Plymouth Municipal Airport
Master Plan

Prepared for:
Town of Plymouth
6 Post Office Square
Plymouth, NH 03264

Prepared by:
Stantec Consulting Services
482 Payne Road
Scarborough, ME 04074
(207) 883-3355

DRAFT

February 2015

Sign-off Sheet

This document entitled Plymouth Municipal Airport Master Plan was prepared by Stantec Consulting Services ("Stantec") for the account of Town of Plymouth, NH (the "Client"). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use, which a third party makes of this document, is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by _____

Jason Gass, Aviation Planner

TO BE COMPLETED AT THE END OF THE PROJECT

Reviewed by _____

Ervin Deck, Sr. Aviation Planner (Project Manager)

Table of Contents

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1 - INTRODUCTION

This document is the first master plan prepared for the Plymouth Municipal Airport (1P1[1]), located in Plymouth, NH.

Preparation of this document is funded through the Airport Improvement Program (AIP) and 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 (Program) in FY 2008. This Program has been in existence in the United States since Congress authorized the pilot program in 1990.

AIRPORT MASTER PLAN DEFINED

An airport master plan is a comprehensive study of the airport and typically describes short-, medium-, and long-term plans for airport development. This master plan includes the following elements:

- **Pre-planning.** The pre-planning process, which was completed earlier in the year (2014), included an Initial Needs Determination, Development of the Study Design, Negotiation of Consultant fee and contract, and an Application for Study Financing. This update 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 AMPU includes the selection and appointment of an Airport Planning Advisory Committee (APAC). Over the course of the study, the public involvement program will encourage information sharing and collaboration among the PAC members. To further encourage public input, a Public Information Meeting (PIM) will be held towards the end of the process in order to solicit advice, ideas, and feedback from the community so a mutually beneficial product can be delivered. Minutes from the APAC and PIM will be included in the final report as part of Appendix 5.
- **Existing Facilities.** The existing facilities element is a snapshot of how and what the airport looks like at the beginning of the project, providing an inventory of pertinent data for use in subsequent plans.
- **Aviation Forecasts.** The aviation forecasts calculate where the airport should be in terms of based aircraft, local and itinerant operations, and other pertinent issues and conditions in five, ten, and twenty years.

[1] 1P1 is the official FAA identifier for the airport.

- **Facility Requirements.** The facility requirements chapter is an assessment of the ability of the existing airport, both airside and landside, to support the forecasted demand. The chapter identifies the demand levels that will trigger the need for facility additions or improvements and estimate the extent of new facilities and/or infrastructure that may be required to meet that demand.
- **Alternatives Development and Evaluation.** The alternatives element identifies options to meet projected facility requirements and alternative configurations for each major component. It assesses the expected performance of each alternative against a wide range of evaluation criteria, including its operational, environmental, and financial impacts. A recommended development alternative, called the preferred alternative, will emerge from this process and will be further refined in subsequent tasks. This element should aid in developing the purpose and need for successive environmental documents.
- **Environmental Considerations.** The environmental chapter will provide an understanding of the environmental requirements needed to move forward with each project in the recommended development program. This task will also identify all permitting requirements associated with implementation of the preferred alternative(s).
- **Airport Layout Plans**. The Airport Layout Plan is one of the key products of a master plan. The ALP is a set of drawings that provides a graphic representation of the long-term development plan for an airport. The primary drawing in this set is the Airport Layout Plan, which becomes airport's official blueprint.
- **Facilities Implementation Plan.** The facilities implementation plan provides a summary description of the recommended improvements and associated costs. The schedule of improvements depends, in large part, on the levels of demand that trigger the need for expansion of existing facilities. These recommended facility improvements are presented for the three respective planning periods and present 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 both regulatory agencies' budgetary process.
- **Financial Feasibility Analysis**. The financial feasibility chapter identifies the financial plan for the airport, describes how the sponsor will finance the projects recommended in the master plans, and demonstrates the financial feasibility of the program.

PROJECT PURPOSE

The purpose of this master plan is to identify and examine several forthcoming issues for Plymouth, such as the airport's impending decision to join the National Plan of Integrated Airport Systems (NPIAS), the feasibility of paving the runway, and the decision of how to best utilize the plot of land north of Quincy Road. In addition, an implementation schedule will be prepared that includes cost estimates and environmental impacts for the recommended improvements.

BACKGROUND

As previously mentioned, this is the first master plan prepared for 1P1. It is an exciting venture for all stakeholders involved in this project considering the airport is essentially a "blank slate" primed for improvements and growth in conjunction with the surrounding communities.

Several issues have been determined and will be addressed in this master plan. The APAC is interested in including a study of the benefits and potential impacts of joining NPIAS, which would most likely lead to a paved runway at 1P1. Adjacent land use issues will also be identified for the parcels of land surrounding the airfield. Considering 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 this scope of work, Stantec Consulting Services (hereinafter referred to as the Consultant) met with the Sponsor to develop their goals and objectives for the airport as part of the process of developing a new master plan; one that reflects the aviation, political, and public vision for the airport. The Sponsor's work on the airport, such as the recent runway drainage corrections, is evident of how serious they the town is about improving and maintaining the airport.

PROJECT FOCUS

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

ECONOMIC DEVELOPMENT

There are three key areas this report focuses on; should the runway be paved, is there excess land the airport cannot use or does not need; and, what are the land issues, if any, of adjoining 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 judgment regarding 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. If this happens, a determination will be made regarding runway length and width as well as potential safety impacts associated with the improved runway.
- **Excess Airport Land.** The airport owns a plot of land adjacent to Quincy Road, just north of the airfield. The PAC is interested in alternative uses for this currently unused land, mainly non-aeronautical, revenue-producing uses. This study will determine (1) ensure this land is in fact "in excess" of future aviation needs, (2) determine what areas are in fact "in excess" of future aviation use, and, (3) what is the best and most profitable use of this area.
- **Land Use.** This master plan will address land use issues in regards to current and future use of adjacent land parcels not owned by the airport or the Town of Plymouth.

NATIONAL PLAN OF INTEGRATED AIRPORT SYSTEMS

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 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. The FAA is required to provide Congress with a 5-year estimate of AIP eligible development every two years.

The NPIAS contains all commercial service airports, all reliever airports, and selected general aviation airports, and within this context, two key elements that this master plan intends to address are the feasibility and impacts of 1P1 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 significant portion of this master plan will be to determine the impacts to the airport, from infrastructure improvements to financial issues, if the PAC determines that it is in the airport's best interest to join NPIAS.

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).

TECHNICAL REPORT

The Master Plan Technical Report is a systematic process that follows a systematic process 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 may (or may not be required) during the next two decades;
- Analyzes options (alternatives) about how to achieve future requirements; and then
- The report provides the sponsor 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, or ALP.

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 1 – Terms and Abbreviations
- Appendix 2 – Environmental Correspondence
- Appendix 3 - Wildlife Hazard Assessment Site Visit
- Appendix 4 – Wetland Analysis Report
- Appendix 5 - Meeting Minutes

AIRPORT LAYOUT PLAN (ALP) DRAWING SET

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

REVIEW AND APPROVAL

NHDOT only reviews, comments upon, and accepts airport master plans from their sponsors. 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 of disagreement to participate in the funding of particular elements denoted 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 state of New Hampshire to participate in any development depicted in the plan, nor does it indicate that the proposed development is environmentally acceptable in accordance with appropriate public law. The FAA and NHDOT will review all elements of this master plan to ensure that sound planning techniques have been applied. However, NHDOT does approve two key elements of airport master plans:

- **Aviation Forecasts.** The master plan forecasts should be reviewed to ensure that the underlying assumptions and forecast methodologies are appropriate. Inconsistencies between the master plan forecast and FAA Terminal Area Forecasts must be resolved, and the forecast approved, before proceeding with subsequent planning work.
- **Airport Layout Plan.** All airport development at federal-obligated airports must be done in accordance with an FAA-approved ALP. Furthermore, 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 or that an approved modification to standard has been issued. Such approval also indicates that NHDOT finds the proposed development to be safe and efficient.

CHAPTER TWO – INVENTORY OF EXISTING CONDITIONS

BACKGROUND

The first step in the airport master planning process involves gathering information about the airport and its environs. An inventory of current conditions is essential to the success of a master plan, since the information also provides a foundation for subsequent evaluations. It is a snapshot of the airport as it appears during a very short period and serves as a benchmark for measuring changes.

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

- Information pertaining to airport ownership and management, the general airport setting, transportation access, the airport's relationship to the federal airport system, and airport history;
- Population and socioeconomic information for the geographic area;
- A review of historic and current airport activity, including general aviation and military activity;
- An overview of the area's airspace and obstructions;
- Descriptions of facilities and services now provided at the airport including a general description of 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 historic revenue and expenses.

The information gathered for this portion of the master plan, to the extent possible, is current as of January 2015. Updated information will be gathered throughout the development of the master plan and will be included in subsequent chapters, to the extent that the final Technical Report will be as current as possible.

TERMS AND ABBREVIATIONS

Appendix 1 contains a list of terms and abbreviations common to the aviation industry, but possibly foreign to outsiders not familiar with airports and aircraft. To avoid defining each term throughout this report, readers not familiar with them should refer to the Appendix.

HISTORY

Since 1941, the Plymouth Municipal Airport has served pilots and aviation enthusiasts from land sold to the Town by Hattie Trow and Helena Spaulding; well-known family names throughout the community. However, the airport's first hangar was constructed pre-1940s (exact date is unknown) and still stands just west of the terminal building. A grass strip has been employed 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 approach paths;

and in 1950 the runway was graded a second time in order to correct some drainage issues not identified during the initial grading project.

Since its inception, the Airport has always been an integral part of the Plymouth community. This was first realized in 1946 when the Town voted to "appoint an Airport Committee consisting of three members to be appointed by a vote and authorized to act for the Town in all matter pertaining to 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 therewith." The new Airport Commission quickly began work enlisting the Airport's first Airport Layout Plan survey the following year (1947).

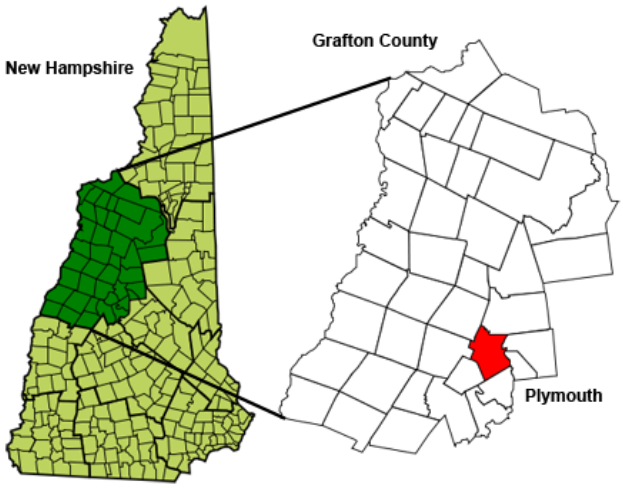


Figure 1 - Plymouth Area Map (Grafton County)

The terminal building was constructed in 1969, providing pilots and other airport users several resources 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.

With the commissioning of this Master Plan, it is evident that the Plymouth Municipal Airport remains well engrained in not only the surrounding community, but also the entire region.

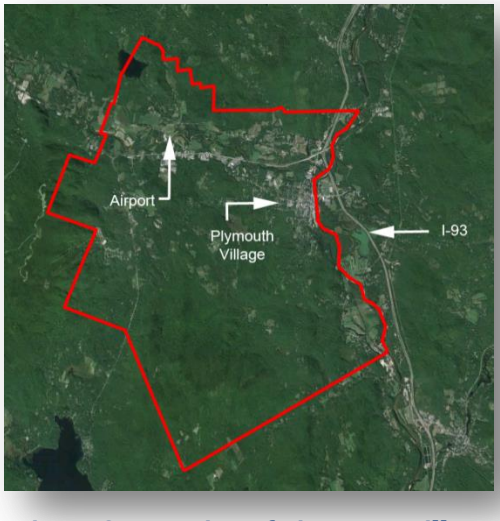


Figure 2 - Location of Airport to Village

AIRPORT LOCATION

Plymouth Municipal Airport is located three miles northwest of the town of Plymouth in Grafton County, New Hampshire. See ***Figure 1*** - *Plymouth Area Map (Grafton County)* and **Figure 2** - *Location of Airport to Village*.

