. Airports should be compatible with surrounding communities, maintaining a balance between the needs of aviation and the requirements of residents of neighboring areas. Airports should be developed in concert with improvements to the air traffic control system.

f. The airport system should support national objectives for defense, emergency readiness, and postal delivery.

g. The airport system should be extensive, providing as many people as possible with convenient access to air transportation, typically not more than 20 miles (30 minutes) travel to the nearest NPIAS airport.

h. The airport system should help air travel contribute to a productive national economy and international competitiveness.

7.5 STANDARDS FOR PARTICIPATING IN THE NPIAS

The FAA uses several criteria for entry into the NPIAS. An existing or proposed airport may be included in the NPIAS if it meets all four of the requirements listed in Table 7.1.

Table 7.1. Standards for Participating in NPIAS

Requirement	Plymouth Meets	Note
It is included in a State Aviation System Plan, assuming one exists.	✓	1P1 is part of the NH State Aviation System of airports[4]
It serves a community more than 30 minutes from the nearest existing or proposed NPIAS airport.	✓	The closest community with an airport is Laconia and the Laconia Municipal Airport (LCI) is 31 miles southeast; about 39 minutes driving time (see Table 2.4, page 2.18).
It is forecast to have 10 based aircraft during the short-range planning period (within 5 years).	✓	The airport has a seasonal average of 17 based aircraft, with forecasts indicating a range of between 17 and 21 aircraft through the 20-year planning period (see Table 3.3, page 3.14).
There is an eligible sponsor willing to undertake the ownership and development of the airport.	✓	As a municipal government, the town of Plymouth is a qualified sponsor. [5]

Source: FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS).

As noted, should the town decide to move forward, the Plymouth Municipal Airport is eligible for entry into the NPIAS. It is extremely important to note, however, that the plan that follows in this chapter is subject to considerable change. First, because entry into NPIAS will not happen overnight; it could take several years. Moreover, second, priorities will and do change, both internally within the town and externally with the funding agencies. Therefore, as with any Airport Capital Improvement Plan (ACIP), the list of projects and their funding priorities must remain fluid. This report and the accompanying Airport Capital Investment Plan (ACIP) is a guide only.

7.6 NPIAS – THE DRAWBACKS, OBLIGATIONS, AND BENEFITS

The decision to join NPIAS should not be taken lightly. This Study and the accompanying documentation (ALP, Property Map, Wildlife Hazard Site Visit Report et al.) are intended for use in support of a request to join NIPAS if desired.

7.6.1 Benefits of non-NPIAS Status

If the Plymouth airport does not make a request to join NPIAS, the airport's status will remain status quo. Status quo means that in the years when the NHDOT Bureau of Aeronautics is fully funded, the Airport would be eligible for:

[4] 2015 State Airport System Plan
[5] A sponsor is any public agency or private owner of a public use airport, as defined in the Airport and Airway
Improvement Act of 1982 (AAIA), codified at 49 U.S.C. § 47102(26).

- Aircraft Operating Fee (AOF) Returns: This is the 25% of the aircraft registration fee (the aircraft operating fee) that aircraft based at the airport pay that is returned to the airport; Plymouth has been getting $300-$600 annually.
- Grants to Airport Sponsors: None-NPIAS airports receive 90% of the funds used for the maintenance, operation, and improvement. NPIAS airports get 10% of the funds); Generally, NHDOT has had between $50,000 and $100,000 in this program; Plymouth has in the past received anywhere from $3,000-$5,000 from this program annually.
- State-Local Airport Grants: An 80% state/20% local split for capital improvements is available for non-NPIAS airports; system-wide, NHDOT has had anywhere from $20,000 to $100,000 annually as the state share of this program. [6]
- The airport does not have to meet FAA airport design standards
- The airport does not have to provide FAA's required level of detail to bid proposed airport improvement projects.
- The airport does not have to ask permission from FAA or NHDOT to purchase additional land or easements, or to sell or otherwise dispose of existing airport property.
- The airport does not have to ask permission from FAA or NHDOT to lease portions of the airport for non-aeronautical uses.
- Revenues generated by the airport (e.g., such as leases, fuel flowage fees, and parking fees) are not restricted and can be used at the airport or as part of the town's general fund.

7.6.2 Federal Obligations

Once the airport is (1) participating in the NPIAS and (2) accepts an FAA grant offer for a development project, the town at that point must accept the obligations regarding the operation, use, and maintenance of the airport in return for the federal financial investment. The documents that obligate an airport to FAA requirements include, but are not limited to the following agreements and statutes:

- Federal grant agreements that include sponsor assurances and any special conditions placed in the grant agreement (see Appendix F for the current airport sponsor grant assurances).[7]
- Instruments of transfer of federal surplus property (including land, buildings or equipment).
- Deeds and other conveyances issues by any agency of the federal government.
- Federal Aviation Act of 1958, Section 308(a), *Exclusive Rights*.
- Civil Rights Act of 1964, Title VI

[6] It is important to note that the Bureau of Aeronautics has not received "normal" or "fully funded monies for non-NPIAS airports since 2008.
[7] Current as of March 2016.

7.6.3 Benefits of NPIAS Status

If the Town elects to participate in NPIAS, many benefits can be realized should the airport be accepted, including:

- Funding Assistance: 90% reimbursement by FAA and 5% reimbursement by NHDOT of eligible project costs when funds are available. [8]
- Protection from Airport Closure: Guidance and support from the FAA to keep the airport available for aeronautical purposes for the long term.
- Support of Airport Security: Guidance and support from the FAA for airport security improvements.
- Protection from Non-Compatible Uses: Guidance and support from FAA to protect airspace, especially when threatened by non-aeronautical development (e.g. tall towers, incompatible land uses, etc.). Although 1P1 is a federally registered airport and once the ALP is complete and the information is provided to the FAA, airspace will be protected to the extent permitted by law by the FAA from future growth and development.[9]
- Non-Primary Entitlement Funding: Federal funding of an annual entitlement sum of 20% of the eligible airport development costs during a five-year period up to a cap of $150,000 per year. (Assuming the cap can be reached by the airport, this annual entitlement can leverage a $166,666 project using 90% FAA and 5% state funding. This amount can be accumulated annually for up to four years (i.e., 4 years x $150,000 of federal funding can leverage a $666,664 project at 90% FAA and 5% state participation).

7.6.4 Types of AIP-Eligible Projects

Eligible projects include those improvements related to enhancing airport safety, capacity, security, and environmental concerns. In general, sponsors can use AIP funds on most airfield capital improvements or repairs and in some specific situations, for terminals, hangars, and non-aviation development. Any professional services that are necessary for eligible projects — such as planning, surveying, and design — are also eligible. Aviation demand at the airport must justify the projects, which must also meet federal environmental and procurement requirements.

Projects related to airport operations and revenue-generating improvements are typically *not* eligible for funding. Operational costs — such as salaries, equipment, and supplies — are also not eligible for AIP grants.

Table 7.2 lists typical examples of eligible and ineligible projects; the list is not complete.

[8] Neither the availability nor the percentage share of federal and state funding assistances is guaranteed. The federal funds must be authorized by Congress and approved by the President each year. The state funds must be authorized by the legislature and the Governor and approved by Executive Council of the State of New Hampshire.
[9] 14 CFR Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace. See §77.29, Evaluating Aeronautical Effect, and §77.31, Determinations.

Table 7.2. Examples of Eligible and Ineligible AIP Projects

Eligible Projects	Ineligible Projects
Runway construction/rehabilitation	Maintenance equipment and vehicles
Taxiway construction/rehabilitation	Office and office equipment
Apron construction/rehabilitation	Landscaping
Airfield lighting	Artworks
Airfield Signage	Industrial park development
Airfield drainage	Marketing plans
Land acquisition	Training
Weather observation stations (AWOS)	Improvements for commercial enterprises
NAVAIDs such as REILs and PAPIs	Maintenance or repairs of buildings [10]
Planning studies	
Environmental studies	
Safety area improvements	
Airport layout plans (ALPs)	
Access roads only located on airport property	
Fuel farms[11]	
Aircraft hangars[12]	
Removing, lowering, moving, marking, and lighting hazards	
Snow Removal Equipment[13]	

Source: FAA Airport Improvement Manual

Also, the following must also apply for FAA to consider a project for AIP funding:

- The sponsorship project requirements have been met.
- The project is reasonably consistent with the plans of planning agencies for the development of the general region in which the airport is located.
- Sufficient funds are available for the portion of the project not paid for by the federal government.
- The project will be completed without undue delay.
- The airport location is included in the current version of the NPIAS.

[10] Does not include eligible terminal buildings or parts thereof.
[11] May be eligible. Check with NHDOT or local FAA Airports Division office.
[12] See footnote 7
[13] To be eligible, the vehicles must be owned and operated by the Airport and meet the Buy American Preference specified in the AIP grant

- The project involves more than $25,000 in AIP funds.
- The project is depicted on a current airport layout plan approved by FAA.

7.6.5 NPIAS Airport Responsibilities

Participating in NPIAS means that some operational and record keeping functions by the airport or town of Plymouth may have to change to be in compliance. Similar to the NPIAS benefits, these are primarily big-picture issues rather than daily matters. Appendix 6 contains the current Airport Sponsor Assurances to which the Town would have to adhere.

Annually, the NHDOT/Bureau of Aeronautics (biennially for the FAA) conducts an inspection to update FAA form 5010-1, this form summarizes for the FAA and others the facilities and their conditions and e inspection process are done regardless of the Airport's participation status in NPIAS. Suggestions for future improvements are made as part of this process. The Plymouth Municipal Airport 5010 (also referred to as the Airport Master Record) can be found in Chapter 2, page 13.

Periodically, but usually before implementing major airport improvement projects, the FAA will conduct an inspection of the airport for compliance with Grant Assurances, FAA Advisory Circular 150/5300-13A, Airport Design, and, where applicable, FAR Part 139, Certification of Airports14. Results of this compliance inspection and any deficiencies found may have an impact on future funding; typically project priorities are rearranged. There are many advisory circulars published in print (for free) and on the Internet by FAA that provide guidance in meeting the requirements identified in these Grant Assurances.

7.6.6 Discontinuing NPIAS Participation

Another aspect of the NPIAS effects on the airport is the ability of an airport to discontinue its participation in the NPIAS once it is a participant and has accepted a development grant from the FAA. A parallel issue is what happens if the town decides it no longer wants to have an airport.

If the town has accepted one or more development grants from FAA and wants to close the airport or withdraw from NPIAS, the FAA Administrator, through the FAA's Assurances - Airport Sponsors, has the discretion to require that the Town return the full FAA grant amount(s) or a prorated portion of the FAA grant amount(s) to the FAA. The NHDOT/BOA has the same discretion. The federal portion of the money is then put back into the Airport and Airway Trust Fund for use at airports all across the nation. Since many physical airport improvements have an expected lifespan of 20 years, the proration may be based on this 20-year timeframe. However, airport land has no such lifespan, and the agencies will require a fair-market value to be obtained for all airport land shown on the Exhibit A - Airport Property Plan that is sold or no longer used for aviation uses. The federal and state dollar value of this land will need to be returned to the agencies. If the airport is to remain in place (rather than closed), the land that is sold will be

[14] Does not include Plymouth Municipal Airport.

required to have terms that run with the land sufficient to ensure that the future use of the land is compatible with the airport and include the Avigation easements necessary to protect the airport's airspace. To close the airport the town would need to provide at least 30 days' notice to the funding agencies and provide sufficient documentation to prove that the useful life of the airport and its facilities has expired or is no longer needed for the purpose for which it was developed. If at least 30 days is not provided to the agencies, then the town is liable for a fine for each day that the airport remains closed after not having given proper notice. Proper notification to airport users (including breaching tenant lease contracts) and appropriate repayment to the funding agencies for funded improvements and land values will need to occur before an airport can be closed.

The FAA does not allow airports to close easily. The documentation required to close an airport is extensive, including appraisal reports of the land value and accounting documentation of grant funds expended and the amount to be returned to the agencies. The agencies may also require justification of the advantages and disadvantages of keeping the airport as an airport versus some non-aeronautical use, history of airport developments and how the property was acquired, and other documents. As an example, the FAA has only approved two airports for closure in the past decade nationwide (not including Chicago's Meigs Field, which FAA did not approve but was closed anyway)15. It is clear that airport closures can be very costly to the sponsor community.

7.6.7 Decision Matrix

One of the goals of this study is to layout the framework for the Town, FAA, and NHDOT/BOA to use when they are ready to make a decision to request or not request participation in the NPIAS. Table 7.3 may prove useful in this decision process. A subjective ranking like the following may be helpful.

1. I disagree
2. I somewhat disagree
3. I am indifferent / I don't know
4. I somewhat agree
5. I agree

[15] The two airports are Blaine Field (4W6) in Blaine, WA, and Vistga Field (S98) in Benton City, WA.

Table 7-3. Decision Matrix

ISSUE	RANKING
The Airport meets the NPIAS participation criteria.	
The Airport is safe.	
The Airport can be expanded or adapted to meet forecasted needs.	
The political situation and community support of the future maintenance of the Airport	
The Airport and community coexist harmoniously.	
The Airport can meet FAA design criteria.	
The Airport serves a variety of users.	
The Town needs assistances in implementing airport improvements.	
The Town can fund a local share of improvements.	
The Town needs assistance to protect against airport closure.	
The Town needs assistance to protect against incompatible land uses.	
The Town has large projects that would make use of accumulating or sharing entitlement funds.	
The Town is willing to comply with the airport obligations in the Grant Assurances.	
The Town has no intention of closing the Airport.	
Other:	
Other:	

The final decision to request participation in NPIAS or continue the status quo rests with the Town of Plymouth. There is no timeframe or deadline for submission of this application, so that if it is decided not to request participation at this time, the decision can be re-evaluated at a later date and a request submitted at that time.

7.7 FINANCIAL PLAN

Chapter 5, Development Alternatives, produced the Ultimate Airport Layout Plan (Chapter 6), a plan that shows what the airport could look like if the site were developed to its maximum capacity in compliance with FAA design standards. It is understood that this level of development far exceeds the facilities needed based on the projected aviation demand forecasts, but the exercise is necessary to determine if future FAA investment at the airport is feasible. Table 7.4 at the end of this chapter presents the NPIAS Schedule, which is applicable irrespective of the airport's status with NPIAS. The content and costs in Table 7.4 remain accurate whether or not the airport participates in the NPIAS program, but the costs associated with each project would be borne exclusively by the airport and possibly private funding if the status quo prevails.

As previously mentioned, the FAA avoids funding numerous "small" projects individually but instead prefers that "small" projects be packaged together to make up a larger project. Small projects can also be incorporated into larger projects if such an approach makes sense. Also, some projects have a higher priority rating for obtaining FAA funds and it makes sense to

"package" these projects with other related projects that might not have a high priority FAA rating. Therefore, the NPIAS Schedule "packages" projects in a way that should make sense to funding agencies.

The ACIP Schedule uses 2016 dollars. These costs can be revised as time passes by applying historical construction cost growth rates found in McGraw-Hill, Inc.'s *Engineering News Record Construction Cost Index*. Over the past 20 years, this index has averaged an annual growth rate of 3.5% (non-compounded). The NPIAS Schedule also indicates the airport's share (5%) of the proposed capital improvement projects. Should the airport decide to participate in the NPIAS, the FAA would set aside its share (90%) of one-fifth of the project costs during the upcoming five-year period, up to a maximum of $150,000 per year. This amount is the airport's non-primary airport entitlement funds amount (not including the state and local share). This program means that each year, the town could carry out a project with a total federal share cost of up to $150,000, with any excess amounts rolling over to the next year. The town could also elect to accumulate up to four years of non-primary airport entitlements (up to a maximum accumulated amount of $600,000) to fund a larger project. As the FAA has a minimum project amount eligible for a grant of $25,000, sequential projects (or projects with higher priority) could be combined into one project. Under this process the FAA would only be providing one grant every five or so years.

7.7.1 Safety and Capacity

Regardless of Plymouth's eligibility within NPIAS, one major safety concern needs to be addressed during the short-term planning period – the vegetative obstructions to the airport's Part 77 surfaces vastly decrease pilot safety whilee using the airport.

Regarding capacity, the airport does not need to address aircraft parking issues in the short-term. The current apron and hangar facilities are sufficient for demand at its present level. However, forecasts include activity growth, particularly in the intermediate-term, that will require additional hangar and apron parking space.

7.7.2 What are the Project Priorities?

The list of Plymouth's proposed development projects is extensive, both airside and landside. The order in which these projects appear on the capital improvement plan is prioritized based on their importance regarding safety and capacity, as well as the financial feasibility of the town to fund their share. FAA and NHDOT priorities have also been taken into account. With the two agencies, safety always comes first, with the capacity second, followed by all other projects. It is important to note that if Plymouth were to join NPIAS, the airport would only receive its annual entitlement funding under the AIP[16]. All other funding comes from the state, local matching funds, and private contributions. Private and another local funding are used for projects not eligible for a federal or state grant or for those of such low federal/state priority that private funding is needed to accelerate project development.

[16] 1P1's entitlement would be $150,000 per year.

It is important to note that this list is dynamic in nature, meaning the order in which projects appear can (and often does) change for some reasons. Changes in airport demand, funding availability, political disposition are some factors here. The town should be prepared to make adjustments as necessary, provided they are feasible and, most importantly, are part of an approved airport layout plan, if applicable.

7.7.3 We Use Planning Level Cost Estimates

The cost estimates that appear in this, and previous chapters are "planning level" estimates. The planning costs are based on industry standards and our knowledge of similar and recent work, but they are general estimates, and the town should understand that actual costs can and probably will vary one way or the other. For example, the cost of paving the turf runway can change considerably based on some factors, such as soil tests, variations in the cost of raw materials (oil and thus asphalt), and consumer price changes with time.

7.7.4 Funding Agency Cost Sharing

As previously discussed, the FAA could participate in funding eligible projects to the tune of 90% of allowable costs. Moreover, NHDOT would fund 5% under similar rules and policies. This funding level means the local share is about 5% or more.

Using the AIP, the FAA may fund a project if it meets criteria established by Congress. By the word "may", we mean it is up to their discretion as to whether to fund a project in any given fiscal year, a decision that usually begins several years in advance of the planned project date. This process begins in earnest with an approved ALP, because all development projects must be shown on the approved ALP. Planning projects such as this master plan, Environmental Assessments, etc., are an exception, but they must still be listed in the ACIP. In addition to whether a project is eligible to be funded, the FAA follows strict guidelines concerning what aspects of a project they'll fund. As an example, the FAA would fund an easement acquisition project, and subsequent tree clearing, but they will not fund the planting of replacement trees or shrubs (landscaping). Those costs must be borne by the landowner and the town of Plymouth. The NHDOT follows a similar funding protocol. In short, projects funded by the FAA and NHDOT must follow and comply with the AIP and variations from this process often incur additional costs that must be borne by the airport sponsor.

Following the guidelines above, a fully AIP-eligible $100,000 project would break out as $90,000 FAA, and $5,000 each for the state and town. If however, only $95,000 of the $100,000 were eligible under the AIP, the FAA's share would be 90% of $95,000 or $85,500, with the state most likely following suit and covering 5% of $95,000 ($4,750). Under this scenario, the local share would increase to $9,750 (9.75% of the total project cost).

7.7.5 Project Execution

Projects proposed in this Plan are prioritized first by safety, then capacity, and finally, based on the needs of the community. Also, the projects are also prioritized according to the funding priorities of the Town, NHDOT and FAA. That is, the list takes into account when funds might be

available given their priority based on other local, state and federal needs. After the safety issues are corrected, and then the airport can begin to focus on development options. However, this is not to say that the airport cannot approach both at the same time. For example, development of hangars can and should proceed consistent with demand, while at the same time dealing with safety issues.

Table 7.4 at the end of this chapter provides a detailed capital improvement plan cost estimate for each project listed in the following sections, plus a breakout of funding shares with and without FAA participation through the AIP.

7.7.6 Safety-Related Alternatives

The following short-term projects should be accomplished in the order in which they are listed and, as such, should be synchronized with NHDOT on at least an annual basis. NHDOT, in turn, coordinates and prioritizes individual airport needs along with the needs of the other New Hampshire NPIAS airports. It is important to note that if Plymouth successfully joins NPIAS, the airport will only receive $150,000 per year in AIP entitlement funding. When combined with the state and local match, this will total about $166,600 per year. Otherwise, all funding must come from local and private sources.

7.7.6.1 Acquire Easements

Plymouth has vegetation penetrating protected airspace around the airport. The trees are a safety hazard to pilots using the airport, which should be mitigated by clearing trees. However, before clearing trees, the town will need to obtain rights to do so from property owners. This can be done in any number of ways, but if using federal or state funds, obtaining a legal easement over the property (or defined area) to be cleared is required. The eight parcels impacted were identified in Chapter 5 – Easement Acquisition. The cost of acquiring these eight easements varies for some reasons, not the least is the value of the land before and after the trees are cleared, which at this level of planning is difficult to estimate. However, for this document, we estimate a cost of between $5,000 and $10,000 per acre, with the higher value consistent with the cost if federal funds are used. With the need to acquire easements over 5± acres, the total cost of this project ranges from a minimum of $25,000 to as much as $60,000. The breakout that follows illustrates typical project costs and agency funding, if applicable.

- Base Project Cost..... $44,500
- Engineering..... 6,675
- Contingency..... 8,900
- **Total Estimated Cost $60,075**
- FAA Share..... $54,068
- State Share..... $3,004
- Local Share $3,004

7.7.6.2 Remove Obstructions

Once the legal right to remove obstructions is obtained, the airport can go ahead and remove the obstructions. As noted, there are approximately 5.7 acres impacted, and the estimated cost of this is slightly more than $28,000.

- Base Project Cost..... $21,000
- Engineering..... 3,150
- Contingency..... 4,200
- **Total Estimated Cost $28,350**
- FAA Share..... $25,515
- State Share..... $1,418
- Local Share $1,418

7.7.6.3 Remove Displaced Threshold

The 294-foot displaced threshold on the approach end of Runway 30 should be removed for two reasons. First, to remove this displacement, trees will need to be cut, which in itself makes the airport a safer operating environment. The second benefit is that it increases available runway for landings on Runway 30. Moreover, by removing the trees, pilots departing Runway 12 will have fewer distractions on takeoff. Other than the earlier noted easements and obstruction removal costs, this project will cost nothing more than removing a few runway edge marking cones.

- Base Project Cost.....$0
- Engineering.....$0
- Contingency.....$0
- **Total Estimated Cost $0**
- FAA Share.....$0
- State Share.....$0
- Local Share $0

7.7.7 Low Growth development

The low growth alternative describes airport development that would occur primarily on demand only basis. For example, hangars will develop when and if aircraft owners or developers realize the need to either protect their investments or for investment purposes. A fuel system would be installed when and if there is sufficient demand to justify the front-end costs. If there is a groundswell of demand for night operations, then some low cost runway edge lights could be installed.

7.7.7.1 Construct 100LL Fuel Farm

After hangar revenue, selling fuel at a general aviation airport is one of the highest grossing means of raising revenue. Moreover, as a revenue-producing project, an Avgas fuel system will not only appease airport users, but it will allow the airport to draw additional funding for airport improvement projects. The fuel system envisioned would be a self-service, 24-hour facility with a

3,000 to 5,000-gallon above-ground tank. The approximate cost for this project is expected to be around $175,000, depending on tank size and the cost of utilities. Utilities for a self-service system include electricity for the fuel pump and credit card reader, and telephone or Internet for credit card transactions.

- Base Project Cost..... $130,000
- Engineering..... 19,500
- Contingency..... 26,000
- **Total Estimated Cost $175,500**
- FAA Share..... $157,950
- State Share..... $8,775
- Local Share $8,775

7.7.7.2 Construct Partial Perimeter Security Fence

To provide additional security measures at Plymouth, particularly if a fuel system is installed, a partial perimeter security fence is proposed along Quincy Road directly in front of the airport's terminal building, which would cover approximately 1,500 linear feet. The fence will have a height of eight feet. The estimated cost of this project is approximate $53,325.

- Base Project Cost..... $39,500
- Engineering..... 5,925
- Contingency..... 7,900
- **Total Estimated Cost $53,325**
- FAA Share..... $47,993
- State Share..... $2,666
- Local Share $2,666

7.7.7.3 Install Solar Powered Runway Lights

Runway edge lights are only required at Plymouth if the airport elects to extend operations into the nighttime hours. Otherwise, there's no need for any runway illumination. Solar power lights are recommended in this situation because of their relatively low cost compared to traditional DC powered lights. DC powered lights need long cables laid in trenches and a lighting vault, which includes a voltage regulator, and this is in addition to the cost of the light units,

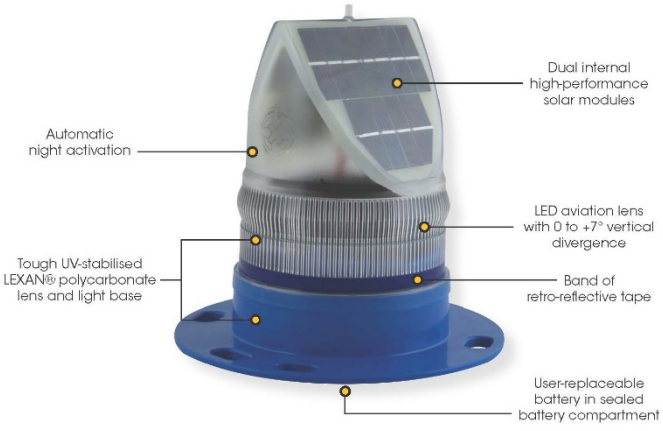

Figure 7.2. Typical Solar Power Runway Edge Light.
Source: Avlite, Tilton, NH

While solar powered runway lights are not (yet) authorized by the FAA, they would be effective just the same at a small turf

field such as 1P1. There are no installation costs (they are just pushed into the ground), and the cost of each light is minimal. The typical unit looks light Figure 7.2 (less the mounting stake). The lights are night activated, and can be equipped with a traditional pilot activated sensor, although this is not required. The estimated cost of this project is $30,000, and there would be no engineering costs associated with this project.

- Base Project Cost..... $25,000
- Engineering.....0
- Contingency..... 5,000
- **Total Estimated Cost $30,000**
- FAA Share[17]..... $27,000
- State Share[18]..... $1,500
- Local Share $1,500

7.7.7.4 Install Rotating Beacon

As with the runway edge lights discussed in the previous section, the installation of a rotating beacon is only required if the airport decides to venture into the world of nighttime operations. Rotating beacons are designed primarily for night operation as identification and location markers for airports. A typical beacon installation today for a small general aviation airport is an standard industry L-801 light mounted on a tip-down fiberglass pole (which makes it easy to change light bulbs and service the unit). The beacon consists of two 150 watt bulbs (with one green and one clear lens)[19] operating off of a standard 110-volt AC circuit, meaning a nearby power source is required. We suggest placing the pole close to the terminal building as noted on the ALP (see Chapter 6). The cost of installing a beacon with a tip-down pole shown in Figure 7.3 is about $50,000.

- Base Project Cost..... $37,000
- Engineering..... 5,550
- Contingency..... 7,400
- **Total Estimated Cost $49,950**
- FAA Share[20]..... $44,955
- State Share[21]..... $2,498
- Local Share $2,498

Figure 7.3. L801 Beacon with Tip-Down Pole. Source: Hali-Brite, Croby, MN

[17] Not currently eligible, but things are changing rapidly in the LED and solar p
[18] Ditto footnote 2
[19] A civil land airport is identified with a green and white (clear) light rotating minute).
[20] Not currently eligible, but things are changing rapidly in the LED and solar p
[21] Ditto footnote 2

7.7.7.5 Expand Turf Aircraft Parking Apron

Forecasts indicate the need for additional aircraft tie-down space, particularly in the active summer months. Figure 5.2 presented earlier illustrates how the airport can add about 1,600 square yards of additional space along Quincy Road while remaining clear of the runway object free area. Grading and preparation of this additional space is a relatively easy project, and could probably be handled through local self-help or the town's Public Works Department. The costs shown below assume some minor engineering effort, but in reality, this project does not rise to that level of effort. However, for planning purposes, we assume a cost of just under $15,000.

- Base Project Cost..... $11,000
- Engineering..... 1,650
- Contingency..... 2,200
- **Total Estimated Cost $14,850**
- FAA Share..... $13,365
- State Share..... $743
- Local Share $743

7.7.7.6 High Growth Development

As noted in Chapter 5 (see High Growth Full Build Plan, page 5.8), this section addresses projects that will probably only develop if the airport enters NPIAS and thus has access to the type of capital required to fund these high-value projects. This is not to suggest that the town would not fund these projects, but the cost of this type of work suggests the need for federal and state assistance. Like the low growth initiative discussed in the previous section, the projects in this section assume that the safety related issues described earlier have already been addressed.

7.7.7.7 Acquire Land for RSA Development

Earlier in the Safety Related section, we addressed the need for Avigation easements for clearing obstructions. Now we look at the cost of obtaining land in a fee simple process[22] for the purpose of constructing runway safety areas. The specifics of this requirement are addressed in more detail in Chapter 5 (see Acquire Property Rights for RSAs). What's important here is the cost, which is about $20,000 to acquire fee simple rights on two parcels abutting each end of the runway. Like the Avigation easements, this project can be accomplished with or without the assistance of a consultant that specializes in this type of work. While the process itself is somewhat straightforward, using federal funds will make it more complicated because of the need to follow strict federal guidelines.[23] The costs listed below assume the utilization of a consultant and federal funds.

[22] A permanent and absolute tenure of an estate in land with freedom to dispose of it at will, especially in full fee simple absolute a freehold tenure, which is the main type of land ownership.
[23] The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Uniform Act)

- Base Project Cost..... $15,000
- Engineering..... 2,250
- Contingency..... 3,000
- **Total Estimated Cost $20,250**
- FAA Share..... $18,225
- State Share..... $1,013
- Local Share $1,013

7.7.7.8 Pave Runway 12-30

In the high growth concept, the runway at 1P1 is paved to a length of 2,600 feet and a width of 60 feet (see Pave Runway 12-30), and includes the cost of constructing full safety areas on both runway ends. The estimated cost of this aggressive project is almost $4 million, with the added caveat that the contingency expenses of this type of work can be significant because of the number of unknown and potentially escalating costs. For example, we do not know what the soil conditions are under the existing runway. Is there extensive ledge or poor drainage issues? What happens to the price of oil and the related price of asphalt in the next 10-15 years? This development option is also a good example of how an airport that is part of NPIAS can easily defray a large portion of the project cost.

- Base Project Cost.....$2,820,000
- Engineering..... 423,090
- Contingency..... 564,120
- **Total Estimated Cost $3,807,810**
- FAA Share.....$3,427,029
- State Share.....$190,391
- Local Share $190,390

7.7.7.9 Install Low-Intensity Runway Edge Lights

As with the solar powered runway lights discussed earlier in this chapter, installation of Low-Intensity Runway Edge Lights (LIRL) and threshold lights is only an option if the airport decides to support night operations. However, getting federal funding for a project of this size and magnitude would probably come with the caveat that the airport operates at night. This project is included based on the probability that the solar power lights discussed earlier may not be eligible for federal funding. The cost listed below includes installation of edge lights, cabling and necessary trenching, and a voltage regulator and control systems inside the existing terminal building. Adding a separate lighting vault would add $25,000 to the price tag of $121,000.

- Base Project Cost..... $89,500
- Engineering..... 13,425
- Contingency..... 17,900
- **Total Estimated Cost $120,825**
- FAA Share..... $108,743
- State Share..... $6,041
- Local Share $6,041

7.7.7.10 Construct Full-Length Parallel Taxiway

Even with a paved runway, adding a full-length parallel taxiway is optional. Full-length parallel taxiways serve several purposes, the primary of which is to increase capacity by reducing wait time while aircraft roll out or taxi out for takeoff. It can be considered a safety issue for longer runways, or very busy airports; however, neither is the case at 1P1. The taxiway would be constructed to ARC A-1 (small aircraft) standards (see Design Aircraft), which is 25 feet wide. No taxiway lights are envisioned. However, taxiway edge reflectors are highly recommended. Like the runway discussion earlier, the number of unknowns in this type of project can easily escalate costs, but for now, we assume a planning cost of about $1.2 million.

- Base Project Cost..... $1,175,000
- Engineering..... 176,250
- Contingency..... 235,000
- **Total Estimated Cost $1,586,250**
- FAA Share..... $1,427,625
- State Share..... $79,313
- Local Share $79,312

7.7.7.11 Construct Paved Parking Apron

Adding paved aircraft parking is a natural fit for an airport with a paved runway (and possibly a paved taxiway). The proposed apron shown on the preferred alternative covers an area of about 7,500 square yards and would cost a little more than $1 million.

- Base Project Cost..... $750,000
- Engineering..... 112,500
- Contingency..... 150,000
- **Total Estimated Cost $1,012,500**
- FAA Share..... $911,250
- State Share..... $50,625
- Local Share $50,625

7.7.8 Other Things Not Discussed Until Now

There are some miscellaneous projects that the airport should consider as a matter of either necessity or just "nice to have." The essential projects are contingent on whether the airport moves forward with several projects listed earlier in this chapter. These include land and easement acquisition and construction of a paved runway. In the "nice to have" category are terminal upgrades and planning ahead for an update to this master plan and the ALP.

7.7.8.1 Environmental Assessment

An Environmental Assessment (EA) would be required for the land and easement acquisition projects as well as the runway paving project. While paving a runway does not normally rise to the level of an EA, this project could be construed as a new runway, which does trigger the need for an EA. In reality, the FAA may require an EA on any action at any time to assist agency

planning and decision-making. More detail on this process is available in Chapter 2 (see National Environmental Policy Act).

We assume a cost of about $100,000 for the cost of preparing an EA.

7.7.8.2 Automobile Parking

The existing automobile parking area (parallel to Quincy Road) serves the airport under most circumstances and should continue to do so for the foreseeable future. While there is ample room for the typical number of vehicles visiting the airport, paving the lot would certainly add to the value and viability of the airport, particularly during the spring "mud" season.

7.8 AIRPORT CAPITAL IMPROVEMENT PLAN (ACIP)

The ACIP is the schedule and cost estimate for implementing the airport improvements designated for NPIAS airports. Scheduling of improvements has been divided into three phases: short-term, intermediate-term, and long-term. The ACIP must be viewed as a constantly evolving document. Planning for Plymouth Municipal Airport should remain flexible and should include annually updated estimates of costs and priorities.

