Plymouth Municipal Airport

Technical Master Plan Update 2022

Plymouth Technical Master Plan Update

Executive Summary

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Chapter 1

1.1 Introduction

An airport master plan describes and depicts the short, inAn airport master plan describes and depicts the short, intermediate, and long-term goals of an airport. A study is needed to address key issues, objectives, and goals pertinent to the airport's development over a 20-year planning period. The Federal Aviation Administration (FAA) recommends that an airport update its master plan every seven to ten years. The previous Master Plan Update for Plymouth Airport (PYM) was conducted in 2011, and as the aviation industry has evolved since, it is necessary to ensure safety and capacity needs are met. Planning studies that encompass major revisions are referred to as "Master Plans" while those that only address particular components of the existing document and require a reduced level of effort are referred to as "Master Plan Updates." The following Technical Master Plan Update has been developed with a focus on airside infrastructure (areas of the airport that support aircraft activity).

The Plymouth Airport Technical Master Plan Update (TMPU) has been undertaken to review existing conditions, formulate an aviation demand forecast, develop a runway length analysis with corresponding alternatives, conduct an overview of the affected environment, update the airport layout plan based on the preferred alternative and assist the Airport by developing financial and proposed project implementation considerations. The intent of this focused Technical Master Plan is to determine if the current airside infrastructure is appropriate for the level of traffic at Plymouth or if changes are necessary to accommodate the current and future use of the airport. Airside facilities include areas of the airport where aircraft move, from the apron side of the terminal to the runways and taxiways. The landside of the airport includes the area from the terminal to the airport boundary, to include hangars, fuel farms, garages, parking lots etc. The Technical Master Plan Update will focus on airside requirements only.

Figure 1-1: Plymouth Municipal Airport Terminal Entrance

1.2 Purpose And Need

According to the Town Of Plymouth Annual Report, "The Mission of the Plymouth Airport Commission is to develop, operate and maintain the Plymouth Municipal Airport in a safe, efficient, and fiscally responsible manner that promotes general aviation, stimulates the economy, and supports the local community."

In alignment with its mission the Plymouth Airport Commission has undertaken this Technical Master Plan Update to determine if Plymouth Municipal Airport has the essential operational features needed for the existing operators, and serving the community in the safest, most efficient manner or if additional infrastructure is needed to accommodate growth and changing operational requirements.

1.3 Guiding Principles

Below are a series of guiding principles that were developed through open discussion between the Plymouth Airport Commission and other airport stakeholders during a series of workshops. These guiding principles serve as goals during the evaluation of planning concepts, selection of a preferred development option, development of a capital improvement program for the Airport, and determination of other major decisions during the planning process.

1. Create a transparent track to encourage public involvement in the Master Planning process to ensure that airport Stakeholders have the opportunity to provide input on future development.
2. Ensure all facilities at Plymouth Municipal airport are at critical mass, so as to service all operational requirements without overbuilding infrastructure.
3. Develop existing airfield conditions and identify future conditions that currently do not or will not meet FAA design requirements as stated in Advisory Circular 150/5300-13A.
4. Strive to take advantage of any and all opportunities to increase safety for both airport users and the surrounding communities.
5. Consider environmentally viable solutions for the future of the airport and invest in Clean Energy opportunities.
6. Ensure that Plymouth Municipal Airport continues to be an economic driver for the community and contributes to the growth of the Town of Plymouth and the surrounding communities.

Figure 1-2: Plymouth Airport Airfoil

1.4 Public Participation/Engagement

The FAA, in 1995 created the Community Involvement Policy Statement, which established the agency's commitment to community involvement. The goals of this policy are:

> *"Provide active, early, and continuous public involvement.*
> *Offer reasonable public access to information.*
> *Give the public an opportunity to comment prior to key decisions.*
> *Solicit and consider input on plans, proposals, alternatives, impacts, mitigation, and decisions."*
> -AC 150/5050-4A

Public Involvement in any plan plays a crucial role in determining future needs. An airport provides service to, is impacted by, and impacts a significant number of groups including airport users, property owners, local businesses, etc. While this is a Technical Master Plan Update and not a full Master Plan, it remains important to gain as much public interest as possible through public notification channels, direct contact with abutters and local interest parties, several public meetings, and the acceptance and incorporation of public comment.

The Public Engagement Plan, which has been prepared for the Plymouth Airport Commission by its consultant, DuBois and King, is attached in Appendix A, with changes to the plan noted as the process was completed. The consultant provided insight and input into issues that arose throughout the process, as well as provided general information.

The inclusion of all Stakeholders is an integral part of ensuring the future of Plymouth Municipal Airport represents the needs of the surrounding community. Close attention was given to the inclusion of Airport neighbors. Three meetings were held to inform the public of the Master Planning process and solicit comments on the future of Plymouth Municipal Airport. These comments were carefully considered, and whenever possible were incorporated into the document and the developed alternatives.

The first Public Meeting regarding the Plymouth Aiport Technical Master Plan Update was held on January 13th, 2022. The meeting was held virtually due to COVID-19 protocols. There were approximately 30 people in attendanc, and the meeting started at 7:05pm to give attendees a chance to finish logging in.The purpose of the Public meeting was to introduce the purpose of the Technical Master Plan Update, Master Planning Process, the team involved in the plan and the projected timeline. An introduction from the PAC Chairman, Ken Fosdick proceeded the D&K presentation and comments/ questions were received following the presentation. Meeting minutes are provided in Appendix B.

The second Public Meeting regarding the Plymouth Aiport Technical Master Plan Update was held on April 27th, 2022. The meeting was held at 7PM in the Hangar Conference Room at Plymouth Municipal Airport. There were approximately 50 people in attendance. The purpose of the Public meeting was to introduce the four developed Alternatives purposed as part of the Technical Master Plan Update. An introduction from the PAC Chairman, Ken Fosdick proceeded the D&K presentation and comments/ questions were received following the presentation. Meeting minutes are provided in Appendix B.

The third Public Meeting was held on July 20th, 2022. The meeting was held in person, at the Airprot and was advertised in the local newspaper, on social media, through the Airport website and via an Airport email list that included email addresses collected via the PlymouthAirportMasterPlan email address set up to received comments and questions during the Master Planning Process. There were approximately 30 people in attendance. The purpose of the Public meeting was to review the developed Alternatives and suggest a preferred

Alternative for questions and comments from the Public. Meeting minutes are provided in Appendix B.

A fourth Public meeting will be held once this document has been completed to showcase the preferred Alternative and discuss next steps with the Public. At the time of this writing, the meeting date for the fourth Public meeting has not been determined.

1.5 Preparation of this Master Plan Update

Preparation of this Update and the associated Airport Layout Plan (ALP) were completed following established federal and to a lesser extent, state guidelines, beginning with an approved scope of work developed for the Plymouth Airport Commission, through the combined effort of DuBois & King, the Town of Plymouth,Town of Carver, MASSDOT, and the FAA. In addition, DuBois & King relied on a number of FAA documents, primarily Advisory Circulars (AC), as well as various FAA Orders and related material for both technical and editorial guidance. The following list contains the principal documents used in the preparation of this document.