As illustrated on **Figure 3** - *NH Airports*, Plymouth is one of 24 public use airports in the state, and one of four in Grafton County, which include Franconia, Newfound Valley, Dean Memorial, and Lebanon Municipal, and

only one (Lebanon is currently part of NPIAS). Table 1 - Airports in Grafton County, NH lists the five airports for comparison.

BASIC AIRPORT DESIGN FACTORS

The Federal Aviation Administration (FAA) provides guidance for airport design through a series of Advisory Circulars (AC). These guidelines promote improvements that enhance airport safety and operational utility for the types of aircraft currently using or that are anticipated to use the Airport on a regular basis. Major considerations when designing with FAA ACs include airport role, airport classification, wind coverage, instrument approach procedures, and airfield capacity.

AIRPORT ROLE

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 and serves a critical aeronautical function within the local market. By definition, a low activity basic category airport averages about 10 propeller-driven aircraft and no jets.[2]

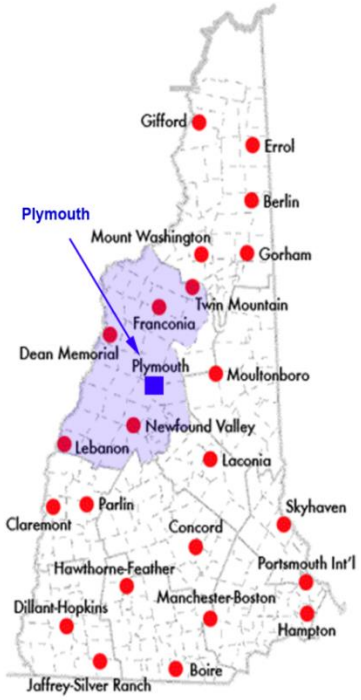


Figure 3 - NH Airports

Table 1 - Airports in Grafton County, NH

Airport	ID	Public	NPIAS	Longest Runway
Plymouth	1P1	Yes	No	2,380 (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)

AIRPORT CLASSIFICATION

The FAA uses a set of airport classifications known as Airport Reference Codes (ARC) to relate airport design criteria to the operational and physical characteristics of the airplane intended to operate on a runway, taxiway, or taxilane at the airport. The ARC has two components relating to the design aircraft: aircraft approach category and airplane design group.

[2] FAA General Aviation Airports: A National Asset (http://www.faa.gov/airports/planning_capacity/ga_study/)

- Aircraft Approach Category (AAC) – Designated by a letter (A– E), this component relates to the operational characteristic of 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 physical characteristic of airplane wingspan, with 'I' being the smallest and 'VI' being the largest.

DESIGN AIRCRAFT

The design aircraft – also referred to as the critical aircraft – is the aircraft (or group of aircraft) with the largest wingspan and the fastest approach speed that conducts at least 500 annual operations at Plymouth. The Airport Reference Code (ARC) is an alphanumeric system that establishes minimum design standards for an airport. These standards include such features as runway and taxiway widths, the size of safety areas, distances between runways, taxiways, and parking areas among other airport characteristics.

Figure 4 - Design Aircraft Cessna 172 Skyhawk

The design aircraft selected for Plymouth is the Cessna 172 – a single engine piston aircraft (see **Figure 4** - *Design Aircraft Cessna 172 Skyhawk*). Therefore, given the design aircraft's wingspan and approach speed, the ARC for Plymouth is A-I. **Table 2** - Existing *and Required Design Standards* lists both the FAA design standards for an airport with an ARC of A-I, as well as the existing conditions at Plymouth.

Table 2 - Existing and Required 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	225’
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

DESCRIPTION OF EXISTING FACILITIES

This section includes a description of the airport’s airside and landside, including the runway, as well as 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. In addition, this section includes a description of major elements of the infrastructure service including utilities such as water, electricity, sanitary sewer needs, communications, heating and power. Finally, an assessment of how the existing airport meets FAA design criteria based on the existing design aircraft is examined.

The Airport, which consists of 116± acres, is divided into two separate and detached parcels divided by Quincy Road. The north parcel spans 47± acres, is primarily wooded and undeveloped. The airport infrastructure is located entirely in the south parcel, which consists of 69± acres. The airport property boundary as well as other existing airport features is shown on **Figure 5** - *Existing Facilities Plan*. Additional airport data is provided in **Figure 6** - *Airport Master Record (5010-1 Form)*.

Insert 11 x 17 Existing Facilities Plan (photo is placeholder)

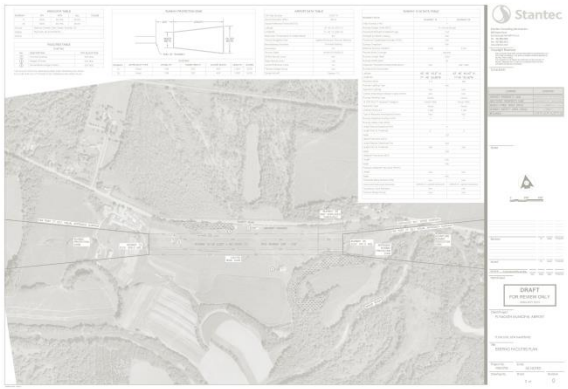


Figure 5 - Existing Facilities Plan

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

AIRPORT MASTER RECORD

PRINT DATE: 10/23/2014
AFD EFF 09/18/2014
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:	PU
> 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:	603-254-6361
> 17 ATTENDANCE SCHEDULE:	IREG

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:	

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:	

FACILITIES

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

BASED AIRCRAFT

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

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	06/30/2014

RUNWAY DATA

> 30 RUNWAY IDENT:	**12/30**			
> 31 LENGTH:	2,380			
> 32 WIDTH:	90			
> 33 SURF TYPE-COND:	TURF-G			
> 34 SURF TREATMENT:				
35 GROSS WT:	SW			
36 (IN THSDS)	DW			
37	DTW			
38	DDTW			
> 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 / TREE	/	/	/
> 53 OBSTN MARKED/LGTD:	/	/	/	/
> 54 HGT ABOVE RWY END:	30 / 15	/	/	/
> 55 DIST FROM RWY END:	114 / 205	/	/	/
> 56 CNTRLN OFFSET:	134R / 123L	/	/	/
57 OBSTN CLNC SLOPE:	4:1 / 14:1	/	/	/
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):	/	/	/	/

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

> 110 REMARKS:

A 013	AIRPORT PHONE 603-586-5818
A 017	ARPT ATNDD IREG. CALL (603) 536-1731 OR (603) 254-6361.
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 052	RWY 30 CONTROLLING OBSTRUCTION SLOPE TO DSPLCD THOLD 17:1.
A 110-001	RY 12/30 STRIP SOFT IN SPRING NOT MAINTAINED IN WINTER.
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: 07/18/2014 113 LAST INFO REQ:

Figure 6 - Airport Master Record (5010-1 Form)

AIRSIDE FACILITIES

There are two main areas of any airport: the airside and the landside. The airside area includes the parts of the airport that accommodate the movement of aircraft, such as runways, and taxiways. The airside also includes the navigation and communication equipment designed to facilitate aircraft operations, navigation aids, lighting systems, antennae, etc. Landside facilities include hangars and other support buildings such as the terminal building, fuel terminal, automobile parking, access roads, and support infrastructure/facilities.

Figure 7 - Ski Plane Operations at 1P1

(Photo by C. McIver, February 2014)

RUNWAY

Plymouth has one turf runway oriented west-northwest and east-southeast. The runway is in good condition and is 2,380 feet long by 90 feet wide. The runway's edges are marked by FAA-approved yellow cones space 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 7 - *Ski Plane Operations at 1P1*, the 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 electric navigational aids such as PAPIs or edge lighting.

Because of trees in the Runway 30 approach surface the landing threshold was displaced 294 feet. **Figure 8** - *Runway 30 Displaced Threshold* on the next page 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.

Surface Gradient

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

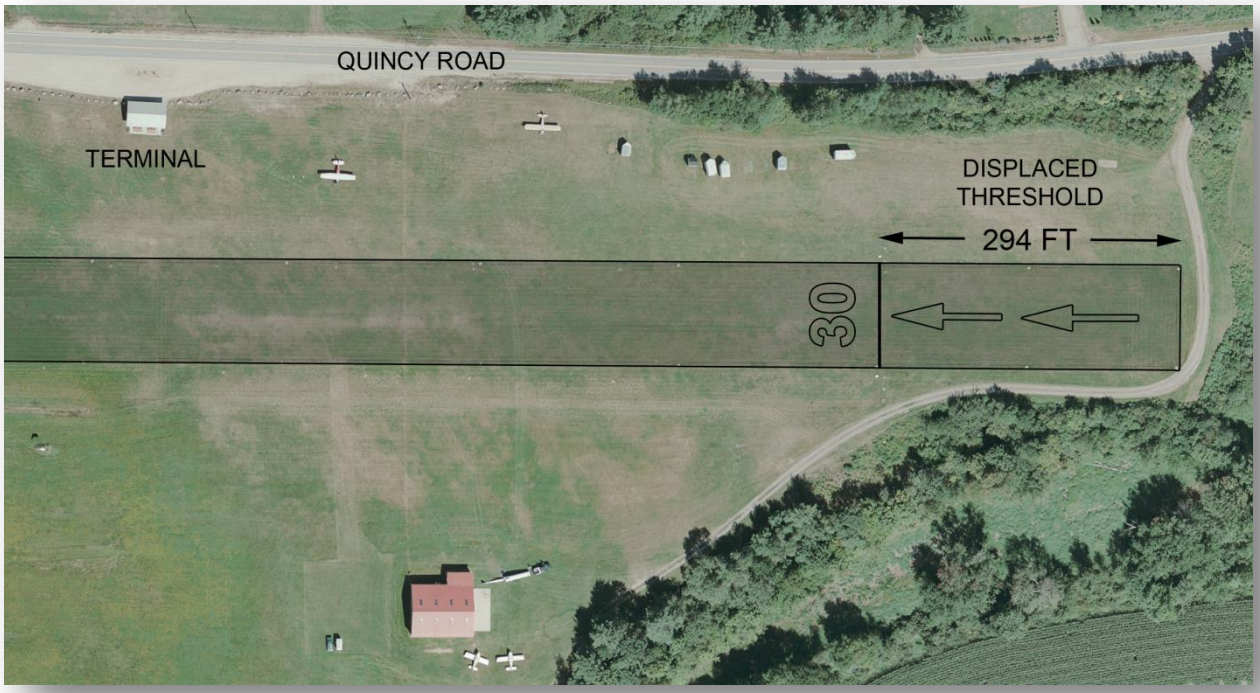


Figure 8 - Runway 30 Displaced Threshold

Background Photo by Col-East (August 2014)

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 condition. A summer inspection indicates that it is smooth with no apparent 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, with six (three on each side) of the threshold.

RUNWAY SAFETY AREAS (RSA)

The RSA and 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. The RSA is required by FAA design standards to be properly graded and adequately

drained. The RSA must also 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 different from a paved runway in that the end of the RSA is also the end of the runway.[3] The logic being that adding any additional turf safety area would only become part of the runway resulting in an infinite runway length. As shown in Figure 5 - Existing Facilities Plan, the RSA width at Plymouth is 120' (60' either side of the runway centerline).