The ACIP is structured in a manner that presents a logical sequence of improvements while attempting to reflect available funding from the state and federal levels. Airport improvements that are eligible for AIP funding in the State of New Hampshire, such as obstruction clearing or runway improvements, currently receive 90% of the funding from the FAA, 5% funding from NHDOT, and the remaining 5% is paid by the town. The state, airport, and private developers must fund projects ineligible for AIP funding.

Table 7.4 lists each of the proposed projects in the recommended order in which they should be implemented. This chart breaks out the cost of both construction and engineering (in 2016 dollars) and includes a contingency factor, which allows for unknown expenses. Also, the table shows cost allocations among the FAA, NHDOT, and the town of Plymouth for the two different scenarios: the current (non-NPIAS) status and a proposed (join NPIAS) status.

It is important to note that there is no guarantee that the projects will be funded by the FAA or NHDOT, or within the timeframe listed. For this reason, the town of Plymouth must work proactively with both agencies, if applicable, to keep this project list current, including the dollar amounts listed.

7.8.1 Inflation

Construction, engineering and other costs listed in this chapter are based on 2016 dollars. These costs will rise in the future, possibly by as much as 2-5% per year. To compute up-to-date cost estimates or revisions in the future, refer to the Construction Cost Index (CCI) of *Engineering*

News Record. [24] As an example (see formula below), a $100,000 project in 2016, with a CCI of 206.2, would cost $114,355 in the year 2022 with a (presumed) CCI of 235.8.

$$\frac{2016\ Project\ Cost\ x * Future\ CCI}{2016\ CCI} = Future\ Project\ Cost$$

$$\frac{\$100{,}000 * 235.8}{206.2} = \frac{23{,}580{,}000}{206.2} = \$114{,}355$$

7.8.2 Financial Plan

The alternatives and costs included in this study reflect both a realistic and an overly optimistic point of view, based on economic forecasts in addition to the town of Plymouth's long-term vision for the airport. The study is realistic in the fact that some modest expansion of general aviation facilities (apron, hangars, and fuel tank) is plausible if growth occurs as anticipated. It is overly optimistic because most of the development projects as described in Chapter 5, *Alternatives,* would occur only if the airport becomes part of NPIAS – and the town has not yet decided if joining NPIAS is the best course of action for the airport.

7.9 LAND IN EXCESS OF AVIATION NEEDS

Based on forecast activity for the next 20 years airport land south of Quincy Road is sufficient to meet long term aviation development needs of the Airport. Moreover, because Quincy Road divides the airport it renders the north parcel unusable for direct aviation use, which makes it in excess of aviation needs for the Plymouth Municipal Airport. The assessment of this master plan means that long-term growth of the airport can be accommodated within the land on the south side of Quincy Road, where existing and future airport activity takes place. This does not mean the north parcel has no aviation value; just that any direct use for aviation purpose is both unnecessary and impossible to use because of the pubic road what makes direct access by aircraft impossible. It is, however, vitally important that the north parcel remain compatible with aviation use. The Town should avoid making land use decisions that might conflict with aviation activity and airport facilities. These decisions are ones that could result in undue constraints being placed on an airport.

7.9.1 Incompatible Land Use

Land use planning is an important tool in ensuring that land adjacent to, or near, the airport is consistent with activities and purposes compatible with normal airport operations, including aircraft landing and takeoff. Ensuring compatible land use near federally obligated airports is an important responsibility and an issue of federal interest. In effect since 1964, Grant Assurance

[24] Access is through a paid subscription.

21, *Compatible Land Use*, implementing Title 49 United States Code (U.S.C.) § 47107 (a) (10), requires, in part, that the sponsor:

> *"…take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft. In addition, if the project is for noise compatibility program implementation, it will not cause or permit any change in land use, within its jurisdiction, that will reduce its compatibility, with respect to the airport, of the noise compatibility program measures upon which federal funds have been expended."*

Incompatible land use at or near airports may result in the creation of hazards to air navigation and reductions in airport utility arising from obstructions to flight paths or noise-related incompatible land use resulting from residential construction too close to the airport.

Airports present a variety of unique challenges to those involved in community planning. Height restrictions are necessary in the vicinity of airports and airways for the protection of aircraft in flight. Residential housing and other land uses near airports must remain compatible with airports and the airport approach/departure corridors. Additional concerns include the airport's proximity to landfills and wetlands that may result in hazards to air navigation created by flocks of birds attracted to the landfills or wetlands. Unusual lighting in the approach area to an airport can create a visual hazard for pilots. Also, land uses that obscure visibility by creating smoke or steam may be hazardous to flight. Each of these concerns must be addressed in community planning to maintain the safety of flight as well as the quality of life expected by community residents.

As communities continue to grow, areas that once were rural in nature can quickly become urbanized. A result of "urban sprawl" is the loss of open space and the resulting loss of airports and their utility. Many communities have relied upon their airports as an economic engine. The proximity to industrial parks and recreational areas has proven not only to be compatible but to be mutually beneficial as well. Some communities have used the resources of an airport to contribute to the quality of life for the local community.

In addition to the basic economic value of the airport, the preservation of open space and the ability to accommodate emergency medical airlifts are specific examples of this contribution to the community. Increases in air travel are placing an increasing demand on the nation's airports. Environmental concerns and cost may prohibit the establishment of new airports. This means that to accommodate air traffic demand, maximum utility must be achieved from existing airports. For this to happen, the land use in the vicinity of airports must be reserved for compatible uses.

Grant Assurance 21 relates to the obligation of the airport sponsor to take appropriate actions to zone and control existing and planned land uses to make them compatible with aircraft operations at the airport. The FAA recognizes that not all airport sponsors have direct

jurisdictional control over uses of property near the airport. However, for the purpose of evaluating airport sponsor compliance with the compatible land use assurance, the FAA does not consider a sponsor's lack of direct authority as a reason for the sponsor to decline to take any action at all to achieve land use compatibility outside the airport boundaries.

In all cases, the FAA expects a sponsor to take appropriate actions to the extent reasonably possible to minimize incompatible land. Quite often, airport sponsors have a voice in the affairs of the community where an incompatible development is located or proposed. The sponsor should make an effort to ensure proper zoning or other land use controls are in place.

7.9.2 Zoning and Land Use Planning

Zoning is an effective method of meeting the federal obligation to ensure compatible land use and to protect airport approaches. Generally, zoning is a matter within the authority of state and local governments. Where the sponsor does have power to zone or control land use, FAA expects the sponsor to zone and use other measures to restrict the use of land in the vicinity of the airport to activities and purposes compatible with normal aircraft operations. Restricting residential development near the airport is essential to avoid noise-related problems. Sponsors and local communities should consider adopting adequate guidelines and zoning laws that consider noise impacts in land use planning and development. Similarly, any airport sponsor that has the authority to adopt ordinances restricting incompatible land development and limiting the height of structures in airport approaches according to the standards prescribed in Part 7, is expected to use that authority.

7.9.3 Airport Property Zoning

The North and South Parcels are both zoned Airport, which in addition to height restrictions, the Town's zoning ordinance also provides restrictions and control measures concerning electrical interference with navigational signals and radio communication between aircraft. Airport zoning also includes provisions that limit interference from lights and glare, and activity that might create bird strike hazards, or otherwise in any way endanger or interfere with the landing takeoff, or maneuvering of aircraft intending to use the airport.

It is essential that this zoning language remains consistent with safe airport and aircraft operating practices and stay in compliance with both state and federal statutes. Also, any future land acquisition, whether through fee simple or an easement contain similar language. The FAA has preferred language that the town should follow when obtaining an Avigation easement[25].

7.9.4 Best Use of the North Parcel

The North parcel is not required for airport activity for at least the next 20 years. However, it does have some nominal value to the airport, even if left undeveloped. Undeveloped land poses little risk to airport and aircraft operations. Some examples of the type of development compatible with aviation would include any use that 1) does not pose a risk to aircraft

[25] The town should contact NHDOT or the FAA prior to negotiating the purchase of land, including an easement because this language is subject to change.

operations, and 2) involves development that would not eventually deem aviation a nuisance. For example, wind turbines or tall smoke stakes are not compatible given the close proximity to the airport. On the other hand, a housing development, or other growth that mixes people, particularly those not keen about airplanes and noise, would eventually create a situation where friction between two opposing parties would eventually result in complaints.

The best activity for this parcel would be one that limits the number of people impacted by aircraft operations, particularly those occupying the land for more than a few days. While a hotel/motel would be a good mix, a hospital, nursing home, or some similar activity would not. Business development, especially if it does not entail smoke, light or electronic emissions is an ideal activity. A solar farm would be a perfect activity and one that is growing in popularity in the country. Modern solar farms have overcome earlier barriers to their location near airports; namely glare from the solar panels.

There are some different development options deemed compatible with the North Parcel. The important thing is to avoid any activity that poses a hazard or nuisance to both the aviation and non-aviation parties and one that might attract activity to the airport. While there's little chance the airport would be used for large scale commercial use (people or cargo), there are activities that are attracted to airports because of its availability for general aviation transportation. This is also limited because the airport is restricted to visual flying only, which limits its viability. Also, the relatively short turf runway also limits its usefulness to a wide-range of aviation operations.

7.10 RECOMMENDATIONS

Given the type, size, and location of the airport, its revenue and expenses are reasonable and consistent with similar airports (those with low aviation activity, located in remote areas with low year-round and higher seasonal populations). Unfortunately, albeit understandably, most small general aviation airports do not generate sufficient revenue to meet expenses. At Plymouth, there are no commercial businesses such as a fixed based operation, aircraft maintenance facility, etc., only municipal facilities such as roads and highways that serve the public by providing an infrastructure that promotes commerce and the public good. However, an airport has a unique ability (as compared to most roads and highways) to generate revenue; consequently, an airport should contribute to the local tax base whenever possible through some revenue source.

Findings in this master plan, particularly in Section 5, *Alternative Analysis*, provide opportunities for development of the airport in a controlled manner that will allow the town to expand the facility as demand dictates. Hangars and their associated land-leases are the greatest source of revenue for the airport. The airport and its proximity to tourism-related activities allow travelers the opportunity to arrive by air. Hence, the town should make sure visitors to the region, particularly those arriving by air, are informed of the on-airport development opportunities. It is true that promoting the airport and increasing revenue for a small, remote general aviation airport is not a simple task. However, the town might consider several possibilities, including the following:

The town should ensure land lease rates remain competitive, have an inflation escalator clause, and are consistent with FAA policies on their term lengths. This report indicates that the airport will need at least two new hangars in the next 20 years. The airport has ample room for hangar growth, with each one having land-lease and property tax revenue potential.

Advertise hangar lot availability at key locations throughout the town, in particular at the airport. Provide airport users with prominently displayed lot plans and contact information inside the airport's terminal building.

Ensure that town planning and zoning activities consider the airport. It is essential that all development on and around the airport (within 3-4 miles) comply with federal statutes by requiring developers to file Form 7460-1, *Notice of Proposed Construction or Alteration*[26]. Also, the town should consider placing Avigation easements over all new development lots near the airport, if applicable, to protect the airport's long-term viability. The placement of an Avigation easement ensures that property owners fully understand the proximity of the airport to their property and sets up clear expectations as to any (minor) inconveniences that will be caused by aircraft noise and other related consequences of aircraft and airport operations.

[26] The form can be filed in paper form or electronically at http://www.faa.gov/documentLibrary/media/Form/FAA_Form_7460-1_2017.pdf

Table 7.3 - Capital Improvement Plan Cost Estimates (Fiscal Years 2016-2035)

Project Priority, Fiscal Year and Type			Project Cost Estimates				NPIAS Break Out		
Priority Groups	Federal Fiscal Year[1]	Project	Base Project Cost	Engineering	Contingency	Total Project Cost	FAA Share (90%)	NHDOT Share (5%)	Local Share (5%)
Safety		Easement Acquisition	$44,500	$6,675	$8,900	$60,075	$54,068	$3,004	$3,004
		Obstruction Removal	$21,000	$3,150	$4,200	$28,350	$25,515	$1,418	$1,418
		Remove Displaced Threshold	$0	$0	$0	$0	$0	$0	$0
		Total Safety Related Costs	**$65,500**	**$9,825**	**$13,100**	**$88,425**	**$79,583**	**$4,421**	**$4,421**
Low Growth		Construct Security Fence	$39,500	$5,925	$7,900	$53,325	$47,993	$2,666	$2,666
		Install Fuel System	$130,000	$19,500	$26,000	$175,500	$157,950	$8,775	$8,775
		Runway Lights (Solar)	$22,000	$3,300	$4,400	$29,700	$26,730	$1,485	$1,485
		Rotating Beacon	$37,000	$5,550	$7,400	$49,950	$44,955	$2,498	$2,498
		Expand Aircraft Parking (Turf)	$11,000	$1,650	$2,200	$14,850	$13,365	$743	$743
		Total Low Growth Costs	**$239,500**	**$35,925**	**$47,900**	**$323,325**	**$290,993**	**$16,166**	**$16,166**
High Growth		Acquire Land for RSA Development	$15,000	$2,250	$3,000	$20,250	$18,225	$1,013	$1,013
		Pave Runway 12-30	$2,840,000	$426,000	$568,000	$3,834,000	$3,450,600	$191,700	$191,700
		Construct Parallel Taxiway	$1,305,000	$195,750	$261,000	$1,761,750	$1,585,575	$88,088	$88,088
		Install Low Intensity Runway Lights	$89,500	$13,425	$17,900	$120,825	$108,743	$6,041	$6,041
		Construct Paved Parking Apron	$750,000	$112,500	$150,000	$1,012,500	$911,250	$50,625	$50,625
		Total High Growth Costs	**$4,999,500**	**$749,925**	**$999,900**	**$6,749,325**	**$6,074,393**	**$337,466**	**$337,466**
		Total Development Costs	**$5,304,500**	**$795,675**	**$1,060,900**	**$7,161,075**	**$6,444,968**	**$358,054**	**$358,054**

1. The fiscal year column cannot be completed until the town decides on whether or not they will pursue entry into NPIAS. At that time officials should meeting with NHDOT and FAA to determine the appropriate timing of each project, in particular the first five years following admission into NPIAS.

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APPENDIX A - MEETING MINUTES

The following pages contain meeting minutes from the project design meeting, scoping meeting and Planning Advisory Committee meetings.

MEETING DATE	PURPOSE
March 24, 2014	Project Scoping Design Meeting
April 11, 2014	Project Scoping Meeting
October 14, 2014	Planning Advisory Committee Meeting #1
February 25, 2015	Planning Advisory Committee Meeting #2
April 2, 2015	Planning Advisory Committee Meeting #3

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Stantec

Meeting Minutes

Plymouth, NH Airport Master Plan

Scoping Design Meeting

Prepared: March 31, 2014

This is a revision to the original minutes prepared on March 27, 2014

Meeting Date/Time:	March 24, 2014 / 9:00 am
Place:	Plymouth, NH Town Office
Next Meeting:	TBD
Attendees:	Ervin Deck (Stantec), Carol Niewola (NHDOT); Colin McIver (Airport Manager), Paul Freitas (Town Administrator), Anne Abear (Town Finance Director), Kathryn Lowe (Executive Assistant), Sharon Penny (Town Planner)
Absentees:	Mike Vignali (Town Engineer) – Independent Fee Estimator
Distribution:	Attendees

Purpose

This was a pre-scoping meeting to discuss the proposed project of preparing planning documents required by the Town for its municipal airport. The outcome will be an understanding of the role each party undertakes in the preparation of a Scope of Work (SOW). The Scope will outline the various tasks and elements necessary to complete several documents required by the Town, Federal Aviation Administration (FAA), and New Hampshire DOT (NHDOT). Stantec will use the information gathered in this meeting to prepare a draft SOW.

Discussion

General Administrative

1. Participants introduced themselves.
2. Carol Niewola discussed the general procedures that need to be followed and the timeline for the project. She addressed the scoping process and deadline for submitting a grant application, which is May 1, 2014.
3. Carol also indicated that the project would take about 12-18 months, at which time Ervin Deck said that the process is often stretched out because of the time needed to review each section of the report, offer comments, and then to come to an agreement on what changes are necessary.
4. Carol indicated the approximate amount of money available for the project is $120,000 in federal funds, plus state and local shares.
5. Erv asked who would be doing the Independent Fee Estimate (IFE). Carol indicated that the town engineer (Mike Vignali). The Town indicated that Mike has experience in this area and would be able to provide a reliable IFE. Carol noted that the goal is to bring the IFE and Stantec's fee with 10% of each other. When the IFE and Stantec's fee are "within" 10% of each other, the negotiations may end and Stantec's fee accepted. She explained the process of how both parties reach an agreement on the scope and fee, and that the key is to develop a detailed, clear SOW was essential.
6. Erv indicated that Stantec would provide a draft SOW by Friday, March 27 to NHDOT and the Town for review and at the same time would start preparing Stantec's fee. Once the SOW is approved, Erv

will provide his proposed fee to the town and a blank fee schedule to Mike along with a copy of the SOW. Mike is not to see Stantec's fee in advance of performing the IFE.

7. Erv said that Stantec would prepare the grant application for review, signature, and forwarding to NHDOT. Erv asked who would sign the application and Stantec's contract and Paul Freitas indicated that he would. Erv asked who invoices should be sent to and Anne Abear indicated that she would handle that end of the project.
8. Erv discussed the need for an open and candid discussion about the future of the airport and that the more information that is presented to the public, the better and easier the process would be. Erv indicated that the town should form an Airport Planning Advisory Committee (APAC), whose composition should include the airport manager, one or two members of the town staff, political entities (Board of Selectmen), aircraft and/or aircraft hangar owners, local business owners, and landowners (airport abutters). The APAC should include about 10-12 people willing to follow the process through from start to finish. Erv also stressed that the APAC is "advisory" only, and that in the end, the Board of Selectman make the final decision about the airport's future.
9. Stantec will look into hiring a technical editor to review documents before they are presented to the Town, and will attempt to hire one that is Disadvantage Business Enterprise (DBE) certified in NH.

Issues

1. Sharon Penny and other town representatives indicated that the town also uses the airport for emergency purposes, such as medical evacuations and staging. The airport is and should continue to serve as a helicopter-landing site, and that PlaneSense, a fractional aircraft ownership program that flies the Pilatus PC-12, has landed at the airport and has indicated a need for a paved runway.
2. The Town owned hangar sits along a right-of-way.
3. The airport is divided by Quincy Road and that the Town needs to know the aviation value of both sides.

Documents

1. The discussion next focused on the types of documents the Town would like to obtain out of this project. Carol noted that these documents include, but are not necessary limited to:
   a. **Airport Master Plan**. The main focus of the project is the preparation of an Airport Master Plan, but not once in the tradition sense because of the size of the airport and the purpose of this project. The Town needs a "usable document" or toolkit that can be used to promote economic development that adds value to the community. As discussed, the Airport Master Plan for 1P1 is not necessarily the traditional document because of the airport's size and the purpose of this project. It will still need to incorporate the traditional master planning components in order to qualify for FAA funding, however, the additional tasks outlined below are what make the study unique to 1P1.
      (1) The Master Plan will provide the background needed for the town to make an educated decision in the future whether to request that 1P1 be included in the NPIAS .
      (2) Carol said that the Town would like to see "checklist" type items in the Plan; forms, etc., that could be used to help them track activity, inspections, etc. Erv indicated that these could be added to the document as appendices.
      (3) Erv noted that he would like to prepare the Plan in three phases, which the group agreed was a good approach. The three phases are:
         (a) Phase I would be a series of working papers covering each of the following:
            - Introduction

- Inventory of Existing Conditions
- Forecasts of Future Aviation Activity
- Facility Requirements
- Alternatives
- Airport Layout Plan (Set)
- Environmental Analysis
- Implementation & Financial Plan
- Various appendices

(b) Phase II is the draft report; a compilation of each of the working papers with agreed upon revisions.

(c) Phase II is the final report; a compilation of the draft report with agreed upon revisions.

b. **Airport Layout Plan.** Erv explained that this is most critical and important document the Town will receive because it lays out the Town's vision of how they see the airport in 10-20 years, and possibly beyond, depending on when various activity thresholds are reached. He explained that for NPIAS airports no development could take place on the airport, with or without FAA funding unless it's on the ALP.

(1) Erv said that the key stakeholders, which are the town and NHDOT sign the final ALP.

(2) The ALP that Stantec produces will be a series of technical documents, not just a single sheet. It will be prepared using AutoCAD from a number of sources, including aerial photogrammetry, ground and aerial surveys, photographs, and other sources to FAA design standards.

c. **Exhibit A Property Map.**

(1) Erv discussed the purpose of the property map, commonly referred to as an Exhibit A.

(2) Erv explained that an Exhibit A is not an ALP, but rather a supplement to it.

(3) Carol noted that she wanted a full property boundary survey, which Erv noted would be quite expensive. Note: subsequent to the meeting, Erv and Carol exchanged email concerning the need for a boundary survey. As discussed, a boundary survey is not required for an Exhibit A, and could cost upwards of 1/3 of the allotted funds available for the entire project. Therefore, with NHDOT's concurrence, a boundary survey will not be included in the scope of work.

(4) Erv will include the Exhibit "A" task in the SOW.

Master Plan Components

1. The discussion then focused on the Master Plan and its general composition.
2. As noted earlier, the Plan will be prepared in three phases (working papers, draft, and final). The following is the general outline of each chapter or section of the report.
3. The report will be prepared following general planning guidelines contained in FAA Advisory Circular (AC) 150/5070-6B and the FAA's Standard Operating Procedures (SOPs)with specifics as noted below.

   a. Aerial survey data will be collected for the purposes of obstruction analysis and preparation of the airport layout plan. The data will include color aerial photography, with 24" x 36" mounted color photos of the airport.

   b. Wetlands will be delineated on the airport side of Quincy Road, and a general overview of wetlands on the north (non-operational) side of the road.

c. Forecasts will be unconstrained with the exception of Baker River.

d. Facility Requirements section will take two tracks: NPIAS and non-NPIAS.

e. Alternatives will also take two tracks, one with and one without FAA funding (NPIAS and non-NPIAS)

f. Alternatives will include a matrix that presents the pros and cons of each proposed alternative in terms of costs and environmental impacts.

g. Environmental chapter will provide a discussion on the entire "preferred alternative."

h. Town will provide Stantec with information on the Groton Wind Farm Tower Study.

i. Implementation and Financial Plan will include a NPIAS and non-NPIAS track

j. Appendices in the report will include:

(1) Terms and Definitions section

(2) A discussion on NPIAS and what it means to the community

(3) Toolkits (as discussed earlier)

(4) Correspondence related to the study

(5) Meeting minutes

(6) Other appendices as necessary

Meetings and Presentations

4. Including this pre-scoping design meeting, numerous other meetings and presentations will be held during the course of this project. Meetings will be held with the APAC, Town Planning Board, Board of Selectman, and Pubic Information Meetings (PIM). It was agreed on the following minimum meetings/presentations.

Meeting/Presentation	When
Pre-Scoping Design Meeting	Today
Scoping Meeting	Between March 31 and April 4 (Tele/Web Conference)
APAC Kickoff Meeting	After the grant is accepted and contract with Stantec signed
APAC	After development of Facility Requirements section
Town Planning Board	Same day as the above APAC meeting
APAC	After development of the alternatives
PIM	Same day after the above APAC
APAC	After the APAC discusses alternatives and selects their preferred alternative
APAC	After development of final working paper
PIM	After the above APAC meeting
Other	SOW will include for possibility of 1-2 unscheduled meetings

The meeting adjourned at 11:20 am

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Stantec Consulting Services Inc.

Eric C. Deck

Ervin Deck, MAS
Associate - Airport Infrastructure
Phone: (207) 887-3828
Fax: (207) 883-3376
ervin.deck@stantec.com

Attachments:

1. Email Ervin Deck/Carol Niewola, dated 3/25/2014

2. Email Carol Niewola-Ervin Deck, dated 3/29/2014

3. Email, Town Administrator, Paul Freitas, dated 3/31/2014

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Deck, Ervin

From: Carol Niewola <Cniewola@dot.state.nh.us>
Sent: Tuesday, March 25, 2014 5:16 PM
To: Deck, Ervin
Subject: RE: Plymouth Exhibit A

Erv,

That is a pretty old document! The current guidance, not that things have changed much, can be found in the FAA's SOP for Exhibit A (http://www.faa.gov/airports/resources/sops/media/arpSOP300ExhibitAReview.pdf). No, you are correct, a boundary survey is not required so long as there is sufficient deed information to be able to represent the parcel(s) that make up the airport. This will become an important "tool" for the airport but I'm not comfortable spending the bulk of the budget on just this. Good question.

Carol L. Niewola, PE, CM
Senior Aviation Planner
NHDOT/Bureau of Aeronautics
7 Hazen Drive
Concord, NH 03302-0483
p: 603-271-1675
f: 603-271-1689
c: 603-419-0683

From: Deck, Ervin [mailto:ervin.deck@stantec.com]
Sent: Tuesday, March 25, 2014 3:52 PM
To: Carol Niewola
Subject: Plymouth Exhibit A

Carol,

I've did some background checks on the Exhibit A Property Map requirements (not many are done in this day and age because most airports already have one). Anyhow, I do want to make certain that you want a full boundary survey. My research indicates that a boundary survey is generally not required in the preparation of an Exhibit A (see attached). My initial calculations indicate this task alone could eat up 25-40% of the allotted budget.

Erv

Ervin Deck MAS
Associate - Airport Infrastructure
Senior Aviation Planner
Stantec
482 Payne Road Scarborough Court Scarborough ME 04074
Phone: (207) 887-3828
Cell: (207) 504-2357
Fax: (207) 883-3376
ervin.deck@stantec.com

Deck, Ervin

From: Carol Niewola <Cniewola@dot.state.nh.us>
Sent: Saturday, March 29, 2014 4:10 PM
To: Deck, Ervin; Paul Freitas (townadmin@plymouth-nh.org); Anne Abear (finance@plymouth-nh.org); Colin McIver (colinmciver@yahoo.com); Sharon Penney (spenney@plymouth-nh.org); Kathryn Lowe (klowe@plymouth-nh.org); Val7 @roadrunner.com
Subject: RE: 1P1: Scoping Meeting Minutes
Attachments: RE: Plymouth Exhibit A; minutes 2014-03-24.pdf

Erv et al,

I've had a chance to review the minutes from our scoping meeting – very nice job capturing all the discussions that day!

I have a few comments/clarifications for your consideration as you finalize these minutes:

- General Administration #5: When the IFE and Stantec's fee are "within" 10% of each other, the negotiations may end and Stantec's fee accepted.
- Documents #1.a: Please clarify that the Airport Master Plan for 1P1 is not *necessarily* the traditional document because of the airport's size and the purpose of this project. It will still need to incorporate the traditional master planning components in order to qualify for FAA funding, however, the additional tasks that you outlined are what make the study unique to 1P1.
- Document #1.a.(1): Please clarify that the Airport Master Plan won't be making the decision whether 1P1 joins the NPIAS or not, but rather provides the background needed for the town to make an educated decision in the future whether to request that 1P1 be included in the NPIAS.
- Document #1.b: I believe we had talked about the ALP being a 20 (or more) year document (depending on when various activity thresholds are reached).
- Document #1.b.(1): As 1P1 is being managed under the Airport Block Grant Program, NHDOT will be signing the ALP on behalf of the FAA.
- Document #1.c.(3): Erv identified an alternate method to preparing the boundary of the airport that I have concurred with (see attached e-mail).
- Master Plan Components #3: In addition to the FAA Advisory Circular, the FAA's new Standard Operating Procedures (SOPs) provides additional details of what the planning documents should include.

That's all I've got. Enjoy the rest of the weekend!

Carol L. Niewola, PE, CM
Senior Aviation Planner
NHDOT/Bureau of Aeronautics
7 Hazen Drive
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p: 603-271-1675
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c: 603-419-0683

From: Deck, Ervin [mailto:ervin.deck@stantec.com]
Sent: Thursday, March 27, 2014 2:13 PM
To: Paul Freitas (townadmin@plymouth-nh.org); Anne Abear (finance@plymouth-nh.org); Colin McIver (colinmciver@yahoo.com); Sharon Penney (spenney@plymouth-nh.org); Kathryn Lowe (klowe@plymouth-nh.org); Carol Niewola
Subject: Meeting Minutes

Deck, Ervin

From: Town Administrator <townadmin@plymouth-nh.org>
Sent: Monday, March 31, 2014 8:01 AM
To: Deck, Ervin; 'Carol Niewola'
Cc: 'Anne Abear'; 'Colin McIver'; 'Sharon Penney'; 'Kathryn Lowe'; Val7@roadrunner.com
Subject: RE: 1P1: Scoping Meeting Minutes

Looks good Carol. Thanks

Paul

Paul H. Freitas
Town Administrator / Emergency Management Director
6 Post Office Square
Plymouth, NH 03264
603-536-1731

From: Deck, Ervin [mailto:ervin.deck@stantec.com]
Sent: Saturday, March 29, 2014 4:12 PM
To: Carol Niewola
Cc: Paul Freitas (townadmin@plymouth-nh.org); Anne Abear (finance@plymouth-nh.org); Colin McIver (colinmciver@yahoo.com); Sharon Penney (spenney@plymouth-nh.org); Kathryn Lowe (klowe@plymouth-nh.org); Val7@roadrunner.com
Subject: Re: 1P1: Scoping Meeting Minutes

Thank you Carol. I will await other comments and should have a draft scope ready Monday.

Erv

Sent from my iPad
Ervin Deck

On Mar 29, 2014, at 4:10 PM, "Carol Niewola" <Cniewola@dot.state.nh.us> wrote:

> Erv et al,
>
> I've had a chance to review the minutes from our scoping meeting – very nice job capturing all the discussions that day!
>
> I have a few comments/clarifications for your consideration as you finalize these minutes:
>
> - General Administration #5: When the IFE and Stantec's fee are "within" 10% of each other, the negotiations may end and Stantec's fee accepted.
> - Documents #1.a: Please clarify that the Airport Master Plan for 1P1 is not *necessarily* the traditional document because of the airport's size and the purpose of this project. It will still need to incorporate the traditional master planning components in order to qualify for FAA funding, however, the additional tasks that you outlined are what make the study unique to 1P1.

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Meeting Minutes

Plymouth, NH Airport Master Plan

Scoping Meeting

Prepared: April 14, 2014

Meeting Date/Time:	April 11, 2014 / 9:00 am
Place:	Plymouth, NH Town Office
Next Meeting:	TBD
Attendees:	Ervin Deck (Stantec); Jason Gass (Stantec); Carol Niewola (NHDOT); Emily Polychronopoulos (NHDOT); Colin McIver (Airport Manager); Paul Freitas (Town Administrator); Anne Abear (Town Finance Director); Kathryn Lowe (Executive Assistant); Mike Vignali (Town Engineer)- Independent Fee Estimator; Val Scarborough (Town Board of Selectman, Chair)
Absentees:	Sharon Penny (Town Planner)
Distribution:	Attendees

Purpose

This was a scoping meeting to discuss the project of preparing planning documents required by the Town for its municipal airport. The outcome will be an understanding of the master planning process as well as a thorough understanding of a Scope of Work (SOW). The Scope outlines various tasks and elements necessary to complete several documents required by the Town, Federal Aviation Administration (FAA), and New Hampshire DOT (NHDOT).

Discussion

General Administrative

1. Participants introduced themselves.
2. Ervin Deck confirmed for Carol Niewola that this project is lump sum and hourly rates will be included in the fee schedule.
3. A standard federal grant application is required for this project, as confirmed by Carol Niewola.
4. Stantec will provide four (4) copies of the grant application to Carol Niewola.
5. In addition, Stantec will provide its insurance certificate Carol Niewola along with the grant applications.
6. Carol Niewola informed the attendees that once the grant offer sheet is signed, approval is needed by the Governor/Council. Once grant offer is approved, a Notice to Proceed will be issued and a confirmation letter will be sent to the Airport.
7. Wetland delineation maps should be signed by a wetland scientist.
8. A property boundary survey will not be included in this master plan due to cost.
9. Aerial photogrammetry will cover both sides (north and south side of Quincy Road) of the airport and will be presented to the Airport in CD and mounted-picture forms.

10. Carol Niewola mentioned that FAA funding can be used to conduct a traffic study at the Route 25 intersection.
11. A noise analysis will not be conducted as part of this master plan.
12. In the master plan, forecasts will be presented as an average (single set) as opposed to a high/low range.
13. Stantec will provide the Airport ten (10) copies of each working paper submittal as well as a .PDF digital version.
14. The master plan and corresponding ALP will provide information regarding the state right-of-way through the Airport. The location of the right-of-way will be specifically shown on the ALP.
15. The ALP to be included in the master plan document will be a scanned version of the signed ALP.
16. Stantec will look into hiring a technical editor to review documents before they are presented to the Town, and will attempt to hire one that is Disadvantage Business Enterprise (DBE) certified in NH.

Issues

1. The Town owned hangar sits along a right-of-way.
2. Stantec will attend the APAC alternative workshop meetings.

Documents

1. The discussion next focused on the types of documents the Town would like to obtain out of this project. Carol noted that these documents include, but are not necessary limited to:

    a. **Airport Master Plan**. The main focus of the project is the preparation of an Airport Master Plan, but not one in the tradition sense because of the size of the airport and the purpose of this project. The Town needs a "usable document" or toolkit that can be used to promote economic development that adds value to the community. As discussed, the Airport Master Plan for 1P1 is not necessarily the traditional document because of the airport's size and the purpose of this project. It will still need to incorporate the traditional master planning components in order to qualify for FAA funding; however, the additional tasks outlined below are what make the study unique to 1P1.

        (1) The Master Plan will provide the background needed for the town to make an educated decision in the future whether to request that 1P1 be included in the NPIAS.

        (2) Carol said that the Town would like to see "checklist" type items in the Plan; forms, etc., that could be used to help them track activity, inspections, etc. Erv indicated that these could be added to the document as appendices.

    b. **Airport Layout Plan**. Erv explained that this is most critical and important document the Town will receive because it lays out the Town's vision of how they see the airport in 10-20 years, and possibly beyond, depending on when various activity thresholds are reached.