- 14 CFR, Part 77, Safe, Efficient Use, And Preservation of the Navigable Airspace
- AC 150/5070-6B, Airport Master Plans
- AC 150/5300-13B, Airport Design
- AC 150/5325-4B, Runway Length Requirements for Airport Design
- AC 150/5340-1L, Standards for Airport Markings
- Airport Sponsor Assurances
- ARP, Standard Operating Procedure (2.00) for FAA Review and Approval of Airport
- Layout Plans (ALPs)
- FAA Aerospace Forecasts (2021-2041)
- FAA Policy and Procedures Concerning the Use of Airport Revenue, Federal Register
- FAA Terminal Area Forecasts (2020-2045)
- National Plan of Integrated Airport Systems (NPIAS) (2021-2045)
- Order 5100.38D, Airport Improvement Program
- Order 5190.6B, Airport Compliance Manual
- 2011 PYM Master Plan Update
- 2016 West Plymouth Master Plan
- 2010 Massachusetts Statewide Airport System Plan

1.6 Master Plan Update Elements

The required and recommended contents of this Master Plan Update were derived from the Federal Aviation Administration under Advisory Circular (AC) 150/5070-6B; Airport Master Plans. Additional guidance was provided by FAA AC 150-5350-13A; Airport Terminal Planning, and AC 150/5300-13A; Airport Design. Effective airport plans are based on the analysis of significant quantities of data. Previous airport master plans (in the case of Plymouth 2011 Master Plan Update) typically present planning conclusions, data, and accompanying analysis in considerable detail.

This Technical Master Plan Update presents extensive data to support the plan in a series of chapters and appendices. Narrative report chapters contain key study information. As the reader moves through the narrative report, there are frequent references to specific appendices to provide additional technical details and data.

This Technical Master Plan Update is organized in the following seven (7) chapters and three (3) appendices:

Chapter One-Introduction

This chapter provides a cursory overview of the document and its development.

Chapter Two–Inventory of Existing Facilities

This chapter provides an inventory of facilities and conditions that currently exist at the Plymouth Municipal Airport (PYM). These baseline conditions allow evaluation of existing facility performance against anticipated future needs.

Chapter Three-Aviation Forecast

The Aviation Activity Forecasts chapter of the Airport Master Plan analyzes current and future airport activity at the Plymouth Municipal Airport (PYM). Forecasting provides an airport with a general idea of the magnitude of growth, as well as fluctuations in activity anticipated over the forecast period. They assist the Airport in determining existing and planned future facility needs based on airport activity level estimates and projections. Forecasts attempt to develop a realistic estimate of future changes.

Chapter Four–Facility Requirements

This chapter identifies existing and long-range airside facility requirements anticipated through the year 2042. The capacity of existing facilities is described and assessed against aviation demand projections developed under Chapter Three - Aviation Forecasts of this plan. T

Chapter Five–Alternatives

The chapter follows the process of developing alternative layouts for airside facilities to meet the needs described in the Facility Requirements of this plan. This Chapter will explore and identify options that best meet projected facility requirements and address the goals of the PYM Technical Master Plan Update. The layouts are assessed for expected aeronautical utility, fiscal feasibility, environmental impacts, and operational performance. This analytical process considers public input and opportunities or constraints discovered on site.

A preferred alternative is chosen during the development of this Chapter.

Chapter Six–Airport Layout Plan Update

This chapter presents a selected alternative in a graphic form, essential to receiving FAA approval.

The ALP set contains the following sheets:

1. **Cover Sheet -** The cover sheet provides a listing of sheets that comprise the ALP set, location and vicinity maps, and Town of Plymouth, FAA, and MassDOT Aeronautics Division project numbers.
2. **Existing Airport Layout -** A drawing depicting the current airport layout in accordance with the FAA New England Region ALP checklist directives.

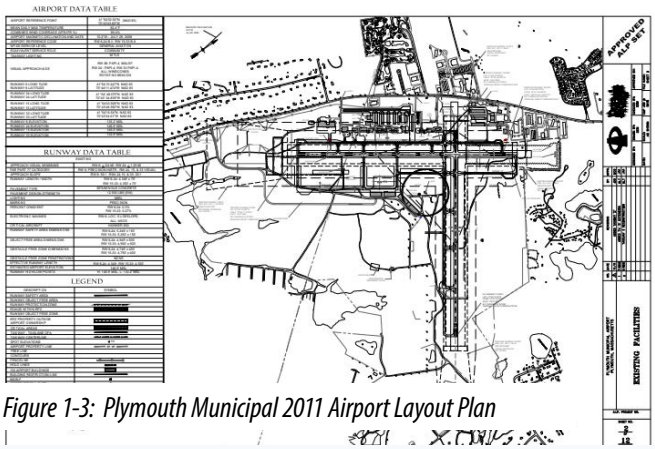


Figure 1-3: Plymouth Municipal 2011 Airport Layout Plan

3. **Ultimate Airport Layout Plan - A**n Airport Layout Plan in accordance with industry and FAA guidelines. This drawing will depict the recommended development identified in Chapter Five; Alternatives and all pertinent data blocks as required in accordance with FAA New England Region Airport Layout Plan Checklist.
4. **Terminal Area Plan -** A terminal area plan illustrating existing conditions that support the current uses of the airport. The drawing will include those features as required by the FAA New England Region Airport Layout Plan Checklist.
5. **Airport Airspace Plan -** An airport airspace plan for all ultimate FAA Part 77 imaginary surfaces, including approach slopes and any height or slope protection established by local zoning ordinances. The drawing will include those features in accordance with the FAA New England Region Airport Layout Plan Checklist.
6. **Inner Portion of the Approach Surface Drawing -** An inner approach surface and runway protection zone control including a plan and profile of the ultimate runway protection zones and inner approach surface areas showing the controlling obstructions therein, their top elevations and proposed disposition. The drawing will

include those features in accordance with the FAA New England Region Airport Layout Plan Checklist such as the Runway End Siting Surface, 14 CFR Part 77 Surfaces, and Engineering Brief 99a.

The ALP plan set will be uploaded into the FAA's OE/AAA system.

Chapter 7–Financial/Implementation Plan

This chapter includes an implementation plan along with a short, medium and long-term capital plan designed to assist Plymouth in implementing the Plan's alternatives. The capital plan identifies potential funding sources and outlines the timing and cost of implementation.

Appendices

Appendix A-PYM TMPU Public Engagement Plan
Appendix B-PYM TMPU Meeting Notes and Public Comments
Appendix C-Airport Layout Plan
Appendix D-Noise Abatement Procedures
Appendix E-Abbreviations

This Technical Master Plan Update is delivered in this report format. The FAA does not "approve" Master Plans; rather, they "accept" them. This Technical Master Plan Update will also deliver an updated Aviation Forecast and an Airport Layout Plan. The FAA does approve aviation forecasts and airport layout plans once they find them acceptable. The Aviation forecast developed in Chapter Three was approved by the FAA prior to the development of Chapter Four; Facility Needs. The Airport Layout Plan was reviewed by the FAA as part of the Master Planning process and uploaded into the FAA OE/AAA system. Once conditionally approved, projects identified will be eligible for FAA funding and may be constructed after proper National Environmental Policy Act (NEPA) environmental review.

The Airport Layout Plan set was prepared and provided to the Plymouth Airport Commission as full-sized drawings.

1.7 Sources of Funding

An implementation plan considers the airport's ability to fund the projects identified in the master plan. Financial feasibility is a major consideration in developing the implementation plan and Capital Improvement Plan (CIP).

Sources of Funding

Airport funding for projects is derived from many sources and funding sources can be categorized into three main categories:

- Federal funding
- Discretionary funding
- State funding
- Local or Private funding

These funding sources, together with airport funds and bond proceeds, are usually combined to produce the total funds required for capital projects. A description of each of the funding sources utilized by Plymouth Municipal Airport is summarized as follows:

Federal

Most funding for airport development comes from federal government programs. Currently, the most predominant program is the Airport Improvement Program, commonly referred to as AIP, managed by the Federal Aviation Administration (FAA). Public-Use airports that are part of the National Plan of Integrated Airport Systems (NPIAS) qualify for AIP funding. Although there are some exceptions, the current legislation limits the federal share of allowable AIP costs at 90 percent for most non-hub primary or smaller airports. The remaining 10 percent is considered the local share. The Massachusetts Department of Transportation, Office of Aeronautics provides a 5 percent match with most AIP funds leaving Plymouth with a 5 percent share of the project cost.