RUNWAY OBJECT FREE AREA (ROFA)

FAA design standards for ARC A-I (small aircraft airport) requires a 250-foot wide 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 on **Figure 5** - *Existing Facilities Plan*.

RUNWAY PROTECTION ZONES (RPZ)

The RPZ is a trapezoidal-shaped area extending outward into the approach area beyond each runway end. The purpose of the RPZ is to enhance the protection of people and property by clearing them of incompatible objects and activities. Fee-simple acquisition is recommended whenever feasibly practicable. Specifically prohibited land uses include residences, places of public assembly, fuel storage facilities, and proposed uses that can potentially attract wildlife or generate dust/smoke. The RPZ size is a function of the Runway Design Code and visibility minimums. As illustrated in **Figure 5** - *Existing Facilities Plan*, the RPZs at Plymouth cover an area of 8.035 acres with an inner width of 250', and outer width of 450' and a length of 1,000'.

Because of the displaced threshold, Plymouth has three separate RPZs. Each runway end has an approach RPZ that begins at the edge of the runway[4], and Runway 12 has a departure RPZ located at the end of the runway.

Where practical, airport sponsors should own the property under the runway approach and departure areas at least to the limits of the RPZ. However, as illustrated in Figure 3 the RPZ on both runway ends are almost entirely off airport property. There appear to be permanent agriculture and farming structures inside of the Runway 12 Approach RPZ.

WIND COVERAGE

One of the primary factors influencing runway orientation and the number of runways is wind. Ideally, a runway should be aligned with the prevailing wind to minimize the crosswind component for aircraft operating at the Airport. Generally, smaller airplanes are more affected by wind and have greater difficulty

[3] A conventional 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.
[4] The RPZ to a paved runway begins 200' from the threshold and at the threshold for turf runways.

compensating for crosswinds. The desirable wind coverage for an airport is 95 percent usability, based on the total number of weather observations.

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 9*** - *1P1 All Weather Wind Rose*, with 99.8% "all weather" coverage for Runway 12-30 exceeds the FAA criteria.5 In addition, the wind predominantly favors Runway 12.

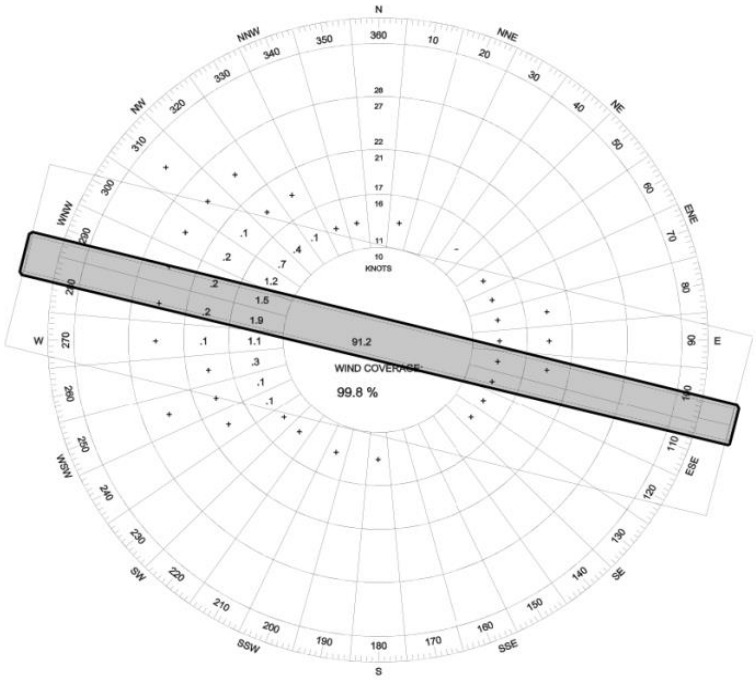


Figure 9 - 1P1 All Weather Wind Rose

Source: Data: National Climatic Data Center, Ashville, NC;

Windrose: Stantec analysis

TAXIWAYS & TAXILANES

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

VISUAL NAVIGATIONAL AIDS

Plymouth is without any electronic navigational aids such as 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.

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 including wind speed/gusts, barometric pressure, wind direction, visibility and sky condition, cloud ceiling height, precipitation type, and thunderstorm detection, among other important pieces of information. Data is only 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

[5] 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).

Administration (NOAA). PSU maintains the system with assistance from the school's student body. The location of the AWOS is shown earlier on **Figure 5** - *Existing Facilities Plan*.

LANDSIDE FACILITIES

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

AIRCRAFT PARKING

Plymouth has a grass aircraft parking area near 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 5** - *Existing Facilities Plan.*

Figure 10 - Terminal Building

HANGARS

Plymouth has two (2) privately owned aircraft hangars. The newest hangar, built in 2000 is located on the southeastern portion of the airfield and can accommodate three aircraft. The original hangar is located 221 feet west of the terminal building. The original hangar was built pre-1941 and can accommodate two aircraft. Both hangars, which are depicted on **Figure 5** - *Existing Facilities Plan*, are currently at capacity.

TERMINAL BUILDING

The airport's small arrivals building (**Figure 10** - *Terminal Building*) was originally constructed in 1969. It is a concrete and glass structure centrally located north of Runway 12/30 (see Figure 5 - Existing Facilities Plan). The 40' x 30' building has a computer for flight planning, a two-way communication radio, and weather information relayed from the AWOS-III-PT. The building was updated in 2008 with new flooring and paneling. Utilities include electricity, water, sewer and telephone. Figure 8 shows the terminal building at Plymouth.

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 capacity for approximately 10-13 vehicles, depending on their size. The auto parking area is sufficient for the current peak activity level at the airport.

FUELING FACILITIES AND SALES

Plymouth does not have aircraft fueling capabilities.

AVIATION ACTIVITY

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

BASED AIRCRAFT

The number of based aircraft has remained steady since 2000 when there were a reported 16-based aircraft, with the number varying little since. 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. Considering Plymouth is an airport affected by tourism and seasonal use, not to mention the turf runway is not plowed in the winter, the based aircraft counts are taken in the summer, when the based aircraft number is at its highest.

OPERATIONS

Aircraft operations are reported at 3,030[6]. This number includes 2,000 local, 1,000 itinerant, and 30 military aircraft operations. This number, according to all accepted sources, is accurate and recent. Therefore, the aforementioned operations count will serve as the baseline quantity for this 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. This fact will have an effect on the airport's Peak Hour Operations, which is detailed in the next section. Furthermore, the airport's runway is not maintained during the winter months. An aircraft can only land at 1P1 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.

OPERATIONS PER BASED AIRCRAFT

A simple 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.

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

[6] 2014 NH State Aviation Systems Plan (Draft report)

OPBA helps determine if data reported at non-towered airports passes the "straight face test." That is, are the numbers reported consistent with other airports? Stantec has tracked this data at both towered airports (where operational data is recorded by air traffic control personnel) 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.[7]

Our assessment is that the reported 3,030 annual operations at 1P1 (or 178 OPBA) are consistent with other airports in New England. This OPBA will be the baseline data we will use later when developing the airport's short-, intermediate-, and long-term forecasts.

FLEET MIX AND OPERATIONS

The airport's fleet mix (**Table 3** - *Existing Fleet Mix Operations*) identifies the class of aircraft that are based at the airport as well as the aircraft that contribute to the operations count at Plymouth.

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, the calculations for determining PH involve some standard planning deductions.

Table 3 - Existing Fleet Mix Operations

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

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, which is calculated as follows:

[7] http://www.invisibleintelligencellc.com/

$PM = Total\ Operations\ (TO) * 15\%$

$PMAD = \frac{PM}{30}$

$PH\ = PMAD * 20\%$

Thus

$PM\ = 3{,}330 * 15\%\ = 455$

$PMAD = \frac{455}{30} = 15$

$PH\ = 15 * 20\% = 3\ operations$

REGIONAL SETTING AND LAND USE

This master plan study will examine the regional setting of the airport and the land use patterns around it. This is a critical task because the impact of airport planning decisions can extend well beyond the airport property line. This assessment will include where appropriate a number of factors involving the political entities and adjacent land uses, as well as the airport's setting with respect to other NPIAS and non-NPIAS airports, as well vehicular traffic in the vicinity of the airport.

The Plymouth Municipal Airport is located approximately 3.5 miles northeast of the city center of Plymouth, New Hampshire, in Grafton County. The NHDOT consolidates Plymouth's region with various surrounding communities. That consolidated region is considered the "North Country".

The town of Plymouth is an diverse mix of traditional New England 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 located within an hour's drive of the state capital in Concord and only 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). From there, Highland Street takes airport users and other interested parties directly into downtown Plymouth. In order 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[8].

[8] As described by the article entitled 'Smith Millennium Bridge' at www.newhampshire.com

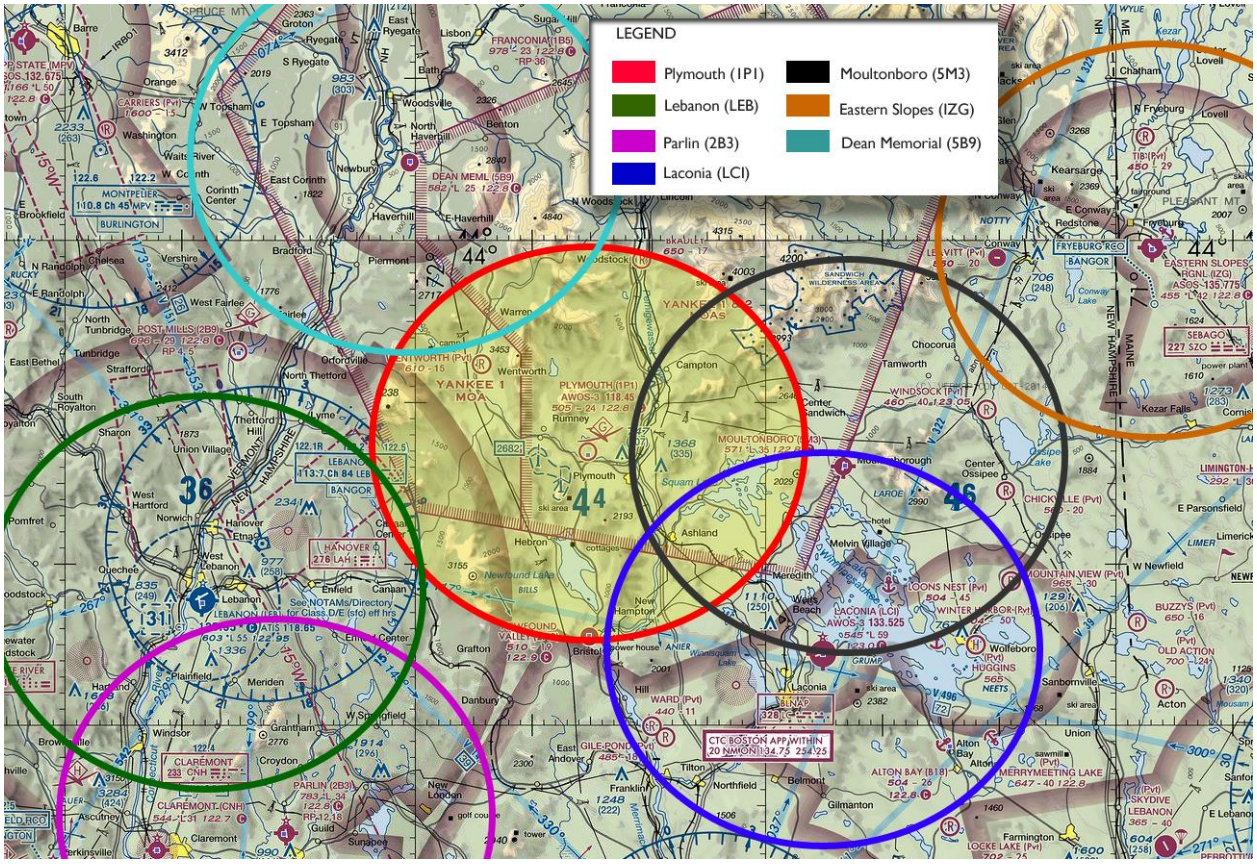


Figure 11 - Airport Service Area

SERVICE AREA

FAA guidelines suggest that the definition for a service area is that area within a 30-minute drive from a general aviation airport. **Figure 11** - *Airport Service Area* shows the approximate 30-minute driving time for Plymouth as well as six other public use airports in the region. As shown, the service areas for Dean Memorial to the northwest, Laconia to the southeast and Moultonboro directly east overlap the 1P1 area. Other airports that neighbor Plymouth include 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 1P1 based aircraft do not remain at Plymouth during the winter. An assessment of each of the seven airports shown in the map above is presented in **Table 4** - *Regional Airports*.