        (1) Erv said that the key stakeholders, which are the town and NHDOT, are to sign the final ALP.

        (2) The ALP that Stantec produces will be a series of technical documents, not just a single sheet. It will be prepared using AutoCAD from a number of sources, including aerial photogrammetry, ground and aerial surveys, photographs, and other sources to FAA design standards.

    c. Exhibit A Property Map.

        (1) Erv discussed the purpose of the property map, commonly referred to as an Exhibit A.

(2) As discussed, a full boundary survey is not required for an Exhibit A, and could cost upwards of 1/3 of the allotted funds available for the entire project. Therefore, with NHDOT's concurrence, a boundary survey will not be included in the scope of work.

Meetings and Presentations

1. Including this scoping meeting, numerous other meetings and presentations will be held during the course of this project. Meetings will be held with the APAC, Town Planning Board, Board of Selectman, and Pubic Information Meetings (PIM). It was agreed on the following minimum meetings/presentations.

Meeting/Presentation	When
Pre-Scoping Design Meeting	March 24, 2014
Scoping Meeting	April 11, 2014
APAC Kickoff Meeting	After the grant is accepted and contract with Stantec signed
APAC	After development of Facility Requirements section
Town Planning Board	Same day as the above APAC meeting
APAC	After development of the alternatives
PIM	Same day after the above APAC
APAC	After the APAC discusses alternatives and selects their preferred alternative
APAC	After development of final working paper
PIM	After the above APAC meeting
Other	SOW will include for possibility of 1-2 unscheduled meetings

The meeting adjourned at 11:55 am

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Stantec Consulting Services Inc.

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Associate - Airport Infrastructure
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Fax: (207) 883-3376
ervin.deck@stantec.com

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Meeting Minutes

Plymouth NH AMP APAC Meeting

Prepared: October 14, 2014

Meeting Date/Time:	October 14, 2014 / 10:00 am
Place:	Plymouth NH Town Office
Next Meeting:	November 17, 2014 / 10:00am
Attendees:	Jason Gass (Stantec), Carol Niewola (NHDOT), Colin McIver (Airport Manager), Paul Freitas (Town Administrator), Anne Abear (Town Finance Director), Kathryn Lowe (Executive Assistant), Sharon Penney (Town Planner), Rita Hunt (NHDOT)
Distribution:	All attendees

Purpose

This was the first APAC meeting to discuss the overall project goals and responsibilities of all stakeholders.

Discussion

1. Meeting began at 10:00am.
2. Attendees introduced themselves.
3. Jason Gass explained the master planning process including what the APAC should expect for the next meeting in November.
4. Carol Niewola mentioned that planning grants, such as the one used for this AMP, cannot be amended. The amount stays the same as requested. If additional project needs are identified later, the scope of work and remaining fee will need to be reviewed to see if they can be accomplished within the grant funds available.
5. Sharon Penney explained that it will be a good idea to get the Town's planning committee involved in the APAC meetings considering the Town is getting ready to prepare a master plan update of its own.
6. The APAC would like to see options for aeronautical and/or non-aeronautical revenue streams to be located across Quincy Rd. in the airport's forested parcel of land.
7. CN explained that the land use plan will be a significant portion of this AMP, especially considering the need for potential NPIAS impacts in the future.
8. It was decided that the APAC will receive each draft copy two weeks prior to the corresponding APAC meeting. The APAC will provide input and mark-ups within the next week, then the draft chapters will be posted online to the Town's or airport's website.
9. Paul Freitas initiated discussion regarding the use of remote-controlled aircraft (i.e., model aircraft for hobby/recreational flying) on the airport and how we can include that group into this AMP.
10. CN indicated that commercial use of remote-controlled aircraft is regulated by the FAA within the confines of their "drone" definition.

Questions and Concerns

1. APAC would like to see the potential impacts of joining NPIAS included in this AMP (has been included in the scope of work).

2. Adjacent land use issues will be closely monitored throughout this AMP process and will provide a point of emphasis in the final document along with a guide for the town protecting the airport's airspace.

Action

1. Wetland Survey will take place Tuesday, October 14 through Thursday, October 16.
2. Stantec will provide all stakeholders with a digital (Word format) draft copy of Chapters 1 – 3 by November 3, 2014 for review and mark-ups.
3. Stantec will ensure the Airport's Exhibit A is included in the final document.
4. CN will provide NH block grant information to Stantec in the form of an email.
5. JG will create an Outlook calendar event for the next planned meeting.
6. Stantec and Colin McIver will schedule a meeting in order to discuss the history of the Plymouth airport.
7. JG will email the FAA's "Do's and Don'ts" list regarding remote-controlled aircraft use on an airport.

The meeting adjourned at 11:22am.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Stantec Consulting Services Inc.

Ervin Deck, M.Sc.
Associate - Airport Infrastructure
Phone: (207) 887-3828
Fax: (207) 883-3376
ervin.deck@stantec.com

Stantec

Meeting Minutes

Plymouth Master Plan APAC Meeting

Prepared: February 27, 2015

Meeting Date/Time:	February 25, 2015 / 10:00am
Place:	Plymouth, NH Town Office
Next Meeting:	March 31, 2015 / 10:00am
Attendees:	Anne Abear, Finance Director; Colin McIver, Airport Manager; Kathryn Lowe, Executive Assistant; Sharon Penney, Town Planner; Carol Niewola, NHDOT; Paul Freitas, Town Administrator; Jason Gass, Stantec
Distribution:	NHDOT and Town (distribute to APAC members)

Purpose

This was the third APAC meeting to discuss Chapters 1 through 3.

Discussion

1. The meeting began at 10:04am.
2. The airport wants to maintain the symbiotic relationship with its neighbors, therefore the airport and Town will be proactive with neighbor involvement throughout this process.
3. The Town and a private company are interested in placing a solar panel farm on airport property; to the south of the AWOS.
4. Sharon Penney (SP) mentioned that the Town's population and potentially the airport's itinerant activity will increase with the proposed construction of a large hotel along Tenney Mountain Highway near the airport.
5. Paul Freitas (PF) mentioned a currently-unused plot of land on the airport that is to be reserved for hangar development. The hangar will be roughly the same size and shape of the new hangar south of the airport's runway. The lease has been in place for years, but the tenant has not held up his end of the deal by failing to construct a hangar.
6. Carol Niewola (CN) suggested that Stantec collect information from Dean Memorial Airport (Haverhill, NH) when writing about the construction of a fuel farm on airport property.
7. Colin McIver (CM) discussed the airport's powered-parachute training operations and suggested that the technical document reflect this information.
8. CN and PF reminded JG that one of the alternatives in Chapter 5 should include a "full build" scenario where the airport is developed to maximum capacity.
9. The APAC is satisfied with only one week to review the technical document updates rather than the previously-agreed two weeks.

Questions and Concerns

1. SP mentioned that Stantec should be wary of using the Town's average age data considering Plymouth State's student body significantly reduces that number.
2. CM noticed a discrepancy in driving distances to certain airports around the region.
3. CM mentioned that the airport's acreage as listed in the technical document is incorrect.

4. PF has safety concerns about the aircraft parked near Quincy Road. He mentioned a past incident where a tenant's aircraft was deliberately burned and totaled. PF suggested an alternative where the airport's apron parking was moved to south of the runway near the new hangar and AWOS.

Action

1. Jason Gass (JG) will provide PF with an expedited copy of the Master Plan's Part 77 Analysis.
2. Stantec will include a caveat regarding the Town's average age in the technical document.
3. Stantec will provide a "Pros vs. Cons" list within the technical document regarding the construction of a fuel farm on airport property.
4. Stantec will increase the airport's flight training data within the technical document and update the forecasts accordingly.
5. Stantec will update the driving distances and driving times to airports around the region from Plymouth.
6. Stantec will correct the airport's acreage discrepancies.
7. Stantec will include all updates to the technical document's Chapter 5 – Alternatives. This includes a "full build" scenario, perimeter fencing, and moving the airport's aircraft parking apron to the south of the runway for security reasons.

The meeting adjourned at 11:25am.

The foregoing is considered to be a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Stantec Consulting Services Inc.

Jason Gass
Aviation Planner
Phone: (207) 887-3437
Fax: (207) 883-3376
jason.gass@stantec.com

Stantec

Meeting Minutes

Plymouth Master Plan APAC Meeting

Prepared: April 3, 2015

Meeting Date/Time:	April 2, 2015 / 10:00am
Place:	Plymouth, NH Town Office
Next Meeting:	April 13, 2015 / 6:30 pm
Attendees:	See attached
Distribution:	Attendees

Purpose

This was the fourth APAC meeting to discuss Chapters 4 and 5 (Facility Requirements and Alternatives).

Discussion

1. Erv kicked off the meeting with a brief statement about its purpose and then turned it over to Jason.
2. Jason began with a brief overview of how we got to where we are today and provided a brief overview of the purpose of today's meeting. He reiterated that a major issue that the Plan hopes to help the town with is whether to join NPIAS.
    a. Carol asked Jason to clarify what NPIAS is, which he did.
3. Jason discussed the two growth concepts out outlined in the previously submitted forecasts chapter. These are the low-growth scenario where the airport would not join NPIAS, and the high-growth setting where the town is accepted into NPIAS.
    a. Erv noted that the theory behind the two scenarios is that by gaining entrance into NPIAS, the airport would be eligible for federal funding, which could provide increased revenue for infrastructure upgrades, thus driving more demand for airport services.
4. Bill asked about the runway length
    a. Jason noted that none of the alternatives considers a longer runway. He explained that the design aircraft, a Cessna 172 (or similar) could operate safely from the existing runway length.
5. Sharon noted that as the town planner, she considers how the airport parlays into community growth.
    a. Rita mentioned ways in which the airport can entice growth.
6. Jason discussed the Low Growth - Non NPIAS Alternatives. He mentioned again that the existing runway length is sufficient and talked about why the airport has a displaced threshold on the Runway 30 approach. While Stantec has not been able to uncover the exact reason why, we speculate that it's because of trees in the approach surface.
    a. Rita suggested it might be because of the access road right near the runway threshold and that DOT would check their files.
    b. Erv asked if the access road was open to the public and Colin said it was not and that there is a chain across the entrance.
7. Jason gave an overview of the Low Growth Landside Alternatives, including the need for a fuel farm at the airport and what size tanks the town should consider.
    a. Sharon asked if the tank would be above or below ground and Jason noted that the tank would be above ground.

b. Carol said that in addition to hangar development, the plan should consider and show areas for both aeronautical and non-aeronautical use on the land use plan. Erv noted that it would.

8. Jason addressed the Low Growth Airside Alternatives, discussing obstructions, runway lighting and the displaced threshold.
   a. A general discussion took place about solar powered LED lights. Carol noted that as of today the FAA would not fund them, however this could change. Erv noted that a recent meeting with one of the larger manufacturers of solar lights, the representative indicated that they are working with the FAA on this matter.
   b. Rita stated that removal of the displaced threshold needs to be looked at carefully. While the airport is currently not obligated to comply with FAA standards, as a NPIAS airport they would be.
   c. Carol discussed the need for mitigation efforts because of the access road.
9. Jason reviewed the Low Growth Alternative I starting with the landside. He addressed the fence, fuel farm and tee hangar.
   a. Sharon asked if there was a way to show the plan in three dimensions. Erv and Carol said there was.
   b. Jason reviewed the airside options noting that it is essentially the same as Alternative I, except for solar powered runway edge lights.
   c. Rita wanted Jason to clarify if lighting costs listed in the draft included installation and design costs. Jason said that the costs in the draft report did, but at a planning level, (meaning detailed engineering was not applied).
10. Jason next reviewed the High Growth Alternatives, starting with Alternative I Landside
    a. Another discussion was held concerning fuel tank sizes and revenue streams, with a general discussion about fuel taxes. Rita noted that in addition to federal taxes, the state also imposes a tax on fuel. A discussion was held about local taxes, with Erv noting that adding a local tax would be the same as the application of a retail price markup. Carol told the group that any revenue generated by the airport must come back to the airport, with the exception of property taxes (on hangars for instance, which can stay with the town's general fund). Anne acknowledged that the town is aware of this and that it is applied accordingly.
11. Jason next reviewed the High Growth Alternative I - Airside options. Again, he noted the need to clear obstructions, and that the option of lighting the runway is a consideration in this alternative as well. He noted that in this alternative the runway remains turf.
    a. Colin asked if the FAA would require year round access to the airport. Carol and Rita will check into this with the FAA for a ruling whether ski operations would be an acceptable way of meeting grant assurances.
12. Jason moved onto High Growth Alternative II, and noted that this option called for paving all operating surfaces (runway, apron(s) and taxilanes). He also noted that unlike a turf runway where the safety area ends at the runway threshold, a paved runway requires an additional safety area on each runway end. In the case of Plymouth, this would add 240' (plus additional land for grading).
    a. Carol said that Stantec needs to address a shorter runway option, one that keeps the runway and safety area on existing airport property. Erv noted that we would add an additional option to this alternative.

b. There was a general discussion about paving and plowing and that as a NPIAS airport, grant assurances require the airport remain operational to the maximum extent possible, meaning the airport can close down for relatively short periods during and following a snowstorm.[1]

c. Carol asked if the runway illustrated on Figure 5.4 is at the correct dimensions. Erv stated no, it was an oversight and that the correct width for this airport would be 60 feet (not the 100 feet as shown). Carol also noted that the opposing taxiways on either side of the Runway 30 approach end are not consistent with current FAA design standards. Again, Erv noted this error and that the plan would be modified.[2]

d. Carol asked that Stantec consider the need for an instrument approach procedure to the airport. Erv indicated that this would be added to the list of recommended alternatives.

e. Jason also noted that when applicable, plans would show when land is required in either fee simple or an easement.

f. Anne asked if there was any consideration to moving the entire airport to the opposite side of Quincy Road. Carol asked if we should or have considered this option. Jason said that we had not.[3]

g. Carol discussed revenue use of airport land. Any commercial or private use of airport land must result in compensation to the town (airport). [4]

13. Jason then presented what is called the "full build" option based on a request from Paul Frietas at the last meeting. Jason noted that this concept shows one of numerous potential development ideas that takes advantage of the entire airport (on the Jason concluded his presentation with a caveat that the alternatives just presented are not a take one package or nothing. In fact, the town can choose the options they want to move forward with in the future airport design. Jason also provided an overview of what work remains and the schedule.

    a. Erv noted that the next critical step in the process is for the town to select the preferred alternative because all remaining work is based on this decision.

    b. Erv also noted that the original scope of work called for a public information meeting tonight (same day as APAC meeting #4, but that as previously discussed, this would not give the APAC members time to digest what they just heard.

    c. Anne suggested that we hold public information meeting on April 13 during the next Board of Selectman meeting. Erv agreed, and at Anne's request, said he would send her suggested wording for the public notice.[5]

The meeting adjourned at 11:25am.

---

[1] One issue not discussed at the meeting was if the town adopts this alternative - one that calls for paving the operating surfaces - then the need to add both snow removal equipment and ultimately a snow removal equipment storage building should be considered, and the latter added to the Airport Layout Plan.

[2] FAA standards try to avoid taxiways that allow an aircraft to cross a runway without making turns. This standard was recently implemented to cut down on runway incursions by forcing pilots to slowdown and turn to have a better view of runway activity.

[3] After the meeting, Erv did a preliminary review of the topography of airport property north of Quincy Road. His findings indicate that there is a considerable grade change of as much 150 feet along a line parallel to the road, which is significant enough that constructing a runway in this area, while not insurmountable engineering wise, would incur considerable added costs for grading and fill

[4] As noted in the FAA Airport Compliance Manual, compensation must be fair and reasonable, and in the case of non-aeronautical use, at fair market value. See Chapter 17 in FAA Order 5190.6B.

[5] The first of two Public Information Meetings is officially scheduled for 6:30 pm, April 13.

The foregoing is a true and accurate record of all items discussed. If any discrepancies or inconsistencies are noted, please contact the writer immediately.

Stantec Consulting Services Inc.

Ervin C. Deck, Associate
Senior Aviation Planner
Phone: (207) 887-3437
Cell: (207) 205-2380
Ervin.deck@stantec.com

Stantec

4.2.15

Sign In Sheet

NAME	ORGANIZATION	
Jason Gass	Stantec	
KATHRYN LOWE	EXECUTIVE ASSISTANT	TOWN OF PLYMOUTH
Anne M. Abear	Finance Director	Town of Plymouth
Sharon Penney	Town Planner	Town of Plymouth
Bill Bolton	Plymouth Selectboard	"
Carol Niewola	NHDOT/Aeronautics	Sr. Aviation Planner
Rita Hunt	NHDOT/Aeronautics	Aviation Planner
ERVIN DECK	STANTEC	PROJECT MGR
COLIN MCIVER	TOWN OF PLYMOUTH	AIRPORT MGR

Designed by: Checked by:

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APPENDIX B - TERMS AND ABBREVIATIONS

The following terms and abbreviations are used in this report and should serve as a benefit to the reader in understanding the distinctive field of aviation and airports.

TERM – ABBREVIATION	DEFINITION
1P1	FAA identifier for Plymouth Municipal Airport, Plymouth, NH
Above Mean Sea Level	Refers to the ground elevation (on the ground) or altitude (in the air) of any object relative to average sea level.
AC	Advisory Circular or Alternating Current
ACIP	Airport Capital Improvement Plan
ADG	Airplane Design Group
Advisory Circular	Regularly published FAA guidelines that provide information for the pubic and industry. In some cases they outline acceptable means of compliance with Federal Aviation Regulations (FARs). In other cases, they provide general information. Advisory Circulars are not enforceable in the same way rules are. However, since airports sometimes face the choice of either complying with an AC or spending months trying to get approval for a different solution, an AC frequently becomes mandatory for all practical purposes.
AGL	See Above Ground Level
AIP	Airport Improvement Program
Air Navigation Aid	See Navigation Aid.
Air Taxi	An air taxi is a for-hire passenger or cargo aircraft that operates on an on-demand basis. In the United States, air taxi and air charter operations are governed by Part 135 of the Federal Aviation Regulations (FAR), unlike the larger scheduled air carriers that are governed by more stringent standards of FAR Part 121.
Air Taxi Operation	Aircraft operations by aircraft other than those classified as an air carrier operation. These use three-letter company designators or the prefix “TANGO” or “Lifeguard.”

TERM – ABBREVIATION	DEFINITION
Air Traffic	Air traffic means aircraft operating in the air or on an airport surface, exclusive of loading ramps and parking areas.
Air Transportation	Air transportation means interstate, overseas, or foreign air transportation or the transportation of mail by aircraft.
Aircraft	Aircraft means a device that is used or intended to be used for flight in the air.
Aircraft Approach Category	A grouping of aircraft into categories based on 1.3 times their stall speed in their landing configuration at the certificated maximum flap setting and maximum landing weight at standard atmospheric conditions. The categories are: Category A: Speed less than 91 knots Category B: Speed 91 knots or more but less than 121 knots. Category C: Speed 121 knots or more but less than 141 knots. Category D: Speed 141 knots or more but less than 166 knots. Category E: Speed 166 knots or more.
Airplane	Airplane means an engine-driven fixed-wing aircraft heavier than air that is supported in flight by the dynamic reaction of the air against its wings.

TERM – ABBREVIATION	DEFINITION
Airplane Design Group	A grouping of airplanes into categories based on wingspan or tail height. Where an airplane is in two categories, the most demanding category should be used. The groups are as follows: Group I: Up to but not including 49 feet wingspan or tail height up to but not including 20 feet Group II: 49 feet up to but not including 79 feet wingspan Group III: 79 feet up to but not including 118 feet wingspan or tail height from 30 up to but not including 45 feet Group IV: 118 feet up to but not including 171 feet wingspan or tail height from 45 up to but not including 60 feet Group V: 171 feet up to but not including 214 feet wingspan or tail height from 60 up to but not including 66 feet Group VI: 214 feet up to but not including 262 feet wingspan
Airport Elevation	The highest point on an airport's usable runway expressed in feet above mean sea level (MSL).
Airport Improvement Program	The Airport Improvement Program is a United States federal grant program that provides funds to airports to help improve safety and efficiency. Improvement projects relate to runways, taxiways, ramps, lighting, signage, weather stations, NAVAIDs, land acquisition, and some areas of planning. The program was established under the Airport and Airway Improvement Act of 1982.
Airport Layout Plan	An ALP is a scaled drawing of the existing and proposed land use and facilities that are necessary for the operation and development of an airport. All airport improvements carried out at a Federally obligated airport must be done in accordance with an FAA-approved ALP. The FAA-approved ALP, to the extent practicable, should conform to the FAA airport design standards existing at the time of its approval.

TERM – ABBREVIATION	DEFINITION
Airport Noise	When evaluating proposed airport projects, airport noise is often the most controversial environmental impact FAA examines. Airport development that changes airport runway configurations, aircraft operations and/or movements, aircraft types using the airport, or aircraft flight characteristics can all affect existing and future noise levels. FAA's noise analysis primarily focuses on how proposed airport actions would change the cumulative exposure to airport noise of individuals in areas surrounding the airport.
Airport Operations Count	The statistics maintained by the control tower, counting the number of arrivals and departures from the airport. Specifically, one airport operation count is taken for each (regular altitude approach) landing and takeoff, while two airport operation counts; i.e., one landing and one takeoff, are taken for each low approach that is below traffic pattern altitude, stop and go, or touch and go operation.
Airport Reference Code	The ARC is a coding system intended to help match airport design to the operational and physical characteristics of the airplanes intended to operate at the airport. The airport reference code has two components. The first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (an operational characteristic). The second component, depicted by a Roman numeral, is the airplane design group and relates to airplane wingspan or tail height (physical characteristics), whichever is the most restrictive.
Airport Reference Point	The latitude and longitude of the approximate center of the airport.
Airside	The aircraft operational side of an airport, including runways, taxiways, aircraft aprons, aircraft hangars, and their supporting infrastructure.
Airspace	The world's navigable airspace is divided into three-dimensional segments, each of which is assigned to a specific class. Most nations adhere to the classification specified by the International Civil Aviation Organization (ICAO).
ALP	Airport Layout Plan
AMSL	See Above Mean Sea Level
Approach Procedure	See Instrument Approach Procedure

TERM – ABBREVIATION	DEFINITION
Apron	The airport apron or ramp is part of an airport. It is usually the area where aircraft are parked, unloaded or loaded, refueled or boarded. Although the use of the apron is covered by regulations, such as lighting on vehicles, it is typically more accessible to users than the runway or taxiway. However, the apron is not usually open to the general public and a license may be required to gain access.
ARC	Airport Reference Code
ARP	Airport Reference Point
ASOS	Automatic Surface Observation System
Automatic Surface Observation System	ASOS are automated weather reporting systems consisting of various sensors, a processor, a computer-generated voice subsystem, and a transmitter to broadcast weather data. Note: ASOS and AWOS are the same basic systems, just developed for different Federal agencies.
Avigation Easement	Avigation easement is an easement or right of over flight in the airspace above or in the vicinity of a particular property. It also includes the right to create such noise or other effects as may result from the lawful operation of aircraft in such airspace and the right to remove any obstructions to such over flight. Hence, Avigation easement permits aircraft approaching an airport to fly at low elevations above private property. This in effect prevents the landowners near airports from building above a set height or requires the trimming of trees.
AWOS	Automatic Weather Observation System
Based Aircraft	An aircraft that is "operational and air worthy" and typically based at a given facility for a majority of the year.
Biotic Communities	For purposes of this Appendix, the term "biotic communities" means various types of flora (plants) and fauna (fish, birds, reptiles, amphibians, marine mammals, coral reefs, etc.) in a particular area. The term also means rivers, lakes, wetlands, forests, upland communities, and other habitat types supporting flora and aquatic and avian fauna.
BOA	Bureau of Aeronautics

TERM – ABBREVIATION	DEFINITION
BRL	Building Restriction Line
Building Restriction Line	A line that identifies suitable building area locations on airports. The line represents an arbitrary elevation, selected by the planner. Thus, objects may be inside the line (closer to the runway) and still permitted, if they do not penetrate a FAR Part 77 surface.
Bureau of Aeronautics	A division of the NHDOT charged with the management of the state's aviation system. The BOA works with aviation agencies at the federal, state and local levels to preserve and promote a system of airports necessary to guarantee the future of air transportation in New Hampshire.
CFR	Code of Federal Regulations
CIP	Capital Improvement Plan
Civil Aircraft	Civil aircraft means aircraft other than public aircraft, that is, privately owned aircraft.
Class	As used with respect to the certification of aircraft, means a broad grouping of aircraft having similar characteristics of propulsion, flight, or landing. Examples include: airplane, rotorcraft, glider, balloon, landplane, and seaplane.
Code of Federal Regulations	The Code of Federal Regulations (CFR) is the codification of the general and permanent rules and regulations (sometimes called administrative law) published in the Federal Register by the executive departments and agencies of the Federal Government of the United States. The CFR is published by the Office of the Federal Register, an agency of the National Archives and Records Administration.
Compatible Land Use	The compatibility of existing and planned land uses near an airport is closely associated with the extent of potential aircraft-noise from the airport, as well as safety concerns with the land under airport imaginary surfaces. Most land uses occurring adjacent to and within the bounds of airport property involve aviation and commercial activities and are considered compatible with airport operations. Rural residential, agricultural and industrial (landfill) development are the principal land uses located adjacent to airport property. Rural residential and agricultural land uses are typically regarded as compatible with standard general aviation operations.

TERM – ABBREVIATION	DEFINITION
DC	Direct Current
Design Aircraft/Airplane	See Design Airplane
Design Airplane	Essentially the biggest, fastest airplane that commonly uses the airport. The technical definition is the airplane (or family grouping of airplanes) with the longest wingspan and fastest approach speed that conducts at least 500 or more annual itinerant operations at the airport.
Displaced Threshold	A threshold that is located at a point on the runway other than the designated beginning of the runway. The portion of the pavement behind the displaced threshold is available for takeoff.
FAR	Federal Aviation Regulation
FAR Part 77	Part 77, Objects Affecting Navigable Airspace. This part: Establishes standards for determining obstructions in navigable airspace; Sets forth the requirements for notice to the Administrator of certain proposed construction or alteration; Provides for aeronautical studies of obstructions to air navigation, to determine their effect on the safe and efficient use of airspace; Provides for public hearings on the hazardous effect of proposed construction or alteration on air navigation; and Provides for establishing antenna farm areas.
FAR Part 91	FAR Part 91, General Operating and Flight Rules. Among other applications, this part prescribes rules governing the operation of aircraft (other than moored balloons, kites, unmanned rockets, and unmanned free balloons).
Farmland	Important farmlands include all pasturelands, croplands, and forests (even if zoned for development) considered to be prime, unique, or statewide or locally important lands.
FBO	Fixed Based Operator
Federal Aviation Regulation	FARs, are rules prescribed by the Federal Aviation Administration (FAA) governing all aviation activities in the United States. The FARs are part of Title 14 of the Code of Federal Regulations (CFR).

TERM – ABBREVIATION	DEFINITION
Fee Simple	A permanent and absolute tenure of an estate in land with freedom to dispose of it at will, especially in full fee simple absolute a freehold tenure, which is the main type of land ownership.
Fixed Base Operator	In the aviation industry, a fixed base operator (also known as fixed base of operation), or FBO, is a service center at an airport that may be a private enterprise or may be a department of the municipality that the airport serves. At a minimum, most FBOs offer aircraft fuel, oil, and parking, along with access to washrooms and telephones. Some FBOs offer additional aircraft services such as hangar (indoor) storage, maintenance, aircraft charter or rental, flight training, deicing, and ground services such as towing and baggage handling. FBOs may also offer services not directly related to the aircraft, such as rental cars, lounges, and hotel reservations.
Fixed by Function Navigation Aid	An air navigation aid (NAVAID) that must be positioned in a particular location in order to provide an essential benefit for civil aviation... An example is a runway light, which must by its nature by located along the edge of the runway.
Fixed Wing Aircraft	A fixed-wing aircraft is a heavier-than-air craft whose lift is generated not by wing motion relative to the aircraft, but by forward motion through the air. The term is used to distinguish from rotary-wing aircraft (rotorcraft, such as helicopters), where the movement of the wing surfaces relative to the aircraft generates lift.
Fleet Mix	A breakout of aircraft categories (single engine, multiengine, etc.).
Floodplains	To meet Executive Order 11988, Floodplains, and the U.S. Department of Transportation (DOT) Order 5650.2, Floodplain Management and Protection, all airport development must avoid floodplain, if a practicable alternative exists. If no practicable alternative exists, development in a floodplain must be designed to minimize adverse impact to the floodplain's natural and beneficial values. The design must also minimize the potential risks for flood-related property loss and impacts on human safety, health, and welfare.

TERM – ABBREVIATION	DEFINITION
Frangible Navigation Aid	A navigational aid (NAVAID) that retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft. The term NAVAID includes electrical and visual air navigational aids, lights, signs, and associated supporting equipment.
GA	See General Aviation
General Aviation	General aviation refers to all flights other than military and scheduled airline flights, both private and commercial. General aviation flights range from gliders and powered parachutes to large, non-scheduled cargo jet flights. As a result, the majority of the world's air traffic falls into this category, and most of the world's airports serve general aviation exclusively.
General Aviation Airport	Communities that do not receive scheduled commercial service or that do not meet the criteria for classification as a commercial service airport may be included in the NPIAS as sites for general aviation airports if they account for enough activity (usually at least 10 locally based aircraft) and are at least 20 miles from the nearest NPIAS airport. The activity criterion may be relaxed for remote locations or in other mitigating circumstances. The 2,574 general aviation airports in the NPIAS tend to be distributed on a one-per-county basis in rural areas and are often located near the county seat. These airports, with an average of 33-based aircraft, account for 40 percent of the nation's general aviation fleet. They are the most convenient source of air transportation for about 19 percent of the population and are particularly important to rural areas.
General Aviation Operations	Civil aircraft operations not classified as air carrier or air taxi.
Geographic Information System	A geographic information system (GIS), also known as a geographical information system, is an information system for capturing, storing, analyzing, managing and presenting data that is spatially referenced (linked to location). In the strictest sense, it is any information system capable of integrating, storing, editing, analyzing, sharing, and displaying geographically referenced information. In a more generic sense, GIS applications are tools that allow users to create interactive queries (user created searches), analyze spatial information, edit data, maps, and present the results of all these operations.

TERM – ABBREVIATION	DEFINITION
GIS	See Geographic Information System
Hazard to Air Navigation	An object that the FAA determines will have a substantial adverse effect upon the safe and efficient use of navigable airspace by aircraft, operation of air navigation facilities, or existing or potential airport capacity. This is as a result of an aeronautical study under 14 CFR part 77.
Helicopter	See Rotorcraft
Holding	A predetermined maneuver that keeps aircraft within a specified airspace while awaiting further clearance from ATC.
IAP	Instrument Approach Procedure
IFR	See Instrument Flight Rules
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
Instrument Approach Procedure	A series of predetermined maneuvers for the orderly transfer of an aircraft under IFR from the beginning of the initial approach to a landing or to a point from which a landing may be made visually.
Instrument Flight Rules	Rules and regulations established by the Federal Aviation Administration to govern flight under conditions in which flight by outside visual reference is not safe. IFR flight depends upon flying by reference to instruments in the flight deck, and navigation is accomplished by reference to electronic signals.
Instrument Meteorological Conditions	Meteorological conditions that are less than the minimums specified for visual meteorological conditions, requiring operations to be conducted under IFR. These are expressed in terms of visibility, distance from clouds, and ceiling.
Itinerant Operation	Operations not classified as "local" operations. See local operation.
Landside	The part of the airport exclusive of aircraft operating areas (runways, taxiways, aircraft aprons/ramps). Landside includes the terminal building, other buildings and structures not on the airport's airside, automobile parking areas, access roads, etc.

TERM – ABBREVIATION	DEFINITION
Large Aircraft	Large aircraft means aircraft of more than 12,500 pounds, maximum certificated takeoff weight.
Light Emissions	Airport-related lighting facilities and activities that could visually affect surrounding residents and other nearby light-sensitive areas such as homes, parks or recreational areas.
Light Sport Aircraft	See Sport Aircraft
LIRL	Low Intensity Runway Lights. See Runway Edge Lights.
Local Operation	Aircraft operations remaining in the local traffic pattern, for example, simulated instrument approaches at the airport, including military and civil operations, operations to or from the airport within a practice area within a 20-mile radius of the tower.
Long-Term	The eleventh through twentieth year of an airport planning period
LSA	Light sport aircraft
Mean Sea Level	The height of the sea surface midway between its average high and low water positions
MGTOW	Maximum Gross Takeoff Weight of an aircraft.
MGLW	Maximum Gross Landing Weight
MIRL	Medium Intensity Runway Lights. See Runway Edge Lights.
Modification to Standards	Means any change to FAA design standards other than dimensional standards for runway safety areas. Unique local conditions may require modification to airport design standards for a specific airport.
Movement Area	The maneuvering area or movement area is the part of the airport used by aircraft for landing and takeoff that does not include the airport ramp. The rest of the airport is considered the non-movement area. Movement Areas are defined areas on the airport or airfields, which are controlled by the control tower, e.g. permission, must be obtained to access these areas.
MSL	Mean Sea Level

TERM – ABBREVIATION	DEFINITION
National Plan of Integrated Airport Systems	The National Plan of Integrated Airport Systems is an inventory of U.S. aviation infrastructure assets (facilities). It is developed and maintained by the Federal Aviation Administration (FAA). Its purposes are to identify all the airports in the U.S. that are considered significant components of the national aviation infrastructure network; to qualify the current state of development, technology, and repair at each of these airports; and to estimate the funding needed to bring each airport up to current standards of design, technology, and capacity. Airports in the NPIAS are eligible for Federal grants from the Airport Improvement Program.
Natural Resources and Energy Supply	Airport development has the potential to change energy requirements or use consumable natural resources. To comply with the Council on Environmental Quality (CEQ) regulations mentioned in Section 2 of this plan, Federal Aviation Administration (FAA) environmental documents must evaluate potential impacts on supplies of energy and natural resources needed to build and maintain airports.
NAVAID	See Navigation Aid
Navigation Aid	A navigational aid (also known as aid to navigation or navaid) is any sort of marker, which aids the traveler in navigation; the term is most commonly used to refer to nautical or aviation travel. Includes electrical and visual air navigational aids, lights, signs, and associated supporting equipment.
NHDEP	New Hampshire Department of Environmental Protection
NHDOT	New Hampshire Department of Transportation
Night	Night means the time between the end of evening twilight and the beginning of morning twilight, as published in the American Air Almanac, converted to local time.
Night Operation	For the purposes of noise analysis, a night operation occurs during the period between 10 pm and 7 am. See also Airport Operation.
NM	Nautical Mile, defined as a unit of distance, set by international agreement as being exactly 1,852 meters (about 6,076 feet). Historically, it was defined as the distance spanned by one minute of arc along a meridian of the Earth (north-south), and developed from the sea mile and the related geographical mile.