Examples of Eligible Versus Ineligible AIP Projects	
Eligible	**Ineligible Projects**
Runway construction/rehabilitation	Maintenance equipment and vehicles
Taxiway construction/rehabilitation	Office and office equipment
Apron construction/rehabilitation	Fuel farms*
Airfield lighting	Landscaping
Airfield signage	Artworks
Airfield drainage	Aircraft Hangars*
Land acquisition	Industrial park development
Weather observation stations (AWOS)	Marketing plans
NAVAIDs such as REILs and PAPIs	Training
Planning studies	Improvements for commercial enterprises
Environmental studies	Maintenance or repairs of buildings
Safety area improvements	
Airport layout plans (ALPs)	
Access roads only located on airport property	
Removing, lowering, moving, marking, and lighting hazards	
Glycol Recovery Trucks/Glycol Vacuum Trucks** (11/29/2007)	

Non-Primary

According to the NPIAS, Plymouth is categorized as a non-primary airport based on the number of annual commercial enplanements. Non-primary airports which typically serve General Aviation (GA) receive non-primary entitlements, typically of $150,000 annually. This funding can be used to support airport infrastructure improvements and other operationally eligible projects.

Discretionary

Discretionary funding is used for higher priority AIP-funded projects where non-primary entitlements are not sufficient to cover the total federal share. Most AIP-eligible projects would be eligible for discretionary funding. However, the assignment of discretionary funds is determined by the FAA, and extensive coordination with the FAA is required to determine the potential availability of discretionary funding for specific projects. Individual projects are given a weighted National Priority Rating based on project purpose, type, component, and airport type. Safety and preservation projects of AIP-funded runways rank the highest but are ranked against other projects and facilities regionally andnationally. In-depth discussions with FAA representatives are necessary to determine the potential availability of discretionary funding for an AIP-funded project.

CARES Act and Similar Funding Sources

The CARES Act, Coronavirus Aid, Relief and Economic Security, was signed into law in March or 2020 and provides funding to increase the match of AIP grants to 100% as well as providing supplemental discretionary funding for airports.

State

State funding for airport development is managed by the Massachusetts Department of Transportation's Office of Aeronautics. This funding, held in the Massachusetts Aeronautics Fund, comes primarily from aviation fuel taxes and aircraft registration fees. Airports may apply for funds to cover up to 80% of the project funding, while the airport is responsible for the 20% local match. This funding can be used for non-AIP eligible development projects including equipment.

Local or Private

Local and private funding satisfies additional needs for infrastructure support at Plymouth. These funds are typically used for projects that are ineligible for Federal funding or need to be moved forward faster than the federal timeline allows.

Local Funds

Local share funding is obtained from the Airport Enterprise Account. The airport receives income from two primary sources: land leases and the sale of aviation fuel. Once expenses are covered, any remaining funds are moved to the enterprise account to cover capital projects.

Private Funds

There are many projects, primarily hangars, which exist to benefit an individual or company. Since demand for these structures is very specific, private funding is typically used to construct these facilities. Land is leased to the entity to

build these privately funded hangars which add to the tax base of the town and produce rental income to the airport enterprise account.

1.8 Completed Projects

Projected Improvements

The previous Master Plan Update completed in 2011 recommended a number of projects meant to increase airport safety and ensure compliance with FAA standards. Numerous improvements have been made based on these previous recommendations. The Plymouth Airport Commission, together with Airport Management and other Stakeholders are constantly evaluating the changing needs of the airport, prioritizing projects that continue to align with the Airport's mission. The projects in Table 1-1 have been completed since the 2011 Master Plan Update with Federal Funds.

Table 1-1 Federally Funded Projects

Fiscal Year	Project	AIP Federal Funds
2011	Rehabilitate Taxiway	$1,724,250
2012	Environmental Mitigation	$369,000
2013	Conduct Environmental Study	$85,581
2014	Conduct Environmental Study	$67,500
2015	Extend Runway 15/33	$7,432,200
2016	Conduct Miscellaneous Study	$88,621
2017	Conduct Environmental Study	$210,960
2018	Environmental Mitigation	$81,000
2018	Wildlife Hazard Assessment	$92,700
2018	Extend Taxiway	$2,365,112
2019	Remove Obstructions	$152,292
2020	Extend Taxiway	$51,362
2020	Shift or Reconfigure Existing Taxiway	$3,587,931
Total		16,308,509

Additionally, projects, listed in Table 1-2, have been completed in the last 10 years with local, state, and private funding.

Table 1-2 Local/State/Private Funded Projects

Fiscal Year	Project	Local/ State Funds
2018	Ultimate Fuel Farm	$600,000
2020	Terminal Development	$5,288,211
2020	Acquire SRE Building	$203,000
Total		$6,091,211

As shown above Plymouth Airport has been consistent with completing necessary projects to maintain the airport in safe and efficient condition. Infrastructure has been incorporated as necessary for growth. This Technical Master Plan update focuses on the airside facilities necessary to keep up with current demand, ensure federal compliance and maintain the airport to appropriate safety standards. A detailed forecast in Chapter 3 will address future infrastructure needs.

Chapter 2

2.1 General

Plymouth Municipal Airport (PYM), originally constructed as a grass airfield in 1934, is located on Massachusetts' historic South Shore, an area along the Cape Cod Bay, stretching south and east from Boston, toward Cape Cod. It is one of 37 public airports in the Commonwealth of Massachusetts and provides necessary access to Southeastern Massachusetts for general aviation, corporate, and business traffic alike.

The Airport is owned by the Town of Plymouth and operated by the Plymouth Airport Commission (PAC), a 7 person commission appointed by the SelectBoard and tasked with operating the airport in a "safe and efficient manner so that it may continue to be a valuable asset for the Town of Plymouth." The airport is considered an enterprise account within the Town of Plymouth, a department reporting to the Assistant Town Manager. Plymouth is operated on the revenue generated by the operations of the airport and is considered in good standing with the Town. The airport is home to nearly 30 businesses and employs approximately 250 people, one of many contributions it makes to Plymouth County.

The Airport Commission has a successful relationship with Airport users and the Businesses operating at the airport. They strive to continually make decisions that are in the best interest of the airport, its users and the surrounding community.

It is of vital importance to the airport to act as a "good neighbor" to the surrounding community. Though the airport typically averages about 20 noise complaints a year, issues are handled promptly and brought to resolution. The Commission works to identify the nature of all noise complaints and works diligently to minimize noise impacts whenever possible.

2.2 Airport Background

2.2.1 History

The history of Plymouth Municipal airport extends back to its early grass-root days in 1934. Until it was purchased by the Department of the Navy in 1942, Plymouth existed as a large circular grass field airport in which aircraft could land into the prevailing wind, no matter the direction. The Navy, in the early years of WWII, purchased the airport for training and coastal defense, selling it to the Town of Plymouth seven years after the end of the War.

The following timeline shows the early development of the Plymouth Municipal Airport as well as improvements made through the FAA Funded Programs.