Table 4 - Regional Airports

Airport (ID)	County	Driving Distance	NPIAS Service Level (Number)[9]	Based Aircraft[10]
Laconia (LCI)	Belknap	63 miles (1:35)	General Aviation (33-0009)	202
Lebanon (LEB)	Grafton	42 miles (1:01)	Primary (Non-Hub) (33-0010)	55
Moultonboro (5M3)	Carroll	25 miles (0:40)	Non-NPIAS (Privately Owned)	18
Parlin Field (2B3)	Sullivan	55 miles (1:14)	General Aviation (33-0013)	28
Plymouth (1P1)	Grafton		Non-NPIAS (Publically Owned)	17
Dean Memorial (5B9)	Grafton	33 miles (0:57)	General Aviation (33-0018)	10

Our estimates indicate that approximately 20,000 people reside in the service area. Grafton County has a population of 89,629[11], or 6.8% of the entire state of New Hampshire's population. Scaling down, the population of Plymouth is 7,027[12], which represents 7.8% of Grafton County's population. In other words, the service area demographic for 1P1 is relatively unpopulated. However, these numbers can be deceiving, as the North Country area of New Hampshire is known for seasonal tourism, which can increase the regional population for several months at a time.

SOCIOECONOMIC PATTERNS

Socioeconomic characteristics such as population and economic conditions provide insights concerning an area's historic and future growth. Moreover, socioeconomic characteristics are collected and examined to derive an understanding of the dynamics of growth within the geographic area served by the airport. This information is typically used in forecasting aviation demand.

Demographics

The state of New Hampshire has seen a steady population growth since 1990. According to the 2010 Census, 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 and the median age for the Town is 24 years old, 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.

[9] FAA 5010 Master Records
[10] Based aircraft includes helicopters and ultralights
[11] United States Census Bureau, *2013 estimate*
[12] Economic and Labor Market Information Bureau, NH Employment Security, *February 2014*

Economics

Within the Town of Plymouth, there are predominantly small businesses, with very few having over 100 employees. The largest employers in the Town (industry; employment) 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.

To summarize, all scales of population relating to the Town of Plymouth (state, county, and city) have increased in population by a relatively average number of people since 1990. This steady growth on all levels over a 30-year period bodes well for the Plymouth Municipal Airport and its future impact in the community.

ENVIRONMENTAL OVERVIEW

The principal objective of an environmental overview is to document environmental conditions that should be considered in the identification and analysis of airport development alternatives. Future alternatives will be prepared with the subsequent environmental processes in mind and will consider available environmental data in the evaluation of each of the alternatives. As a result, this master plan may aid in the formation of the purpose and need statements in subsequent environmental documents.

The assessment of the natural environment in the 1P1 vicinity is an important first step for 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 require the acquisition of permits before completing land-altering activities. Many of these permits contain conditions mandating the completion of construction according to specific sequences and methods. In addition, the natural environment of a site often dictates the location and layout of improvement projects because both the cost of construction and permitting can be prohibitive when the proposed development plan involves direct impacts to protected natural resources. 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/or how the development can proceed.

COMPATIBLE LAND USE

The compatibility of existing and planned land uses near an airport is most often associated with the extent of potential aircraft-noise impacts from the airport as well as safety concerns with the land located beneath the protected airspace. Land uses occurring adjacent 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. Adjacent land uses are typically regarded as compatible with airport operations. Additionally, the Town has established an *Airport Overlay District* in their zoning ordinance. This overlay district includes use restrictions which may interfere with the safe operation of the airport. Building and vegetation height restrictions apply to new construction and plantings within adjacent zones in an effort to safely and efficiently manage airspace around the airport.

AIR QUALITY

Air quality assessments are required for proposed federally sponsored projects for compliance with NEPA, the Clean Air Act (CAA) and other environmental regulations. In 1997, the FAA published *Air Quality Procedures for Civilian Airports & Air Force Bases* (Handbook), amended in 2004, to establish the scope of air quality assessments for proposed federal actions for compliance with the National Environmental Policy Act, the Clean Air Act (CAA) and other related regulations. In July 2014, the FAA replaced earlier versions of the Handbook with the publication of the *Aviation Emissions and Air Quality Handbook Version 3*. The new Handbook is intended to assist in assessing air quality impacts of FAA projects and to provide guidance, procedures and methodologies for conducting such assessments.

The Handbook identifies criteria pollutants to be analyzed in relation to National Ambient Air Quality Standards (NAAQS). The criteria pollutants include Nitrogen Dioxide (NO_2), Sulfer Dioxide (SO_2), Carbon Monoxide (CO), Ozone (O_3), Particulate Matter (PM-2.5), and Lead (Pb). Regions in which one or more of the criteria pollutant levels exceeds air quality standards are referred to as nonattainment or maintenance areas. Federal actions proposed in nonattainment or maintenance areas are subject to various levels of NAAQS assessment, including General Conformity, Emissions and Dispersion Modeling System (EDMS), and other emissions modeling tools, to determine conformity with the CAA and NEPA regulations. There are no towns or regions within Grafton County that are in nonattainment or maintenance status due to an exceedance of criteria pollutant air quality standards.

HISTORIC, ARCHITECTURAL, ARCHEOLOGICAL, AND CULTURAL RESOURCES

The National Historic Preservation Act of 1966 (NHPA), as amended, and the Archeological and Historic Preservation Act of 1974, as amended, require federal agencies to consider impacts of their actions to resources of historic, cultural, or archeological significance. Section 106 of the NHPA requires consultation with the State Historic Preservation Officer (SHPO) and Tribal Historic Preservation Officer(s) (THPO) to determine potential adverse effects of a federal action to culturally significant resources and/or historic properties on or eligible for listing on the National Register of Historic Places. Prior to initiating an airport improvement project at Plymouth Municipal Airport, consultation with the New Hampshire Division of Historical Resources (NHDHR) must be undertaken to determine the potential for impacts to historical or archaeologically sensitive resources. There are not, at this time, any federally recognized tribes in New Hampshire.

PLANT AND WILDLIFE COMMUNITIES

Pursuant to Section 7 of the Endangered Species Act, the U.S. Fish and Wildlife Service (USFWS) has been consulted in order 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 contacted regarding the status of state-listed species and exemplary natural communities occurring within the vicinity of activities proposed in this EA. According to the USFWS, the Northern Long-eared bat (*Myotis septentrionalis*) is listed as Proposed Endangered for protection across the state of New Hampshire. A final decision on the bats' listing is expected in April 2015. Until an official

designation under the Endangered Species Act is issued, USFWS has published an interim guidance document to be utilized when planning projects within the species' range. Correspondence with the New Hampshire NHB is forthcoming.

WETLANDS AND ADJACENT WATERBODIES

The Plymouth Municipal Airport site consists of approximately 116 acres. Approximately 48 acres comprised of the turf airstrip, agricultural fields, and wooded hedgerows, are located south of Quincy Road. Airport property also includes approximately 69 acres of land located opposite the airstrip parcel, to the north of Quincy Road. The parcel north of Quincy Road 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.

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 (on the southern parcel) using the technical criteria described in the 1987 *Corps of Engineers Wetlands Delineation Manual*[13] and the 2012 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regional Supplement*[14]. Wetland boundaries were marked with pink, alphanumeric-coded flags. Wetland boundaries and stream locations were recorded using global positioning system (GPS) survey equipment. Refer to Appendix 3.

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) Wetlands Bureau Administrative Rules. Identification of potential vernal pools and streams was limited to observable conditions within the study area and available background information.

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

Wetlands delineated 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 dominant herbaceous species documented within airport wetlands.

[13] 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.
[14] 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.

The 69 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 Appendix 3 for approximate locations of these natural resource features encountered during the reconnaissance survey.

FLOODPLAINS

Floodplains are defined in Executive Order 11988 as "the lowland and relatively flat areas adjoining inland and coastal waters including, at a minimum, that area subject to a one percent or greater chance of flooding in any given year, or in other words, the area that would be inundated by a 100 year flood." This order directs federal agencies to "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 natural beneficial 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). Special Flood hazard Areas (100-year flood) and other floodway areas associated with the Baker River do not encroach upon airport property.

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, accurate description of potential environmental impacts resulting from proposed federal actions. Federally funded airport improvements constitute a "Federal Action" and are therefore subject to the requirements of NEPA. The NEPA process addresses the impacts of federal actions on the human environment, including noise, socioeconomic, land uses, air quality, and water quality. Prior to FAA approval of an AIP funded project, the project must undergo NEPA review.

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

- Those normally requiring an Environmental Impact Statement (EIS);
- Those normally requiring an Environmental Assessment (EA); and
- Those that are normally categorically excluded (from comprehensive environmental review).

Projects requiring an EIS are those that are likely to significantly affect the environment. Projects requiring an EA are those that have the potential to affect the environment. Projects that are categorically excluded include those projects that are *unlikely* to affect the environment. The NEPA review process as it relates to development alternatives presented in this Airport Master Plan will be further discussed in Chapter 5.

WILDLIFE HAZARD SITE VISIT

The wildlife hazard site visit is tentatively scheduled for the spring of 2015. The data collected during the site visit will be reported in this section using FAA Advisory Circular 150/5200-XX, *Protocol for the Conduct and Review of Wildlife Hazard Site Visits, Wildlife Hazard Assessments, and Wildlife Hazard Management Plans.*

WETLAND ANALYSIS

A field survey was conducted in early October 2014 and the results of this survey are contained in Appendix 3. Data collected as part of this survey will be analyzed and developed onto existing wetland data and delineations will be used where appropriate to assist with determining future wetland impacts. Only wetlands on the airport side of Quincy Road were delineated.

WETLAND FUNCTION AND VALUE ASSESSMENT

A field survey was conducted in early October 2014 (see Appendix 3). Because of this survey, Stantec provided a description of on-airport wetlands. This description includes an assessment of wetland functions and values prepared in accordance with the Federal Highway Methodology. Descriptions also include dominant vegetation, approximate size, and general wildlife habitat value. Wetland areas are presented on various plans and figures, including the existing airport layout plan (**Figure 5** - Existing Facilities Plan. Plans will be stamped by a certified wetlands scientist as certified by the New Hampshire Board of Natural Scientists.

OBSTRUCTION ANALYSIS

Developing this master plan also involved evaluating both on and off airport obstructions. 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. With the data we collected, and if necessary we can conduct "What if Studies," enabling us to see the effects of possible future alternatives, such as extending (or shortening) the runway, shifting the runway, etc.

- 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 normal approach surface, which is the case at 1P1 for the Runway 30 displaced threshold, which as discussed earlier (see Runway, page 14). 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.

As part 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 5 - Existing Facilities Plan and Figure 8 - Runway 30 Displaced Threshold). In addition, we calculated the Part 77 surface dimensions. Somewhat similar to Airport Design Surfaces, the size of civil airport imaginary (Part 77)

surfaces are based 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. In addition, there are five different Part 77 imaginary surfaces, which are listed in **Table 5** - *Existing Part 77 Surface Dimensions at 1P1*.