TERM – ABBREVIATION	DEFINITION
NPIAS	National Plan of Integrated Airports System
Object	Includes, but is not limited to above ground structures, NAVAIDs, people, equipment, vehicles, natural growth, terrain, and parked aircraft.
Object Free Area	An area on the ground, centered on a runway, taxiway, or taxilane centerline, that for safety reasons is required to be free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.
Obstacle Free Zone	The Obstacle Free Zone (OFZ) is the airspace between the established airport elevation of the runway and 150 feet above. It is required to be clear of all objects. In order to provide clearance protection for aircraft landing or taking off and for missed approaches. The only exception is frangible visual NAVAIDs, which need to be located in the OFZ because of their function. The OFZ is subdivided as follows: Runway OFZ: The airspace above a surface that is centered on the runway centerline. Inner-approach OFZ: The airspace above a surface that is centered on the extended runway centerline. It applies to runways with an approach lighting system. Inner-transitional OFZ: The airspace above the surfaces located on the outer edges of the runway OFZ and the inner-approach OFZ. It applies to runways with approach visibility minimums lower than 3/4-statute mile.
Obstruction to Air Navigation	An object of greater height than any of the heights or surfaces presented in Subpart C of Code of Federal Regulation (14 CFR), Part 77. (Obstructions to air navigation are presumed to be hazards to air navigation until an FAA study has determined otherwise.)
OFA	Object Free Area
OFZ	Obstacle Free Zone
Operation	The takeoff or landing of an aircraft.
PAPI	See Precision Approach Path Indicator
PAPI	Precision Approach Path Indicator
PCL	See Pilot Controlled Lighting

TERM – ABBREVIATION	DEFINITION
Pilot Controlled Lighting	Pilot Controlled Lighting (also known as Aircraft Radio Control of Aerodrome Lighting [ARCAL] or Pilot Activated Lighting [PAL]) is a system that allows aircraft pilots to control the lighting of an airport or airfield's approach lights, runway edge lights, and taxiways via radio. PCL systems are most common at non-towered or little-used airfields where it is neither economical to light the runways all night, nor to provide staff to turn the runway lighting on and off. PCL enables pilots to control the lighting only when required, saving electricity and reducing light pollution.
Piston Aircraft	An aircraft powered by one or more piston engines (regardless of fuel type).
Plan View	The overhead view of an approach procedure on an instrument approach chart. The plan view shows the routes that guide the pilot from the en route segments to the IAF.
Precision Approach Path Indicator	The precision approach path indicator (PAPI) uses light units similar to the VASI but is installed in a single row of either two or four light units. These systems have an effective visual range of about five miles during the day and up to 20 miles at night. The row of light units is normally installed on the left side of the runway and the glide path indications are as depicted. Each box of lights is equipped with an optical apparatus that splits light output into two segments, red and white. Depending on the angle of approach, the lights will appear either red or white to the pilot. Ideally the total of lights will change from white to half red, moving in succession from right to left side. The pilot will have reached the normal glidepath (usually 3 degrees) when there is an even split in red and white lights. If an aircraft is beneath the glidepath, red lights will outnumber white; if an aircraft is above the glidepath, more white lights are visible.
Profile View	Side view of an IAP chart illustrating the vertical approach path altitudes, headings, distances, and fixes.
Public Aircraft	An aircraft operated by or on behalf of the United States Government, a State, the District of Columbia, a territory or possession of the United States, or a political subdivision of one of these governments, but only when operated under the conditions specified by 49 USC 40125(b), 40125(c), or 40125(d).
Ramp	See Apron

TERM – ABBREVIATION	DEFINITION
REIL	Runway End Identifier Light
Relocated Threshold	A threshold located at a point on the runway other than the beginning of the runway pavement. The portion of pavement behind a relocated threshold is not available for takeoff
ROFA	See Object Free Area
ROFZ	See Obstacle Free Zone
Rotating Beacon	A rotating beacon is a light system used to assist pilots in finding an airport, particularly those flying in IMC or VFR at night. Additionally, the rotating beacon provides information about the type of airport through the use of a particular set of color filters. Beacons for civil land airports emit a white and green light that appears as a flash.
RPZ	Runway Protection Zone
RSA	Runway Safety Area
Runway	A runway is a strip of land on an airport on which aircraft can take off and land. Runways may be a fabricated surface (often asphalt, concrete, or a mixture of both) or a natural surface (grass, dirt, or gravel).
Runway Blast Pad	A surface adjacent to the ends of runways provided to reduce the erosive effect of jet blast and propeller wash.
Runway Edge Lights	Runway Edge Lights are used to outline the edges of runways during periods of darkness or restricted visibility conditions. These light systems are classified according to the intensity they are capable of producing: High Intensity Runway Lights (HIRL) Medium Intensity Runway Lights (MIRL) Low Intensity Runway Lights (LIRL) The HIRL and MIRL systems have variable intensity controls, whereas the LIRLs normally have one intensity setting. Runway Edge Lights are white, except on instrument runways where yellow replaces white on the last 2,000 feet or half the runway length, whichever is less, to form a caution zone for landings. The lights marking the ends of the runway emit red light toward the runway to indicate the end of runway to a departing aircraft and emit green outward from the runway end to indicate the threshold to landing aircraft.

TERM – ABBREVIATION	DEFINITION
Runway End Identifier Lights	A pair of synchronized flashing lights, located laterally on each side of the runway threshold, providing rapid and positive identification of the approach end of a runway.
Runway Protection Zone	An area off the runway end to enhance the protection of people and property on the ground.
Runway Safety Area	A runway safety area (RSA) or runway end safety area (RESA) is defined as "the surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway."
Short-Term	The first five years of an airport planning period
Small Aircraft	Small aircraft means aircraft of 12,500 pounds or less, maximum certificated takeoff weight.
Social Impacts	Social impacts are defined as those that would cause relocation of any business or residence, alter the patterns of surface transportation, divide or disrupt established communities, disrupt orderly planned development, or create an appreciable change in employment.
Solid Waste	Construction, renovation, or demolition of most airside projects produces debris (e.g., dirt, concrete, asphalt) that must be properly disposed of. In addition, new or renovated terminal, cargo, or maintenance facilities may involve construction, renovation, or demolition that produces other types of solid waste (bricks, steel, wood, gypsum, glass). Therefore, airport sponsors should follow Federal, state, or local regulations that address solid waste. Doing so reduces the environmental effects of airport-related construction or operation.

TERM – ABBREVIATION	DEFINITION
Sport Aircraft	A light-sport aircraft, also known as light sport aircraft or LSA, is a small aircraft that is simple to fly and that meets certain regulations set by a national aviation authority restricting weight and performance. For example, in Australia the Civil Aviation Safety Authority defines a light-sport aircraft as a heavier-than-air or lighter-than-air craft, other than a helicopter, with a maximum gross takeoff weight of not more than 560 kilograms (1,230 lb) for lighter-than-air craft; 600 kilograms (1,300 lb) for heavier-than-air craft not intended for operation on water; or 650 kilograms (1,430 lb) for aircraft intended for operation on water.[1] It must have a maximum stall speed of 45 knots (83 km/h; 52 mph) in landing configuration; a maximum of two seats; there is no limit on maximum speed unless it is a glider, which is limited to Vne 135 kn CAS; fixed undercarriage (except for amphibious aircraft, which may have repositionable gear, and gliders, which may have retractable gear); an unpressurized cabin; and a single non-turbine engine driving a propeller if it is a powered aircraft.
Stopway	A defined rectangular surface beyond the end of a runway that is prepared or suitable for use in lieu of a runway to support an airplane, without causing structural damage to the airplane, during an aborted takeoff.
TAF	Terminal Area Forecasts
Taxilane	The portion of the aircraft parking area used for access between taxiways and aircraft parking positions.
Taxiway	A taxiway is a path on an airport connecting runways with ramps, hangars, terminals and other facilities. They mostly have hard surfaces such as asphalt or concrete, although smaller airports sometimes use gravel or grass.
Taxiway Safety Area	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.
TDG	Taxiway Design Group
Terminal Area	The airspace around major airports; normally associated with Class B and Class C airspace.

TERM – ABBREVIATION	DEFINITION
Terminal Area Forecasts	The official forecast of aviation activity at FAA facilities. These forecasts are prepared to meet the budget and planning needs of FAA and provide information for use by state and local authorities, the aviation industry, and the public.
Threatened and Endangered Species	To satisfy the Endangered Species Act of 1973, the Federal Aviation Administration (FAA) must determine if a proposed action under its purview would affect a Federally listed species or habitat critical to that species. For purposes of this Plan, the following definitions apply: Major construction activity; Endangered species; Threatened species; Candidate species; and, Critical habitat.
Threshold	The beginning of that portion of the runway available for landing. In some instances, the landing threshold may be displaced. See also Displaced Threshold.
Threshold Lights	Threshold lights mark the ends of the runway and emit red light toward the runway to indicate the end of runway to a departing aircraft and emit green outward from the runway end to indicate the threshold to landing aircraft.
Title 14 of the Code of Federal Regulations (14 CFR)	The federal aviation regulations governing the operation of aircraft, airways, and aviators.
Traffic Pattern	Traffic pattern means the traffic flow that is prescribed for aircraft landing at, taxiing on, or taking off from an airport.
TSA	Taxiway Safety Area (see Runway Safety Area for similar application)
Ultralight	An "ultralight" as a vehicle that: has only one seat; Is used only for recreational or sport flying; Does not have a U.S. or foreign airworthiness certificate; If unpowered, weighs less than 155 pounds; If powered: Weighs less than 254 pounds (115 kg) empty weight, excluding floats and safety device; Has a maximum fuel capacity of 5 U.S. gallons (19 L); Has a top speed of 55 knots (102 km/h; 63 mph) calibrated airspeed at full power in level flight; Has a power-off stall speed of 24 knots (45 km/h; 28 mph) calibrated airspeed or less.

TERM – ABBREVIATION	DEFINITION
USDOT § 4(f)	Section 4(f) of the Department of Transportation Act requires the Secretary of Transportation investigate all alternatives before affecting any publicly owned lands designated as public parks, recreation areas, wildlife or waterfowl refuges of national, state, or local significance, or land having national, state, or local historical significance.
VAGL	Visual Approach Guidance Lights
VASI	See Visual Approach Slope Indicator.
VFR	See Visual Flight Rules
VGSI	Visual Glideslope Indicators (VGSI) is a system of lights so arranged to provide visual descent guidance information during the approach to a runway. There are several VGSI systems; the most common are VASI and its replacement PAPI.
VIS	Visibility
Visual Approach	An approach based on the pilot's perception of the correct alignment with the runway centerline and glideslope with no reference to navigational equipment.
Visual Approach Slope Indicator	A visual aid of lights arranged to provide descent guidance information during the approach to the runway. A pilot on the correct glide slope will see red lights over white lights. See PAPI.
Visual Flight Rules	Flight rules adopted by the FAA governing aircraft flight using visual references. VFR operations specify the amount of ceiling and the visibility the pilot must have in order to operate according to these rules. When the weather conditions are such that the pilot cannot operate according to VFR, he or she must use instrument flight rules (IFR).
Visual Meteorological Conditions	Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling meeting or exceeding the minimums specified for VFR.
Visual Runway	A runway without an existing or planned straight-in instrument approach procedure.
VMC	See Visual Meteorological Conditions

TERM – ABBREVIATION	DEFINITION
Water Quality	Construction often causes sediment-laden runoff to enter waterways. Biological and chemical breakdown of deicing chemicals in airport runoff can cause severe dissolved oxygen demands on receiving waters. Operations or maintenance are other activities that may affect water quality. Airport-related water quality impacts can occur from both point and non-point sources at airports. If not properly controlled, the resultant water quality impacts may adversely affect animal, plant, or human populations.
Wetlands	Executive Order 11990, Protection of Wetlands, sets the standard for a Federal agency action involving any wetland. The U.S. Department of Transportation (DOT) developed and issued DOT Order 5660.1A, Preservation of the Nation's Wetlands to provide more guidance to DOT agencies regarding their actions in wetlands. The DOT Order governs the Federal Aviation Administration's (FAA's) actions.
Wild & Scenic Rivers	Those rivers having remarkable scenic, recreational, geologic, fish, wildlife, historic, or cultural values. Federal land management agencies in the Departments of the Interior and Agriculture manage the Wild and Scenic Rivers Act (Act).

APPENDIX C - ENVIRONMENTAL CORRESPONDENCE

Appendix C contains the following correspondence and related maps concerning the environmental review process in development of this master plan.

- Letter from US Department of the Interior, Fish and Wildlife Service concerning endangered and threatened species that may occur in the project area
- Email dated 6/17/2016, from New Hampshire Natural Heritage Bureau referencing rare species and exemplary natural communities
- Federally listed endangered and threatened species in New Hampshire
- Soil Map, Grafton County, Plymouth Municipal Airport

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Consultation Code: 05E1NE00-2016-SLI-1650 June 21, 2016
Event Code: 05E1NE00-2016-E-02396
Project Name: Plymouth Municipal Airport Master Plan Update

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

To Whom It May Concern:

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

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

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

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

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

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

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

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

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Plymouth Municipal Airport Master Plan Update

Official Species List

Provided by:

New England Ecological Services Field Office
70 COMMERCIAL STREET, SUITE 300
CONCORD, NH 03301
(603) 223-2541
http://www.fws.gov/newengland

Consultation Code: 05E1NE00-2016-SLI-1650
Event Code: 05E1NE00-2016-E-02396

Project Type: TRANSPORTATION

Project Name: Plymouth Municipal Airport Master Plan Update
Project Description: Update to the airport's master plan, 2016

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:

Project Coordinates: MULTIPOLYGON (((-71.75833940505981 43.784247443611804, -71.76286697387695 43.77490541344873, -71.75029277801514 43.772271409837956, -71.74628019332886 43.78178426392523, -71.75833940505981 43.784247443611804)))

Project Counties: Grafton, NH

Endangered Species Act Species List

There are a total of 1 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Mammals	Status	Has Critical Habitat	Condition(s)
Northern long-eared Bat *(Myotis septentrionalis)*	Threatened		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

New Hampshire Natural Heritage Bureau

To: Erica Kidd
482 Payne Road
Scarborough Court
Scarborough, ME 04074

Date: 6/17/2016

From: NH Natural Heritage Bureau

Re: Review by NH Natural Heritage Bureau of request dated 6/17/2016

NHB File ID: NHB16-1922

Applicant: Town of Plymouth

Location: Tax Map(s)/Lot(s): Map 14
Plymouth

Project Description: This project is an update to the Plymouth Municipal Airport Master Plan.

The NH Natural Heritage database has been checked for records of rare species and exemplary natural communities near the area mapped below. The species considered include those listed as Threatened or Endangered by either the state of New Hampshire or the federal government. We currently have no recorded occurrences for sensitive species near this project area.

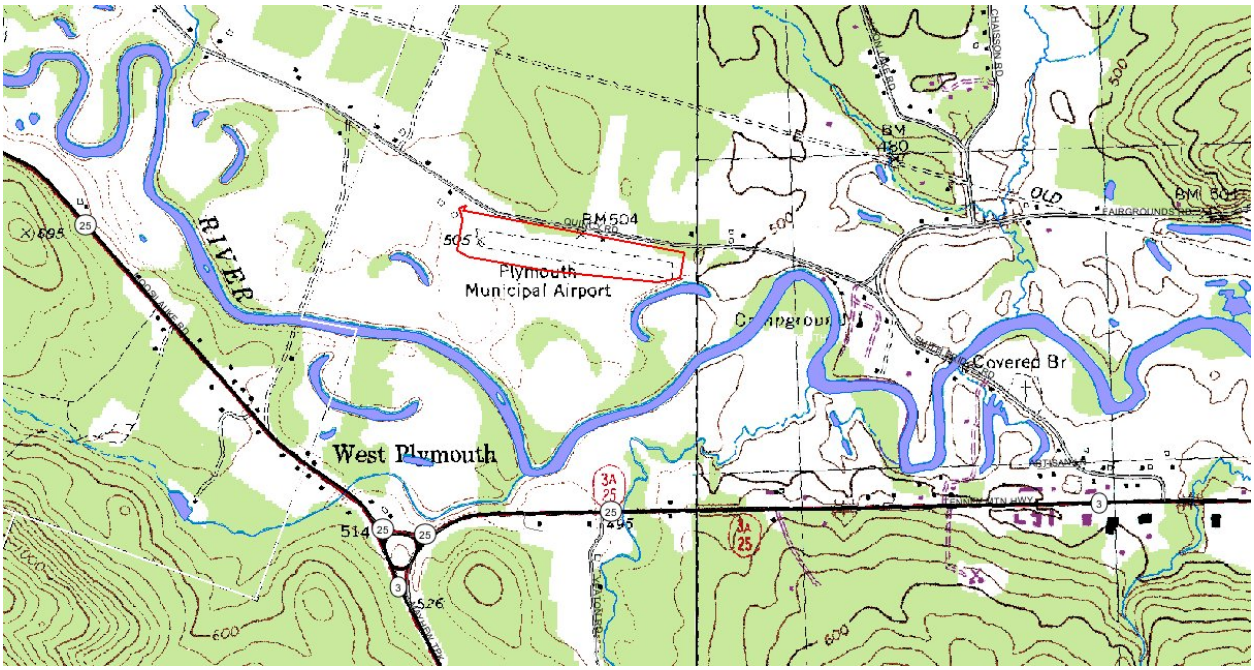
A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

This report is valid through 6/16/2017.

Department of Resources and Economic Development
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DRED/NHB
172 Pembroke Road
Concord NH 03301

MAP OF PROJECT BOUNDARIES FOR NHB FILE ID: NHB16-1922



Department of Resources and Economic Development
Division of Forests and Lands
(603) 271-2214 fax: 271-6488

DRED/NHB
172 Pembroke Road
Concord NH 03301

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN NEW HAMPSHIRE

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Belknap	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Meredith, Alton and Laconia
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Carroll	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Albany, Brookfield, Eaton, Effingham, Madison, Ossipee, Wakefield and Wolfeboro
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Coos	Canada Lynx	Threatened	Regenerating softwood forest, usually with a high density of snowshoe hare.	All Towns
	Dwarf wedgemussel	Endangered	Connecticut River main channel and Johns River	Northumberland, Lancaster and Dalton
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Cheshire	Dwarf wedgemussel	Endangered	S. Branch Ashuelot River and Ashuelot River	Swanzey, Keene and Surry
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Grafton	Dwarf wedgemussel	Endangered	Connecticut River main channel	Haverhill, Piermont, Orford and Lyme
	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Holderness
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Hillsborough	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Manchester, Weare
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Merrimack	Karner Blue Butterfly	Endangered	Pine Barrens with wild blue lupine	Concord and Pembroke
	Small whorled Pogonia	Threatened	Forests	Bow, Danbury, Epsom, Loudon, Warner and Allenstown
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

Updated 02/05/2016

FEDERALLY LISTED ENDANGERED AND THREATENED SPECIES IN NEW HAMPSHIRE

COUNTY	SPECIES	FEDERAL STATUS	GENERAL LOCATION/HABITAT	TOWNS
Rockingham	Piping Plover	Threatened	Coastal Beaches	Hampton and Seabrook
	Roseate Tern	Endangered	Atlantic Ocean and nesting at the Isle of Shoals	
	Red knot[1]	Threatened	Coastal Beaches and Rocky Shores, sand and mud flats	Coastal towns
	Small whorled Pogonia	Threatened	Forests	Deerfield, Northwood, Nottingham, and Epping
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Strafford	Small whorled Pogonia	Threatened	Forests with somewhat poorly drained soils and/or a seasonally high water table	Middleton, New Durham, Milton, Farmington, Strafford, Barrington, and Madbury
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide
Sullivan	Northeastern bulrush	Endangered	Wetlands	Acworth, Charlestown, Langdon
	Dwarf wedgemussel	Endangered	Connecticut River main channel	Plainfield, Cornish, Claremont and Charlestown
	Jesup's milk-vetch	Endangered	Banks of the Connecticut River	Plainfield and Claremont
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

[1]Migratory only, scattered along the coast in small numbers

-Eastern cougar, gray wolf and Puritan tiger beetle are considered extirpated in New Hampshire.

-Endangered gray wolves are not known to be present in New Hampshire, but dispersing individuals from source populations in Canada may occur statewide.-There is no federally-designated Critical Habitat in New Hampshire

Updated 02/05/2016

Soil Map—Grafton County, New Hampshire
(Plymouth Municipal Airport)

Map Scale: 1:9,020 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 400 800 1600 2400

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Grafton County, New Hampshire
Survey Area Data: Version 18, Sep 18, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 8, 2011—May 1, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Grafton County, New Hampshire (NH009)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
15	Searsport mucky peat	9.2	2.1%
28A	Madawaska fine sandy loam, 0 to 3 percent slopes	8.8	2.0%
36A	Adams loamy sand, 0 to 3 percent slopes	74.4	17.0%
36B	Adams loamy sand, 3 to 8 percent slopes	0.1	0.0%
36C	Adams loamy sand, 8 to 15 percent slopes	6.4	1.5%
36E	Adams loamy sand, 15 to 60 percent slopes	3.2	0.7%
101	Ondawa fine sandy loam, 0 to 3 percent slopes, frequently flooded	12.0	2.7%
102	Sunday loamy sand	33.9	7.7%
104	Podunk fine sandy loam, 0 to 3 percent slopes, frequently flooded	2.4	0.6%
105	Rumney fine sandy loam, 0 to 3 percent slopes, frequently flooded	60.8	13.9%
201	Ondawa fine sandy loam, 0 to 3 percent slopes, occasionally flooded	56.5	12.9%
255B	Monadnock and Hermon soils, 3 to 8 percent, very stony	5.2	1.2%
255C	Monadnock and Hermon soils, 8 to 15 percent, very stony	0.7	0.2%
395	Chocorua mucky peat	20.4	4.6%
406	Medomak silt loam	5.1	1.2%
613	Croghan loamy fine sand	73.5	16.8%
614	Kinsman sand	43.4	9.9%
632A	Nicholville very fine sandy loam, 0 to 3 percent slopes	12.5	2.8%
633	Pemi silt loam	0.7	0.1%
W	Water	9.6	2.2%
Totals for Area of Interest		**438.6**	**100.0%**

APPENDIX D - WILDLIFE HAZARD ASSESSMENT SITE VISIT

The following contains the results of a Wildlife Hazard Site Visit conducted on July 7 and 8, 2015 by Stantec Consulting Services and Verdanterra, LLC.

July 13, 2015

Colin McIver - Airport Manager
Town of Plymouth
6 Post Office Square
Plymouth, NH 03264

RE: Wildlife Hazard Site Visit – Plymouth Municipal Airport

Dear Colin:

Verdanterra, LLC (Verdanterra) and Stantec Consulting Services, Inc. (Stantec) performed a Wildlife Hazard Site Visit at the Plymouth Municipal Airport (1P1 or Airport) between July 7 and July 8, 2015.

BACKGROUND

Airports that hold Airport Operating Certificates issued under Title 14, Code of Federal Regulations (C.F.R.), Part 139, Certification of Airports, Subpart D, must use the standards, practices and recommendations contained in Draft Advisory Circular (AC) 150/5200-XX to comply with the wildlife hazard management requirements in 14 C.F.R. §139.337. All other airports that have received federal assistance and/or that have authority to impose and/or use a Passenger Facility Charge must use the standards practices and recommendations contained in AC 150/5200-XX during the conduct and preparation of Site Visits, Assessments and Plans. Per Federal Aviation Administration (FAA) recommendation, Verdanterra used a Qualified Airport Wildlife Biologist (as defined in 14 C.F.R. §139.337) to perform this Site Visit. The biologist's resume is included in Attachment B. The Qualified Airport Biologist was assisted by a Stantec Certified Wildlife Biologist.

The intent of this Site Visit was to provide an abbreviated analysis of the Airport's wildlife hazards, determine if a Wildlife Hazard Assessment is warranted, and, if necessary, provide actionable information that allows the Airport to expedite the mitigation of these hazards. While many species of wildlife can pose a threat to aircraft safety, they are not equally hazardous. This Site Visit weighs the overall risk of wildlife that pose a threat to aircraft operations along with ongoing airfield management to determine whether more in depth study and planning is warranted.

Aircraft collisions with wildlife, also commonly referred to as wildlife strikes, cost the civil aviation industry more than $187 million dollars annually based on damage reported to the FAA Wildlife Strike Database. When taking into consideration that at least 60% of strikes are not reported, the cost could be as high as $937 million dollars per year. Since 1988, there have been 243 aircraft either destroyed or damaged beyond repair. The economic costs of wildlife strikes can be extreme; however, the cost in human lives (255 fatalities globally since 1988) when aircraft crash because of a wildlife strike best expresses the need for a Wildlife Hazard Assessment or Wildlife Hazard Site Visit and the development of a Wildlife Hazard Management Plan.

A Wildlife Hazard Assessment is an ecological study conducted by a wildlife biologist that provides the scientific basis for the development, implementation, and refinement of a Wildlife Hazard Management Plan. According

to 14 C.F.R. §139.337 (b)(1-4), a Wildlife Hazard Assessment is mandated when any of the following events occurs on or near an airport:

- An air carrier aircraft experiences multiple wildlife strikes;
- An air carrier aircraft experiences substantial damage from striking wildlife;
- An air carrier aircraft experiences an engine ingestion of wildlife; or
- Wildlife of a size, or in numbers, capable of causing one of the above-mentioned events is observed to have access to any airport flight pattern or aircraft movement area.

Hazard rankings for wildlife (as shown in Table 1) help focus hazardous wildlife management efforts on those species or groups that represent the greatest threats to safe air operations in the airport environment. We used these rankings in conjunction with this site visit to determine the relative abundance and use patterns of wildlife species to assess the general threat level (and consequences) at 1P1. Many of these high-threat animals are not likely to be present at 1P1, but we used them as surrogate species where the local analog may present a significant risk to aircraft safety.

In addition to individual species, other environmental factors (habitat types and human activities) influence the occurrence of potentially hazardous wildlife at 1P1. AC No. 150/5200-33B *Hazardous Wildlife Attractants On or Near Airports* provides guidance to help identify potential attractants on-site. Prior to conducting the site visit, we reviewed and characterized current aerial photographs of the Airport property, its natural surroundings, and manmade facilities (e.g., surface waters, commercial development, etc.) that may pose as wildlife attractants. This information was summarized and used as reference material during the Airport personnel interviews and field assessments. To identify these wildlife attractants and their locations, the survey team also utilized the following data sources and on-site reconnaissance:

- recent aerial photographs;
- interviews with Airport personnel on types of aircraft and annual movements, wildlife strike records, mowing strategy, vegetation clearing strategy, and other wildlife management activities;
- habitat observations during the surveys (wetlands, ditches, overgrown vegetation, forested areas, stormwater treatment areas, abandoned structures, construction sites/debris, snags, and food sources that could attract wildlife);
- GIS review of wetlands, agriculture, forested/shrub areas, golf courses, commercial development, recycling facilities, wildlife management areas, and other known attractants within 5 miles of the Airport.

Table 1. Ranking of 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 (listed for those species with a relative hazard score of 15 or higher). The composite rank reflects 3 variables: the percentage of total strikes (for that species–group) that caused 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. (Source; FAA AC 150/5200-XX)

Species	Scientific Name	Relative Hazard Score	Composite Rank	Observed at 1P1
mule deer	*Odocoileus hemionus*	100	1	
white-tailed deer	*Odocoileus virginianus*	88	2	
domestic dog	*Canis lupus familiaris*	71	3	
other geese		61	4	
Canada goose	*Branta canadensis*	46	5	
turkey vulture	*Cathartes aura*	44	5	Yes
other ducks		48	7	
great horned owl	*Bubo virginianus*	44	8	
double-crested cormorant	*(Phalacrocorax auritis*	43	8	
brown pelican	*Pelecanus occidentalis*	40	10	
wild turkey	*Meleagris gallopavo*	40	11	Yes
sandhill crane	*Grus canadensis*	37	11	
glaucous-winged gull	*Larus glaucescens*	39	13	
bald eagle	*Haliaeetus leucocephalus*	36	14	
great black-backed gull	*Larus marinus*	32	14	
osprey	*Pandion haliaetus*	32	16	
great blue heron	*Ardea herodius*	31	17	
ring-necked pheasant	*Phasianus colchicus*	29	18	
herring gull	*Larus argentatus*	29	18	
snowy owl	*Bubo scandiacus*	28	20	
mallard	*Anas platyrhynchos*	29	21	
great egret	*Ardea alba*	28	22	
red-tailed hawk	*Buteo jamaicensis*	25	23	Yes
California gull	*Larus californicus*	22	24	
cattle egret	*Bubulcus ibis*	23	25	
ring-billed gull	*Larus delawarensis*	23	26	
Franklin's gull	*Larus pipixcan*	19	27	
raccoon	*Procyon lotor*	20	28	
coyote	*Canis latrans*	22	29	
rock dove	*Columba livia*	20	30	
Swainson's hawk	*Buteo swainsoni*	19	31	
other hawks		18	32	
laughing gull	*Larus atricilla*	18	33	
mew gull	*Larus canus*	19	34	
laysan albatross	*Phoebastria immutabiilis*	18	36	

AIRPORT INFORMATION

Plymouth Municipal Airport is located 3 miles northwest of the town of Plymouth in Grafton County, New Hampshire. Plymouth is home to Plymouth State University, a full service four-year university. Plymouth is also located at the gateway to the White Mountain National Forest. The town is located within an hour's drive of the state capital in Concord and 30 minutes from Franconia Notch, one of the more popular tourist sites in the state. The Airport is located off Quincy Road. Quincy Road turns into Smith Bridge Road, which connects to Tenney Mountain Highway (State Route 25). The location of the Airport is shown in Figure 1.

Plymouth Municipal Airport is one of 25 public use airports in the state, and one of five in Grafton County, which include Franconia, Newfound Valley, Dean Memorial, and Lebanon Municipal. Plymouth Municipal Airport is defined by the FAA as a general aviation airport in the basic category meaning it has a low- to moderate-level of activity in terms of based aircraft and serves a critical aeronautical function within the local market. By definition, a low-activity (in terms of based aircraft), basic category airport averages about 10 propeller-driven aircraft and no jets.

The Airport, which consists of approximately 116 acres, is divided into two separate and detached parcels divided by Quincy Road. The north parcel spans more than 47 acres and is primarily wooded and undeveloped. The Airport infrastructure is located entirely in the south parcel, which consists of approximately 69 acres. The Airport property boundary as well as other existing airport features is shown on Figure 1.

The Airport has one turf runway oriented west-northwest and east-southeast. The runway is 2,380 feet long by 90 feet wide. The runway's edges are marked by FAA-approved yellow cones spaced approximately 200 feet apart, with cones also marking the runway thresholds. The turf at 1P1 appears to be in good condition. There are no apparent ruts or soft spots, and the grass is maintained at about 3-4 inches. The runway is not maintained in the winter.

The number of based aircraft has remained steady since 2000 when there were a reported 16 based aircraft. As of the summer of 2014 there were 17 based aircraft; however, this number drops off considerably in the winter to as low as 4 or 5 aircraft. There are a reported 3,030 annual operations. This includes 2,000 local, 1,000 itinerant, and 30 military aircraft operations per year.

WILDLIFE HAZARD SITE VISIT

The Site Visit at 1P1 was conducted over a 2 day period July 7 to July 8, 2015. On July 7, 2015 Qualified Airport Biologist Gino Giumarro and Certified Wildlife Biologist Elizabeth Annand met with Airport Manager Colin McIver at 1P1 to discover what airport staff and pilots believed were the top wildlife hazards at the Airport. This meeting was followed by the site visit to characterize ecological communities and identify locations for wildlife observation surveys in places that could be characterized as onsite wildlife attractants. Mr. McIver described the Airport as having no known wildlife strikes with aircraft. There are no known aircraft strikes of wildlife at 1P1 in the FAA Strike Database.

Mr. McIver's observations of wildlife and attractants include the following. Small groups of Canada geese (*Branta canadensis*) are seen typically in the fall during migration. The geese will forage on the runway and then fly north toward Loon Lake. There are occasional observations of white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), and coyote (*Canis latrans*) on and adjacent to the runway; however, these observations are very infrequent. Pilots with aircraft stationed at 1P1 are aware of the hazard of white-tailed deer near the agricultural fields, particularly at dusk. In addition, pilots are aware of occasional flocking birds over the farm. The agricultural areas on and adjacent to the runway are likely the greatest wildlife attractants.

The Airport's goal of turf maintenance is 4 inches in height. Woody vegetation and shrubs are removed regularly in areas adjacent to the runway (especially in the wet ditches that parallel the runway). Buildings are maintained to be free of nesting opportunities for birds. The Airport manager inspects hangers for openings that allow birds and mammals to use these areas as shelter or nesting areas. There is no fence surrounding the Airport, and there has been no need for other active wildlife management activities (e.g., pyrotechnics, wildlife removal, nest removal, etc.).

The Airport was surveyed for wildlife hazards following the interview with Mr. McIver. Figures and photographs documenting the Airport context and wildlife hazards are attached to this report. Biologists characterized the ecological communities surrounding the airfield and looked for wildlife, their signs, or attractive habitats. Ecological communities surrounding the Airport are characteristic of second-growth forests in the region, with stands dominated by red oak (*Quercus rubrum*), white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), and American beech (*Fagus grandifolia*) that are 20 to 40 years in age. Dense stands of staghorn sumac (*Rhus typhina*) make up the treeline between the parking areas and Quincy Road. Mowed areas are composed of grasses and other herbaceous plants with high percentages of fescue (*Festuca* sp.), crabgrass (*Digitaria* sp.), red clover (*Trifolium pratense*), white clover (*Trifolium repens*), and timothy (*Phleum pratense*). The Airport leases land to an adjacent farm that is managed in row crops of corn, squash, broccoli, potatoes, Brussels sprouts, and cut flowers. The farm is adjacent to the airfield and contains manure piles and pastures that attract flocking birds. The wildlife attractants on and adjacent to the Airport are shown in Figure 2.