Figure 2-1: PYM from the southeast, 2005 MPR

Figure 2-2: Plymouth Airport 1942

- 1934: Grass airfield was constructed by Mr. Edward Griffith
- 1942: Airfield was purchased by Department of the Navy, existing runway configuration established
- 1952: Town of Plymouth purchased the Airfield and appointed Airport Commission
- 1954 Runway 6/24 was paved
- 1956 First Hangars were Privately Constructed
- 1968 Runway 15/33 was paved
- 1972 Terminal Construction
- 1983: Airport Master Plan Study
  - Runway Rehabilitation Projects
  - Installation of NAVAIDS
- 1991: Airport Master Plan Study
  - Rehabilitate Runway and widen to 75-ft,
  - Construct Apron,
  - Construct Taxiway
- 1999 Runway, Taxiway, Apron and Lighting Improvements
- 2003 Instrument Landing System on Runway 6
- 2011: Technical Master Plan Update
  - Runway and Taxiway Improvements
- 2020 Development of New Administration Building

Figure 2-3: Plymouth Airport 2008

Figure 2-4: Taxiway E Construction

Plymouth Airport Commission conducted a Master Plan Update (MPU) in 2011 and has benefitted from the strong support of several key stakeholders. The 2011 MPU revealed an unconstrained ultimate length for Runway 6-24 of 5,500-ft. Due to physical and environmental constraints, a 5,000-ft runway was recommended. Concerns were raised by neighbors and citizens of West Plymouth and the Plymouth Airport Advisory Group (PAAG) was formed to assist in resolving the concerns. After a year-long mediation process, a consensus was reached and it was determined that Runway 15-33 be extended 1000-ft with a 300-ft stopway. A 300-ft stopway was also added to the end of the Runway 6-24, which provided a runway length of 4350-ft, plus a 300-ft stopway on both runways. Consistent with Grant Assurance 5, Preserving Rights and Powers, states that the sponsor may not take or permit any action which would operate to deprive it of any of the rights and powers necessary to perform any or all of the terms, conditions, and assurances. In part, the Plymouth Airport Commission at that time, felt it inappropriate to inadvertently tie the hands of a future Commission without violating this Assurance and therefore it was agreed that the Commission would wait 10 years before re-evaluating the runway length. Now, 10 years later, the Town of Plymouth, with FAA funding, is reevaluating the current and future needs of the Airport including a Runway Length Analysis.

Figure 2-5: Plymouth Airport Committee

2.2.2 Airport Role

The National Plan of Integrated Airport Systems (NPIAS) is a nationwide plan sponsored by the FAA that groups airports into several classes based on their capacity and the type of operations that they service. The Plan offers a top-down view, showing how aircraft across the country work together to benefit the entire airport system This plan assists the FAA in determining funding for airports within the system. Public-Use airports qualify as part of the NPIAS if they meet a set of requirements that include:

- Operated by a sponsor eligible to receive federal funds and meet obligations.
- Used by 10 or more operational and airworthy aircraft based on the airport. The aircraft tail numbers must be provided and validated against the FAA Aircraft Registry.
- Located at least 30 miles from the nearest NPIAS airport. The 30-mile calculation must consider all existing NPIAS airports within a 30-mile radius, even if it is in an adjacent state.
- Demonstrates an identifiable role in the national system (such as a basic, local, regional, or national).
- Included in a state or territory aviation system plan with a role similar to the federal role, and recommended by the airport's state or territory aviation authority to be a part of the NPIAS.
- A review by the FAA finds no significant airfield design standard deficiencies, compliance violations, or wetland or wildlife issues.

The following are the goals of the National Plan of Integrated Airport Systems:

- Airports should be safe and efficient, located where people will use them, and developed and maintained to appropriate standards.
- Airports should be affordable to both users and the Government, relying primarily on producing self-sustaining revenue and placing minimal burden on the general revenues of the local, State, and Federal Governments.
- Airports should be flexible and expandable and able to meet increased demand and accommodate new aircraft types.
- Airports should be permanent with assurance that they will remain open for aeronautical use over the long term.
- Airports should be compatible with surrounding communities, maintaining a balance between the needs of aviation, the environment, and the requirements of residents.
- Airports should be developed in concert with improvements to the air traffic control system and technological advancement.
- The airport system should support a variety of critical national objectives, such as defense, emergency readiness, law enforcement, and mail and shipping needs.
- The airport system should be extensive, providing as many people as possible with convenient access to air transportation.

As designated by the NPIAS, Plymouth Municipal is categorized as a Non-Primary, Regional Airport. Non Primary airports serve mostly general aviation traffic. Categorizing these General Aviation airports more precisely, Regional Airports generally serve large population centers that are serviced by interstates. These

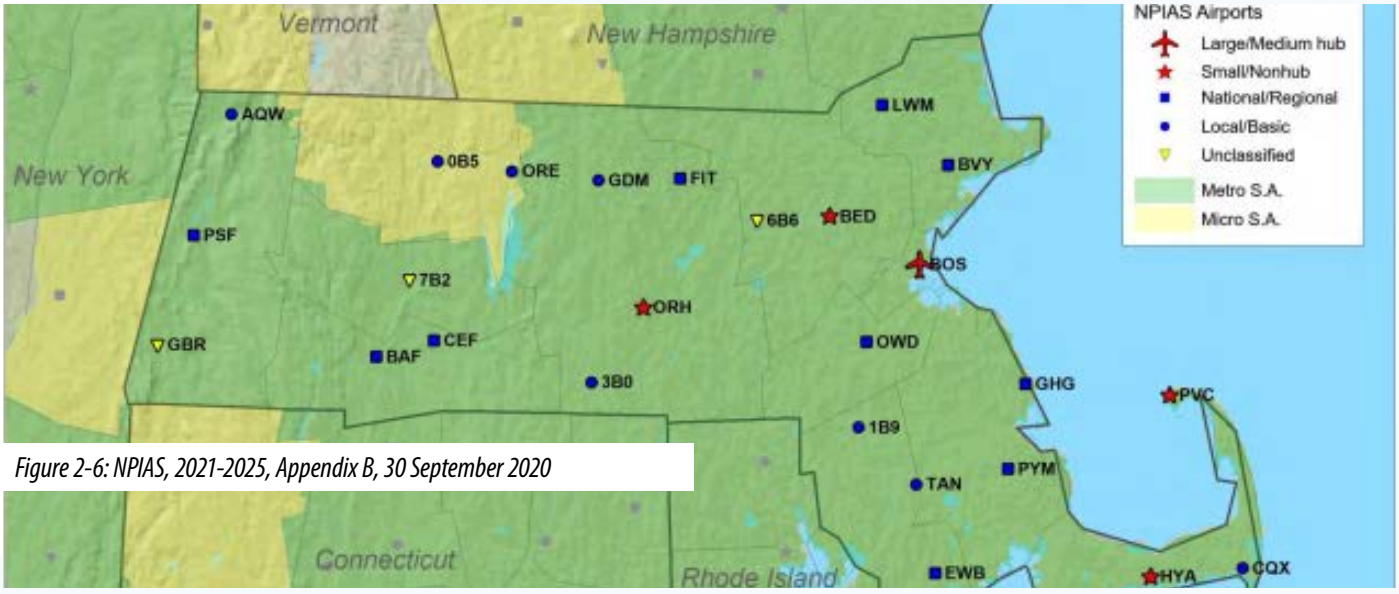


Figure 2-6: NPIAS, 2021-2025, Appendix B, 30 September 2020

airports typically have high levels of activity and according to the 2021-2045 NPIAS average 86 based aircraft, including 6 jets. Plymouth airport exceeds this average in both cases. According to the NPIAS, and shown in Figure 2-7 Regional Airports will focus on reconstruction of airport pavement, compliance with FAA standards, and safety and infrastructure or operational improvements to meet capacity over the next several years.