Figure 12 - *Typical Part 77 Surface Schematic* is a cut away graphic depiction of a typical Part 77 surface plan. The complete Part 77 plan for Plymouth will be prepared later in the study. For now, a plan that shows the primary surface and the approach surface to both runway ends was prepared and is presented as Figure 13 - Existing Part 77 &Threshold Siting Analysis Plan. This plan shows the various surfaces just discussed which include:

- Threshold Siting Surface
- Part 77 Primary Surface
- Part 77 Approach Surface
- Part 77 Transitional Surface

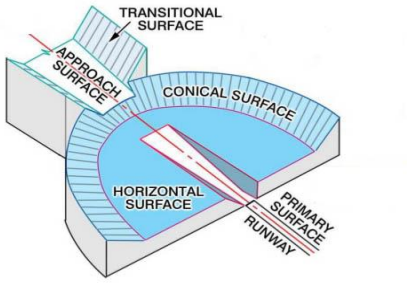


Figure 12 - Typical Part 77 Surface Schematic

Table 5 - Existing Part 77 Surface Dimensions at 1P1

Surface	Area/Surface	Dimension
Horizontal	A horizontal plane 150 feet above the established airport elevation (505 feet)	605 feet x 5,000 feet
Conical	A surface extending outward and upward from the periphery of the horizontal surface	20:1 slope x 4,000 feet
Primary	A surface longitudinally centered on a runway. When the runway has no prepared hard surface (such as 1P1), 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 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 to 1 from the sides of the primary surface and from the sides of the approach surfaces.	7:1 slope to join the approach, primary and horizontal surfaces

Data collected during the ground and aerial survey was analyzed and converted into the plan presented as the plan shown ***Figure 13*** - *Existing Part 77 &Threshold Siting Analysis Plan*. As illustrated by the various colored markers on **Figure 13**, obstructions (red and yellow tags) occur in all of the six surfaces listed above. In addition, numerous "near" objects (green, blue and white tags) are close to penetrating one of the surfaces.[15] **Table 6** - *Obstruction Analysis*, breaks out the level of obstructions in more detail.

The following is offered to assist in understanding Figure 13.

- 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 underlies the graphics is an orthophoto,[16] 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 1P1.

[15] An object is any manmade or nature feature (tree, shrub, tower, building, etc.). An obstruction is an object that penetrates an imaginary airport surface.
[16] An orthophoto, orthophotograph 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.

Figure 13 - Existing Part 77 &Threshold Siting Analysis Plan

Table 6 - Obstruction Analysis

Surface	Obstructions	Note
Primary Surface	There are numerous low shrubs and several small trees that penetrate the Primary Surface	A small part of the Primary Surface to the south of the approach end of Runway 30 extends off airport property
Runway 12 Approach	There are 0.96 acres of obstructions within this surface a well as several objects that lie just below the surface	Almost the entire Runway 12 approach surface is off airport property.
Runway 30 Approach Surface	There are 4.72 acres of existing obstructions in this surface as well as numerous other trees just below the surface.	Almost the entire Runway 12 approach surface is off airport property.
Runway 30 Siting Surface	There are 4.53 acres of obstructions within the siting surface, most of which are duplicates from the Part 77 Approach Surface	With the exception of the first 294 feet, most of the obstructions are off airport property.

INVENTORY SUMMARY

Table 7 - *Inventory Summary* that follows this section summarizes the quantity of aircraft and operations, as well as other quantifiable data at 1P1, and it along with other measurable and unquantifiable statistics provide the basis for the airport's forecasts, facility requirements, and other elements of this master plan. Some significant findings during our field investigations and preparation of the inventory section include the following assessment.

- According to historical data and interviews, operations at 1P1 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. Ultralight and small, single engine aircraft dominate airport usage, accounting for nearly all of the takeoffs and landings at the airport.
- The population for the state, Grafton County, and the Town of Plymouth are consistent with each other in the fact that each has been steadily growing since 1990. In that 30-year period, each entity has grown 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, and most vegetation is off airport property. In addition, the vast majority of obstructions occur off airport.

Table 7 - Inventory Summary

Element	Measurement
Runway 12/30	2,380' x 90'
Critical Aircraft	Cessna 172
Airport Reference Code	A-I
Fleet Mix (Aircraft / Operations)	14
Single Engine Reciprocating	2
Multiengine Reciprocating	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	N/A
Fuel Sales	N/A
Automobile Parking	10 - 13

CHAPTER 3 – FORECASTS OF AVIATION DEMAND

INTRODUCTION

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

In all likelihood, activity growth will not occur as projected. Undoubtedly, there will be peaks and valleys over the next 20 years that our process depicts in a linear fashion. Therefore, the facility development recommendations may have to be adjusted accordingly. Slower than projected growth may delay or even negate the need for development, especially in the outlying years. Naturally, the opposite may hold true for faster than projected growth.

This master plan started with the preparation of a reliable activity baseline, which was accomplished in ***CHAPTER TWO*** – *INVENTORY OF EXISTING CONDITIONS*. The next step will be a review of factors affecting aviation activity, followed by discussion of other local, regional, and national aviation and related forecasts, and a review of various forecast methodologies. We then develop a forecast range, compare it to other forecasts for reasonableness, and submit the forecasts to the Sponsor, NHDOT, and FAA for approval.

FORECAST ELEMENTS

To establish the demands likely to be placed on Plymouth, forecasts will include all relevant aviation demand elements, including both the type and level of aviation activity expected at the airport over the planning horizon. The specific activity elements to be forecasted include:

- Number and type of based aircraft;
- Aircraft operations;
- Peak activity (both aircraft and operations); and
- Identification of the forecasted critical aircraft.

AVIATION FORECAST PERIODS

Forecasts are prepared for short-, medium-, and long-term periods and will specify the existing and future critical aircraft. Short-term forecasts for the first five years are used to justify near-term development and support operational planning and environmental improvement programs, and in the case of 1P1, will provide a strong argument for or again the airport joining NPIAS. The intermediate-term (next five years) are

typically used in planning capital improvements, and long-term forecasts (11th through 20th year) are helpful in general planning (the communities long-term vision for the airport).

Given the above, the forecast horizons for this master plan are as shown in **Figure 14** - *Planning Periods* are as follows:

Figure 14 - Planning Periods

SHORT-TERM

The short-term planning period is the first five years, in this case from 2016 through 2020. During this period, the airport and its sponsor 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 the term that fiscal requirements and limitations are determined.

INTERMEDIATE-TERM

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

LONG-TERM

The long-term planning phase is the 10th through 20th year. This is the general planning period. Assuming all short-term and medium-term projects are successfully implemented, the sponsor 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 communities' long-term vision for the airport.

FACTORS AFFECTING AVIATION FORECASTS

In preparing forecasts of demand and updating existing estimates considerations include socioeconomic data, demographics, disposable income, geographic attributes, and external factors such as fuel costs and local attitudes towards aviation. To the extent data is available; we will address each of these elements.

ECONOMICS

The economic characteristics of a community will affect the demand for air traffic. In regions experiencing strong economic growth, business travel typically increases and greater 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.

DEMOGRAPHICS

The demographic characteristics of an area's population also affect the demand for aviation services. Demographic characteristics influence the level, composition, and growth of both local 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, which is a good indicator of the propensity to travel and general aviation aircraft purchases and use.

POPULATION

In 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. We noted in Chapter 2 that the state, county and town all saw a significant 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 11** - *Airport Service Area*). The service area population was then linked to airport's based aircraft inventory, which produced a ratio of one aircraft for every 1,176 people residing in the service area. 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.[17] The study projects 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 will essentially mirror the state's growth (see **Figure 15** - *State and County Population Projections*). Given that the county population projections echo the states, we feel it is safe to assume that the same growth rate will occur within the airport's service area.

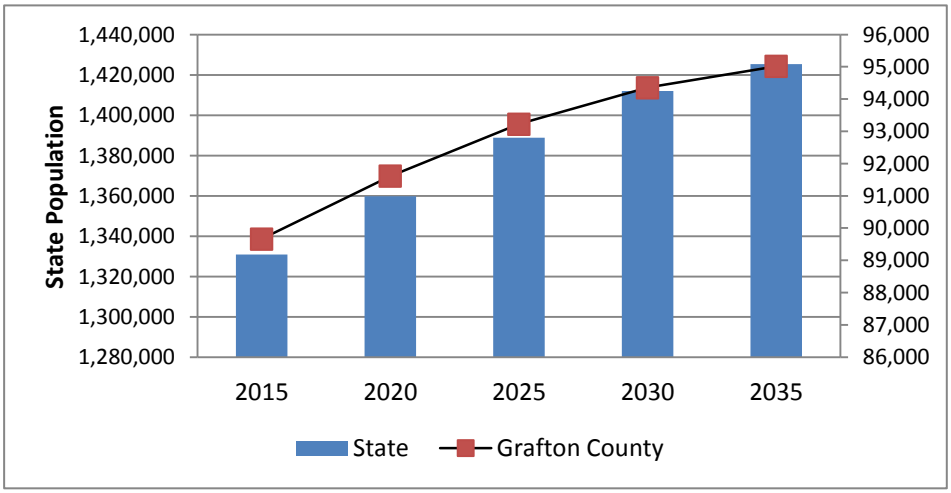


Figure 15 - State and County Population Projections

[17] 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.

GEOGRAPHIC ATTRIBUTES

The geographic distances between populations and centers of commerce within the airport's service area may have a direct bearing on the type and level of transportation demand. The existence of populations and centers of commerce beyond an airport's service area may indicate the need for additional airports that serve transportation demand. The physical characteristics of the area and the local climate may also be important, since they may stimulate holiday traffic and tourism. The role of the airport within the airport system and its relationship to other airports may also have an effect on the services that are demanded at the airport. Plymouth is outside of the main population areas of New Hampshire. Except for the year-round faithful, Plymouth experiences increased demand for air traffic, but this demand is low by any measurement. As shown in **Table 8** - Distance *to Major Population Areas*, Plymouth is somewhat secluded from large population areas, but has easy access to Interstate 93, which takes users directly into the state's capital of Concord and Manchester, the state's largest city in terms of population. The driving time from Plymouth to these metropolitan centers is reasonable.

Table 8 - Distance to Major Population Areas

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

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 changes 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.

FAA FORECASTS

The principle FAA document reviewed is the FAA Aviation/Aerospace Forecasts for 2010 – 2030. This forecast is heavily dependent on the reported level of activity from the airport's self-reporting through the FAA Form 5010-1, *Airport Master Record* (see **Figure 6** - *Airport Master Record* (5010-1 Form)). This document updated annually by the FAA and represents a national overview of projected aviation levels. It is especially helpful in projecting the changes in fleet mix at both commercial service and general aviation airports. The FAA uses this plan to measure the effects of expected growth, which in turn predicts aviation activities over the next 20 years. That is, regardless of which growth scenario is used, the increase in both aircraft and operations will be relatively average.

FORECAST METHODOLOGY

At this level airport, based aircraft and operations forecasts are significant in terms of facility design, and unfortunately are difficult to predict, but are none-the-less used to determine the adequacy of existing tie-downs, hangars, and storage needs.

FAA FORECASTS

Considering Plymouth is currently a non-NPIAS airport, forecasts specific to the airport are unavailable. Therefore, general forecasts produced by the FAA were studied and the general information applied into the forecasts for 1P1. This approach is called a "top-down" method; meaning this method looks at the national forecasts and trends and applies them in ratio form to a specific region or airport.

NH DEPARTMENT OF TRANSPORTATION FORECASTS

NHDOT produces a state aviation systems plan update about every 10 years. For this master plan, we used the draft version of the 2014 update. Unlike the FAA forecasts, the update provides current information and future estimates specific to 1P1.

PLYMOUTH MUNICIPAL AIRPORT FORECASTS

To assess the future of general aviation activity at 1P1, 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, particularly 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?