In general, there were few wildlife observations made in and adjacent to the runway on July 7, 2015. A single turkey vulture (*Cathartes aura*), Cooper's hawk (*Accipiter cooperii*), red-tailed hawk (*Buteo jamaicensis*), and several songbirds were observed. A summary of wildlife and wildlife signs observed during the site visit is detailed in Table 2. Biologists did not observe scat, rodent runs, trails, or other signs of mammals during the survey of the Airport. Perhaps the steep bank on the east side of the Airport and the Baker River limits the movements of many of the larger mammal species that are likely attracted to the agricultural fields and facilities to the south and west of the airfield. The grasses of the airfield are particularly thin and mowed short which limits the presence of small mammals in the airfield. The overall lack of wildlife or their signs was noteworthy during the site visit at the airfield. In addition meandering surveys conducted, point count surveys were conducted in several strategic locations throughout the airport. These survey points are shown in Figure 5.

Following the Airport site visit, biologists conducted surveys of potential wildlife attractants within 5 miles of 1P1. Wildlife attractants in the area are rather limited due to the location of the Airport in the Baker and Pemigewasset River valleys, which are bordered by steep mountains. Those areas thought to act as wildlife attractants within 5 miles of the airfield are shown in Figure 3. Generally, wildlife habitat in the region includes several lakes, forested habitat, wetlands, rivers, agricultural areas, and limited commercial development. The overall landuse of the region surrounding the Airport is shown in Figure 4. Lakes visited included Loon Lake, Squam Lake, and Newfound Lake. No waterfowl were observed at these lakes, however, they undoubtedly provide habitat for waterfowl and wading birds during breeding and migration season. Biologists also visited Campton Bog, Quincy Bog, Hebron Marsh Wildlife Sanctuary, Pemigewasset River at Blair Bridge, Baker River, Palazzi Wildlife Management Area, and the Grey Rocks Conservation Area (confluence of Cockermouth River and Newfound Lake). There were some signs of waterfowl and wading birds at these wetland and riverine habitats, including red-breasted merganser (*Mergus serrator*), Canada goose, and great blue heron (*Ardea herodias*). However the overall waterfowl and wading bird activity was very low. This low activity is likely attributable to the survey occurring at the beginning of July. These areas likely support reasonable amounts of wading bird and waterfowl activity, particularly during migration. All that withstanding, we do not suspect these lakes, wetlands, and rivers likely create significant wildlife strike hazards at 1P1.

Biologists also visited the Plymouth Recycling Facility. The facility is very fastidious, and no wildlife were observed. Much of the recycling activity is done indoors and the facility does not seem to be a significant attractant of wildlife. Biologists also drove through the commercial, fast food, and box store parking areas to look for gulls or other scavengers. Trash was well managed at all of the facilities observed, and no gulls or scavengers were observed.

In the evening of July 7, 2015, biologists returned to the Airport to conduct a dusk/early evening survey. Wildlife observations on Airport property and in the vicinity of the Airport were limited to the occasionally singing songbird. On July 8, 2015, biologists conducted an early morning survey of the airfield. Wildlife activity was very limited on and adjacent to the runway. Biologists walked the perimeter of the airfield/runway looking for wildlife and their signs. Three adult and 12 juvenile wild turkeys (*Meleagris gallopavo*) were observed walking on and adjacent to the eastern end of the runway. In addition, a flock of European starlings (*Sturnus vulgaris*) and four American crows (*Corvus brachyrhynchos*) were observed flying across the runway. No other wildlife or wildlife signs were observed during the morning visit. There were no federal or state-listed wildlife observed during the Site Visit.

Biologists recorded detections of wildlife seen and heard, and all detections of wildlife signs (scat, tracks, browse, burrows, trails, etc.) while on the airfield. Table 2 provides a summary of the wildlife observations. This list is not a comprehensive list of wildlife that use the airfield; however it is representative of the types of wildlife known to occur at 1P1. A photograph log of observations made during the Site Visit is included in Attachment A.

SUMMARY AND CONCLUSIONS

There are very few wildlife attractants on and near the Airport that warrant management. The mowed airfield environment contains forage species that are attractive to white-tailed deer, wild turkey, and Canada goose; however the short grass height and thin vegetative cover limit the attractiveness. The proximity of the farm and row crops to the airfield is perhaps the greatest wildlife risk at the Airport. Some perching opportunities can be found on a few signs, which have not been fitted with perching deterrents, and snags along the treeline bordering Quincy Road. However, these perching features are limited when compared to other airports of similar size and operational mission.

Wildlife hazards within 5 miles of the Airport include the lakes and wetlands in the region that attract waterfowl and wading birds and agricultural fields that encourage ungulate, coyote, goose, and wild turkey forage. These wildlife concentration areas do not pose significant threats to aviation primarily because there is contiguous habitat through the forests, agricultural areas, wetlands, rivers, and lakes for both terrestrial wildlife and birds. The Airport represents a small island of poor wildlife habitat and does not pose as a major barrier to wildlife movement in the landscape. There are currently no recorded wildlife strikes at 1P1 that are part of the FAA Wildlife Strike Database (accessed July 1, 2015) or that are known to Airport management.

There are 3 species we observed at 1P1 that have a relative hazard score of 15 or greater; turkey vulture, wild turkey, and red-tailed hawk. These species are all common to northern New England airports and can generally be managed through general harassment if necessary. Implementation of current practices should be adequate to reduce risk of wildlife incident at the airfield. Interactions between aircraft and wildlife are stochastic events that would not be further reduced by conducting a Wildlife Hazard Assessment or by implementing a Wildlife Hazard Management Plan. The conditions at 1P1 do not meet the conditions specified in 14 C.F.R. §139.337 for necessitating a Wildlife Hazard Assessment.

Table 2. Wildlife observations or wildlife signs recorded during the wildlife hazard site visit conducted July 7 to July 8, 2015 at Plymouth Municipal Airport. No mammal signs were observed on the airfield. This list should not be considered a complete record of wildlife that use the airfield.

Common name	Scientific name	Observation
American crow	*Corvus brachyrhynchos*	Groups of up to four birds flying over and feeding on and adjacent to runway
American goldfinch	*Carduelis tristis*	Heard singing adjacent to runway and seen flying over the runway
American robin	*Turdus migratorius*	Heard and observed on forest edge adjacent to runway
barn swallow	*Hirundo rustica*	Observed feeding over runway and over farm operations on the west end of the runway
blue jay	*Cyanocitta cristata*	Heard and observed on forest edge adjacent to runway
chestnut-sided warbler	*Setophaga pensylvanica*	Heard singing in forest adjacent to airfield
common yellowthroat	*Geothlypis trichas*	Heard and observed on forest edge adjacent to runway
Cooper's hawk	*Accipiter cooperii*	Seen flying across the runway
eastern bluebird	*Sialia sialis*	Seen flying adjacent to runway in forest edge
eastern phoebe	*Sayornis phoebe*	Heard singing in treeline adjacent to Quincy Road
European starling	*Sturnus vulgaris*	Flock of 15-20 observed west of the airfield
grey catbird	*Dumetella carolinensis*	Heard singing adjacent to runway
indigo bunting	*Passerina cyanea*	Observed and heard singing adjacent to runway in forest edge
red-eyed vireo	*Vireo olivaceus*	Heard singing in forest adjacent to airfield
red-tailed hawk	*Buteo jamaicensis*	Soaring above runway
savannah sparrow	*Passerculus sandwichensis*	Observed and heard in mowed areas and wet ditches adjacent to the runway
song sparrow	*Melospiza melodia*	Heard and seen in wet ditches adjacent to runway and along forest edge
tree swallow	*Tachycineta bicolor*	Observed foraging over runway and parking areas
turkey vulture	*Cathartes aura*	Observed soaring above runway
veery	*Catharus fuscescens*	Heard singing in forests adjacent to runway
wild turkey	*Meleagris gallopavo*	Three adults and 12 juveniles feeding adjacent to and on runway

Recommendations that will aid in risk management are as follows:

1. Continue to control vegetation in the wet ditches to either side of the runway to help minimize habitat for wildlife. Brushy areas along ditches and streams should be mowed and maintained clear of vegetation to increase runoff and eliminate wildlife habitat where animals would nest, feed, and roost/loaf. Whenever possible, all standing water should be eliminated from the airport. Fresh water in temporary pools or in wet grassy areas, ditches and drains, and wetlands, provide a very strong attractant to wildlife, including ducks, Canada geese, blackbirds, gulls, and other birds and mammals.

2. Improve Reporting of Wildlife Strikes - Wildlife strikes are deemed to have occurred when: 1) a pilot reports striking a bird or mammal, 2) aircraft maintenance personnel identify damage as having been caused by wildlife, 3) ground personnel see wildlife collide with an aircraft, or 4) wildlife remains are found on airside runway area or within 200 feet of a runway, unless another reason for the animal's death is identified. The fourth category of this definition, the collection of bird carcasses near movement areas, usually constitutes the greatest proportion of an airport's wildlife strike record.

   Diligent and accurate collection of wildlife strike information is the most important element in identifying and monitoring wildlife hazards at airports. Therefore, the following is recommended:

   Report strikes from all four categories. Do not rely only on pilot-reported strikes. These typically represent less than 25% of all strikes that occur. Runway and grassy areas should be searched regularly to locate and collect carcasses. Submit all wildlife strikes using one of two methods. An on-line strike reporting form (FAA Form 5200-7) is available on the FAA's Airport Wildlife Hazard Mitigation Home Page (http://wildlife.faa.gov). Strikes can also be reported by completing the paper version of the form and mailing directly to FAA. Anyone at 1P1 who has knowledge of a wildlife strike will report the incident to the airport manager. The airport manager should coordinate with the aircraft operators to ensure that duplication of the strike is not occurring.

   A significant portion of the strikes that are reported are not identified to exact species of bird. For example, identification of bird type (e.g., "gull") does not yield sufficient information to monitor strike hazards and implement meaningful management actions. In your area, different gull species are common and these species pose different types of hazards during different times of the year. Management actions differ based on species behavior and ecology. If bird carcasses are in a condition that does not allow 1P1 personnel to identify the species, send the feathers and/or other remains to the Smithsonian Institution (attachment), which has an agreement with the FAA to provide bird identification services free of charge to airports.

   To submit bird remains:

   1. Place the feathers and other material in a clean plastic zip-lock bag;
   2. include a copy of FAA Form 5200-7;
   3. for US Postal Service, recommended for routine cases, send to: Feather Identification Lab, Smithsonian Institution, NHB E-600, MRC 116, P.O. Box 37012, Washington, D.C. 20013-7012;
   4. for overnight shipping (e.g. FedEx, DHL, UPS), recommended for damaging or priority cases, send to: Feather Identification Lab, Smithsonian Institution, NHB E-600, MRC 116, 10th & Constitution Ave., NW, Washington, D.C. 20560-0116.

3. Continue to encourage awareness about wildlife hazards with pilots and the community. Monitor wildlife activity adjacent to the farm. Coordinate with farmers as needed to control manure piles,

spoiled vegetables, or nuisance wildlife should wildlife activity increase adjacent to the agricultural fields and farm.

4. Review all New Landscaping/Development Plans for Wildlife Hazards - All landscaping and airport development plans should be reviewed by a qualified airport wildlife biologist to identify potential wildlife attractants and hazard potential. Vegetation that provides fruits, nuts, and nesting/roosting sites should be avoided. Dense stands of evergreens and deciduous trees that provide roosting habitat should not be developed.

5. There is no single recommendation regarding maintenance of grass height to reduce all wildlife hazards on an airport. Research findings made by USDA Wildlife Services note marginally higher use by birds in short vegetation during the spring and summer. In areas where Canada geese, gulls, starlings and other bird species are prevalent, maintaining grass height between 6 to-8 inches may reduce the extent to which these birds will occur there. Maintenance of longer grass height (10 to12 inches) could further reduce the presence of these birds, but does have the potential to harbor populations of small mammals, which in turn could exacerbate aircraft hazards created by raptors and other predators. The current mowing height of 4 to6 inches seems effective at limiting the presence of wildlife on the airfield.

6. Acquire State and Federal Permits

   The Airport should work to obtain depredation permits from the New Hampshire Fish and Game for hazardous wildlife. Should take or harassment of migratory birds be necessary, USFWS should be contacted regarding permits. These permits authorize harassment and take of wildlife that are frequently observed on the airfield. The permits could include a wide range of wildlife but should at least include white-tailed deer, Canada goose, wild turkey, and coyote. Additional technical assistance can be obtained from USDA Wildlife Services for harassment and depredation permits and for conducting harassment and take services. Several of the mammals and birds observed during this Wildlife Hazard Site Visit are known to cause damaging strikes, occasionally resulting in death. The Airport Authority must have the legal means to mitigate this risk whenever it is present; in fact the airport is legally obligated to manage these hazards immediately.

   New Hampshire Fish and Game
   Lakes Region and Central NH (Region 2)
   PO Box 417, New Hampton NH 03256
   (603) 744-5470

   US Fish and Wildlife Service
   70 Commercial Street, Suite 300
   Concord, NH 03301-5087
   (603) 223-2541

   USDA Wildlife Services
   59 Chenell Drive, Suite 7
   Concord, NH 03301-8548
   (603) 223-6832

Conclusion

In conclusion, the Wildlife Hazard Site Visit documented very few wildlife hazards on, or within 5 miles of the airfield. There have been no known wildlife strikes at the Airport. While some wildlife hazard does exist, they will not be significantly mitigated by conducting a Wildlife Hazard Assessment or preparing a Wildlife Hazard Management Plan.

Should you have any questions about the site visit or the suggested recommendations, please do not hesitate to contact me.

Sincerely,

Gino JM Giumarro
Qualified Airport Biologist
ggiumarro@verdanterra.com
Verdanterra, LLC

Elizabeth Annand
Certified Wildlife Biologist
elizabeth.annand@stantec.com
Stantec Consulting Services, Inc.

Attachments

cc: Erv Deck – Stantec Consulting Services, Inc.

Figures

Figure 1

Airport Location
Plymouth Municipal Airport

Map Location in Red

Legend

- Airport Runway
- Airport Property Boundary
- Perennial Stream
- Intermittent Stream

0 1,500 3,000
Feet

Data Sources include: USGS, PADUS, ESRI

VERDANTERRA

Map Details

Location

Plymouth
Grafton County
New Hampshire

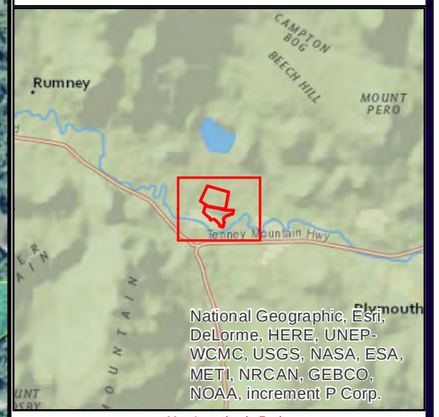
Last Modified: July 16, 2015

REVISION	00	
CREATOR	CCP	07/15/2015
REVIEWED	ACS	07/15/2015

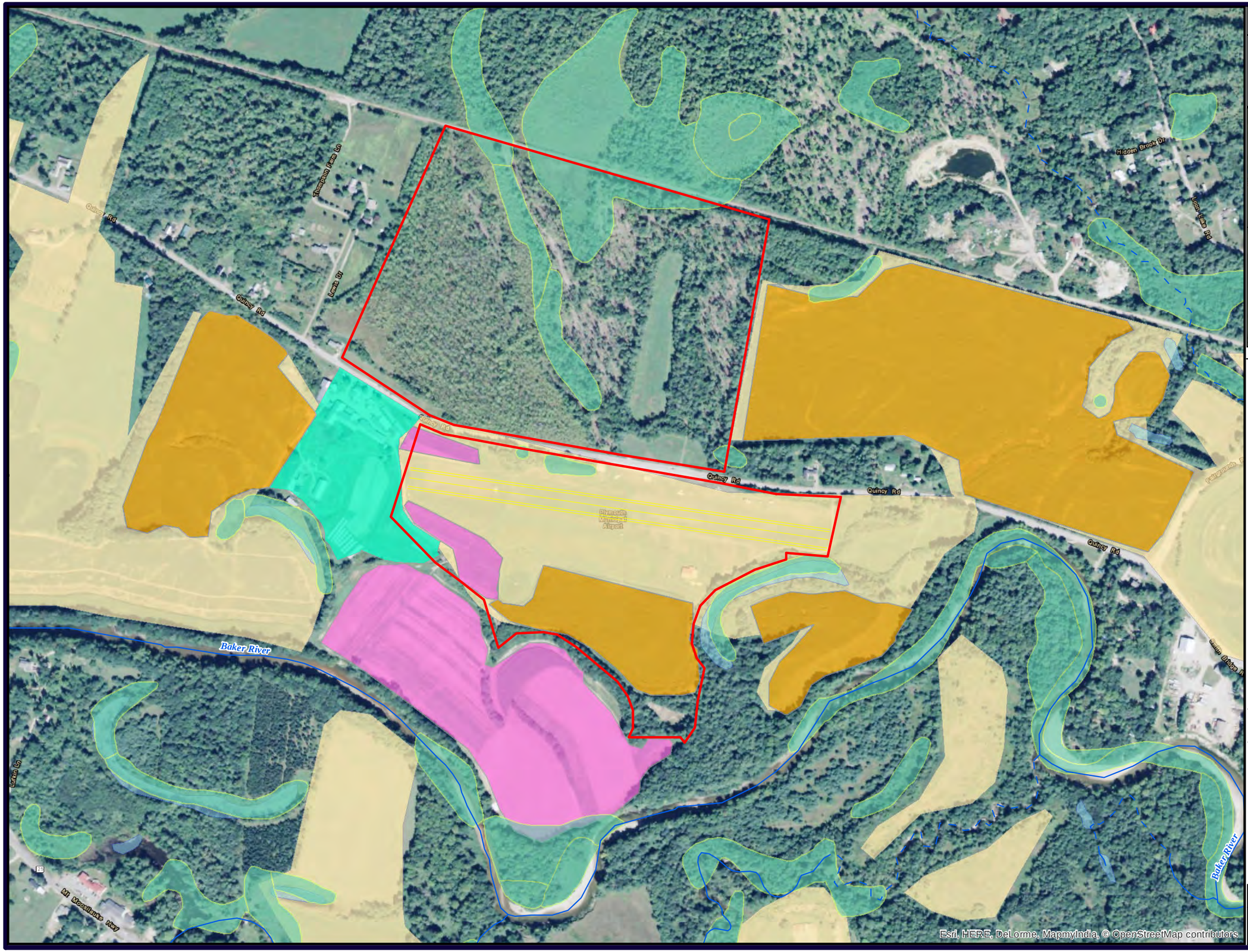
P:\004_Stantec\00415004_Plymouth_Municipal_Airport\GIS\MXDs\Figure 1 Location.mxd

Figure 2

Wildlife Attractants on and Adjacent to Airport
Plymouth Municipal Airport



Map Location in Red



Legend

- Airport Runway
- Airport Property Boundary
- Cornfield
- Farm
- Row Crops
- Open Grass Land
- National Wetlands Inventory
- Perennial Stream
- Intermittent Stream

0 250 500
Feet

Data Sources include: USGS, PADUS, ESRI

VERDANTERRA

Map Details

Location

Plymouth
Grafton County
New Hampshire

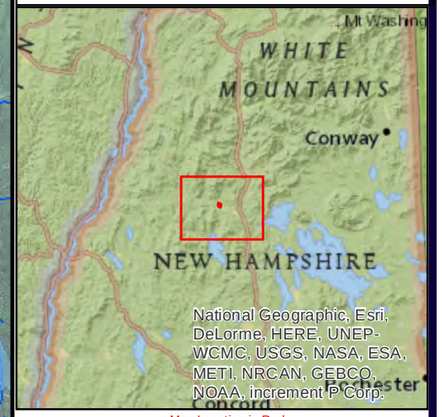
Last Modified: July 16, 2015

REVISION	00	
CREATOR	CCP	07/15/2015
REVIEWED	ACS	07/15/2015

P:\004_Stantec\00415004_Plymouth_Municipal_Airport\GIS\MXDs\Figure 2 Nearby.mxd

Figure 3

Wildlife Attractants within 5 Miles of Plymouth Municipal Airport



Map Location in Red

Legend

- Airport Location
- 5 Mile Buffer

Wildlife Attractants

- C Conservation Area
- O Maintained Open Area
- W Wetland/Waterbody

- Perennial Stream
- Intermittent Stream

0 0.5 1
Miles

Data Sources include: USGS, PADUS, ESRI

VERDANTERRA

Map Details

Location

Plymouth
Grafton County
New Hampshire

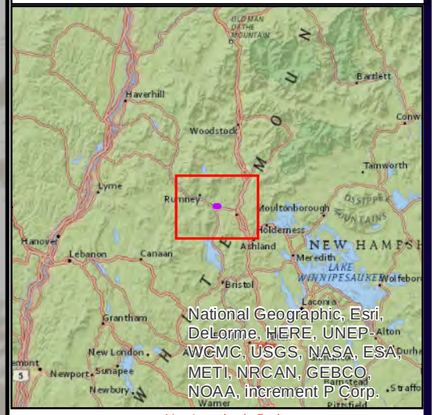
Last Modified: July 16, 2015

REVISION	00	
CREATOR	CCP	07/15/2015
REVIEWED	ACS	07/15/2015

P:\004_Stantec\00415004_Plymouth_Municipal_Airport\GIS\MXDs\Figure 3 Wildlife Attractants.mxd

Figure 4

Land Cover
Plymouth Municipal Airport



Map Location in Red

Legend

- Airport Location
- 5 Mile Buffer

Landcover Analysis

- Agriculture
- Forest
- Golf Course
- Open Grass Land
- Open Water
- Urban/Residential

0 0.5 1
Miles

Data Sources include: USGS, PADUS, ESRI

VERDANTERRA

Map Details

Location

Plymouth
Grafton County
New Hampshire

Last Modified: July 16, 2015

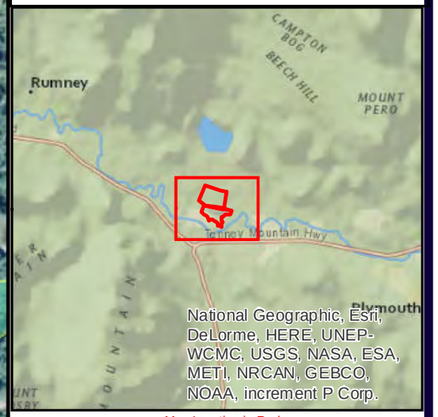
REVISION	00	
CREATOR	CCP	07/14/2015
REVIEWED	ACS	07/15/2015

Sources: Esri, USGS, NOAA, Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors

P:\004_Stantec\00415004_Plymouth_Municipal_Airport\GIS\MXDs\Figure 4 Landcover.mxd

Figure 5

Wildlife Observation Points
Plymouth Municipal Airport



Map Location in Red

Legend

- Observation Points
- Airport Runway
- Airport Property Boundary
- National Wetlands Inventory
- Perennial Stream
- Intermittent Stream

0 250 500
Feet

Data Sources include: USGS, PADUS, ESRI

VERDANTERRA

Map Details

Location
Plymouth
Grafton County
New Hampshire

Last Modified: October 06, 2015

REVISION	00	
CREATOR	CCP	10/06/2015
REVIEWED	ACS	10/05/2015

Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors

P:\004_Stantec\00415004_Plymouth_Municipal_Airport\GIS\MXDs\Figure 5 Observation Pts.mxd

Attachment A

PHOTOGRAPHIC LOG

Plymouth Airport Terminal Building

Original Airport Hanger and Parking Area

Airport Mowing in Progress

Airport Hanger

Parking for Trailers

FAA Approved Runway Cones

Runway Looking West

Signage Used as Songbird Perch

Cornfield Adjacent to Airfield

Wet Ditch South of Runway

Potatoes Growing Adjacent to Airfield

Dairy Barns West of Runway

Farm off West End of Runway

Runway Looking East

Cut Flowers Growing North of Runway

Wet Ditch on North Side of Runway

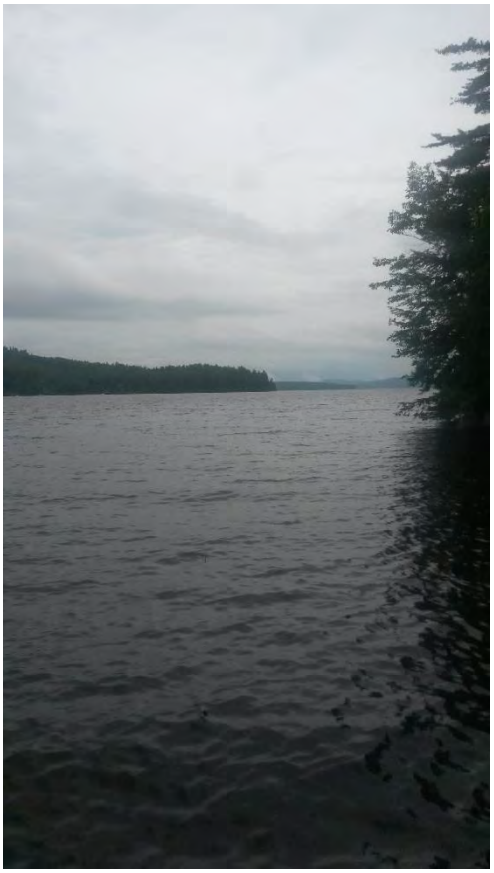
Snags Used as Perches North of Runway

Mowing Equipment

Loon Lake

Recycling Facility

Campton Bog



Newfound Lake

Grey Rocks Conservation Area

Hebron Marsh Wildlife Sanctuary

Quincy Bog

Attachment B

Qualified Airport Biologist Resume

Gino Giumarro

Director of Ecological Services

Gino is a Certified Wildlife Biologist and Director of Ecological Services and leads our team of biologists who complete pipeline assessment and permitting, transmission line assessment and permitting, wind power assessments, regional natural resources planning, wildlife management planning, and permitting. Gino has performed environmental surveys and planning a several US military and general aviation airports.

Gino oversees FERC license applications, RTE surveys, ecological community characterizations, biological assessments, Section 7 consultations, Clean Water Act permitting, and document preparation in accordance with the NEPA.

Gino's client experience includes a wide array of federal, state, local, and private clients. He is certified by the US Army Center for Health Promotion and Preventative Medicine in the Evaluation of Environmental Noise and is a Qualified Airport Biologist as recognized by the FAA.

REPRESENTATIVE PROJECT EXPERIENCE

KNOX COUNTY REGIONAL AIRPORT

Gino was the qualified airport biologist in conducting a Wildlife Hazard Assessment and Wildlife Hazard Management Plan.

LAWRENCE MUNICPAL AIRPORT

Gino was the qualified airport biologist in conducting a Wildlife Hazard Assessment and Wildlife Hazard Management Plan (underway).

GREENVILLE MUNICIPAL AIRPORT

Gino was the qualified airport biologist in conducting a Wildlife Hazard Site Visit.

PLYMOUTH MUNICIPAL AIRPORT

Gino was the qualified airport biologist in conducting a Wildlife Hazard Site Visit.

HOULTON INTERNATIONAL AIRPORT

Gino was the qualified airport biologist in conducting a Wildlife Hazard Site Visit.

EDUCATION

MS, Natural Resources Planning, University of Vermont, Burlington, Vermont

BS, Wildlife Biology, University of Massachusetts, Amherst, Massachusetts

TRAINING

Airport Wildlife Hazard Management Workshop (meets requirements of 14 CFR 139 and FAA Circ 150/5200-36), Embry-Riddle Aeronautical University, Daytona Beach, Florida, 2010

Certified Wildlife Biologist, The Wildlife Society

North American Birdstrike Conference – Montreal - 2015

APPENDIX E - WETLAND FUNCTION AND VALUE ASSESSMENT

In October 2014, Stantec conducted an extensive three-day field survey of the Plymouth Municipal Airport for the purpose of conducting a wetland function and value assessment. The report that follows was submitted to the town of Plymouth and is included in this report for reference.

Stantec Consulting Services Inc.
30 Park Drive, Topsham ME 04086-1737

December 3, 2014
File: 195210752

Attention: Ervin Deck
Stantec Consulting
482 Payne Road – Scarborough Court
Scarborough, ME 04074

Reference: Plymouth Municipal Airport Wetland Delineation and Reconnaissance Report, Plymouth, New Hampshire

Dear Ervin,

As requested, Stantec Consulting Services Inc. (Stantec) completed wetland delineation surveys on Plymouth Municipal Airport property, south of Quincy Road in Plymouth, New Hampshire. A natural resource reconnaissance was also performed on an undeveloped parcel north of Quincy Road.

PROJECT SITE DESCRIPTION

The Plymouth Municipal Airport project site consists of approximately 75-acres south of Quincy Road, consisting of an active municipal airstrip, adjacent agricultural fields, and wooded hedgerows. The project site north of Quincy Road is approximately 150 acres and consists of wooded uplands and wetlands and agricultural fields. The soils in this area can typically be described as well-drained sandy loams and loamy sands, with mucky peat occurring in an adjacent bog. The Baker River borders the property to the south and east.

SURVEY METHODS

WETLAND AND WATERBODY RESOURCE DELINEATION

Surveys for wetland and waterbody resources were completed between October 15 and October 20, 2014, under seasonally appropriate field conditions. Wetland boundaries under federal and state jurisdiction were determined using the technical criteria described in the 1987 *Corps of Engineers Wetlands Delineation Manual*[1] and the 2012 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regional Supplement*[2]. Wetland boundaries were marked with pink, alphanumeric-coded flags. Boundary flags were located using Trimble® Geo Series Global Positioning System (GPS) receivers. Stream locations were also recorded using GPS receivers. Jurisdictional stream and potential vernal pool determinations made during the wetland and waterbody resource delineations were based on the criteria set forth in the New Hampshire Department of Environmental Services (NHDES)

[1] Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS.
[2] U.S. Army Corps of Engineers. 2012. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)*, ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Wetlands Bureau Administrative Rules. Identification of potential vernal pools and streams was limited to observable conditions within the project area and available background information. GPS data were used to produce the attached natural resource map (Figure 1).

The natural resource reconnaissance completed on the parcel north of Quincy Road was conducted through meandering surveys throughout the parcel. No GPS data was collected during the reconnaissance; however, a sketch was completed and is provided as Figure 2.

WETLAND DELINEATION RESULTS

Stantec completed the wetland delineation between October 15 and 20, 2014. A total of 4 wetlands and 2 streams were identified during the survey. Two non-jurisdictional features were also delineated as they displayed some, but not all of the necessary criteria to be considered jurisdictional. One area is an excavated drainage ditch within the airstrip that met hydrology and vegetation criteria's; however, it did not meet hydric soil criteria. A second area was a ditch that could convey water during flood events but did not meet stream or wetland criteria. Table 1 includes information concerning the individual wetlands and stream type, and defining characteristics for the resources identified on site. The locations of the delineated wetlands and streams are shown on Figure 1.

TABLE 1. WETLAND SUMMARY TABLE

Wetland ID	Wetland Type(s)	Wetland Characteristics	Important Information
01SMA	PEM, PFO	Dominant plants: silver maple (*Acer saccharinum*), red maple (*Acer rubrum*), reed canarygrass (*Phalaris arundinacea*), sensitive fern (Onoclea sensibilis) Soil: 16 in. depleted [silt loam] with redoximorphic concentrations Hydrology: soil saturated at surface, water-stained leaves, drainage pattern	Wetland appears to be an old oxbow that used to be part of the Baker River. Seasonal floodwater from the river appears to overflow into the wetland.
01SMB	PFO, PUBx, PSS	Dominant plants: red maple, nannyberry (*Viburnum nudum*), white meadowsweet (*Spiraea alba*), lamp rush (*Juncus effusus*) Soil: 4 in. dark [sandy loam], 12 in. depleted [sandy loam] with redoximorphic concentrations Hydrology: soil saturated at surface, inundation (6 in.)	Wetland occurs to the south of Quincy Road and appears to have been influenced by excavations as part of the construction of the adjacent road. A roadside ditch meeting wetland criteria occurs within the wetland.

Wetland ID	Wetland Type(s)	Wetland Characteristics	Important Information
01SMC	PFO, PSS	Dominant plants: red maple, nannyberry, American elm (*Ulmus americana*), lamp rush Soil: 4 in. dark [sandy loam], 12 in. depleted [sandy loam] with redoximorphic concentrations Hydrology: soil saturated at surface	Wetland occurs to the south of Quincy Road and appears to have been influenced by excavations as part of the construction of the adjacent road. A roadside ditch meeting wetland criteria occurs within the wetland.
O1SME	PEM	Dominant plants: Broad-leaved cattail (*Typha latifolia*), lamp rush, white meadowsweet, sensitive fern Soil: 2 in. dark [silt loam], 12 in. depleted [silt loam] with redoximorphic concentrations Hydrology: soil saturated at surface, drainage pattern	Excavated ditch within the airstrip designed for drainage. Has developed hydric soils and vegetation.
Steam S01SM	Intermittent	Top of bank width: 1.5 ft. – 2.5 ft. Ordinary high water mark: 2 ft. Substrate: silt, sand, organics (leaf matter)	Stream is fed via culvert coming from under Quincy Road. Hydrology flows south in to culvert/ drainage system under the airstrip.
Stream S02SM	Intermittent	Top of bank width: 1 ft. – 3 ft. Ordinary high water mark: 2 ft. Substrate: silt, gravel, sand	Stream is fed via culvert from drainage under airstrip (same system that S01SM flows into). Hydrology flows south towards the Baker River.

NATURAL RESOURCE RECONNAISSANCE RESULTS

The approximately 150 acre parcel to the north of Quincy Road consists of forested uplands, agricultural fields, forested and emergent wetland areas (including a bog on the western portion of the parcel), and two streams. The forested upland habitat is dominated by red oak (*Quercus rubrum*), white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), and American beech (*Fagus grandifolia*). Five potential wetland areas were identified; as well as one perennial stream and one intermittent stream. See figure 2 for approximate locations of these natural resource features encountered during the survey.