Plymouth Municipal Airport is also included in the State plan, developed by the Massachusetts Department of Transportation (MASSDOT), Bureau of Aeronautics. The Massachusetts Statewide Airport System Plan (2010) defines General Aviation airports as "either publicly or privately owned public-use airports that primarily service general aviation users." It classifies Plymouth as a General Aviation airport with a "Corporate/Business" role, which is assigned to airports that serve a primary role in the regional economy and can serve all varieties of business and general aviation traffic. The MASSDOT Airport System Plan also lists PYM as being one of only three coastal airports that have high potential for expansion.

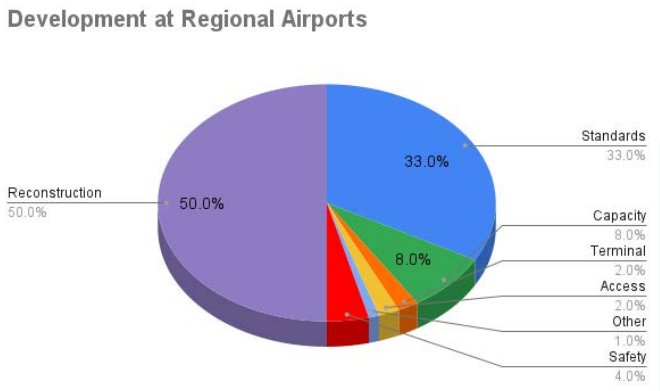


Figure 2-7: Development at Regional Airports; Data obtained from NPIAS

2.2.3 Airport Access

Plymouth Airport is served by State Route 3, the major connector between Boston and the Cape and Islands. It sits 40 miles south of Boston and 30 miles northwest of Hyannis. US Route 44, connects Plymouth to Providence, RI and beyond. Major interstates, I-495 and I-195 are both accessible within 12 miles of the airport and make transportation north into central Massachusetts and south along Buzzards Bay, fast and efficient. The airport itself is served by South Meadow Road, a two-lane paved roadway that connects Plymouth to neighboring Carver. 250 acres of the airport rest inside the Carver town lines while the remaining 500 acres are in Plymouth.

2.3 Airport Service and Socioeconomic Trends

According to the NPIAS the airport system should be extensive and provide convenient access to air transportation to as many people as possible. Air transportation includes not only scheduled air carrier service, but business, corporate and private aviation services.

"Convenient access" is considered land within the Airport Service Area (ASA). For General Aviation airports, the ASA is typically defined anywhere within a 30-minute drive time from the Airport. For Plymouth Airport this includes the counties of Plymouth, Norfolk, Bristol, and Barnstable County on Cape Cod.

The following sections will present historical trends in population, employment measures of income and business climate for the Airport Service Area, Plymouth County and for the Commonwealth of Massachusetts.

2.3.1 Population

The County of Plymouth, Massachusetts has had an average annual growth rate of 2.52% since 1930, increasing from 162,300 to 531,000 people. Since 1930, the ASA has had an annual compounded rate of growth in population of over 1.5% increasing from 0.86 million people in 1930 to over 2.06 million in 2020. The growth rate for the ASA is below the national growth rate (1.87%), but above the state growth rate (0.73%). The growth rate for Plymouth County is above both the national and state rates. Most of the growth in the region occurred between 1950 and 1970, achieving a rate of 2.15% in the 1950s. The growth of Plymouth County has consistently remained above the growth rate of the ASA since the 1950s.

Figure 2-9 illustrates the population density in the ASA by census tract and shows that a majority of the population lives to the north and northwest of Plymouth Municipal Airport with some pockets in Bristol and Barnstable Counties. As such, airport access on routes from the north and west are of primary importance including the Interstate 495, Route 44, and Route 3 corridors.

Population Growth by ASA Municipality: 1930-2020												
Area	Population (In Thousands)										Rate of Growth	
	1930	1940	1950	1960	1970	1980	1990	2000	2010	2020	'20-'30	'10-'20
Barnstable County	32.3	37.3	46.8	70.3	96.7	147.9	186.6	222.2	215.8	229	6.76%	0.61%
Bristol County	364.6	364.6	381.6	398.5	444.3	474.6	506.3	534.7	548.2	579.2	0.65%	0.56%
Norfolk County	299.4	325.2	392.3	510.3	605	606.6	616.1	650.3	671	726	1.58%	0.82%
Plymouth County	162.3	168.8	189.5	248.5	333.3	405.4	435.3	472.8	495	531	2.25%	0.72%