Forecasts for 1P1 could depend on the decision to join NPIAS. It is entirely possible that 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, thus potentially attracting more itinerant and based users. Therefore, the challenge is to define the role and importance of the airport in the community. This is essential to build justification to maintain eligibility for federal funding and to secure local and state political support for public expenditures on an airport with a steady market demand. Consequently we have prepared two sets of forecasts; one based on a non-NPIAS airport and the second on a NPIAS facility in Plymouth, NH.

We feel that overall growth will remain constrained without some investment in the airport's infrastructure, meaning that without a paved and slightly longer runway, and without paved parking areas and additional hangar development. While normal variations in aircraft and operations will occur, overall growth will remain consistent with population changes in the service area. This change represents the "no-build" rate, which is about 6.6% over between now and 2035, or about 0.3% per year on average.

On the other hand, paving the runway (to its current length) and adding other paved facilities, such as aircraft parking aprons and automobile parking, will add opportunities for a much higher growth rate, mainly because the airport would be available year round and would become more attractive to aircraft owners looking for a permanent home for their aircraft. This is particularly important if additional hangars are constructed. Under this "high-growth" scenario, the facility could realize a 1.0 to 1.5 percent per year increase in activity, or a 20 - 30% growth rate over the course of the next 20 years. For planning purposes,

we will assume 30% or 1.5% per year under the "high-growth" (NPIAS) plan, beginning in the fifth year after the airport enters NPIAS. This change will take at least 2-3 years after this report is finished and the town elects to petition the FAA for entrance in the National System. Thus for planning purposes we assume that the high growth scenario would not take place for 10 years.

It is important to remember that changes in the number of based aircraft will drive all other growth elements; that is, as the number of based aircraft goes up or down, so will the number of operations and number of itinerant visitors (because the same things that attract based aircraft will attract transient aircraft). This also drives the need for facilities such as the terminal, hangars, aircraft parking, and auto parking, etc.

BASED AIRCRAFT FORECAST

Based aircraft could see a slight increase with expansion of the airport's role in the region. In fact, based aircraft could reach 20 – 25 in the next 20 years with proper management of landside asset (hangar and apron availability), as well as services, including a part or full-service Fixed-Base Operator (FBO) with the availability of aviation fuel. It is important to keep in mind that the aforementioned is a broad assumption at this time. Most likely, with improvements and advertising, the airport will witness a small increase in based aircraft, thus leading to higher operation counts.

- The "low-growth" rate in based aircraft will mirror changes in the service area population, which will increase by 6.6% by the year 2035, or 0.3% per year. This would result in the addition of 1 or possibly 2 additional aircraft during this 20-year period, keeping the status quo of 1 aircraft for every 1,176 people in the service area (1:1,176).
- The "high-growth" scenario could see as many as 22 aircraft if the 1.5% per year growth rate is realized. For planning purposes, we estimate 24. This results in a ratio of 1:900 (1 aircraft for every 900 people in the service area).

OPERATIONS FORECAST

The anticipated growth in operations will mirror the changes in based aircraft. Today the Operations per Based Aircraft (OPBA) is 178 (see **Table 3** - Existing *Fleet Mix Operations*). The OPBA ratio is typically anywhere from 1:200-350 (200 to 300 operations per based aircraft), however this historic national ratio is trending downward, and for airports without an active flight training program or other activity that promotes flight operations, an airport tends to be on the lower end of the scale. Plymouth resides at the lower end of that spectrum because of its seasonal nature, and the fact that the airport does not offer aviation fuel for sale.

Assuming the OPBA remains a constant 178:1 (178 operations for every based aircraft), then operations forecasts will range from 3,300 to 3,900 (numbers rounded), based on the low and high growth scenarios. The split of local versus itinerant aircraft operations will remain the same as it is today, 66% - 33% respectively.

FLEET MIX FORECAST

Regardless of the future status of 1P1, the fleet mix will remain primarily single-engine reciprocating aircraft. Other than changes in the general aviation market (trending toward 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 will remain the same.

PEAK HOUR FORECAST

Peak hour forecasts will naturally change as the number of based aircraft and operations changes. Current peak hour operations were calculated at 3 per hour. Given the potential for change, PH could easily increase to 4 or 5 per hour, which in the overall planning of the airport is insignificant.

DESIGN AIRCRAFT AND ARC FORECAST

The design aircraft in this master plan is the Cessna 172. The design aircraft dictates Plymouth ARC, which is currently being designed at A-I standards for small aircraft. For planning purposes, the Cessna 172 makes sense for long-term and current airport designs. It is safe to assume that small, single-engine air traffic will dominate the operations numbers at Plymouth throughout the 20-year planning period. Even if the population increase remains steady and the airport decides to join NPIAS, Plymouth will most likely remain a small general-aviation airport. Moreover, the ARC and design aircraft will remain the same regardless of which growth scenario occurs.

FUEL SALES

The airport does not sell fuel at this time and given the existing and forecasted operations, it is unlikely that there would be sufficient activity to justify fuel sales. For planning purposes, we assume that a typical general aviation airport could sell between 4 and 6 gallons of aviation fuel per year for every aircraft operation. This would equal about 12,000 to 18,000 gallons per year at Plymouth, with the majority of sales occurring in the summer months.

FORECAST SUMMARY

After assessing current conditions at Plymouth (Chapter 2) and then analyzing potential changes in the next 20 years, two scenarios were developed. The first assumes the airport remains essentially as it is today: a municipally owned, turf airfield. Our assessment indicates that without an infusion of federal and state funding, 1P1 will probably see very little growth. And the growth that does occur will be from natural population changes in the service area. That is, the number of based aircraft and subsequent operations will mirror changes in population. Development of hangars on the airport will probably result in a shift in the percentage of aircraft parked outside versus inside, resulting in no substantial increase in the overall number of based aircraft.

The second scenario assumes the airport (sponsor) elects to enter NPIAS (and the FAA concurs). The introduction of capital through federal and state funding will permit the airport to possibly expand the facility

and deal with safety issues that will naturally make the airport more attractive, and viable. The viability comes from the fact that the airport could remain operational year round (with a paved runway) and could obtain federally sanctioned instrument approach procedures. While the latter two concepts are a financial and possibly political reach at this point, they are both feasible. However, as the next two chapters will show (Facility Requirements and Alternative Analysis), talking about a paved runway and actually making it happen are two different things. Given the above, two forecasts were prepared and are presented in the two tables that appear on the next page.

- **Table 9** - *Low Growth Forecasts* summarizes forecast data for 1P1 under the non-NPIAS scenario. This data is broken out by three planning periods.
- **Table 10** - *High Growth Forecasts* presents the same data based on the assumption that the airport joins NPIAS, which could result in a scenario that results in a slightly higher rate of growth.

Table 9 - Low Growth Forecasts

Condition	Existing (2015)	Short Term (2016– 2020)	Medium Term (2021 – 2025)	Long Term (2026 – 2035)
Design Aircraft	Cessna 172	Cessna 172	Cessna 172	Cessna 172
Airport Reference Code	A-I	A-I	A-I	A-I
Based Aircraft Fleet Mix				
Single Engine Reciprocating	14	14	14	15
Multiengine Reciprocating	1	1	1	1
Turboprop	0	0	0	0
Helicopter	0	0	1	1
Powered-parachute	2	2	2	2
Total Based Aircraft	**17**	**17**	**19**	**19**
Operations				
Local	2,000	2,027	2,175	2,208
Itinerant	1,030	1,044	1,120	1,137
Total	**3,030**	**3,071**	**3,295**	**3,345**
OPBA	178	178	178	178
Aviation Fuel Sales (gallons)	0	12,286	13,182	13,380

Table 10 - High Growth Forecasts

Condition	Existing (2015)	Short Term (2016– 2020)	Medium Term (2021 – 2025)	Long Term (2026 – 2035)
Design Aircraft	Cessna 172	Cessna 172	Cessna 172	Cessna 172
Airport Reference Code	A-I	A-I	A-I	A-I
Based Aircraft Fleet Mix				
Single Engine Reciprocating	14	14	15	16
Multiengine Reciprocating	1	1	1	1
Turboprop	0	0	0	0
Helicopter	0	0	1	2
Powered-parachute	2	2	2	2
Total Based Aircraft	**17**	**17**	**20**	**22**
Operations				
Local	2,000	2,024	2,293	2,573
Itinerant	1,030	1,042	1,181	1,326
Total	**3,030**	**3,066**	**3,474**	**3,899**
OPBA	178	178	178	178
Aviation Fuel Sales (gallons)	0	12,264	20,844	23,395

CHAPTER 4 - FACILITY REQUIREMENTS

Pending

CHAPTER 5 - ALTERNATIVES ANALYSIS

Pending

CHAPTER 6 - AIRPORT LAYOUT PLAN

Pending

CHAPTER 7 - IMPLEMENTATION AND FINANCIAL PLAN

Pending

APPENDIX 1 - TERMS AND ABBREVIATIONS

The following terms and abbreviations are used in this report, or may be of some benefit to the reader in understanding the distinctive field of aviation and airports.

Term – Abbreviation	Definition
1P1	FAA identifier for Plymouth Municipal Airport
Above Mean Sea Level (AMSL)	Refers to the elevation (on the ground) or altitude (in the air) of any object, relative to the average sea level datum.
Advisory Circular (AC)	Guidelines published by the FAA 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 as are rules. However, since users sometimes face the choice of complying with an AC or spending months to get approval of a different means of complying, an AC frequently becomes mandatory for all practical purposes.
AGL	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 that use three-letter company designators or the prefix “TANGO” or “Lifeguard.”
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.

Term – Abbreviation	Definition
Aircraft Approach Category	A grouping of aircraft 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.
Airplane Design Group (ADG)	A grouping of airplanes 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 (AIP)	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.

Term – Abbreviation	Definition
Airport Layout Plan	An airport layout plan is a scaled drawing of existing and proposed land and facilities necessary for the operation and development of an airport. All airport 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.
*Airport Noise**	When evaluating proposed airport projects, airport noise is often the most controversial environmental impact FAA examines. Airport development actions that change airport runway configurations, aircraft operations and/or movements, aircraft types using the airport, or aircraft flight characteristics may affect existing and future noise levels. FAA's noise analysis primarily focuses on how proposed airport actions would change the cumulative noise exposure of individuals to aircraft noise in areas surrounding the airport.
Airport Operations Count	The statistic maintained by the control tower. It is the number of arrivals and departures from the airport. Specifically, one airport operation count is taken for each land and takeoff, while two airport operation counts; i.e., one landing and one takeoff, are taken for each low approach below traffic pattern altitude, stop and go, or touch and go operation.
Airport Reference Code (ARC)	The ARC is a coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport. The airport reference code has two components relating to the airport design aircraft. The first component, depicted by a letter, is the aircraft approach category and relates to aircraft approach speed (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. Generally, runways standards are related to aircraft approach speed, airplane wingspan, and designated or planned approach visibility minimums. Taxiway and taxilane standards are related to airplane design group.
Airport Reference Point (ARP)	The latitude and longitude of the approximate center of the airport.
Airside	The aircraft operational side of an airport, including runways, taxiways, aircraft aprons, 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).
AMPU	Airport Master Plan Update

Term – Abbreviation	Definition
AMSL	Above Mean Sea Level
Approach Minimum	Pilots may not operate an aircraft at any airport below the authorized MDA or continue an approach below the authorized DA/DH unless: 1. The aircraft is continuously in a position from which a descent to a landing on the intended runway can be made at a normal descent rate using normal maneuvers; 2. The flight visibility is not less than that prescribed for the approach procedure being used; and 3. At least one of the following visual references for the intended runway is visible and identifiable to the pilot: ▪ Approach light system ▪ Threshold ▪ Threshold markings ▪ Threshold lights ▪ Runway end identifier lights (REIL) ▪ Visual approach slope indicator (VASI) ▪ Touchdown zone or touchdown zone markings ▪ Touchdown zone lights ▪ Runway or runway markings ▪ Runway lights
Approach Procedure	See Instrument Approach Procedure
Apron	The airport or 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.
Area Navigation (RNAV)	Area navigation (RNAV) is a method of navigation that permits aircraft operations on any desired flight path.
ARP	Airport Reference Point
ASOS	Automatic Surface Observation System

Term – Abbreviation	Definition
Automatic Surface Observation System (ASOS)	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.
AWOS	Automatic Weather Observation System
Based Aircraft	An aircraft that is "operational & air worthy"; one that is 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.
Building Restriction Line (BRL)	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 exceed.
Category	As used with respect to the certification of aircraft, means a grouping of aircraft based upon intended use or operating limitations. Examples include: transport, normal, utility, acrobatic, limited, restricted, and provisional.
CFR	Code of Federal Regulations
Circling Approach	A maneuver initiated by the pilot to align the aircraft with a runway for landing when a straight in landing from an instrument approach is not possible or is not desirable.
Civil Aircraft	Civil aircraft means aircraft other than public 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 (CFR)	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.