WETLAND REGULATIONS

STATE AND FEDERAL REGULATIONS

The NHDES and the U.S. Army Corps of Engineers (Corps) regulate the wetlands identified within the vicinity of the project site. NHDES permits are required to dredge, fill, or construct a structure in a wetland, surface water, or adjacent to a municipally designated prime wetland. For most projects, one submittal to NHDES will also meet the application submittal requirements of the Corps.

Relevant types of wetland impacts and the potential permitting processes are described below:

Minimum Impact Projects

- Fill for lot access that impact less than 3,000 square feet of swamp or wet meadow.
- A construction project that will disturb 50 linear feet or less of an intermittent stream, with work occurring during low flow periods.
- Repair or replacement of an existing legal structure.

Minor Impact Projects

- The construction or modification of a docking system that will yield no more than four boat slips (new, plus existing) and affects less than 100 linear feet of shoreline.
- The construction of a fire pond (with an inlet or an outlet) with less than 20,000 square feet of impact to very poorly drained soils (Hydric A) or impact to a stream.
- Removal of less than 20 cubic yards of rocks, gravel, sand, and/or mud from public waters.
- The repair or replacement of a retaining wall that requires work in the water but results in no change to the wall's height, length, location, or configuration.
- The combination of a series of minimum impact projects amounting to less than 20,000 square feet of dredge and/or fill, four boat slips or less, or cumulative impacts of less than 200 linear feet of shoreline or stream bank.

Major Impacts

- The filling of more than 20,000 square feet of jurisdictional wetlands.
- Placing fill in public waters for the purpose of making land.
- A combination of new plus prior site work (over the past five years) which exceeds 20,000 square feet of impact.
- Any impacts to a wetland designated as a "prime wetland" by the host community.

LOCAL REGULATIONS

The Town of Plymouth (Town) does not have a wetland buffer zone; however, the local Zoning Ordinance defines the "Environmentally Sensitive Zone (ESZ)," as: "all land within 500 feet as measured horizontally from the edge of the normal river channels of the Baker and Pemigewasset Rivers and the mean high water line of Loon Lake."

The Baker River is located immediately adjacent to the south and east of the project site; therefore, the ESZ could fall onto portions of the project site. Land use activities within the ESZ are required to conform to performance standards stated in the Town Ordinance. Stantec

recommends further consultation with the Town Code Enforcement Officer to determine what site constraints may apply within the project site.

Regards,

STANTEC CONSULTING SERVICES INC.

Sean P. Moriarty

Sean P. Moriarty
Wildlife Biologist | Project Manager
Phone: (207) 729-1199
Fax: (207) 729-2715
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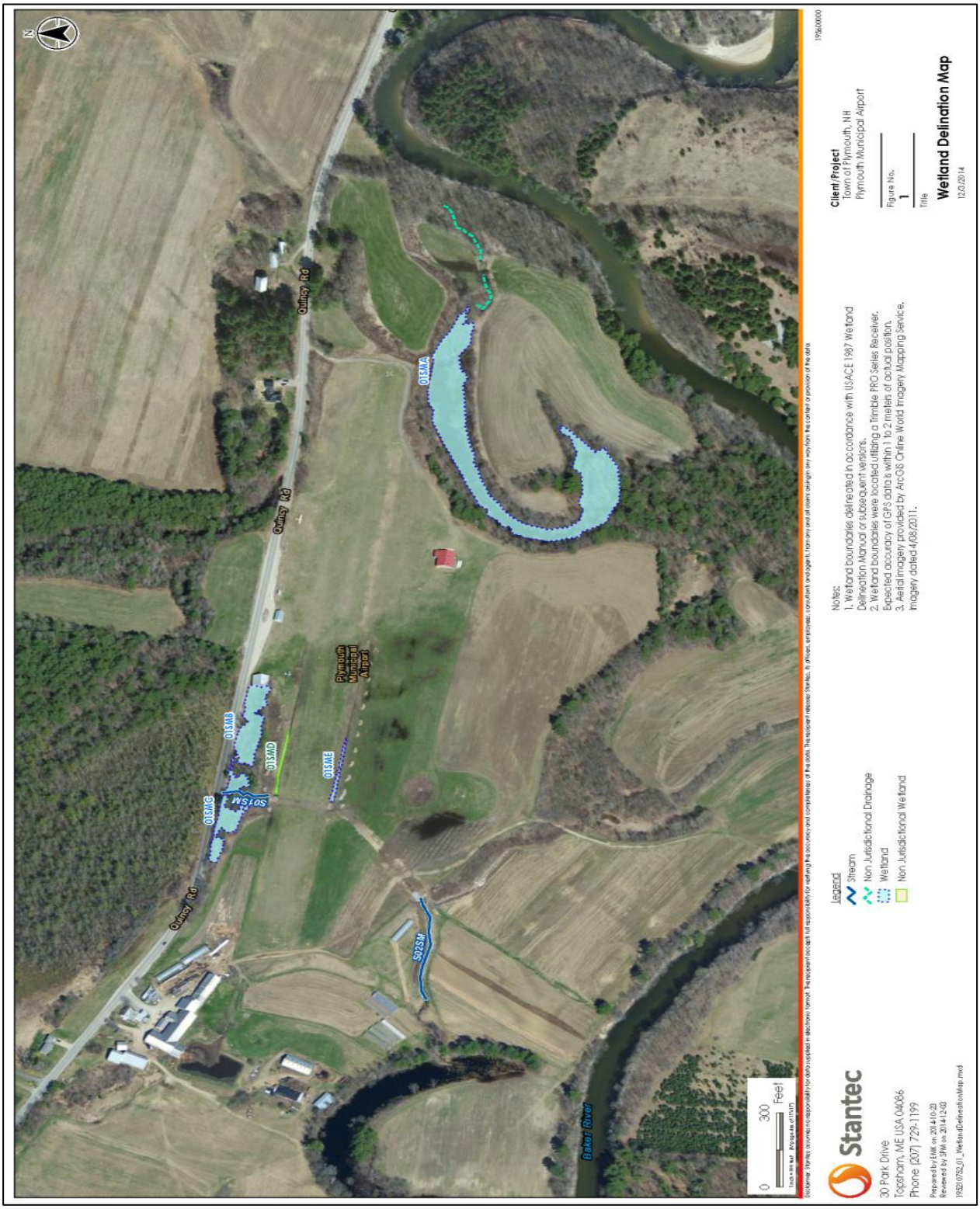
Attachments: Figure 1. Wetland Delineation Map
Figure 2. Natural Resource Reconnaissance Sketch
Representative Site Photographs
Corps Plot Forms


Quincy Rd
Quincy Rd
Quincy Rd
Plymouth Municipal Airport
Baker River
0
300
Feet
Legend
Stream
Non Jurisdictional Drainage
Wetland
Non Jurisdictional Wetland
Notes:
1. Wetland boundaries delineated in accordance with USACE 1987 Wetland Delineation Manual or subsequent versions.
2. Wetland boundaries were located utilizing a Trimble PRO Series Receiver. Expected accuracy of GPS data is within 1 to 2 meters of actual position.
3. Aerial imagery provided by ArcGIS Online World Imagery Mapping Service. Imagery dated 4/08/2011.
Stantec
30 Park Drive
Topsham, ME USA 04086
Phone (207) 729-1199
Client/Project
Town of Plymouth, NH
Plymouth Municipal Airport
Figure No.
1
Title
Wetland Delination Map
12/3/2014

REPRESENTATIVE SITE PHOTOGRAPHS

Photo 1. Wetland 01SMA (October 2014, Stantec)

Photo 2. Wetland 01SMB (October 2014, Stantec)

Photo 3. Wetland 01SMC (October 2014, Stantec)

Photo 4. Wetland 01SME (October 2014, Stantec)

Photo 5. Stream 01SM (October 2014, Stantec)

Photo 6. Stream 02SM (October 2014, Stantec)

CORPS PLOT FORMS

WETLAND DETERMINATION DATA FORM
Atlantic Gulf and Coastal Plain

Project/Site:	Plymouth Municipal Airport	Stantec Project #:	195210752
Applicant:	Town of Plymouth, NH		
Investigator #1:	SPM	Investigator #2:	
Soil Unit:	Croghan Loamy Fine Sand	NWI Classification:	N/A
Landform:	Hillslope	Local Relief:	none
Slope (%):	0%	Latitude: 43°46'44.47"N	Longitude: 71°45'21.47"W Datum: NAD 83

Are climatic/hydrologic conditions on the site typical for this time of year? (If no, explain in remarks) ☑ Yes ☐ No

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed?
Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic?

Are normal circumstances present? ☑ Yes ☐ No

Date:	10/20/14
County:	Grafton
State:	NH
Wetland ID:	01SMA
Sample Point:	U1
Subregion:	
Community:	PFO
Section, Township, Range:	Plymouth

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	☑ Yes ☐ No	Hydric Soils Present?	☐ Yes ☑ No
Wetland Hydrology Present?	☐ Yes ☑ No	Is This Sampling Point Within A Wetland?	☐ **Yes** ☑ **No**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators (Check here if indicators are not present ☑):

Primary:
- ☐ A1 - Surface Water
- ☐ A2 - High Water Table
- ☐ A3 - Saturation
- ☐ B1 - Water Marks
- ☐ B2 - Sediment Deposits
- ☐ B3 - Drift Deposits
- ☐ B4 - Algal Mat or Crust
- ☐ B5 - Iron Deposits
- ☐ B7 - Inundation Visible on Aerial Imagery
- ☐ B9 - Water-Stained Leaves
- ☐ B13 - Aquatic Fauna
- ☐ B15 - Marl deposits (LRR U)
- ☐ C1 - Hydrogen Sulfide Odor
- ☐ C3 - Oxidized Rhizospheres on Living Roots
- ☐ C4 - Presence of Reduced Iron
- ☐ C6 - Recent Iron Reduction in Tilled Soils
- ☐ C7 - Thin Muck Surface
- ☐ D9 - Gauge or Well Data
- ☐ Other (Explain in Remarks)

Secondary:
- ☐ B6 - Surface Soil Cracks
- ☐ B8 - Sparsely Vegetated Concave Surface
- ☐ B10 - Drainage Patterns
- ☐ B16 - Moss Trim Lines
- ☐ C2 - Dry-Season Water Table
- ☐ C8 - Crayfish Burrows
- ☐ C9 - Saturation Visible on Aerial Imagery
- ☐ D2 - Geomorphic Position
- ☐ D3 - Shallow Aquitard
- ☐ D5 - FAC-Neutral Test
- ☐ D8 - Sphagnum Moss (LRR T, U)

Field Observations:

Surface Water Present?	☐ Yes	☑ No	Depth:	(in.)
Water Table Present?	☐ Yes	☑ No	Depth:	(in.)
Saturation Present?	☐ Yes	☑ No	Depth:	(in.)

Wetland Hydrology Present? ☐ Yes ☑ No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: N/A

Remarks:

SOILS

Map Unit Name: Croghan Loamy Fine Sand

Profile Description (Describe to the depth needed to document the indicator or confirm the absence of indicators.) (Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered/Coated Sand Grains; Location: PL=Pore Lining, M=Matrix)

Top Depth	Bottom Depth	Horizon	Matrix Color (Moist)	Matrix %	Redox Features Color (Moist)	Redox Features %	Redox Features Type	Redox Features Location	Texture (e.g. clay, sand, loam)
0	4	1	10YR 3/2	100	--	--	--	--	sandy loam
4	10	2	7.5YR 4/4	100	--	--	--	--	sandy loam
10	16	3	10YR 4/4	100	--	--	--	--	sandy loam
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--

NRCS Hydric Soil Field Indicators (check here if indicators are not present ☑):
- ☐ A1- Histosol
- ☐ A2 - Histic Epipedon
- ☐ A3 - Black Histic
- ☐ A4 - Hydrogen Sulfide
- ☐ A5 - Stratified Layers
- ☐ A6 - Organic Bodies (LRR P, T, U)
- ☐ A7 - 5cm Mucky Mineral (LRR P, T, U)
- ☐ A8 - Muck Presence (LRR U)
- ☐ A9- 1cm Muck (LRR P, T)
- ☐ A11 - Depleted Below Dark Surface
- ☐ A12 - Thick Dark Surface
- ☐ A16 - Coast Prairie Redox (MLRA 150A)
- ☐ S1 - Sandy Mucky Mineral (LRR O, S)
- ☐ S4 - Sandy Gleyed Matrix
- ☐ S5 - Sandy Redox
- ☐ S6 - Stripped Matirx
- ☐ S7 - Dark Surface (LRR P, S, T, U)
- ☐ S8 - Polyvalue Below Surface (LRR S, T, U)
- ☐ S9 - Thin Dark Surface (LRR S, T, U)
- ☐ F1 - Loamy Mucky Mineral (LRR O)
- ☐ F2 - Loamy Gleyed Matrix
- ☐ F3 - Depleted Matrix
- ☐ F6 - Redox Dark Surface
- ☐ F7 - Depleted Dark Surface
- ☐ F8 - Redox Depressions
- ☐ F10 - Marl (LRR U)
- ☐ F11 - Depleted Ochric (MLRA 151)
- ☐ F12 - Iron-Manganese Masses (LRR O, P, T)
- ☐ F13 - Umbric Surface (LRR P, T, U)
- ☐ F17 - Delta Ochric (MLRA 151)
- ☐ F18 - Reduced Vertic (MLRA 150A, B)
- ☐ F19 - Piedmont Floodplain Soils (MLRA 149A)
- ☐ F20 - Anomalous Bright Loamy Soils (MLRA 149A, 153C, D)

Indicators for Problematic Soils [1]
- ☐ A9-1cm Muck (LRR O)
- ☐ A10-2cm Muck (LRR S)
- ☐ F18-Reduced Vertic (outside MLRA 150A, B)
- ☐ F19-Piedmont Floodplain Soils (LRR P, S, T)
- ☐ F20-Anomalous Bright Loamy Soils (MLRA 153B)
- ☐ TF2-Red Parent Material
- ☐ TF12-Very Shallow Dark Surface
- ☐ TF12-Very Shallow Dark Surface

[1] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If Observed) Type: N/A Depth: N/A

Hydric Soil Present? ☐ Yes ☑ No

Remarks:

WETLAND DETERMINATION DATA FORM
Atlantic Gulf and Coastal Plain

Project/Site: Plymouth Municipal Airport | Wetland ID: 01SMA | Sample Point: U1

VEGETATION

Tree Stratum (Plot size: 30 ft radius)

	Species Name	% Cover	Dominant	Ind.Status
1.	*Acer rubrum*	20	Y	FAC
2.	*Betula populifolia*	20	Y	FAC
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	40		

Sapling Stratum (Plot size: 30 ft radius)

1.	*Betula populifolia*	40	Y	FAC
2.	*Acer rubrum*	20	Y	FAC
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	60		

Shrub Stratum (Plot size: 30 ft radius)

1.	*Prunus serotina*	20	Y	FACU
2.	*Acer rubrum*	10	Y	FAC
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	30		

Herb Stratum (Plot size: 30 ft radius)

1.	--	--	--	--
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
8.	--	--	--	--
9.	--	--	--	--
10.	--	--	--	--
11.	--	--	--	--
12.	--	--	--	--
	Total Cover =	0		

Woody Vine Stratum (Plot size: 30 ft radius)

1.	--	--	--	--
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
	Total Cover =	0		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ***83%*** (A/B)

Prevalence Index Worksheet

Total % Cover of:		Multiply by:	
OBL spp.	0	x 1 =	0
FACW spp.	0	x 2 =	0
FAC spp.	110	x 3 =	330
FACU spp.	20	x 4 =	80
UPL spp.	0	x 5 =	0
Total	130 (A)		410 (B)

Prevalence Index = B/A = ***3.154***

Hydrophytic Vegetation Indicators:

- ☐ Yes ☑ No Rapid Test for Hydrophytic Vegetation
- ☑ Yes ☐ No Dominance Test is > 50%
- ☐ Yes ☑ No Prevalence Index is ≤ 3.0 *
- ☐ Yes ☑ No Morphological Adaptations (Explain) *
- ☐ Yes ☑ No Problem Hydrophytic Vegetation (Explain) *

* Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants approximately 20 ft or more in height and 3 in or larger DBH

Sapling - Woody plants approximately 20 ft or more in height and less than 3 in DBH

Shrub - Woody plants approximately 3-20 ft in height

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft. tall.

Woody Vines - All woody vines greater than 3.28 ft. in height.

Hydrophytic Vegetation Present ☑ Yes ☐ No

Remarks:

Additional Remarks:

WETLAND DETERMINATION DATA FORM
Atlantic Gulf and Coastal Plain

Project/Site:	Plymouth Municipal Airport	Stantec Project #:	195210752
Applicant:	Town of Plymouth, NH		
Investigator #1:	SPM	Investigator #2:	
Soil Unit:	Sunday Loamy Sand	NWI Classification:	N/A
Landform:	Depression	Local Relief:	Concave
Slope (%):	0%	Latitude: 43°46'38.42"N	Longitude: 71°44'59.18"W Datum: NAD 83

Are climatic/hydrologic conditions on the site typical for this time of year? (If no, explain in remarks) ☑ Yes ☐ No

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed?
Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic?

Are normal circumstances present? ☑ Yes ☐ No

Date:	10/20/14
County:	Grafton
State:	NH
Wetland ID:	01SMA
Sample Point:	W1
Subregion:	
Community:	PEM/PFO
Section, Township, Range:	Plymouth

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present? ☑ Yes ☐ No
Wetland Hydrology Present? ☑ Yes ☐ No
Hydric Soils Present? ☑ Yes ☐ No
Is This Sampling Point Within A Wetland? ☑ **Yes** ☐ **No**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators (Check here if indicators are not present ☐):

Primary:
- ☐ A1 - Surface Water
- ☐ A2 - High Water Table
- ☑ A3 - Saturation
- ☐ B1 - Water Marks
- ☐ B2 - Sediment Deposits
- ☐ B3 - Drift Deposits
- ☐ B4 - Algal Mat or Crust
- ☐ B5 - Iron Deposits
- ☑ B7 - Inundation Visible on Aerial Imagery
- ☑ B9 - Water-Stained Leaves
- ☐ B13 - Aquatic Fauna
- ☐ B15 - Marl deposits (LRR U)
- ☐ C1 - Hydrogen Sulfide Odor
- ☐ C3 - Oxidized Rhizospheres on Living Roots
- ☐ C4 - Presence of Reduced Iron
- ☐ C6 - Recent Iron Reduction in Tilled Soils
- ☐ C7 - Thin Muck Surface
- ☐ D9 - Gauge or Well Data
- ☐ Other (Explain in Remarks)

Secondary:
- ☐ B6 - Surface Soil Cracks
- ☐ B8 - Sparsely Vegetated Concave Surface
- ☑ B10 - Drainage Patterns
- ☐ B16 - Moss Trim Lines
- ☐ C2 - Dry-Season Water Table
- ☐ C8 - Crayfish Burrows
- ☐ C9 - Saturation Visible on Aerial Imagery
- ☐ D2 - Geomorphic Position
- ☐ D3 - Shallow Aquitard
- ☐ D5 - FAC-Neutral Test
- ☐ D8 - Sphagnum Moss (LRR T, U)

Field Observations:

Surface Water Present?	☐ Yes	☑ No	Depth:	(in.)
Water Table Present?	☐ Yes	☑ No	Depth:	(in.)
Saturation Present?	☑ Yes	☐ No	Depth: 0	(in.)

Wetland Hydrology Present? ☑ Yes ☐ No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: N/A

Remarks: Saturation was present at the surface.

SOILS

Map Unit Name: Sunday Loamy Sand

Profile Description (Describe to the depth needed to document the indicator or confirm the absence of indicators.) (Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered/Coated Sand Grains; Location: PL=Pore Lining, M=Matrix)

Top Depth	Bottom Depth	Horizon	Matrix Color (Moist)	Matrix %	Redox Features Color (Moist)	Redox Features %	Redox Features Type	Redox Features Location	Texture (e.g. clay, sand, loam)
0	16	1	2.5Y 4/1	100	7.5YR 4/6	10	C	M	silt loam
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--

NRCS Hydric Soil Field Indicators (check here if indicators are not present ☐):

- ☐ A1- Histosol
- ☐ A2 - Histic Epipedon
- ☐ A3 - Black Histic
- ☐ A4 - Hydrogen Sulfide
- ☐ A5 - Stratified Layers
- ☐ A6 - Organic Bodies (LRR P, T, U)
- ☐ A7 - 5cm Mucky Mineral (LRR P, T, U)
- ☐ A8 - Muck Presence (LRR U)
- ☐ A9- 1cm Muck (LRR P, T)
- ☐ A11 - Depleted Below Dark Surface
- ☐ A12 - Thick Dark Surface
- ☐ A16 - Coast Prairie Redox (MLRA 150A)
- ☐ S1 - Sandy Mucky Mineral (LRR O, S)
- ☐ S4 - Sandy Gleyed Matrix
- ☐ S5 - Sandy Redox
- ☐ S6 - Stripped Matirx
- ☐ S7 - Dark Surface (LRR P, S, T, U)
- ☐ S8 - Polyvalue Below Surface (LRR S, T, U)
- ☐ S9 - Thin Dark Surface (LRR S, T, U)
- ☐ F1 - Loamy Mucky Mineral (LRR O)
- ☐ F2 - Loamy Gleyed Matrix
- ☑ F3 - Depleted Matrix
- ☐ F6 - Redox Dark Surface
- ☐ F7 - Depleted Dark Surface
- ☐ F8 - Redox Depressions
- ☐ F10 - Marl (LRR U)
- ☐ F11 - Depleted Ochric (MLRA 151)
- ☐ F12 - Iron-Manganese Masses (LRR O, P, T)
- ☐ F13 - Umbric Surface (LRR P, T, U)
- ☐ F17 - Delta Ochric (MLRA 151)
- ☐ F18 - Reduced Vertic (MLRA 150A, B)
- ☐ F19 - Piedmont Floodplain Soils (MLRA 149A)
- ☐ F20 - Anomalous Bright Loamy Soils (MLRA 149A, 153C, D)

Indicators for Problematic Soils [1]
- ☐ A9-1cm Muck (LRR O)
- ☐ A10-2cm Muck (LRR S)
- ☐ F18-Reduced Vertic (outside MLRA 150A, B)
- ☐ F19-Piedmont Floodplain Soils (LRR P, S, T)
- ☐ F20-Anomalous Bright Loamy Soils (MLRA 153B)
- ☐ TF2-Red Parent Material
- ☐ TF12-Very Shallow Dark Surface
- ☐ TF12-Very Shallow Dark Surface

[1] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If Observed) Type: N/A Depth: N/A

Hydric Soil Present? ☑ Yes ☐ No

Remarks:

WETLAND DETERMINATION DATA FORM
Atlantic Gulf and Coastal Plain

Project/Site: Plymouth Municipal Airport | Wetland ID: 01SMA | Sample Point: W1

VEGETATION

Tree Stratum (Plot size: 30 ft radius)

	Species Name	% Cover	Dominant	Ind.Status
1.	*Acer saccharinum*	20	Y	FAC
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	20		

Sapling Stratum (Plot size: 30 ft radius)

1.	*Ulmus americana*	10	Y	FAC
2.	*Acer rubrum*	10	Y	FAC
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	20		

Shrub Stratum (Plot size: 30 ft radius)

1.	*Ulmus americana*	10	Y	FAC
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	10		

Herb Stratum (Plot size: 30 ft radius)

1.	*Phalaris arundinacea*	80	Y	OBL
2.	*Polygonum sagittatum*	20	N	OBL
3.	*Carex intumescens*	10	N	FACW
4.	*Onoclea sensibilis*	10	N	FACW
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
8.	--	--	--	--
9.	--	--	--	--
10.	--	--	--	--
11.	--	--	--	--
12.	--	--	--	--
	Total Cover =	120		

Woody Vine Stratum (Plot size: 30 ft radius)

1.	--	--	--	--
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
	Total Cover =	0		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ***100%*** (A/B)

Prevalence Index Worksheet

Total % Cover of:		Multiply by:	
OBL spp.	100	x 1 =	100
FACW spp.	20	x 2 =	40
FAC spp.	50	x 3 =	150
FACU spp.	0	x 4 =	0
UPL spp.	0	x 5 =	0
Total	170 (A)		290 (B)

Prevalence Index = B/A = ***1.706***

Hydrophytic Vegetation Indicators:

- ☐ Yes ☑ No Rapid Test for Hydrophytic Vegetation
- ☑ Yes ☐ No Dominance Test is > 50%
- ☑ Yes ☐ No Prevalence Index is ≤ 3.0 *
- ☐ Yes ☑ No Morphological Adaptations (Explain) *
- ☐ Yes ☑ No Problem Hydrophytic Vegetation (Explain) *

* Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants approximately 20 ft or more in height and 3 in or larger DBH

Sapling - Woody plants approximately 20 ft or more in height and less than 3 in DBH

Shrub - Woody plants approximately 3-20 ft in height

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft. tall.

Woody Vines - All woody vines greater than 3.28 ft. in height.

Hydrophytic Vegetation Present ☑ Yes ☐ No

Remarks:

Additional Remarks:

WETLAND DETERMINATION DATA FORM
Atlantic Gulf and Coastal Plain

Project/Site:	Plymouth Municipal Airport	Stantec Project #:	195210752
Applicant:	Town of Plymouth, NH		
Investigator #1:	SPM	Investigator #2:	
Soil Unit:	Chocorua Mucky Peat	NWI Classification:	N/A
Landform:	Depression	Local Relief:	Concave
Slope (%):	0%	Latitude: 43°46'44.27"N	Longitude: 71°45'18.23"W Datum: NAD 83

Are climatic/hydrologic conditions on the site typical for this time of year? (If no, explain in remarks) ☑ Yes ☐ No

Are Vegetation☐ , Soil ☐ , or Hydrology☐ significantly disturbed?
Are Vegetation☐ , Soil ☐ , or Hydrology☐ naturally problematic?

Are normal circumstances present? ☑ Yes ☐ No

Date:	10/20/14
County:	Grafton
State:	NH
Wetland ID:	01SMB
Sample Point:	W1
Subregion:	
Community:	PFO/PUBx/PSS
Section, Township, Range:	Plymouth

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	☑ Yes ☐ No	Hydric Soils Present?	☑ Yes ☐ No
Wetland Hydrology Present?	☑ Yes ☐ No	Is This Sampling Point Within A Wetland?	☑ **Yes** ☐ **No**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators (Check here if indicators are not present ☐):

Primary:
- ☑ A1 - Surface Water
- ☐ A2 - High Water Table
- ☑ A3 - Saturation
- ☐ B1 - Water Marks
- ☐ B2 - Sediment Deposits
- ☐ B3 - Drift Deposits
- ☐ B4 - Algal Mat or Crust
- ☐ B5 - Iron Deposits
- ☐ B7 - Inundation Visible on Aerial Imagery
- ☑ B9 - Water-Stained Leaves
- ☐ B13 - Aquatic Fauna
- ☐ B15 - Marl deposits (LRR U)
- ☐ C1 - Hydrogen Sulfide Odor
- ☐ C3 - Oxidized Rhizospheres on Living Roots
- ☐ C4 - Presence of Reduced Iron
- ☐ C6 - Recent Iron Reduction in Tilled Soils
- ☐ C7 - Thin Muck Surface
- ☐ D9 - Gauge or Well Data
- ☐ Other (Explain in Remarks)

Secondary:
- ☐ B6 - Surface Soil Cracks
- ☐ B8 - Sparsely Vegetated Concave Surface
- ☑ B10 - Drainage Patterns
- ☐ B16 - Moss Trim Lines
- ☐ C2 - Dry-Season Water Table
- ☐ C8 - Crayfish Burrows
- ☐ C9 - Saturation Visible on Aerial Imagery
- ☐ D2 - Geomorphic Position
- ☐ D3 - Shallow Aquitard
- ☐ D5 - FAC-Neutral Test
- ☐ D8 - Sphagnum Moss (LRR T, U)

Field Observations:

Surface Water Present?	☑ Yes ☐ No	Depth:	18"	(in.)
Water Table Present?	☐ Yes ☑ No	Depth:		(in.)
Saturation Present?	☑ Yes ☐ No	Depth:	0	(in.)

Wetland Hydrology Present? ☑ Yes ☐ No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: N/A

Remarks: Saturation was present at the surface.

SOILS

Map Unit Name: Chocorua Mucky Peat

Profile Description (Describe to the depth needed to document the indicator or confirm the absence of indicators.) (Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered/Coated Sand Grains; Location: PL=Pore Lining, M=Matrix)

Top Depth	Bottom Depth	Horizon	Matrix Color (Moist)	Matrix %	Redox Features Color (Moist)	Redox Features %	Redox Features Type	Redox Features Location	Texture (e.g. clay, sand, loam)
0	4	1	10YR 3/2	100	--	--	--	--	sandy loam
4	16	2	10YR 4/2	90	7.5YR 4/6	10	C	M	sandy loam
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
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--	--	--	--	--	--	--	--	--	--

NRCS Hydric Soil Field Indicators (check here if indicators are not present ☐):
- ☐ A1- Histosol
- ☐ A2 - Histic Epipedon
- ☐ A3 - Black Histic
- ☐ A4 - Hydrogen Sulfide
- ☐ A5 - Stratified Layers
- ☐ A6 - Organic Bodies (LRR P, T, U)
- ☐ A7 - 5cm Mucky Mineral (LRR P, T, U)
- ☐ A8 - Muck Presence (LRR U)
- ☐ A9- 1cm Muck (LRR P, T)
- ☐ A11 - Depleted Below Dark Surface
- ☐ A12 - Thick Dark Surface
- ☐ A16 - Coast Prairie Redox (MLRA 150A)
- ☐ S1 - Sandy Mucky Mineral (LRR O, S)
- ☐ S4 - Sandy Gleyed Matrix
- ☐ S5 - Sandy Redox
- ☐ S6 - Stripped Matirx
- ☐ S7 - Dark Surface (LRR P, S, T, U)
- ☐ S8 - Polyvalue Below Surface (LRR S, T, U)
- ☐ S9 - Thin Dark Surface (LRR S, T, U)
- ☐ F1 - Loamy Mucky Mineral (LRR O)
- ☐ F2 - Loamy Gleyed Matrix
- ☑ F3 - Depleted Matrix
- ☐ F6 - Redox Dark Surface
- ☐ F7 - Depleted Dark Surface
- ☐ F8 - Redox Depressions
- ☐ F10 - Marl (LRR U)
- ☐ F11 - Depleted Ochric (MLRA 151)
- ☐ F12 - Iron-Manganese Masses (LRR O, P, T)
- ☐ F13 - Umbric Surface (LRR P, T, U)
- ☐ F17 - Delta Ochric (MLRA 151)
- ☐ F18 - Reduced Vertic (MLRA 150A, B)
- ☐ F19 - Piedmont Floodplain Soils (MLRA 149A)
- ☐ F20 - Anomalous Bright Loamy Soils (MLRA 149A, 153C, D)

Indicators for Problematic Soils [1]
- ☐ A9-1cm Muck (LRR O)
- ☐ A10-2cm Muck (LRR S)
- ☐ F18-Reduced Vertic (outside MLRA 150A, B)
- ☐ F19-Piedmont Floodplain Soils (LRR P, S, T)
- ☐ F20-Anomalous Bright Loamy Soils (MLRA 153B)
- ☐ TF2-Red Parent Material
- ☐ TF12-Very Shallow Dark Surface
- ☐ TF12-Very Shallow Dark Surface

[1] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If Observed) Type: N/A Depth: N/A

Hydric Soil Present? ☑ Yes ☐ No

Remarks:

WETLAND DETERMINATION DATA FORM
Atlantic Gulf and Coastal Plain

Project/Site: Plymouth Municipal Airport | Wetland ID: 01SMB | Sample Point: W1

VEGETATION

Tree Stratum (Plot size: 30 ft radius)

	Species Name	% Cover	Dominant	Ind.Status
1.	*Acer rubrum*	60	Y	FAC
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	60		

Sapling Stratum (Plot size: 30 ft radius)

1.	*Ulmus americana*	10	Y	FAC
2.	*Acer rubrum*	10	Y	FAC
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	20		

Shrub Stratum (Plot size: 30 ft radius)

1.	*Spiraea alba*	30	Y	FACW
2.	*Ilex verticillata*	20	Y	FACW
3.	*Viburnum nudum*	20	Y	FACW
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	70		

Herb Stratum (Plot size: 30 ft radius)

1.	*Juncus effusus*	50	Y	OBL
2.	*Glyceria melicaria*	20	Y	OBL
3.	*Fragaria virginiana*	10	N	FACU
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
8.	--	--	--	--
9.	--	--	--	--
10.	--	--	--	--
11.	--	--	--	--
12.	--	--	--	--
	Total Cover =	80		

Woody Vine Stratum (Plot size: 30 ft radius)

1.	--	--	--	--
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
	Total Cover =	0		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ***100%*** (A/B)

Prevalence Index Worksheet

Total % Cover of:		Multiply by:	
OBL spp.	70	x 1 =	70
FACW spp.	70	x 2 =	140
FAC spp.	80	x 3 =	240
FACU spp.	10	x 4 =	40
UPL spp.	0	x 5 =	0
Total	230 (A)		490 (B)

Prevalence Index = B/A = ***2.130***

Hydrophytic Vegetation Indicators:

- ☐ Yes ☑ No Rapid Test for Hydrophytic Vegetation
- ☑ Yes ☐ No Dominance Test is > 50%
- ☑ Yes ☐ No Prevalence Index is ≤ 3.0 *
- ☐ Yes ☑ No Morphological Adaptations (Explain) *
- ☐ Yes ☑ No Problem Hydrophytic Vegetation (Explain) *

* Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants approximately 20 ft or more in height and 3 in or larger DBH

Sapling - Woody plants approximately 20 ft or more in height and less than 3 in DBH

Shrub - Woody plants approximately 3-20 ft in height

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft. tall.

Woody Vines - All woody vines greater than 3.28 ft. in height.