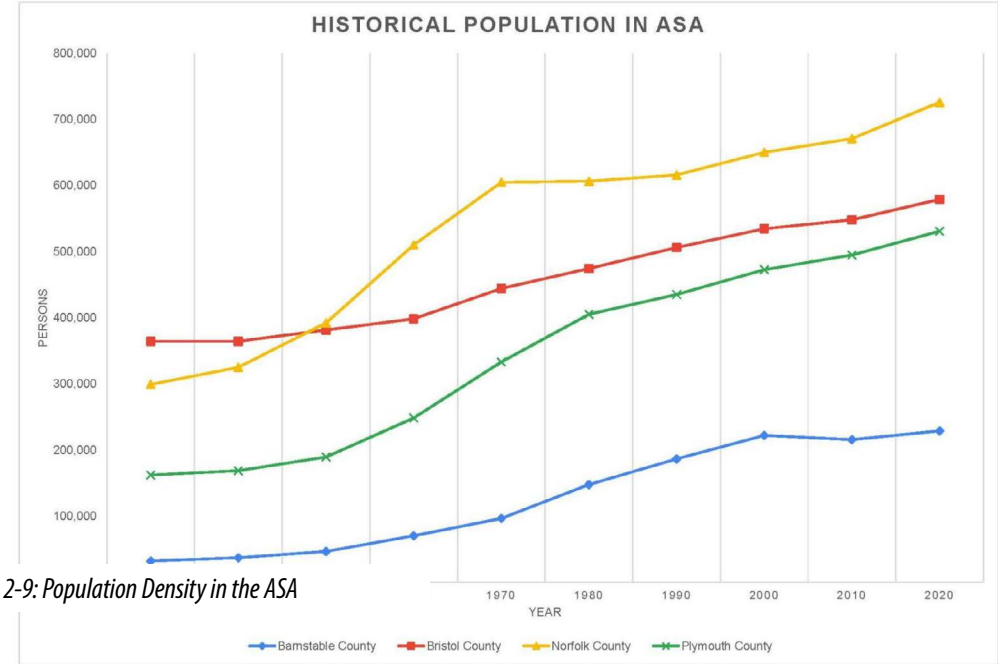


Figure 2-9: Population Density in the ASA

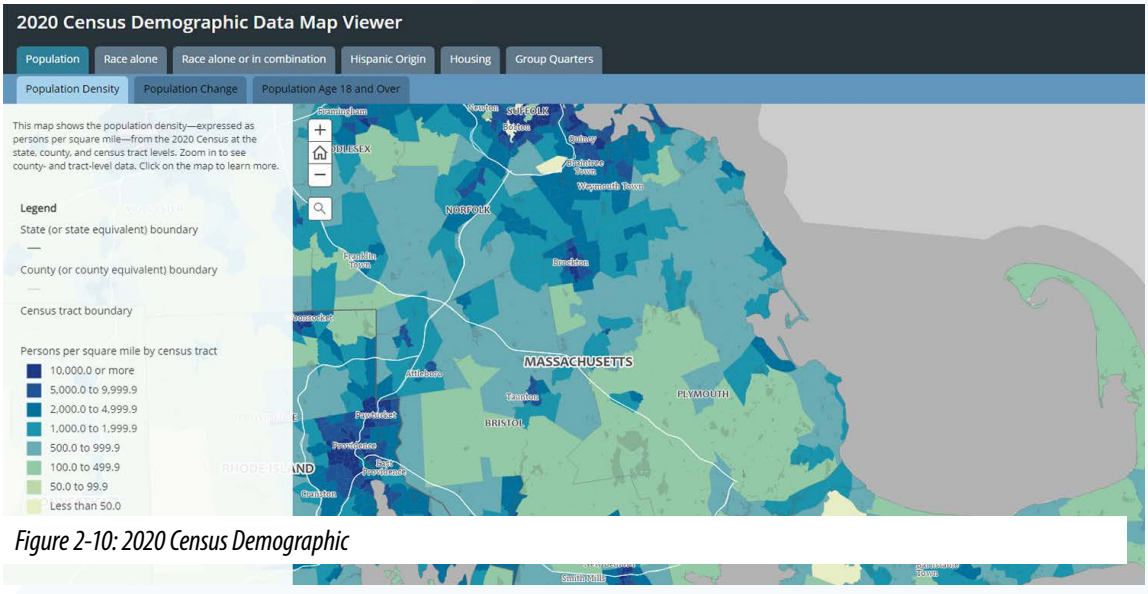


Figure 2-10: 2020 Census Demographic

2.3.2 Employment

Historically since 2010, the ASA and Plymouth County have had unemployment rates that roughly mirror state and national trends. Unemployment and labor force are inversely related. The unemployment rate in the ASA, Massachusetts and the United States was the highest in 2010 and steadily fell for the next decade, while the labor force was the lowest in 2010 and steadily grew over the same period. COVID19 created an anomaly of high unemployment and low labor force beginning in April 2020, both of which are slowly dropping and rising respectively, though neither back to their ultimate lows/highs of late 2019.

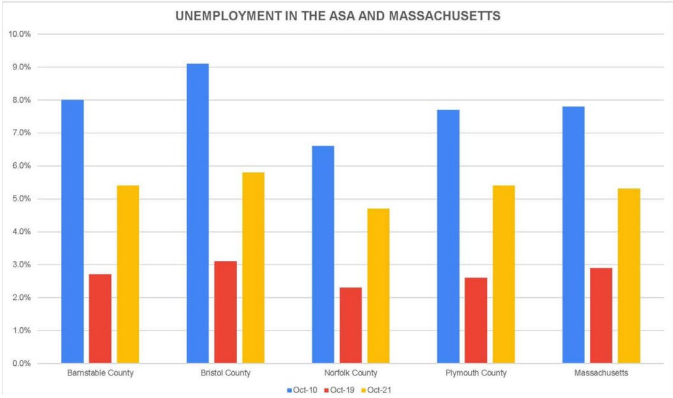


Figure 2-11: Unemployment in the ASA and Massachusetts

The overall labor force has increased in the ASA from approximately 1,039,268 in 2010 to 1,117,817 in 2019 which equates to an 0.84% annual rate of growth, dropping by -0.92% to 1,097,179 in 2021. Total employed persons increased from 931,880 in 2010 to 1,058,545 in 2019 which equates to an annual growth rate of 1.51%.

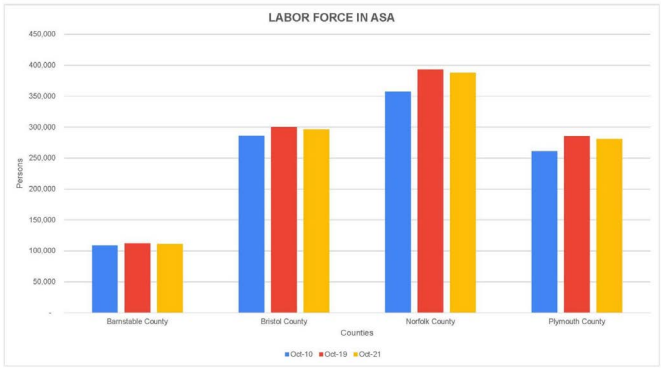


Figure 2-12: Labor Force in the ASA. Source: US Bureau of Labor Statistics, BLS Data Finder

Within Plymouth County, the labor force, employment and unemployment rates are consistent with regional trends. Since 2010, the labor force in Plymouth County was lowest in 2010, with approximately 265,158 persons, and increased to a maximum of 289,635 persons in 2019, which amounts to a 1.66% annual growth rate (to account for seasonal fluctuations, highs and lows analyzed are within the same season). Number of employed persons in Plymouth County has increased at a similar annual growth rate, from 240,867 in 2010 to 277,711 in 2019. The unemployment rate in Plymouth County has decreased since 2010 from 10.10% to 2.5% in 2019 with a spike due to COVID that jumped to 18.3% in April 2020. The rate has significantly fallen since then to 5.4% in October 2021. Both the regional and Plymouth County unemployment rates appear to follow national unemployment rates for the same period, being highest in 2010 and falling consistently until late 2019/early 2020 then spiking due to COVID and gradually falling again through late 2021. Nationally, the unemployment rate in 2010 was approximately 9.8% which decreased to 3.5% in early 2020 before spiking to 14.8% a month later, falling back to 4.2% in late 2021.

2.3.3 Measures of Income

There are three primary measurements of income: median household income, median family income and per capita income. With the exception of Bristol County, the income of individuals in the ASA is well above the national average according to the 2020 Census Estimates of Population and Housing. According to Census 2020 data, the median household income for the United States was $62,843 while for the Commonwealth of Massachusetts the median household income was $81,215 and for Plymouth County, the median household income was $89,489. A majority of this increase in per capita and median household income has come about since 1980. The median household income in the ASA has increased from $17,917 in 1980 to $52,119 in 2000 and to $84,052 in 2020, which is similar for Plymouth County. Per capita income is defined as the total personal income in a geographic region divided by the total population in the region, regardless of age or employment status. In the ASA, per capita income increased from $7,372 in 1980 to $31,093 in 2005 which

Table 2-13: Measures of Income for Plymouth County, Airport Service Area, and Commonwealth of Massachusetts 1980-2018						
Year	Plymouth County		ASA		Massachusettes	
	Median HH	Per Capita	Median HH	Per Capita	Median HH	Per Capita
1980	$18,749	$6,978	$17,917	$7,372	17,575$	$10,103
1990	$40,905	$16,523	$37,602	$16,967	$36,952	$17,224
2000	$55,615	$24,789	$52,119	$25,892	$50,502	$25,952
2010	$72,076	$37,637	$64,782	$35,120	$62,072	$35,547
2019	$89,489	$43,412	$84,052	$44,388	$81,215	$43,761

yields an annual rate of growth of approximately 6%, and to $44,388 in 2020 with a rate of 2.85% in the past 15 years. Within Plymouth County, the increase in per capita income between 1980 and 2005 mirrors that of the ASA. In 1980, Plymouth County's per capita income totaled approximately $6,978. Plymouth County again mirrors the ASA with a per capita income in 2020 of $43,412.

2.3.4 Business Climate

The top five industry sectors for Plymouth County for full-time, year-round employees are healthcare, professional and technical services, finance and real estate, retail, and construction, followed closely by manufacturing and education. The top five sectors make up 57% of the employment in the county. When taking into account all employees, the top five sectors shift slightly to include healthcare, retail, professional and technical services, education, and accommodation and food for 58% of employment, followed by finance and real estate and construction.

The number of business establishments in Plymouth County has increased at a rate of 0.35% annually between 2004 and 2019 with approximately 12,832 establishments in 2019.

2.4 Airport Administration

Plymouth Airport directly employs nine people, for the public 7 days a week from 6am-10pm EST. Positions held are Airport Manager, Assistant Manager, Office manager, and six airport operations/maintenance personnel.

PYM airport employees remain active in the Aviation Industry. They are active members of MAMA (Massachusetts Airport Management Association), several serving as President and on the Board of Directors. Many are also AOPA (Airport Owners and Pilots Association) and EAA (Experimental Aircraft Association) members which allows them to remain current on Aviation related issues.