Term – Abbreviation	Definition
Commercial Operator (or operation)	Commercial operator means a person who, for compensation or hire, engages in the carriage by aircraft in air commerce of persons or property, other than as an air carrier or foreign air carrier or under the authority of Part 375 of this title. Where it is doubtful that an operation is for ''compensation or hire'', the test applied is whether the carriage by air is merely incidental to the person's other business or is, in itself, a major enterprise for profit.
Common Traffic Advisory Frequency (CTAF)	Common Traffic Advisory Frequency (CTAF), is the name given to the VHF radio frequency used for air-to-air communication at U.S., non-towered airports. Many towered airports close their towers overnight, but keeping the airport opened during periods when activity is very low. Pilots use the common frequency to coordinate their arrivals and departures safely, giving position reports and acknowledging other aircraft in the airfield traffic pattern. In many locations, smaller airports use pilot-controlled lighting systems when it is uneconomical or inconvenient to have automated systems or staff to turn on the taxiway and runway lights. Two common CTAF allocations are UNICOM, a licensed non-government base station that provides air-to-ground communications (and vice versa) and may also serve as a CTAF when in operation, and MULTICOM, a frequency allocation (without a physical base station) that is reserved as a CTAF for airports without other facilities.
Commuter Aircraft	A small aircraft designed to fly between 35 and 100 passengers from point to point on short-haul flights. These classes of airliners are typically flown by the regional airline divisions of the larger international airlines. The regional jet (RJ) aircraft of the same class that has become the aircraft of choice for most domestic operations.
*Compatible Land Use**	The compatibility of existing and planned land uses near an airport is usually associated with the extent of potential aircraft-noise impacts 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 comprise the principal land uses adjacent to airport property. Rural residential and agricultural land uses are typically regarded as compatible with standard general aviation operations.

Term – Abbreviation	Definition
*Construction Impacts**	Airport construction may cause various environmental effects primarily due to dust, aircraft and heavy equipment emissions, storm water runoff containing sediment and/or spilled or leaking petroleum products and noise. In most cases, these effects are subject to Federal, State, or local ordinances or regulations. While the long-term impacts of the proposed action are usually greater than construction impacts, sometimes construction may also cause significant short-term impacts. Descriptions of the many construction impacts associated with airport actions are often covered in the descriptions of other environmental impact categories.
Critical Design Airplane	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.
CTAF	Common Traffic Advisory Frequency
DA	Decision Altitude
Decision Altitude (DA)	A specified altitude in the precision approach, charted in feet MSL, at which a missed approach must be initiated if the required visual reference to continue the approach has not been established.
Decision Height (DH)	A specified altitude in the precision approach, charted in height above threshold elevation, at which a decision must be made either to continue the approach or to execute a missed approach.
Declared Distances	The distances the airport owner declares available for the airplane's takeoff run, takeoff distance, accelerate-stop distance, and landing distance requirements. The distances are: ▪ Takeoff-run available (TORA). The runway length declared available and suitable for the ground run of an airplane taking off; ▪ Takeoff distance available (TODA). The TORA plus the length of any remaining runway or clearway (CWY) beyond the far end of the TORA; ▪ Accelerate-stop distance available (ASDA). The runway plus stopway (SWY) length declared available and suitable for the acceleration and deceleration of an airplane aborting a takeoff; and ▪ Landing distance available (LDA). The runway length declared available and suitable for a landing airplane.
Design Aircraft/Airplane	See Critical Design Airplane

Term – Abbreviation	Definition
Displaced Threshold	A threshold that is located at a point on the runway other than the designated beginning of the runway.
Distance Measuring Equipment (DME)	Distance Measuring Equipment (DME) is a radio navigation technology that measures distance by timing the propagation delay of VHF or UHF radio signals. Aircraft use DME to determine their distance from a land-based transponder by sending and receiving pulse pairs - two pulses of fixed duration and separation. The ground stations are typically collocated with VORs. DME in an aircraft shows the pilot, by an instrument-panel indication, the number of nautical miles between the aircraft and a ground station or waypoint.
DME	Distance Measuring Equipment
Enplanement	When a passenger boards an aircraft at an airport. Industry standards typically identify enplanements as the measure of activity at an airport. See also deplanement. Note: For the purposes of airport classifications under NPIAS, an enplanement refers to a passenger boarding an aircraft for commercial or for hire purposes.
FAF	Final Approach Fix
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 Base Operator or Operation
Federal Aviation Regulation (FAR)	The FAR are published in Chapter 1 of Title 14 of the CFR.

Term – Abbreviation	Definition
Final Approach	Part of an instrument approach procedure in which alignment and descent for landing are accomplished.
Final Approach Fix (FAF)	The fix from which the IFR final approach to an airport is executed, and which identifies the beginning of the final approach segment. An FAF is designated on government charts by a Maltese cross symbol for non-precision approaches, and a lightning bolt symbol for precision approaches.
Fixed Base Operator (FBO)	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 is fixed by function. 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), where the movement of the wing surfaces relative to the aircraft generates lift.
Fleet Mix	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 actions must avoid the floodplain, if a practicable alternative exists. If no practicable alternative exists, actions 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.
Frangible Navigation Aid	A navigational aid (NAVAID) which 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.

Term – Abbreviation	Definition
GA	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 Operation	Civil aircraft operations not classified as air carrier or air taxi.
Geographic Information System (GIS)	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.
GIS	Geographic Information System
Glideslope (GS)	Part of the ILS that projects a radio beam upward at an angle of approximately 3° from the approach end of an instrument runway. The glideslope provides vertical guidance to aircraft on the final approach course for the aircraft to follow when making an ILS approach along the localizer path.
Global Navigation Satellite Systems (GNSS)	Satellite navigation systems that provide autonomous geo-spatial positioning with global coverage. It allows small electronic receivers to determine their location (longitude, latitude, and altitude) to within a few meters using time signals transmitted along a line of sight by radio from satellites.

Term – Abbreviation	Definition
Global Positioning System	A space-based radio-navigation system consisting of a constellation of satellites and a network of ground stations used for monitoring and control. A minimum of 24 GPS satellites orbit the Earth at an altitude of approximately 11,000 miles providing users with accurate information on position, velocity, and time anywhere in the world and in all weather conditions.
Global Positioning System (GPS)	Navigation system that uses satellite rather than ground-based transmitters for location information.
GPA	Glidepath Angle
GPS	Glidepath Qualification Surface
GPS	Global Positioning System
GS	Glideslope
HATH	Height Above Threshold
Hazard to Air Navigation	An object which, as a result of an aeronautical study under 14 CFR part 77, 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.
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	Instrument Flight Rules
ILS	Instrument Landing System
ILS Approach	A precision instrument approach utilizing the ILS.
IMC	Instrument Meteorological Conditions
Initial Approach Fix (IAF)	The fix depicted on IAP charts where the instrument approach procedure (IAP) begins unless otherwise authorized by ATC.
INM	Integrated Noise Model

Term – Abbreviation	Definition
Instrument Approach	A set of regulations and procedures for flying aircraft whereby navigation and obstacle clearance is maintained with reference to aircraft instruments only, while separation from other aircraft is provided by Air Traffic Control. In non-technical language, a pilot who is rated for IFR can keep a plane in controlled flight solely on the data provided by his instruments, even if that pilot cannot see anything out the cockpit windows; one of the benefits of these regulations is the ability to fly through clouds, which is otherwise not allowed. IFR is an alternative to visual flight rules (VFR), where the pilot is ultimately responsible for navigation, obstacle clearance and traffic separation using the see-and-avoid concept. The vast majority of commercial traffic (any flight for hire) and all scheduled air carriers operate exclusively under IFR (even on clear days). Commercial aircraft providing sightseeing flights, aerial photography, or lift services for parachute jumping usually operate under VFR.
Instrument Approach Procedure (IAP)	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 (IFR)	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 (IMC)	Meteorological conditions expressed in terms of visibility, distance from clouds, and ceiling less than the minimums specified for visual meteorological conditions, requiring operations to be conducted under IFR.
Instrument Takeoff	Using the instruments rather than outside visual cues to maintain runway heading and execute a safe takeoff.
Intermediate-Term	The sixth through tenth year of an airport planning period.
Itinerant Operation	Operations not classified as "local" operations. See local operation.
KIAS	Knots indicated airspeed
KOLD	International identifier for DeWitt Field, Old Town (see also OLD)
Landside	The part of the airport exclusive of aircraft operating areas (runways, taxiways, aircraft aprons/ramps). Landside includes the terminal building, hangars, 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 could visually affect surrounding residents and other nearby light-sensitive areas such as homes, parks or recreational areas.
LIRL	Low Intensity Runway Lights. See Runway Edge Lights.
LNAV	Localizer Performance with Vertical
Local Operation	Aircraft operations remaining in the local traffic pattern, simulated instrument approaches at the airport, including military and civil operations, and operations to or from the airport and a practice area within a 20-mile radius of the tower.
Localizer (LOC)	The portion of an ILS that gives left/right guidance information down the centerline of the instrument runway for final approach.
Localizer Approach	A non-precision instrument approach procedure using only localizer component of the ILS.
Long-Term	The eleventh through twentieth year of an airport planning period
LP	Localizer Performance
LPV	Localizer Performance with Vertical Navigation
Marker Beacon	A low-powered transmitter that directs its signal upward in a small, fan-shaped pattern. Used along the flight path when approaching an airport for landing, marker beacons indicate both aurally and visually when the aircraft is directly over the facility.
Mean Sea Level (MSL)	The height of the sea surface midway between its average high and low water positions
Medium Intensity Approach Light System with Runway Alignment Indicator Lights (MALSR)	Medium-intensity approach light system with Runway Alignment Indicator Lights. See also Approach Lighting System.
MGTOW	Maximum Gross Takeoff Weight
Military Operation	Aircraft operations by all classes of military aircraft.
Minimum Altitude	An altitude depicted on an instrument approach chart with the altitude value underscored. Aircraft are required to maintain altitude at or above the depicted value.

Term – Abbreviation	Definition
Minimum descent altitude (MDA)	The lowest altitude (in feet MSL) to which descent is authorized on final approach, or during circle-to-land maneuvering in execution of a non-precision approach.
MIRL	Medium Intensity Runway Lights. See Runway Edge Lights.
Missed Approach Point (MAP)	A point prescribed in each instrument approach at which a missed approach procedure shall be executed if the required visual reference has not been established.
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. A modification to an airport design standard related to new construction, reconstruction, expansion, or upgrade on an airport that received Federal aid requires FAA approval.
Movement Area	The maneuvering area, 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
National Airspace System (NAS)	The common network of United States airspace—air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information; and labor and material.
National Plan of Integrated Airport Systems (NPIAS)	The National Plan of Integrated Airport Systems (NPIAS) is an inventory of U.S. aviation infrastructure assets. 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.