Hydrophytic Vegetation Present ☑ Yes ☐ No

Remarks:

Additional Remarks:

WETLAND DETERMINATION DATA FORM
Atlantic Gulf and Coastal Plain

Project/Site:	Plymouth Municipal Airport	Stantec Project #:	195210752
Applicant:	Town of Plymouth, NH		
Investigator #1:	SPM	Investigator #2:	
Soil Unit:	Croghan Loamy Fine Sand	NWI Classification:	N/A
Landform:	Crest	Local Relief:	none
Slope (%):	0%	Latitude: 43°46'44.47"N	Longitude: 71°45'21.47"W Datum: NAD 83

Are climatic/hydrologic conditions on the site typical for this time of year? (If no, explain in remarks) ☑ Yes ☐ No

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed?
Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic?

Are normal circumstances present? ☑ Yes ☐ No

Date:	10/20/14
County:	Grafton
State:	NH
Wetland ID:	01SMB-C-E
Sample Point:	U1
Subregion:	
Community:	PFO
Section, Township, Range:	Plymouth

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present? ☐ Yes ☑ No
Wetland Hydrology Present? ☐ Yes ☑ No
Hydric Soils Present? ☐ Yes ☑ No
Is This Sampling Point Within A Wetland? ☐ **Yes** ☑ **No**

Remarks: Upland plot is shared with wetlands 01SMB, 01SMC, and 01SME.

HYDROLOGY

Wetland Hydrology Indicators (Check here if indicators are not present ☑):

Primary:
- ☐ A1 - Surface Water
- ☐ A2 - High Water Table
- ☐ A3 - Saturation
- ☐ B1 - Water Marks
- ☐ B2 - Sediment Deposits
- ☐ B3 - Drift Deposits
- ☐ B4 - Algal Mat or Crust
- ☐ B5 - Iron Deposits
- ☐ B7 - Inundation Visible on Aerial Imagery
- ☐ B9 - Water-Stained Leaves
- ☐ B13 - Aquatic Fauna
- ☐ B15 - Marl deposits (LRR U)
- ☐ C1 - Hydrogen Sulfide Odor
- ☐ C3 - Oxidized Rhizospheres on Living Roots
- ☐ C4 - Presence of Reduced Iron
- ☐ C6 - Recent Iron Reduction in Tilled Soils
- ☐ C7 - Thin Muck Surface
- ☐ D9 - Gauge or Well Data
- ☐ Other (Explain in Remarks)

Secondary:
- ☐ B6 - Surface Soil Cracks
- ☐ B8 - Sparsely Vegetated Concave Surface
- ☐ B10 - Drainage Patterns
- ☐ B16 - Moss Trim Lines
- ☐ C2 - Dry-Season Water Table
- ☐ C8 - Crayfish Burrows
- ☐ C9 - Saturation Visible on Aerial Imagery
- ☐ D2 - Geomorphic Position
- ☐ D3 - Shallow Aquitard
- ☐ D5 - FAC-Neutral Test
- ☐ D8 - Sphagnum Moss (LRR T, U)

Field Observations:

Surface Water Present?	☐ Yes ☑ No	Depth:	(in.)
Water Table Present?	☐ Yes ☑ No	Depth:	(in.)
Saturation Present?	☐ Yes ☑ No	Depth:	(in.)

Wetland Hydrology Present? ☐ Yes ☑ No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: N/A

Remarks:

SOILS

Map Unit Name: Croghan Loamy Fine Sand

Profile Description (Describe to the depth needed to document the indicator or confirm the absence of indicators.) (Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered/Coated Sand Grains; Location: PL=Pore Lining, M=Matrix)

Top Depth	Bottom Depth	Horizon	Matrix Color (Moist)	Matrix %	Redox Features Color (Moist)	Redox Features %	Redox Features Type	Redox Features Location	Texture (e.g. clay, sand, loam)
0	3	1	10YR 3/2	100	--	--	--	--	sandy loam
3	10	2	7.5YR 4/4	100	--	--	--	--	sandy loam
10	16	3	10YR 4/4	100	--	--	--	--	sandy loam
--	--	--	--	--	--	--	--	--	--
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NRCS Hydric Soil Field Indicators (check here if indicators are not present ☑):

- ☐ A1- Histosol
- ☐ A2 - Histic Epipedon
- ☐ A3 - Black Histic
- ☐ A4 - Hydrogen Sulfide
- ☐ A5 - Stratified Layers
- ☐ A6 - Organic Bodies (LRR P, T, U)
- ☐ A7 - 5cm Mucky Mineral (LRR P, T, U)
- ☐ A8 - Muck Presence (LRR U)
- ☐ A9- 1cm Muck (LRR P, T)
- ☐ A11 - Depleted Below Dark Surface
- ☐ A12 - Thick Dark Surface
- ☐ A16 - Coast Prairie Redox (MLRA 150A)
- ☐ S1 - Sandy Mucky Mineral (LRR O, S)
- ☐ S4 - Sandy Gleyed Matrix
- ☐ S5 - Sandy Redox
- ☐ S6 - Stripped Matirx
- ☐ S7 - Dark Surface (LRR P, S, T, U)
- ☐ S8 - Polyvalue Below Surface (LRR S, T, U)
- ☐ S9 - Thin Dark Surface (LRR S, T, U)
- ☐ F1 - Loamy Mucky Mineral (LRR O)
- ☐ F2 - Loamy Gleyed Matrix
- ☐ F3 - Depleted Matrix
- ☐ F6 - Redox Dark Surface
- ☐ F7 - Depleted Dark Surface
- ☐ F8 - Redox Depressions
- ☐ F10 - Marl (LRR U)
- ☐ F11 - Depleted Ochric (MLRA 151)
- ☐ F12 - Iron-Manganese Masses (LRR O, P, T)
- ☐ F13 - Umbric Surface (LRR P, T, U)
- ☐ F17 - Delta Ochric (MLRA 151)
- ☐ F18 - Reduced Vertic (MLRA 150A, B)
- ☐ F19 - Piedmont Floodplain Soils (MLRA 149A)
- ☐ F20 - Anomalous Bright Loamy Soils (MLRA 149A, 153C, D)

Indicators for Problematic Soils [1]
- ☐ A9-1cm Muck (LRR O)
- ☐ A10-2cm Muck (LRR S)
- ☐ F18-Reduced Vertic (outside MLRA 150A, B)
- ☐ F19-Piedmont Floodplain Soils (LRR P, S, T)
- ☐ F20-Anomalous Bright Loamy Soils (MLRA 153B)
- ☐ TF2-Red Parent Material
- ☐ TF12-Very Shallow Dark Surface
- ☐ TF12-Very Shallow Dark Surface

[1] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If Observed) Type: N/A Depth: N/A

Hydric Soil Present? ☐ Yes ☑ No

Remarks:

WETLAND DETERMINATION DATA FORM
Atlantic Gulf and Coastal Plain

Project/Site: Plymouth Municipal Airport | Wetland ID: 01SMB-C-E | Sample Point: U1

VEGETATION

Tree Stratum (Plot size: 30 ft radius)

	Species Name	% Cover	Dominant	Ind.Status
1.	*Acer rubrum*	30	Y	FAC
2.	*Pinus strobus*	20	Y	FACU
3.	*Betula populifolia*	20	Y	FAC
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	70		

Sapling Stratum (Plot size: 30 ft radius)

1.	*Pinus strobus*	40	Y	FACU
2.	*Betula populifolia*	20	Y	FAC
3.	*Acer rubrum*	10	N	FAC
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	70		

Shrub Stratum (Plot size: 30 ft radius)

1.	*Pinus strobus*	20	Y	FACU
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	20		

Herb Stratum (Plot size: 30 ft radius)

1.	*Solidago rugosa*	20	Y	FAC
2.	*Fragaria virginiana*	10	Y	FACU
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
8.	--	--	--	--
9.	--	--	--	--
10.	--	--	--	--
11.	--	--	--	--
12.	--	--	--	--
	Total Cover =	30		

Woody Vine Stratum (Plot size: 30 ft radius)

1.	--	--	--	--
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
	Total Cover =	0		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ***50%*** (A/B)

Prevalence Index Worksheet

Total % Cover of:		Multiply by:	
OBL spp.	0	x 1 =	0
FACW spp.	0	x 2 =	0
FAC spp.	100	x 3 =	300
FACU spp.	90	x 4 =	360
UPL spp.	0	x 5 =	0
Total	190 (A)		660 (B)

Prevalence Index = B/A = ***3.474***

Hydrophytic Vegetation Indicators:

- ☐ Yes ☑ No Rapid Test for Hydrophytic Vegetation
- ☐ Yes ☑ No Dominance Test is > 50%
- ☐ Yes ☑ No Prevalence Index is ≤ 3.0 *
- ☐ Yes ☑ No Morphological Adaptations (Explain) *
- ☐ Yes ☑ No Problem Hydrophytic Vegetation (Explain) *

* Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants approximately 20 ft or more in height and 3 in or larger DBH

Sapling - Woody plants approximately 20 ft or more in height and less than 3 in DBH

Shrub - Woody plants approximately 3-20 ft in height

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft. tall.

Woody Vines - All woody vines greater than 3.28 ft. in height.

Hydrophytic Vegetation Present ☐ Yes ☑ No

Remarks:

Additional Remarks:

WETLAND DETERMINATION DATA FORM
Atlantic Gulf and Coastal Plain

Project/Site:	Plymouth Municipal Airport	Stantec Project #:	195210752
Applicant:	Town of Plymouth, NH		
Investigator #1:	SPM	Investigator #2:	
Soil Unit:	Chocorua Mucky Peat	NWI Classification:	N/A
Landform:	Depression	Local Relief:	Concave
Slope (%):	2-4%	Latitude: 43°46'45.09"N	Longitude: 71°45'22.89"W Datum: NAD 83

Are climatic/hydrologic conditions on the site typical for this time of year? (If no, explain in remarks) ☑ Yes ☐ No

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed?
Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic?

Are normal circumstances present? ☑ Yes ☐ No

Date:	10/20/14
County:	Grafton
State:	NH
Wetland ID:	01SMC
Sample Point:	W1
Subregion:	
Community:	PFO/PSS
Section, Township, Range:	Plymouth

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present? ☑ Yes ☐ No
Wetland Hydrology Present? ☑ Yes ☐ No
Hydric Soils Present? ☑ Yes ☐ No
Is This Sampling Point Within A Wetland? ☑ **Yes** ☐ **No**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators (Check here if indicators are not present ☐):

Primary:
- ☐ A1 - Surface Water
- ☐ A2 - High Water Table
- ☑ A3 - Saturation
- ☐ B1 - Water Marks
- ☐ B2 - Sediment Deposits
- ☐ B3 - Drift Deposits
- ☐ B4 - Algal Mat or Crust
- ☐ B5 - Iron Deposits
- ☐ B7 - Inundation Visible on Aerial Imagery
- ☑ B9 - Water-Stained Leaves
- ☐ B13 - Aquatic Fauna
- ☐ B15 - Marl deposits (LRR U)
- ☐ C1 - Hydrogen Sulfide Odor
- ☐ C3 - Oxidized Rhizospheres on Living Roots
- ☐ C4 - Presence of Reduced Iron
- ☐ C6 - Recent Iron Reduction in Tilled Soils
- ☐ C7 - Thin Muck Surface
- ☐ D9 - Gauge or Well Data
- ☐ Other (Explain in Remarks)

Secondary:
- ☐ B6 - Surface Soil Cracks
- ☐ B8 - Sparsely Vegetated Concave Surface
- ☑ B10 - Drainage Patterns
- ☐ B16 - Moss Trim Lines
- ☐ C2 - Dry-Season Water Table
- ☐ C8 - Crayfish Burrows
- ☐ C9 - Saturation Visible on Aerial Imagery
- ☐ D2 - Geomorphic Position
- ☐ D3 - Shallow Aquitard
- ☐ D5 - FAC-Neutral Test
- ☐ D8 - Sphagnum Moss (LRR T, U)

Field Observations:

Surface Water Present?	☐ Yes	☑ No	Depth:	(in.)
Water Table Present?	☐ Yes	☑ No	Depth:	(in.)
Saturation Present?	☑ Yes	☐ No	Depth: 0	(in.)

Wetland Hydrology Present? ☑ Yes ☐ No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: N/A

Remarks: Saturation was present at the surface.

SOILS

Map Unit Name: Chocorua Mucky Peat

Profile Description (Describe to the depth needed to document the indicator or confirm the absence of indicators.) (Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered/Coated Sand Grains; Location: PL=Pore Lining, M=Matrix)

Top Depth	Bottom Depth	Horizon	Matrix Color (Moist)	Matrix %	Redox Features Color (Moist)	Redox Features %	Redox Features Type	Redox Features Location	Texture (e.g. clay, sand, loam)
0	5	1	10YR 3/2	100	--	--	--	--	sandy loam
5	16	2	10YR 4/2	90	7.5YR 4/6	10	C	M	sandy loam
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--

NRCS Hydric Soil Field Indicators (check here if indicators are not present ☐):

- ☐ A1- Histosol
- ☐ A2 - Histic Epipedon
- ☐ A3 - Black Histic
- ☐ A4 - Hydrogen Sulfide
- ☐ A5 - Stratified Layers
- ☐ A6 - Organic Bodies (LRR P, T, U)
- ☐ A7 - 5cm Mucky Mineral (LRR P, T, U)
- ☐ A8 - Muck Presence (LRR U)
- ☐ A9- 1cm Muck (LRR P, T)
- ☐ A11 - Depleted Below Dark Surface
- ☐ A12 - Thick Dark Surface
- ☐ A16 - Coast Prairie Redox (MLRA 150A)
- ☐ S1 - Sandy Mucky Mineral (LRR O, S)
- ☐ S4 - Sandy Gleyed Matrix
- ☐ S5 - Sandy Redox
- ☐ S6 - Stripped Matirx
- ☐ S7 - Dark Surface (LRR P, S, T, U)
- ☐ S8 - Polyvalue Below Surface (LRR S, T, U)
- ☐ S9 - Thin Dark Surface (LRR S, T, U)
- ☐ F1 - Loamy Mucky Mineral (LRR O)
- ☐ F2 - Loamy Gleyed Matrix
- ☑ F3 - Depleted Matrix
- ☐ F6 - Redox Dark Surface
- ☐ F7 - Depleted Dark Surface
- ☐ F8 - Redox Depressions
- ☐ F10 - Marl (LRR U)
- ☐ F11 - Depleted Ochric (MLRA 151)
- ☐ F12 - Iron-Manganese Masses (LRR O, P, T)
- ☐ F13 - Umbric Surface (LRR P, T, U)
- ☐ F17 - Delta Ochric (MLRA 151)
- ☐ F18 - Reduced Vertic (MLRA 150A, B)
- ☐ F19 - Piedmont Floodplain Soils (MLRA 149A)
- ☐ F20 - Anomalous Bright Loamy Soils (MLRA 149A, 153C, D)

Indicators for Problematic Soils [1]
- ☐ A9-1cm Muck (LRR O)
- ☐ A10-2cm Muck (LRR S)
- ☐ F18-Reduced Vertic (outside MLRA 150A, B)
- ☐ F19-Piedmont Floodplain Soils (LRR P, S, T)
- ☐ F20-Anomalous Bright Loamy Soils (MLRA 153B)
- ☐ TF2-Red Parent Material
- ☐ TF12-Very Shallow Dark Surface
- ☐ TF12-Very Shallow Dark Surface

[1] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If Observed) Type: N/A Depth: N/A

Hydric Soil Present? ☑ Yes ☐ No

Remarks:

WETLAND DETERMINATION DATA FORM

Atlantic Gulf and Coastal Plain

Project/Site: Plymouth Municipal Airport | Wetland ID: 01SMC | Sample Point: W1

VEGETATION

Tree Stratum (Plot size: 30 ft radius)

	Species Name	% Cover	Dominant	Ind.Status
1.	*Acer rubrum*	60	Y	FAC
2.	*Pinus strobus*	20	Y	FACU
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	80		

Sapling Stratum (Plot size: 30 ft radius)

1.	*Ulmus americana*	10	Y	FAC
2.	*Acer rubrum*	10	Y	FAC
3.	*Betula populifolia*	10	Y	FAC
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	30		

Shrub Stratum (Plot size: 30 ft radius)

1.	*Ilex verticillata*	20	Y	FACW
2.	*Viburnum nudum*	20	Y	FACW
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	40		

Herb Stratum (Plot size: 30 ft radius)

1.	*Juncus effusus*	30	Y	OBL
2.	*Glyceria melicaria*	20	Y	OBL
3.	*Solidago rugosa*	20	Y	FAC
4.	--	10	N	FACU
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
8.	--	--	--	--
9.	--	--	--	--
10.	--	--	--	--
11.	--	--	--	--
12.	--	--	--	--
	Total Cover =	80		

Woody Vine Stratum (Plot size: 30 ft radius)

1.	--	--	--	--
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
	Total Cover =	0		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 9 (A)

Total Number of Dominant Species Across All Strata: 10 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ***90%*** (A/B)

Prevalence Index Worksheet

Total % Cover of:		Multiply by:	
OBL spp.	50	x 1 =	50
FACW spp.	40	x 2 =	80
FAC spp.	110	x 3 =	330
FACU spp.	30	x 4 =	120
UPL spp.	0	x 5 =	0
Total	230 (A)		580 (B)

Prevalence Index = B/A = ***2.522***

Hydrophytic Vegetation Indicators:

- ☐ Yes ☑ No Rapid Test for Hydrophytic Vegetation
- ☑ Yes ☐ No Dominance Test is > 50%
- ☑ Yes ☐ No Prevalence Index is ≤ 3.0 *
- ☐ Yes ☑ No Morphological Adaptations (Explain) *
- ☐ Yes ☑ No Problem Hydrophytic Vegetation (Explain) *

* Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants approximately 20 ft or more in height and 3 in or larger DBH

Sapling - Woody plants approximately 20 ft or more in height and less than 3 in DBH

Shrub - Woody plants approximately 3-20 ft in height

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft. tall.

Woody Vines - All woody vines greater than 3.28 ft. in height.

Hydrophytic Vegetation Present ☑ Yes ☐ No

Remarks: Pinus strobus growing on elevated mounds

Additional Remarks:

WETLAND DETERMINATION DATA FORM
Atlantic Gulf and Coastal Plain

Project/Site:	Plymouth Municipal Airport	Stantec Project #:	195210752
Applicant:	Town of Plymouth, NH		
Investigator #1:	SPM	Investigator #2:	
Soil Unit:	Croghan Loamy Fine Sand	NWI Classification:	N/A
Landform:	Depression	Local Relief:	Concave
Slope (%):	0%	Latitude: 43°46'41.39"N	Longitude: 71°45'19.44"W Datum: NAD 83

Are climatic/hydrologic conditions on the site typical for this time of year? (If no, explain in remarks) ☑ Yes ☐ No

Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed?
Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic?

Are normal circumstances present? ☑ Yes ☐ No

Date:	10/20/14
County:	Grafton
State:	NH
Wetland ID:	01SME
Sample Point:	W1
Subregion:	
Community:	PEM
Section, Township, Range:	Plymouth

SUMMARY OF FINDINGS

Hydrophytic Vegetation Present?	☑ Yes ☐ No	Hydric Soils Present?	☑ Yes ☐ No
Wetland Hydrology Present?	☑ Yes ☐ No	Is This Sampling Point Within A Wetland?	☑ **Yes** ☐ **No**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators (Check here if indicators are not present ☐):

Primary:
- ☐ A1 - Surface Water
- ☐ A2 - High Water Table
- ☑ A3 - Saturation
- ☐ B1 - Water Marks
- ☐ B2 - Sediment Deposits
- ☐ B3 - Drift Deposits
- ☐ B4 - Algal Mat or Crust
- ☐ B5 - Iron Deposits
- ☐ B7 - Inundation Visible on Aerial Imagery
- ☑ B9 - Water-Stained Leaves
- ☐ B13 - Aquatic Fauna
- ☐ B15 - Marl deposits (LRR U)
- ☐ C1 - Hydrogen Sulfide Odor
- ☐ C3 - Oxidized Rhizospheres on Living Roots
- ☐ C4 - Presence of Reduced Iron
- ☐ C6 - Recent Iron Reduction in Tilled Soils
- ☐ C7 - Thin Muck Surface
- ☐ D9 - Gauge or Well Data
- ☐ Other (Explain in Remarks)

Secondary:
- ☐ B6 - Surface Soil Cracks
- ☐ B8 - Sparsely Vegetated Concave Surface
- ☑ B10 - Drainage Patterns
- ☐ B16 - Moss Trim Lines
- ☐ C2 - Dry-Season Water Table
- ☐ C8 - Crayfish Burrows
- ☐ C9 - Saturation Visible on Aerial Imagery
- ☐ D2 - Geomorphic Position
- ☐ D3 - Shallow Aquitard
- ☐ D5 - FAC-Neutral Test
- ☐ D8 - Sphagnum Moss (LRR T, U)

Field Observations:

Surface Water Present?	☐ Yes	☑ No	Depth:	(in.)
Water Table Present?	☐ Yes	☑ No	Depth:	(in.)
Saturation Present?	☑ Yes	☐ No	Depth: 0	(in.)

Wetland Hydrology Present? ☑ Yes ☐ No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: N/A

Remarks: Saturation was present at the surface.

SOILS

Map Unit Name: Croghan Loamy Fine Sand

Profile Description (Describe to the depth needed to document the indicator or confirm the absence of indicators.) (Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered/Coated Sand Grains; Location: PL=Pore Lining, M=Matrix)

Top Depth	Bottom Depth	Horizon	Matrix Color (Moist)	Matrix %	Redox Features Color (Moist)	Redox Features %	Redox Features Type	Redox Features Location	Texture (e.g. clay, sand, loam)
0	3	1	10YR 3/2	100	--	--	--	--	loamy sand
3	12	2	5Y 5/2	95	7.5YR 4/6	5	C	M	loamy sand
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--

NRCS Hydric Soil Field Indicators (check here if indicators are not present ☐):

- ☐ A1- Histosol
- ☐ A2 - Histic Epipedon
- ☐ A3 - Black Histic
- ☐ A4 - Hydrogen Sulfide
- ☐ A5 - Stratified Layers
- ☐ A6 - Organic Bodies (LRR P, T, U)
- ☐ A7 - 5cm Mucky Mineral (LRR P, T, U)
- ☐ A8 - Muck Presence (LRR U)
- ☐ A9- 1cm Muck (LRR P, T)
- ☐ A11 - Depleted Below Dark Surface
- ☐ A12 - Thick Dark Surface
- ☐ A16 - Coast Prairie Redox (MLRA 150A)
- ☐ S1 - Sandy Mucky Mineral (LRR O, S)
- ☐ S4 - Sandy Gleyed Matrix
- ☑ S5 - Sandy Redox
- ☐ S6 - Stripped Matirx
- ☐ S7 - Dark Surface (LRR P, S, T, U)
- ☐ S8 - Polyvalue Below Surface (LRR S, T, U)
- ☐ S9 - Thin Dark Surface (LRR S, T, U)
- ☐ F1 - Loamy Mucky Mineral (LRR O)
- ☐ F2 - Loamy Gleyed Matrix
- ☐ F3 - Depleted Matrix
- ☐ F6 - Redox Dark Surface
- ☐ F7 - Depleted Dark Surface
- ☐ F8 - Redox Depressions
- ☐ F10 - Marl (LRR U)
- ☐ F11 - Depleted Ochric (MLRA 151)
- ☐ F12 - Iron-Manganese Masses (LRR O, P, T)
- ☐ F13 - Umbric Surface (LRR P, T, U)
- ☐ F17 - Delta Ochric (MLRA 151)
- ☐ F18 - Reduced Vertic (MLRA 150A, B)
- ☐ F19 - Piedmont Floodplain Soils (MLRA 149A)
- ☐ F20 - Anomalous Bright Loamy Soils (MLRA 149A, 153C, D)

Indicators for Problematic Soils [1]
- ☐ A9-1cm Muck (LRR O)
- ☐ A10-2cm Muck (LRR S)
- ☐ F18-Reduced Vertic (outside MLRA 150A, B)
- ☐ F19-Piedmont Floodplain Soils (LRR P, S, T)
- ☐ F20-Anomalous Bright Loamy Soils (MLRA 153B)
- ☐ TF2-Red Parent Material
- ☐ TF12-Very Shallow Dark Surface
- ☐ TF12-Very Shallow Dark Surface

[1] Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (If Observed) Type: N/A Depth: N/A

Hydric Soil Present? ☑ Yes ☐ No

Remarks:

WETLAND DETERMINATION DATA FORM
Atlantic Gulf and Coastal Plain

Project/Site: Plymouth Municipal Airport | Wetland ID: 01SME | Sample Point: W1

VEGETATION

Tree Stratum (Plot size: 30 ft radius)

	Species Name	% Cover	Dominant	Ind.Status
1.	--	--	--	--
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	0		

Sapling Stratum (Plot size: 30 ft radius)

1.	--	--	--	--
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	0		

Shrub Stratum (Plot size: 30 ft radius)

1.	--	--	--	--
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
	Total Cover =	0		

Herb Stratum (Plot size: 30 ft radius)

1.	*Juncus effusus*	60	Y	OBL
2.	*Carex projecta*	10	Y	FACW
3.	*Typha latifolia*	10	Y	OBL
4.	*Carex lurida*	10	Y	OBL
5.	--	--	--	--
6.	--	--	--	--
7.	--	--	--	--
8.	--	--	--	--
9.	--	--	--	--
10.	--	--	--	--
11.	--	--	--	--
12.	--	--	--	--
	Total Cover =	90		

Woody Vine Stratum (Plot size: 30 ft radius)

1.	--	--	--	--
2.	--	--	--	--
3.	--	--	--	--
4.	--	--	--	--
5.	--	--	--	--
	Total Cover =	0		

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ***100%*** (A/B)

Prevalence Index Worksheet

Total % Cover of:		Multiply by:	
OBL spp.	80	x 1 =	80
FACW spp.	10	x 2 =	20
FAC spp.	0	x 3 =	0
FACU spp.	0	x 4 =	0
UPL spp.	0	x 5 =	0
Total	90 (A)		100 (B)

Prevalence Index = B/A = ***1.111***

Hydrophytic Vegetation Indicators:

☐ Yes	☑ No	Rapid Test for Hydrophytic Vegetation
☑ Yes	☐ No	Dominance Test is > 50%
☑ Yes	☐ No	Prevalence Index is ≤ 3.0 *
☐ Yes	☑ No	Morphological Adaptations (Explain) *
☐ Yes	☑ No	Problem Hydrophytic Vegetation (Explain) *

* Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree - Woody plants approximately 20 ft or more in height and 3 in or larger DBH

Sapling - Woody plants approximately 20 ft or more in height and less than 3 in DBH

Shrub - Woody plants approximately 3-20 ft in height

Herb - All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft. tall.

Woody Vines - All woody vines greater than 3.28 ft. in height.

Hydrophytic Vegetation Present ☑ Yes ☐ No

Remarks:

Additional Remarks:

APPENDIX F - AIRPORT SPONSOR ASSURANCES

Appendix F contains an example of the FAA's Airport Sponsor Assurances as of September 2016. These assurances are subject to change, but will become part of any agreement between the town of Plymouth and the federal government should the town elect to join NPIAS and accept its first development grant. For additional information refer to Federal Obligations in Chapter 7.

FAA
Airports

ASSURANCES

Airport Sponsors

A. General.

1. These assurances shall be complied with in the performance of grant agreements for airport development, airport planning, and noise compatibility program grants for airport sponsors.
2. These assurances are required to be submitted as part of the project application by sponsors requesting funds under the provisions of Title 49, U.S.C., subtitle VII, as amended. As used herein, the term "public agency sponsor" means a public agency with control of a public-use airport; the term "private sponsor" means a private owner of a public-use airport; and the term "sponsor" includes both public agency sponsors and private sponsors.
3. Upon acceptance of this grant offer by the sponsor, these assurances are incorporated in and become part of this grant agreement.

B. Duration and Applicability.

1. **Airport development or Noise Compatibility Program Projects Undertaken by a Public Agency Sponsor.**

   The terms, conditions and assurances of this grant agreement shall remain in full force and effect throughout the useful life of the facilities developed or equipment acquired for an airport development or noise compatibility program project, or throughout the useful life of the project items installed within a facility under a noise compatibility program project, but in any event not to exceed twenty (20) years from the date of acceptance of a grant offer of Federal funds for the project. However, there shall be no limit on the duration of the assurances regarding Exclusive Rights and Airport Revenue so long as the airport is used as an airport. There shall be no limit on the duration of the terms, conditions, and assurances with respect to real property acquired with federal funds. Furthermore, the duration of the Civil Rights assurance shall be specified in the assurances.

2. **Airport Development or Noise Compatibility Projects Undertaken by a Private Sponsor.**

   The preceding paragraph 1 also applies to a private sponsor except that the useful life of project items installed within a facility or the useful life of the facilities developed or equipment acquired under an airport development or noise compatibility program project shall be no less than ten (10) years from the date of acceptance of Federal aid for the project.

3. **Airport Planning Undertaken by a Sponsor.**

Unless otherwise specified in this grant agreement, only Assurances 1, 2, 3, 5, 6, 13, 18, 25, 30, 32, 33, and 34 in Section C apply to planning projects. The terms, conditions, and assurances of this grant agreement shall remain in full force and effect during the life of the project; there shall be no limit on the duration of the assurances regarding Airport Revenue so long as the airport is used as an airport.

C. Sponsor Certification.

The sponsor hereby assures and certifies, with respect to this grant that:

1. **General Federal Requirements.**

It will comply with all applicable Federal laws, regulations, executive orders, policies, guidelines, and requirements as they relate to the application, acceptance and use of Federal funds for this project including but not limited to the following:

Federal Legislation

a. Title 49, U.S.C., subtitle VII, as amended.
b. Davis-Bacon Act - 40 U.S.C. 276(a), et seq.[1]
c. Federal Fair Labor Standards Act - 29 U.S.C. 201, et seq.
d. Hatch Act – 5 U.S.C. 1501, et seq.[2]
e. Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 Title 42 U.S.C. 4601, et seq.[1 2]
f. National Historic Preservation Act of 1966 - Section 106 - 16 U.S.C. 470(f).[1]
g. Archeological and Historic Preservation Act of 1974 - 16 U.S.C. 469 through 469c.[1]
h. Native Americans Grave Repatriation Act - 25 U.S.C. Section 3001, et seq.
i. Clean Air Act, P.L. 90-148, as amended.
j. Coastal Zone Management Act, P.L. 93-205, as amended.
k. Flood Disaster Protection Act of 1973 - Section 102(a) - 42 U.S.C. 4012a.[1]
l. Title 49, U.S.C., Section 303, (formerly known as Section 4(f))
m. Rehabilitation Act of 1973 - 29 U.S.C. 794.
n. Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin);
o. Americans with Disabilities Act of 1990, as amended, (42 U.S.C. § 12101 et seq.), prohibits discrimination on the basis of disability).
p. Age Discrimination Act of 1975 - 42 U.S.C. 6101, et seq.
q. American Indian Religious Freedom Act, P.L. 95-341, as amended.
r. Architectural Barriers Act of 1968 -42 U.S.C. 4151, et seq.[1]
s. Power plant and Industrial Fuel Use Act of 1978 - Section 403- 2 U.S.C. 8373.[1]
t. Contract Work Hours and Safety Standards Act - 40 U.S.C. 327, et seq.[1]
u. Copeland Anti-kickback Act - 18 U.S.C. 874.1
v. National Environmental Policy Act of 1969 - 42 U.S.C. 4321, et seq.[1]
w. Wild and Scenic Rivers Act, P.L. 90-542, as amended.
x. Single Audit Act of 1984 - 31 U.S.C. 7501, et seq.[2]
y. Drug-Free Workplace Act of 1988 - 41 U.S.C. 702 through 706.

z. The Federal Funding Accountability and Transparency Act of 2006, as amended (Pub. L. 109-282, as amended by section 6202 of Pub. L. 110-252).

Executive Orders

a. Executive Order 11246 - Equal Employment Opportunity[1]
b. Executive Order 11990 - Protection of Wetlands
c. Executive Order 11998 – Flood Plain Management
d. Executive Order 12372 - Intergovernmental Review of Federal Programs
e. Executive Order 12699 - Seismic Safety of Federal and Federally Assisted New Building Construction[1]
f. Executive Order 12898 - Environmental Justice

Federal Regulations

a. 2 CFR Part 180 - OMB Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement).
b. 2 CFR Part 200, Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards. [OMB Circular A-87 Cost Principles Applicable to Grants and Contracts with State and Local Governments, and OMB Circular A-133 - Audits of States, Local Governments, and Non-Profit Organizations].[4, 5, 6]
c. 2 CFR Part 1200 – Nonprocurement Suspension and Debarment
d. 14 CFR Part 13 - Investigative and Enforcement Procedures14 CFR Part 16 - Rules of Practice For Federally Assisted Airport Enforcement Proceedings.
e. 14 CFR Part 150 - Airport noise compatibility planning.
f. 28 CFR Part 35- Discrimination on the Basis of Disability in State and Local Government Services.
g. 28 CFR § 50.3 - U.S. Department of Justice Guidelines for Enforcement of Title VI of the Civil Rights Act of 1964.
h. 29 CFR Part 1 - Procedures for predetermination of wage rates.[1]
i. 29 CFR Part 3 - Contractors and subcontractors on public building or public work financed in whole or part by loans or grants from the United States.[1]
j. 29 CFR Part 5 - Labor standards provisions applicable to contracts covering federally financed and assisted construction (also labor standards provisions applicable to non-construction contracts subject to the Contract Work Hours and Safety Standards Act).[1]
k. 41 CFR Part 60 - Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor (Federal and federally assisted contracting requirements).[1]
l. 49 CFR Part 18 - Uniform administrative requirements for grants and cooperative agreements to state and local governments.[3]
m. 49 CFR Part 20 - New restrictions on lobbying.
n. 49 CFR Part 21 – Nondiscrimination in federally-assisted programs of the Department of Transportation - effectuation of Title VI of the Civil Rights Act of 1964.
o. 49 CFR Part 23 - Participation by Disadvantage Business Enterprise in Airport Concessions.

p. 49 CFR Part 24 – Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs.[1] [2]
q. 49 CFR Part 26 – Participation by Disadvantaged Business Enterprises in Department of Transportation Programs.
r. 49 CFR Part 27 – Nondiscrimination on the Basis of Handicap in Programs and Activities Receiving or Benefiting from Federal Financial Assistance.[1]
s. 49 CFR Part 28 – Enforcement of Nondiscrimination on the Basis of Handicap in Programs or Activities conducted by the Department of Transportation.
t. 49 CFR Part 30 - Denial of public works contracts to suppliers of goods and services of countries that deny procurement market access to U.S. contractors.
u. 49 CFR Part 32 – Governmentwide Requirements for Drug-Free Workplace (Financial Assistance)
v. 49 CFR Part 37 – Transportation Services for Individuals with Disabilities (ADA).
w. 49 CFR Part 41 - Seismic safety of Federal and federally assisted or regulated new building construction.