Figure 2-14: New Arrivals Building Mockup

2.5 Fixed Base Operators and Airport Businesses

The airport's many businesses provide jobs for approximately 250 people. This is of great benefit, not only to the airport but to the community as well. A selection of businesses operating at Plymouth are listed below.

Fixed Base Operators (FBO) at Plymouth are considered any operation that performs two or more core aeronautical services. As such there are multiple FBOs on the field.

The Town of Plymouth operates as a Fixed Base Operation providing fuel, land leases, tie-downs and operation of the Administration building.

Major businesses operating at Plymouth:

Figure 2-15: Professional Jet Center at Plymouth Airport

Professional Jet Center: FAA 145 certified repair station providing Aircraft Maintenance.

Professional Airways: Private jet charter company operating a fleet of Hawker and Falcon jets.

Alpha One: Part 61 flight school, aircraft maintenance and scenic flights.

NexAir: Avionics, FAA Repair Station.

Yankee Air Services: Full Service General Aviation Maintenance Facility.

Heliops: Private Helicopter Charter, Scenic Rides, VIP Transportation.

Northeast Aircraft: Aircraft Parts, Annual Inspections, APU Batteries (Lead, NiCad) Courtesy Transportation, Fabric Covering, Float Repair, Fuel, Hangar Maintenance & Repairs, Oxygen, Parking (Tiedowns).

Ryan Rotors: Helicopter Tours and Agriculture Work.

Boston Medflight: Non-Profit, region's primary provider of critical care medical transport by air (and ground).

Figure 2-16: Boston Med Flight Helicopter

Additional businesses operating at Plymouth Airport:

Technology Service Corporation: Innovative and proven technologies to support, enhance, and train federal, state and local government agencies with their tactical communication requirements.

Final Forge: Human centric technology for the military, law enforcement, first responders and homeland security.

New England Helicopter: Helicopter instruction.

State Police Air Wing: Responds to more than 1900 mission requests annually and is one of the Commonwealth's most versatile assets. Aircrews are routinely called on to work in collaboration with state and local incident commanders to search for wanted, missing, or endangered persons, to conduct airborne incident and scene assessment, aerial photography, or investigative support and surveillance.

Goulian Aerosports / Mike Goulian Aviation: Airshow team, Part 61 Flight school, Authorized Cirrus Service Center (aircraft maintenance), and aircraft management.

Cape Cod Community College: Aviation Maintenance Technology Program provides highly skilled maintenance technicians needed to fill crucial vacancies in the Aviation Maintenance field.

Figure 2-17: Students Training at Cape Cod Community College

2.6 Airspace

Plymouth Airport sits at 148.2 ft above sea level from its perch on the South Shore coast. It is 4 nautical miles southwest of Plymouth village and 30 nm southeast of Boston. The airport is in Class G airspace, with overlying Class E beginning at 700 ft AGL and extending to the overlying Class A airspace at 18,000 ft MSL. The New

York sectional chart shows the Mode C Class B Ring passing directly through the airport, requiring anyone flying north of the airport to have a Mode C transponder equipped aircraft.

Though PYM Airport is uncontrolled and local traffic is coordinated through CTAF, Air Traffic Control is performed enroute by Boston Center with departure/approach traffic separated by Boston Approach and Providence Approach. Pilots in the vicinity of the airport announce their positions on the Common Traffic Advisory Frequency of 122.725."

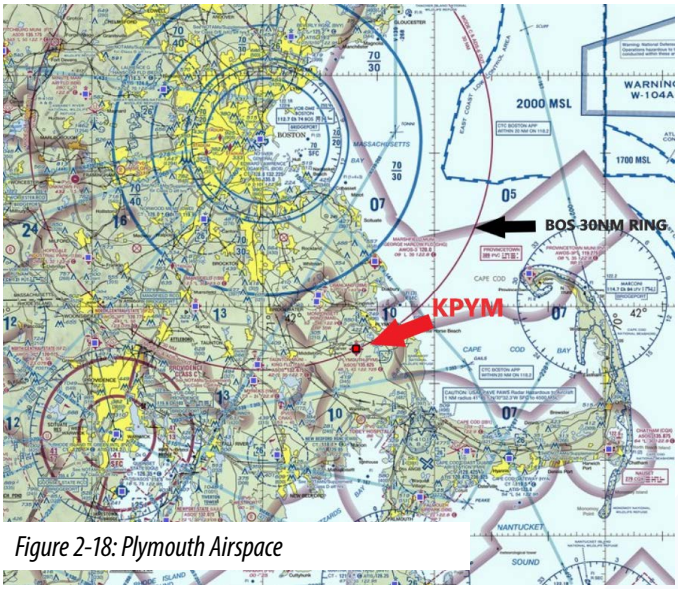


Figure 2-18: Plymouth Airspace

2.7 Weather and Wind Coverage

Plymouth, Massachusetts has mostly sunny, humid summers due to its proximity to the coast, with an average maximum temperature of 82º. December is the wettest month accounting for a substantial amount of the 51 inches of precipitation Plymouth sees each year. Low temperatures in the winter months average 20º, rain accounting for nearly 60% of the precipitation.

From its position on the south shore coast, PYM is subjected to varied wind; velocity and direction. As the airport is evaluated it is important to not only review infrastructure such as runway length and runway/taxiway width, but also the associated meteorological factors.

Wind patterns and runway crosswind conditions are important meteorological factors in assessing runway utilization and determining runway design requirements in accordance with FAA aircraft category standards. Crosswind coverage is the component of wind speed and relative direction acting at right angles to the runway—the greater the angle, the more difficult the landing. The FAA's desirable threshold for adequate crosswind coverage is 95 percent minimum.

A wind analysis was conducted to affirm the results of previous studies. FAA Advisory Circular (AC) 150/5300-13A specifies the maximum allowable crosswind component for B-II runways as 13 knots. Crosswind considerations for A-I aircraft of 10.5 knots were evaluated as well, considering the high volume of small General Aviation aircraft that utilize the field. As part of the wind analysis, both runways at PYM were analyzed independently. It was determined that Runway 6/24 provides adequate wind coverage during all weather conditions for crosswind components of 13 knots, but falls below the 95 percent threshold for 10.5 knots. Runway 15/33 does not meet the required 95 percent coverage on its own. The analysis did reveal that together Runway 6/24 and Runway 15/33 account for 99.34 percent for 13 knots and 97.89 percent for 10.5 knots in all weather conditions.

During Visual Flight Rules (VFR) conditions, runway 6/24 provides over 97.19 percent coverage for crosswind components of 13 knots but only 94.16 percent for 10.5 knots. Runway 15/33 does not meet the coverage requirements for either category during VFR conditions.

During Instrument Flight Rules (IFR) conditions, Runway 6/24 provides 95.1 percent coverage for crosswind components of 13 knots but only 91.03 percent for 10.5 knots. Again, Runway 15/33 does not meet the coverage requirements for either category.

In summary, the analysis revealed that to adequately provide all weather coverage for all aircraft utilizing Plymouth airport, both Runway 6/24 and 15/33 are necessary.

Figure 2-19: Main Ramp and Windsock at PYM

2.8 Current Airport Layout

The current existing Airport Layout Plan for Plymouth Municipal was approved by the FAA in 2021. It depicts the airport as Airport Reference Code B-II with two runways at 4650-ft x 75-ft. In its updated form it added a runway extension for Runway 33 and a stopway on both Runway 15 and Runway 24.