Term – Abbreviation	Definition
*Natural Resources and Energy Supply**	Airport development actions have 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 chapter, Federal Aviation Administration (FAA) environmental documents must evaluate potential impacts on supplies of energy and natural resources needed to build and maintain airports.
NAVAID	Navigation Aid
Navigation Aid (NAVAID)	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 civil twilight and the beginning of morning civil 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
Non-Movement Area	See Movement Area
Nonprecision Approach	Nonprecision approach procedure means a standard instrument approach procedure in which no electronic glide slope is provided.
NPIAS	National Plan of Integrated Airport Systems
Object	Includes, but is not limited to above ground structures, NAVAIDs, people, equipment, vehicles, natural growth, terrain, and parked aircraft.
Object Free Area (OFA)	An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.
Obstacle Clearance Surface (OCS)	An inclined obstacle evaluation surface associated with a glidepath (glideslope).

Term – Abbreviation	Definition
Obstacle Free Zone (OFZ)	The OFZ is the airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway, and for missed approaches. The OFZ is sub-divided as follows: Runway OFZ. The airspace above a surface centered on the runway centerline. Inner-approach OFZ. The airspace above a surface 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.)
OCS	Obstacle Clearance Surface
OIS	Obstacle Identification Surface
Operation	A takeoff or landing of an aircraft.
PAPI	Precision Approach Path Indicator
PCL	Pilot Controlled Lighting
Pilot Controlled Lighting (PCL)	Pilot Controlled Lighting (PCL), also known as Aircraft Radio Control of Aerodrome Lighting (ARCAL) or Pilot Activated Lighting (PAL), is a system which 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 depicts the routes that guide the pilot from the en route segments to the IAF.

Term – Abbreviation	Definition
Precision Approach	Approaches are classified as either precision or nonprecision, depending on the accuracy and capabilities of the navigational aids (navaids) used. Precision approaches utilize both lateral (localizer) and vertical (glideslope) information. Nonprecision approaches provide lateral course information only.
Precision Approach Path Indicator (PAPI)	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 5 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.
Precision Approach Procedure	Precision approach procedure means a standard instrument approach procedure in which an electronic glide slope is provided, such as ILS and PAR.
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
RCO	Remote Communications Outlet
REIL	Runway End Identifier Lights
Remote Communications Outlet (RCO)	A Remote Communications Outlets (RCO) is an isolated aviation band radio transceivers, established to extend to communication capabilities of Flight Service Stations (FSS).
ROFA	Runway Object Free Area

Term – Abbreviation	Definition
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.
Runway End Identifier Lights (REIL)	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 (RPZ)	An area off the runway end to enhance the protection of people and property on the ground.
Runway Safety Area (RSA)	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."
Runway Visibility Range (RVR)	The instrumentally derived horizontal distance a pilot should be able to see down the runway from the approach end, based on either the sighting of high-intensity runway lights, or the visual contrast of other objects.

Term – Abbreviation	Definition
Runway Visibility Value (RVV)	The visibility determined for a particular runway by a transmissometer.
Short-Term	The first five years of an airport planning period
SHPO	State Historic Preservation Commission
Small Aircraft	Small aircraft means aircraft of 12,500 pounds or less, maximum certificated takeoff weight.
*Social Impacts**	Social impacts are those associated with the relocation of any business or residence, alter surface-transportation patterns, 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. 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.
SRE	Snow Removal Equipment
Stopway	A defined rectangular surface beyond the end of a runway prepared or suitable for use in lieu of runway to support an airplane, without causing structural damage to the airplane, during an aborted takeoff.
TAF	Terminal Area Forecasts. For the purposes of this study, TAF refers to the forecasts prepared by the FAA for airport planning purposes and not the aviation weather report by the same term.
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 surface 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.
TCH	Threshold Crossing Height

Term – Abbreviation	Definition
Terminal Area	Depicts airspace around major airports; normally associated with Class B and Class C airspace.
Terminal Area Forecasts (TAF)	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.
Terminal Procedures	See Instrument Approach Procedure
*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 (critical habitat). For purposes of this Chapter, 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 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.
*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	Visual Approach Slope Indicator
Very High Frequency (VHF)	A band of radio frequencies falling between 30 and 300 MHz
VFR	Visual Flight Rules

Term – Abbreviation	Definition
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.
VHF	Very High Frequency
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 (VASI)	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 Descent Point (VDP)	A defined point on the final approach course of a nonprecision straight-in approach procedure, from which normal descent from the MDA to the runway touchdown point may be commenced, provided the runway environment is clearly visible to the pilot.
Visual Flight Rules (VFR)	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 (VMC)	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	Visual Meteorological Conditions
VNAV	Vertical Navigation
*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.

Term – Abbreviation	Definition
*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.
Wide Area Augmentation System (WAAS)	A differential global positioning system (DGPS) that improves the accuracy of the system by determining position error from the GPS satellites, then transmitting the error, or corrective factors, to the airborne GPS receiver.
*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).

Table A-1 - Terms and Abbreviations 1

APPENDIX 2 - ENVIRONMENTAL CORRESPONDENCE

Pending reply from agencies

APPENDIX 3 - WILDLIFE HAZARD ASSESSMENT SITE VISIT

Pending (scheduled for spring 2015)

APPENDIX 3 - 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 Stantec Project Manager for inclusion in this report.

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

[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.

Reference: Plymouth Municipal Airport Wetland Delineation and Reconnaissance Report, Plymouth, New Hampshire

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) 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.

Reference: Plymouth Municipal Airport Wetland Delineation and Reconnaissance Report, Plymouth, New Hampshire

Wetland ID	Wetland Type(s)	Wetland Characteristics	Important Information
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.
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.

Reference: Plymouth Municipal Airport Wetland Delineation and Reconnaissance Report, Plymouth, New Hampshire

Wetland ID	Wetland Type(s)	Wetland Characteristics	Important Information
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.

Reference: Plymouth Municipal Airport Wetland Delineation and Reconnaissance Report, Plymouth, New Hampshire

- 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.

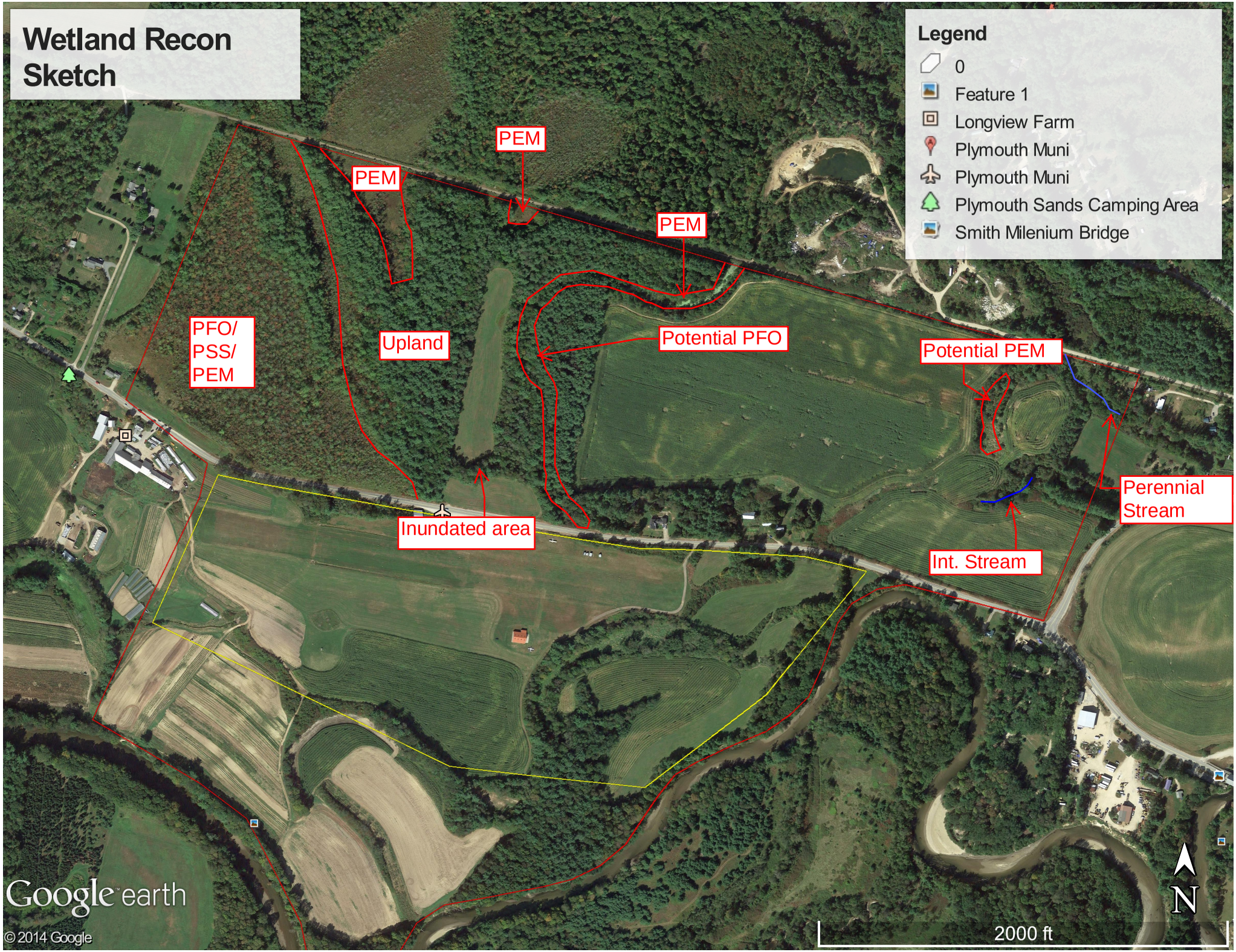
Sean P. Moriarty

Sean P. Moriarty
Wildlife Biologist | Project Manager
Phone: (207) 729-1199
Fax: (207) 729-2715
sean.moriarty@stantec.com

Attachments: Figure 1. Wetland Delineation Map
Figure 2. Natural Resource Reconnaissance Sketch
Representative Site Photographs
Corps Plot Forms

Reference: Plymouth Municipal Airport Wetland Delineation and Reconnaissance Report, Plymouth, New Hampshire

FIGURE 1. WETLAND DELINEATION MAP


Wetland Recon Sketch
Legend
0
Feature 1
Longview Farm
Plymouth Muni
Plymouth Muni
Plymouth Sands Camping Area
Smith Milenium Bridge
PEM
PEM
PEM
PFO/ PSS/ PEM
Upland
Potential PFO
Potential PEM
Perennial Stream
Inundated area
Int. Stream
Google earth
© 2014 Google
N
2000 ft

Reference: Plymouth Municipal Airport Wetland Delineation and Reconnaissance Report, Plymouth, New Hampshire

REPRESENTATIVE SITE PHOTOGRAPHS

Photo 1. Wetland 01SMA (October 2014, Stantec)

Photo 2. Wetland 01SMB (October 2014, Stantec)

Reference: Plymouth Municipal Airport Wetland Delineation and Reconnaissance Report, Plymouth, New Hampshire

Photo 3. Wetland 01SMC (October 2014, Stantec)

Photo 4. Wetland 01SME (October 2014, Stantec)

Reference: Plymouth Municipal Airport Wetland Delineation and Reconnaissance Report, Plymouth, New Hampshire

Photo 5. Stream 01SM (October 2014, Stantec)

Photo 6. Stream 02SM (October 2014, Stantec)

Reference: Plymouth Municipal Airport Wetland Delineation and Reconnaissance Report, Plymouth, New Hampshire

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
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--

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
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--
--	--	--	--	--	--	--	--	--	--

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 5 - MEETING MINUTES

Pending completion of the draft report