Specific Assurances

Specific assurances required to be included in grant agreements by any of the above laws, regulations or circulars are incorporated by reference in this grant agreement.

Footnotes to Assurance C.1.

[1] These laws do not apply to airport planning sponsors.

[2] These laws do not apply to private sponsors.

[3] 49 CFR Part 18 and 2 CFR Part 200 contain requirements for State and Local Governments receiving Federal assistance. Any requirement levied upon State and Local Governments by this regulation and circular shall also be applicable to private sponsors receiving Federal assistance under Title 49, United States Code.

[4] On December 26, 2013 at 78 FR 78590, the Office of Management and Budget (OMB) issued the Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards in 2 CFR Part 200. 2 CFR Part 200 replaces and combines the former Uniform Administrative Requirements for Grants (OMB Circular A-102 and Circular A-110 or 2 CFR Part 215 or Circular) as well as the Cost Principles (Circulars A-21 or 2 CFR part 220; Circular A-87 or 2 CFR part 225; and A-122, 2 CFR part 230). Additionally it replaces Circular A-133 guidance on the Single Annual Audit. In accordance with 2 CFR section 200.110, the standards set forth in Part 200 which affect administration of Federal awards issued by Federal agencies become effective once implemented by Federal agencies or when any future amendment to this Part becomes final. Federal agencies, including the Department of Transportation, must implement the policies and procedures applicable to Federal awards by promulgating a regulation to be effective by December 26, 2014 unless different provisions are required by statute or approved by OMB.

[5] Cost principles established in 2 CFR part 200 subpart E must be used as guidelines for determining the eligibility of specific types of expenses.

[6] Audit requirements established in 2 CFR part 200 subpart F are the guidelines for audits.

2. **Responsibility and Authority of the Sponsor.**

   a. Public Agency Sponsor:

   It has legal authority to apply for this grant, and to finance and carry out the proposed project; that a resolution, motion or similar action has been duly adopted or passed as an official act of the applicant's governing body authorizing the filing of the application, including all understandings and assurances contained therein, and directing and authorizing the person identified as the official representative of the applicant to act in connection with the application and to provide such additional information as may be required.

   b. Private Sponsor:

   It has legal authority to apply for this grant and to finance and carry out the proposed project and comply with all terms, conditions, and assurances of this grant agreement. It shall designate an official representative and shall in writing direct and authorize that person to file this application, including all understandings and assurances contained therein; to act in connection with this application; and to provide such additional information as may be required.

3. **Sponsor Fund Availability.**

   It has sufficient funds available for that portion of the project costs which are not to be paid by the United States. It has sufficient funds available to assure operation and maintenance of items funded under this grant agreement which it will own or control.

4. **Good Title.**

   a. It, a public agency or the Federal government, holds good title, satisfactory to the Secretary, to the landing area of the airport or site thereof, or will give assurance satisfactory to the Secretary that good title will be acquired.

   b. For noise compatibility program projects to be carried out on the property of the sponsor, it holds good title satisfactory to the Secretary to that portion of the property upon which Federal funds will be expended or will give assurance to the Secretary that good title will be obtained.

5. **Preserving Rights and Powers.**

   a. It will not take or permit any action which would operate to deprive it of any of the rights and powers necessary to perform any or all of the terms, conditions, and assurances in this grant agreement without the written approval of the Secretary, and will act promptly to acquire, extinguish or modify any outstanding rights or claims of right of others which would interfere with such performance by the sponsor. This shall be done in a manner acceptable to the Secretary.

b. It will not sell, lease, encumber, or otherwise transfer or dispose of any part of its title or other interests in the property shown on Exhibit A to this application or, for a noise compatibility program project, that portion of the property upon which Federal funds have been expended, for the duration of the terms, conditions, and assurances in this grant agreement without approval by the Secretary. If the transferee is found by the Secretary to be eligible under Title 49, United States Code, to assume the obligations of this grant agreement and to have the power, authority, and financial resources to carry out all such obligations, the sponsor shall insert in the contract or document transferring or disposing of the sponsor's interest, and make binding upon the transferee all of the terms, conditions, and assurances contained in this grant agreement.

c. For all noise compatibility program projects which are to be carried out by another unit of local government or are on property owned by a unit of local government other than the sponsor, it will enter into an agreement with that government. Except as otherwise specified by the Secretary, that agreement shall obligate that government to the same terms, conditions, and assurances that would be applicable to it if it applied directly to the FAA for a grant to undertake the noise compatibility program project. That agreement and changes thereto must be satisfactory to the Secretary. It will take steps to enforce this agreement against the local government if there is substantial non-compliance with the terms of the agreement.

d. For noise compatibility program projects to be carried out on privately owned property, it will enter into an agreement with the owner of that property which includes provisions specified by the Secretary. It will take steps to enforce this agreement against the property owner whenever there is substantial non-compliance with the terms of the agreement.

e. If the sponsor is a private sponsor, it will take steps satisfactory to the Secretary to ensure that the airport will continue to function as a public-use airport in accordance with these assurances for the duration of these assurances.

f. If an arrangement is made for management and operation of the airport by any agency or person other than the sponsor or an employee of the sponsor, the sponsor will reserve sufficient rights and authority to insure that the airport will be operated and maintained in accordance Title 49, United States Code, the regulations and the terms, conditions and assurances in this grant agreement and shall insure that such arrangement also requires compliance therewith.

g. Sponsors of commercial service airports will not permit or enter into any arrangement that results in permission for the owner or tenant of a property used as a residence, or zoned for residential use, to taxi an aircraft between that property and any location on airport. Sponsors of general aviation airports entering into any arrangement that results in permission for the owner of residential real property adjacent to or near the airport must comply with the requirements of Sec. 136 of Public Law 112-95 and the sponsor assurances.

6. **Consistency with Local Plans.**

   The project is reasonably consistent with plans (existing at the time of submission of this application) of public agencies that are authorized by the State in which the project is located to plan for the development of the area surrounding the airport.

7. **Consideration of Local Interest.**

   It has given fair consideration to the interest of communities in or near where the project may be located.

8. **Consultation with Users.**

   In making a decision to undertake any airport development project under Title 49, United States Code, it has undertaken reasonable consultations with affected parties using the airport at which project is proposed.

9. **Public Hearings.**

   In projects involving the location of an airport, an airport runway, or a major runway extension, it has afforded the opportunity for public hearings for the purpose of considering the economic, social, and environmental effects of the airport or runway location and its consistency with goals and objectives of such planning as has been carried out by the community and it shall, when requested by the Secretary, submit a copy of the transcript of such hearings to the Secretary. Further, for such projects, it has on its management board either voting representation from the communities where the project is located or has advised the communities that they have the right to petition the Secretary concerning a proposed project.

10. **Metropolitan Planning Organization.**

    In projects involving the location of an airport, an airport runway, or a major runway extension at a medium or large hub airport, the sponsor has made available to and has provided upon request to the metropolitan planning organization in the area in which the airport is located, if any, a copy of the proposed amendment to the airport layout plan to depict the project and a copy of any airport master plan in which the project is described or depicted.

11. **Pavement Preventive Maintenance.**

    With respect to a project approved after January 1, 1995, for the replacement or reconstruction of pavement at the airport, it assures or certifies that it has implemented an effective airport pavement maintenance-management program and it assures that it will use such program for the useful life of any pavement constructed, reconstructed or repaired with Federal financial assistance at the airport. It will provide such reports on pavement condition and pavement management programs as the Secretary determines may be useful.

12. **Terminal Development Prerequisites.**

    For projects which include terminal development at a public use airport, as defined in Title 49, it has, on the date of submittal of the project grant application, all the safety equipment required for certification of such airport under section 44706 of Title 49, United States Code, and all the security equipment required by rule or regulation, and

has provided for access to the passenger enplaning and deplaning area of such airport to passengers enplaning and deplaning from aircraft other than air carrier aircraft.

13. **Accounting System, Audit, and Record Keeping Requirements.**

    a. It shall keep all project accounts and records which fully disclose the amount and disposition by the recipient of the proceeds of this grant, the total cost of the project in connection with which this grant is given or used, and the amount or nature of that portion of the cost of the project supplied by other sources, and such other financial records pertinent to the project. The accounts and records shall be kept in accordance with an accounting system that will facilitate an effective audit in accordance with the Single Audit Act of 1984.

    b. It shall make available to the Secretary and the Comptroller General of the United States, or any of their duly authorized representatives, for the purpose of audit and examination, any books, documents, papers, and records of the recipient that are pertinent to this grant. The Secretary may require that an appropriate audit be conducted by a recipient. In any case in which an independent audit is made of the accounts of a sponsor relating to the disposition of the proceeds of a grant or relating to the project in connection with which this grant was given or used, it shall file a certified copy of such audit with the Comptroller General of the United States not later than six (6) months following the close of the fiscal year for which the audit was made.

14. **Minimum Wage Rates.**

    It shall include, in all contracts in excess of $2,000 for work on any projects funded under this grant agreement which involve labor, provisions establishing minimum rates of wages, to be predetermined by the Secretary of Labor, in accordance with the Davis-Bacon Act, as amended (40 U.S.C. 276a-276a-5), which contractors shall pay to skilled and unskilled labor, and such minimum rates shall be stated in the invitation for bids and shall be included in proposals or bids for the work.

15. **Veteran's Preference.**

    It shall include in all contracts for work on any project funded under this grant agreement which involve labor, such provisions as are necessary to insure that, in the employment of labor (except in executive, administrative, and supervisory positions), preference shall be given to Vietnam era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns owned and controlled by disabled veterans as defined in Section 47112 of Title 49, United States Code. However, this preference shall apply only where the individuals are available and qualified to perform the work to which the employment relates.

16. **Conformity to Plans and Specifications.**

    It will execute the project subject to plans, specifications, and schedules approved by the Secretary. Such plans, specifications, and schedules shall be submitted to the Secretary prior to commencement of site preparation, construction, or other performance under this grant agreement, and, upon approval of the Secretary, shall be incorporated into this grant agreement. Any modification to the approved plans,

specifications, and schedules shall also be subject to approval of the Secretary, and incorporated into this grant agreement.

17. **Construction Inspection and Approval.**

    It will provide and maintain competent technical supervision at the construction site throughout the project to assure that the work conforms to the plans, specifications, and schedules approved by the Secretary for the project. It shall subject the construction work on any project contained in an approved project application to inspection and approval by the Secretary and such work shall be in accordance with regulations and procedures prescribed by the Secretary. Such regulations and procedures shall require such cost and progress reporting by the sponsor or sponsors of such project as the Secretary shall deem necessary.

18. **Planning Projects.**

    In carrying out planning projects:

    a. It will execute the project in accordance with the approved program narrative contained in the project application or with the modifications similarly approved.

    b. It will furnish the Secretary with such periodic reports as required pertaining to the planning project and planning work activities.

    c. It will include in all published material prepared in connection with the planning project a notice that the material was prepared under a grant provided by the United States.

    d. It will make such material available for examination by the public, and agrees that no material prepared with funds under this project shall be subject to copyright in the United States or any other country.

    e. It will give the Secretary unrestricted authority to publish, disclose, distribute, and otherwise use any of the material prepared in connection with this grant.

    f. It will grant the Secretary the right to disapprove the sponsor's employment of specific consultants and their subcontractors to do all or any part of this project as well as the right to disapprove the proposed scope and cost of professional services.

    g. It will grant the Secretary the right to disapprove the use of the sponsor's employees to do all or any part of the project.

    h. It understands and agrees that the Secretary's approval of this project grant or the Secretary's approval of any planning material developed as part of this grant does not constitute or imply any assurance or commitment on the part of the Secretary to approve any pending or future application for a Federal airport grant.

19. **Operation and Maintenance.**

    a. The airport and all facilities which are necessary to serve the aeronautical users of the airport, other than facilities owned or controlled by the United States, shall be operated at all times in a safe and serviceable condition and in accordance with the minimum standards as may be required or prescribed by applicable Federal,

state and local agencies for maintenance and operation. It will not cause or permit any activity or action thereon which would interfere with its use for airport purposes. It will suitably operate and maintain the airport and all facilities thereon or connected therewith, with due regard to climatic and flood conditions. Any proposal to temporarily close the airport for non-aeronautical purposes must first be approved by the Secretary. In furtherance of this assurance, the sponsor will have in effect arrangements for-

1) Operating the airport's aeronautical facilities whenever required;
2) Promptly marking and lighting hazards resulting from airport conditions, including temporary conditions; and
3) Promptly notifying airmen of any condition affecting aeronautical use of the airport. Nothing contained herein shall be construed to require that the airport be operated for aeronautical use during temporary periods when snow, flood or other climatic conditions interfere with such operation and maintenance. Further, nothing herein shall be construed as requiring the maintenance, repair, restoration, or replacement of any structure or facility which is substantially damaged or destroyed due to an act of God or other condition or circumstance beyond the control of the sponsor.

b. It will suitably operate and maintain noise compatibility program items that it owns or controls upon which Federal funds have been expended.

20. **Hazard Removal and Mitigation.**

It will take appropriate action to assure that such terminal airspace as is required to protect instrument and visual operations to the airport (including established minimum flight altitudes) will be adequately cleared and protected by removing, lowering, relocating, marking, or lighting or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards.

21. **Compatible Land Use.**

It will take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft. In addition, if the project is for noise compatibility program implementation, it will not cause or permit any change in land use, within its jurisdiction, that will reduce its compatibility, with respect to the airport, of the noise compatibility program measures upon which Federal funds have been expended.

22. **Economic Nondiscrimination.**

a. It will make the airport available as an airport for public use on reasonable terms and without unjust discrimination to all types, kinds and classes of aeronautical activities, including commercial aeronautical activities offering services to the public at the airport.

b. In any agreement, contract, lease, or other arrangement under which a right or privilege at the airport is granted to any person, firm, or corporation to conduct or

to engage in any aeronautical activity for furnishing services to the public at the airport, the sponsor will insert and enforce provisions requiring the contractor to-

1) furnish said services on a reasonable, and not unjustly discriminatory, basis to all users thereof, and

2) charge reasonable, and not unjustly discriminatory, prices for each unit or service, provided that the contractor may be allowed to make reasonable and nondiscriminatory discounts, rebates, or other similar types of price reductions to volume purchasers.

c. Each fixed-based operator at the airport shall be subject to the same rates, fees, rentals, and other charges as are uniformly applicable to all other fixed-based operators making the same or similar uses of such airport and utilizing the same or similar facilities.

d. Each air carrier using such airport shall have the right to service itself or to use any fixed-based operator that is authorized or permitted by the airport to serve any air carrier at such airport.

e. Each air carrier using such airport (whether as a tenant, non-tenant, or subtenant of another air carrier tenant) shall be subject to such nondiscriminatory and substantially comparable rules, regulations, conditions, rates, fees, rentals, and other charges with respect to facilities directly and substantially related to providing air transportation as are applicable to all such air carriers which make similar use of such airport and utilize similar facilities, subject to reasonable classifications such as tenants or non-tenants and signatory carriers and non-signatory carriers. Classification or status as tenant or signatory shall not be unreasonably withheld by any airport provided an air carrier assumes obligations substantially similar to those already imposed on air carriers in such classification or status.

f. It will not exercise or grant any right or privilege which operates to prevent any person, firm, or corporation operating aircraft on the airport from performing any services on its own aircraft with its own employees [including, but not limited to maintenance, repair, and fueling] that it may choose to perform.

g. In the event the sponsor itself exercises any of the rights and privileges referred to in this assurance, the services involved will be provided on the same conditions as would apply to the furnishing of such services by commercial aeronautical service providers authorized by the sponsor under these provisions.

h. The sponsor may establish such reasonable, and not unjustly discriminatory, conditions to be met by all users of the airport as may be necessary for the safe and efficient operation of the airport.

i. The sponsor may prohibit or limit any given type, kind or class of aeronautical use of the airport if such action is necessary for the safe operation of the airport or necessary to serve the civil aviation needs of the public.

23. **Exclusive Rights.**

It will permit no exclusive right for the use of the airport by any person providing, or intending to provide, aeronautical services to the public. For purposes of this paragraph, the providing of the services at an airport by a single fixed-based operator shall not be construed as an exclusive right if both of the following apply:

a. It would be unreasonably costly, burdensome, or impractical for more than one fixed-based operator to provide such services, and

b. If allowing more than one fixed-based operator to provide such services would require the reduction of space leased pursuant to an existing agreement between such single fixed-based operator and such airport. It further agrees that it will not, either directly or indirectly, grant or permit any person, firm, or corporation, the exclusive right at the airport to conduct any aeronautical activities, including, but not limited to charter flights, pilot training, aircraft rental and sightseeing, aerial photography, crop dusting, aerial advertising and surveying, air carrier operations, aircraft sales and services, sale of aviation petroleum products whether or not conducted in conjunction with other aeronautical activity, repair and maintenance of aircraft, sale of aircraft parts, and any other activities which because of their direct relationship to the operation of aircraft can be regarded as an aeronautical activity, and that it will terminate any exclusive right to conduct an aeronautical activity now existing at such an airport before the grant of any assistance under Title 49, United States Code.

24. **Fee and Rental Structure.**

It will maintain a fee and rental structure for the facilities and services at the airport which will make the airport as self-sustaining as possible under the circumstances existing at the particular airport, taking into account such factors as the volume of traffic and economy of collection. No part of the Federal share of an airport development, airport planning or noise compatibility project for which a grant is made under Title 49, United States Code, the Airport and Airway Improvement Act of 1982, the Federal Airport Act or the Airport and Airway Development Act of 1970 shall be included in the rate basis in establishing fees, rates, and charges for users of that airport.

25. **Airport Revenues.**

a. All revenues generated by the airport and any local taxes on aviation fuel established after December 30, 1987, will be expended by it for the capital or operating costs of the airport; the local airport system; or other local facilities which are owned or operated by the owner or operator of the airport and which are directly and substantially related to the actual air transportation of passengers or property; or for noise mitigation purposes on or off the airport. The following exceptions apply to this paragraph:

1) If covenants or assurances in debt obligations issued before September 3, 1982, by the owner or operator of the airport, or provisions enacted before September 3, 1982, in governing statutes controlling the owner or operator's financing, provide for the use of the revenues from any of the airport owner or

operator's facilities, including the airport, to support not only the airport but also the airport owner or operator's general debt obligations or other facilities, then this limitation on the use of all revenues generated by the airport (and, in the case of a public airport, local taxes on aviation fuel) shall not apply.

2) If the Secretary approves the sale of a privately owned airport to a public sponsor and provides funding for any portion of the public sponsor's acquisition of land, this limitation on the use of all revenues generated by the sale shall not apply to certain proceeds from the sale. This is conditioned on repayment to the Secretary by the private owner of an amount equal to the remaining unamortized portion (amortized over a 20-year period) of any airport improvement grant made to the private owner for any purpose other than land acquisition on or after October 1, 1996, plus an amount equal to the federal share of the current fair market value of any land acquired with an airport improvement grant made to that airport on or after October 1, 1996.

3) Certain revenue derived from or generated by mineral extraction, production, lease, or other means at a general aviation airport (as defined at Section 47102 of title 49 United States Code), if the FAA determines the airport sponsor meets the requirements set forth in Sec. 813 of Public Law 112-95.

b. As part of the annual audit required under the Single Audit Act of 1984, the sponsor will direct that the audit will review, and the resulting audit report will provide an opinion concerning, the use of airport revenue and taxes in paragraph (a), and indicating whether funds paid or transferred to the owner or operator are paid or transferred in a manner consistent with Title 49, United States Code and any other applicable provision of law, including any regulation promulgated by the Secretary or Administrator.

c. Any civil penalties or other sanctions will be imposed for violation of this assurance in accordance with the provisions of Section 47107 of Title 49, United States Code.

26. **Reports and Inspections.**

It will:

a. submit to the Secretary such annual or special financial and operations reports as the Secretary may reasonably request and make such reports available to the public; make available to the public at reasonable times and places a report of the airport budget in a format prescribed by the Secretary;

b. for airport development projects, make the airport and all airport records and documents affecting the airport, including deeds, leases, operation and use agreements, regulations and other instruments, available for inspection by any duly authorized agent of the Secretary upon reasonable request;

c. for noise compatibility program projects, make records and documents relating to the project and continued compliance with the terms, conditions, and assurances of this grant agreement including deeds, leases, agreements, regulations, and other instruments, available for inspection by any duly authorized agent of the Secretary upon reasonable request; and

d. in a format and time prescribed by the Secretary, provide to the Secretary and make available to the public following each of its fiscal years, an annual report listing in detail:

1) all amounts paid by the airport to any other unit of government and the purposes for which each such payment was made; and

2) all services and property provided by the airport to other units of government and the amount of compensation received for provision of each such service and property.

27. **Use by Government Aircraft.**

It will make available all of the facilities of the airport developed with Federal financial assistance and all those usable for landing and takeoff of aircraft to the United States for use by Government aircraft in common with other aircraft at all times without charge, except, if the use by Government aircraft is substantial, charge may be made for a reasonable share, proportional to such use, for the cost of operating and maintaining the facilities used. Unless otherwise determined by the Secretary, or otherwise agreed to by the sponsor and the using agency, substantial use of an airport by Government aircraft will be considered to exist when operations of such aircraft are in excess of those which, in the opinion of the Secretary, would unduly interfere with use of the landing areas by other authorized aircraft, or during any calendar month that –

a. Five (5) or more Government aircraft are regularly based at the airport or on land adjacent thereto; or

b. The total number of movements (counting each landing as a movement) of Government aircraft is 300 or more, or the gross accumulative weight of Government aircraft using the airport (the total movement of Government aircraft multiplied by gross weights of such aircraft) is in excess of five million pounds.

28. **Land for Federal Facilities.**

It will furnish without cost to the Federal Government for use in connection with any air traffic control or air navigation activities, or weather-reporting and communication activities related to air traffic control, any areas of land or water, or estate therein, or rights in buildings of the sponsor as the Secretary considers necessary or desirable for construction, operation, and maintenance at Federal expense of space or facilities for such purposes. Such areas or any portion thereof will be made available as provided herein within four months after receipt of a written request from the Secretary.

29. **Airport Layout Plan.**

a. It will keep up to date at all times an airport layout plan of the airport showing

1) boundaries of the airport and all proposed additions thereto, together with the boundaries of all offsite areas owned or controlled by the sponsor for airport purposes and proposed additions thereto;

2) the location and nature of all existing and proposed airport facilities and structures (such as runways, taxiways, aprons, terminal buildings, hangars and

roads), including all proposed extensions and reductions of existing airport facilities;

3) the location of all existing and proposed nonaviation areas and of all existing improvements thereon; and

4) all proposed and existing access points used to taxi aircraft across the airport's property boundary. Such airport layout plans and each amendment, revision, or modification thereof, shall be subject to the approval of the Secretary which approval shall be evidenced by the signature of a duly authorized representative of the Secretary on the face of the airport layout plan. The sponsor will not make or permit any changes or alterations in the airport or any of its facilities which are not in conformity with the airport layout plan as approved by the Secretary and which might, in the opinion of the Secretary, adversely affect the safety, utility or efficiency of the airport.

b. If a change or alteration in the airport or the facilities is made which the Secretary determines adversely affects the safety, utility, or efficiency of any federally owned, leased, or funded property on or off the airport and which is not in conformity with the airport layout plan as approved by the Secretary, the owner or operator will, if requested, by the Secretary (1) eliminate such adverse effect in a manner approved by the Secretary; or (2) bear all costs of relocating such property (or replacement thereof) to a site acceptable to the Secretary and all costs of restoring such property (or replacement thereof) to the level of safety, utility, efficiency, and cost of operation existing before the unapproved change in the airport or its facilities except in the case of a relocation or replacement of an existing airport facility due to a change in the Secretary's design standards beyond the control of the airport sponsor.

30. **Civil Rights.**

It will promptly take any measures necessary to ensure that no person in the United States shall, on the grounds of race, creed, color, national origin, sex, age, or disability be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination in any activity conducted with, or benefiting from, funds received from this grant.

a. Using the definitions of activity, facility and program as found and defined in §§ 21.23 (b) and 21.23 (e) of 49 CFR § 21, the sponsor will facilitate all programs, operate all facilities, or conduct all programs in compliance with all non-discrimination requirements imposed by, or pursuant to these assurances.

b. Applicability

1) Programs and Activities. If the sponsor has received a grant (or other federal assistance) for any of the sponsor's program or activities, these requirements extend to all of the sponsor's programs and activities.

2) Facilities. Where it receives a grant or other federal financial assistance to construct, expand, renovate, remodel, alter or acquire a facility, or part of a facility, the assurance extends to the entire facility and facilities operated in connection therewith.

3) Real Property. Where the sponsor receives a grant or other Federal financial assistance in the form of, or for the acquisition of real property or an interest in real property, the assurance will extend to rights to space on, over, or under such property.

c. Duration.

The sponsor agrees that it is obligated to this assurance for the period during which Federal financial assistance is extended to the program, except where the Federal financial assistance is to provide, or is in the form of, personal property, or real property, or interest therein, or structures or improvements thereon, in which case the assurance obligates the sponsor, or any transferee for the longer of the following periods:

1) So long as the airport is used as an airport, or for another purpose involving the provision of similar services or benefits; or

2) So long as the sponsor retains ownership or possession of the property.

d. Required Solicitation Language. It will include the following notification in all solicitations for bids, Requests For Proposals for work, or material under this grant agreement and in all proposals for agreements, including airport concessions, regardless of funding source:

"The **(Name of Sponsor)**, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises and airport concession disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award."

e. Required Contract Provisions.

1) It will insert the non-discrimination contract clauses requiring compliance with the acts and regulations relative to non-discrimination in Federally-assisted programs of the DOT, and incorporating the acts and regulations into the contracts by reference in every contract or agreement subject to the non-discrimination in Federally-assisted programs of the DOT acts and regulations.

2) It will include a list of the pertinent non-discrimination authorities in every contract that is subject to the non-discrimination acts and regulations.

3) It will insert non-discrimination contract clauses as a covenant running with the land, in any deed from the United States effecting or recording a transfer of real property, structures, use, or improvements thereon or interest therein to a sponsor.

4) It will insert non-discrimination contract clauses prohibiting discrimination on the basis of race, color, national origin, creed, sex, age, or handicap as a

covenant running with the land, in any future deeds, leases, license, permits, or similar instruments entered into by the sponsor with other parties:

a) For the subsequent transfer of real property acquired or improved under the applicable activity, project, or program; and

b) For the construction or use of, or access to, space on, over, or under real property acquired or improved under the applicable activity, project, or program.

f. It will provide for such methods of administration for the program as are found by the Secretary to give reasonable guarantee that it, other recipients, sub-recipients, sub-grantees, contractors, subcontractors, consultants, transferees, successors in interest, and other participants of Federal financial assistance under such program will comply with all requirements imposed or pursuant to the acts, the regulations, and this assurance.

g. It agrees that the United States has a right to seek judicial enforcement with regard to any matter arising under the acts, the regulations, and this assurance.

31. **Disposal of Land.**

a. For land purchased under a grant for airport noise compatibility purposes, including land serving as a noise buffer, it will dispose of the land, when the land is no longer needed for such purposes, at fair market value, at the earliest practicable time. That portion of the proceeds of such disposition which is proportionate to the United States' share of acquisition of such land will be, at the discretion of the Secretary, (1) reinvested in another project at the airport, or (2) transferred to another eligible airport as prescribed by the Secretary. The Secretary shall give preference to the following, in descending order, (1) reinvestment in an approved noise compatibility project, (2) reinvestment in an approved project that is eligible for grant funding under Section 47117(e) of title 49 United States Code, (3) reinvestment in an approved airport development project that is eligible for grant funding under Sections 47114, 47115, or 47117 of title 49 United States Code, (4) transferred to an eligible sponsor of another public airport to be reinvested in an approved noise compatibility project at that airport, and (5) paid to the Secretary for deposit in the Airport and Airway Trust Fund. If land acquired under a grant for noise compatibility purposes is leased at fair market value and consistent with noise buffering purposes, the lease will not be considered a disposal of the land. Revenues derived from such a lease may be used for an approved airport development project that would otherwise be eligible for grant funding or any permitted use of airport revenue.

b. For land purchased under a grant for airport development purposes (other than noise compatibility), it will, when the land is no longer needed for airport purposes, dispose of such land at fair market value or make available to the Secretary an amount equal to the United States' proportionate share of the fair market value of the land. That portion of the proceeds of such disposition which is proportionate to the United States' share of the cost of acquisition of such land will, (1) upon application to the Secretary, be reinvested or transferred to another

eligible airport as prescribed by the Secretary. The Secretary shall give preference to the following, in descending order: (1) reinvestment in an approved noise compatibility project, (2) reinvestment in an approved project that is eligible for grant funding under Section 47117(e) of title 49 United States Code, (3) reinvestment in an approved airport development project that is eligible for grant funding under Sections 47114, 47115, or 47117 of title 49 United States Code, (4) transferred to an eligible sponsor of another public airport to be reinvested in an approved noise compatibility project at that airport, and (5) paid to the Secretary for deposit in the Airport and Airway Trust Fund.

c. Land shall be considered to be needed for airport purposes under this assurance if (1) it may be needed for aeronautical purposes (including runway protection zones) or serve as noise buffer land, and (2) the revenue from interim uses of such land contributes to the financial self-sufficiency of the airport. Further, land purchased with a grant received by an airport operator or owner before December 31, 1987, will be considered to be needed for airport purposes if the Secretary or Federal agency making such grant before December 31, 1987, was notified by the operator or owner of the uses of such land, did not object to such use, and the land continues to be used for that purpose, such use having commenced no later than December 15, 1989.

d. Disposition of such land under (a) (b) or (c) will be subject to the retention or reservation of any interest or right therein necessary to ensure that such land will only be used for purposes which are compatible with noise levels associated with operation of the airport.

32. **Engineering and Design Services.**

It will award each contract, or sub-contract for program management, construction management, planning studies, feasibility studies, architectural services, preliminary engineering, design, engineering, surveying, mapping or related services with respect to the project in the same manner as a contract for architectural and engineering services is negotiated under Title IX of the Federal Property and Administrative Services Act of 1949 or an equivalent qualifications-based requirement prescribed for or by the sponsor of the airport.

33. **Foreign Market Restrictions.**

It will not allow funds provided under this grant to be used to fund any project which uses any product or service of a foreign country during the period in which such foreign country is listed by the United States Trade Representative as denying fair and equitable market opportunities for products and suppliers of the United States in procurement and construction.

34. **Policies, Standards, and Specifications.**

It will carry out the project in accordance with policies, standards, and specifications approved by the Secretary including but not limited to the advisory circulars listed in the Current FAA Advisory Circulars for AIP projects, dated _____ (the latest approved version as of this grant offer) and included in this grant, and in accordance

with applicable state policies, standards, and specifications approved by the Secretary.

35. **Relocation and Real Property Acquisition.**

    a. It will be guided in acquiring real property, to the greatest extent practicable under State law, by the land acquisition policies in Subpart B of 49 CFR Part 24 and will pay or reimburse property owners for necessary expenses as specified in Subpart B.
    b. It will provide a relocation assistance program offering the services described in Subpart C and fair and reasonable relocation payments and assistance to displaced persons as required in Subpart D and E of 49 CFR Part 24.
    c. It will make available within a reasonable period of time prior to displacement, comparable replacement dwellings to displaced persons in accordance with Subpart E of 49 CFR Part 24.

36. **Access By Intercity Buses.**

    The airport owner or operator will permit, to the maximum extent practicable, intercity buses or other modes of transportation to have access to the airport; however, it has no obligation to fund special facilities for intercity buses or for other modes of transportation.

37. **Disadvantaged Business Enterprises.**

    The sponsor shall not discriminate on the basis of race, color, national origin or sex in the award and performance of any DOT-assisted contract covered by 49 CFR Part 26, or in the award and performance of any concession activity contract covered by 49 CFR Part 23. In addition, the sponsor shall not discriminate on the basis of race, color, national origin or sex in the administration of its DBE and ACDBE programs or the requirements of 49 CFR Parts 23 and 26. The sponsor shall take all necessary and reasonable steps under 49 CFR Parts 23 and 26 to ensure nondiscrimination in the award and administration of DOT-assisted contracts, and/or concession contracts. The sponsor's DBE and ACDBE programs, as required by 49 CFR Parts 26 and 23, and as approved by DOT, are incorporated by reference in this agreement. Implementation of these programs is a legal obligation and failure to carry out its terms shall be treated as a violation of this agreement. Upon notification to the sponsor of its failure to carry out its approved program, the Department may impose sanctions as provided for under Parts 26 and 23 and may, in appropriate cases, refer the matter for enforcement under 18 U.S.C. 1001 and/or the Program Fraud Civil Remedies Act of 1936 (31 U.S.C. 3801).

38. **Hangar Construction.**

    If the airport owner or operator and a person who owns an aircraft agree that a hangar is to be constructed at the airport for the aircraft at the aircraft owner's expense, the airport owner or operator will grant to the aircraft owner for the hangar a long term lease that is subject to such terms and conditions on the hangar as the airport owner or operator may impose.

39. **Competitive Access.**

a. If the airport owner or operator of a medium or large hub airport (as defined in section 47102 of title 49, U.S.C.) has been unable to accommodate one or more requests by an air carrier for access to gates or other facilities at that airport in order to allow the air carrier to provide service to the airport or to expand service at the airport, the airport owner or operator shall transmit a report to the Secretary that-

   1) Describes the requests;

   2) Provides an explanation as to why the requests could not be accommodated; and

   3) Provides a time frame within which, if any, the airport will be able to accommodate the requests.

b. Such report shall be due on either February 1 or August 1 of each year if the airport has been unable to accommodate the request(s) in the six month period prior to the applicable due date.