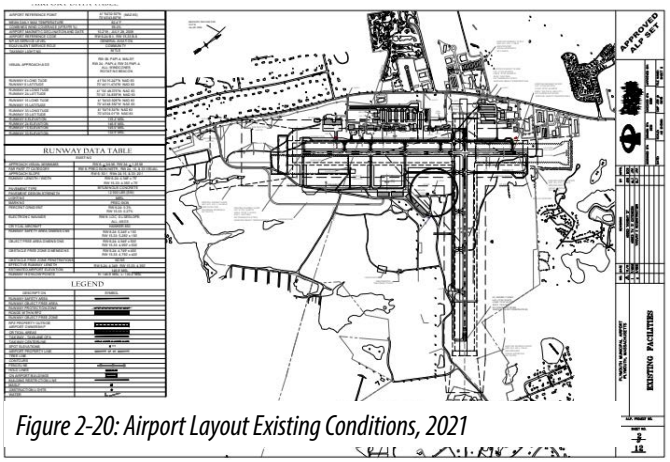


Figure 2-20: Airport Layout Existing Conditions, 2021

2.9 Airside Facilities

Plymouth Municipal Airport is currently categorized as a B-II design group airport and serves a variety of traffic from single engine reciprocating general aviation aircraft to Corporate Business Jets. The airport has two 4,350-ft x 75-ft asphalt runways, designated as 6/24 and 15/33. There are FAA approved non-precision instrument approaches to every runway and a precision approach, in the form of an ILS (Instrument Landing System) as well as a non-precision Localizer Approach with Vertical Guidance (LPV) to Runway 6. Runway 6/24 has a four-bar PAPI on each end. There are full length parallel taxiways providing access to all four runway ends.

Figure 2-21: Runway 6 Approach at Sunrise (Tom Maher)

2.9.1 Airport Classification and Design

During Airport planning exercises, airports are designed to FAA Airport Reference Codes. The Airport Reference Code (or ARC) is a two-part code, which utilizes the Aircraft Approach Category and Airplane Design Group classifications under which all aircraft are categorized.

The Aircraft Approach Category (AAC) divides aircraft into groupings based on Approach Speed, or 1.3 x Vso (aircraft stall speed, fully configured). Figure 2-22 depicts the FAA-designated AAC categories.

Figure 2-22: Aircraft Approach Categories	
Category A	**Approach speed less than 91 knots**
Category B	**Approach speed 91 knots or more but less than 121 knots**
Category C	**Approach speed 121 knots or more but less than 141 knots**
Category D	**Approach speed 141 knots or more but less than 166 knots**
Category E	**Approach speed 166 knots or more**

The FAA also classifies aircraft by Airplane Design Group, depicted by a Roman numeral classifying aircraft by wingspan. See Figure 2-23.

Figure 2-23: Aircraft Approach Categories	
Group #	**Wingspan (ft)**
I	**< 49**
II	**49- <79**
III	**79 - <118**
IV	**118 - <171**
V	**171 - <214**
VI	**214 - <262**

The Airport Reference Code under which an airport is designed is determined by the Critical Design Aircraft. The FAA defines the critical aircraft as the most demanding aircraft having regular use of an airport. Regular use of an airport is considered at least 500 annual itinerant operations (a takeoff or landing is considered an operation). The critical aircraft designation can be an individual aircraft type or a grouping of aircraft with similar operating characteristics.

Previous Master Plans listed the Hawker 850XP as the critical aircraft, resulting in an ARC designation of B-II. A thorough analysis of the current airport operations was completed to determine the current critical aircraft at Plymouth.

According to the FAA 5010, airport master record and operational data collected via the airport's GARD (Invisible Intelligence) system and the FAA's TFMSC (Traffic Flow Management System Counts), total annual operations at Plymouth Municipal Airport are estimated to be 65,900. This number appears to be consistent annually, with only a slight decrease in total annual operations during 2020, weighted by several months of COVID impacts.

Figure 2-24: Operations by Airport Reference Code

AAC*	ADG*	Operations
A	I	2785
A	II	283
B	I	223
B	II	1620
B	III	0
C	I	117
C	II	111
C	III	4
C	IV	0
D	I	0
D	II	0
D	III	6
Rotorcraft		99

*AAC is Airport Approach Category
**ADG is Airport Design Group

A multi-year analysis of the data further revealed that ARC B-II aircraft operations account for the second highest number of operations in a particular Design Group. Though larger, more demanding aircraft do operate to and from Plymouth Municipal, ARC C aircraft operations are sporadic, do not approach 500 annual operations, and are not anticipated within the 20-yr planning period. ARC D aircraft are not known to operate at Plymouth.

ARC B-II aircraft data was analyzed. Between 2016-2020, TFMSC data revealed that there are consistently over 500 annual operations of B-II aircraft operating at Plymouth Municipal Airport. For the previous 12 months (2020-2021), a B-II Business Jet composite was formed using aircraft having similar performance characteristics and operating weights. An analysis of this composite was conducted, which revealed 513 annual operations.

Figure 2-25: B-II Jet Composite

Aircraft Type	Operations	% of Composite
Cessna CJ3/4	4	0.8%
Cessna Citation Brvo	4	0.8%
Cessna Citation Encore	7	1.4%
Cessna Citation Excel	68	13.3%
Cessna Citation Sovereign	13	2.5%
Cessna Citation Latitude	69	13.5%
Cessna Citation X	2	0.4%
Embrear Legacy 450	15	2.9%
Embrear Phenom 300	45	8.8%
Dassault Falcon 2000	149	29.0%
Dassault Falcon 900	75	14.6%
Dassault Falcon 50	7	1.4%
Hawker 4000	55	10.7%
Total Operations		513

The Falcon 2000 is the most demanding and has the highest number of operations, accounting for 30% of the B-II composite operating at Plymouth. Thus, the current critical aircraft is the Falcon 2000 and the ARC code for Plymouth Municipal airport remains B-II.

Figure 2-26: Falcon 2000

2.9.2 Runways

Runway 6/24 is 4,650-ft x 75-ft of asphalt. It has a Pavement Condition Index (PCI) of 25 / double wheel 64. This means the pavement is strong enough to support

an aircraft weight of up to 25,000lbs when equipped with single wheels and up to 64,000lbs when equipped with double wheels. Standard left traffic patterns are published for Runway 6/24 and the runway has precision markings, and MALSF (Medium Intensity Approach Lighting System). The runway is currently published with a cleared approach slope of 20:1, which means that the airspace beyond the runway ends is published as clear 1 foot horizontally for every 20-ft vertically. The effective runway gradient is 0.3 percent. Currently there is a displaced threshold on Runway 24, allowing 4650- ft for takeoff and landing on Runway 6, 4650-ft for takeoff on 24 and 4350-ft for landing on 24.

Runway 15/33, which was extended to match the runway length of 6/24 after the previous Master Plan Update, is also 4,650-ft X 75-ft of asphalt with an identical PCI rating. This runway has non-precision markings, supports left traffic and is cleared to a 20:1 slope. The effective runway gradient is 0.3 percent. A 300-ft stopway on Runway 15 allows pilots to calculate an accelerate/stop distance that includes the stopway length.

The PCN is a numerical index between 0 and 100, which is used to indicate the general condition of a pavement section. Aircraft schedulers and dispatchers as well as airport users will consider pavement conditions when evaluating the airport during preflight. If the pavement is listed as Very Poor, the pilot may reconsider their destination

The Aircraft Classification Number (ACN) expresses the relative effect of an aircraft on the runway pavement for a specified standard subgrade category. The Pavement Classification Number (PCN) is a number that expresses the load-carrying capacity of pavement for unrestricted operations. An aircraft that has an ACN equal to or less than the PCN of a given pavement can operate without restriction on the pavement. If PCN is lower than the ACN, the aircraft will not be able to operate on the

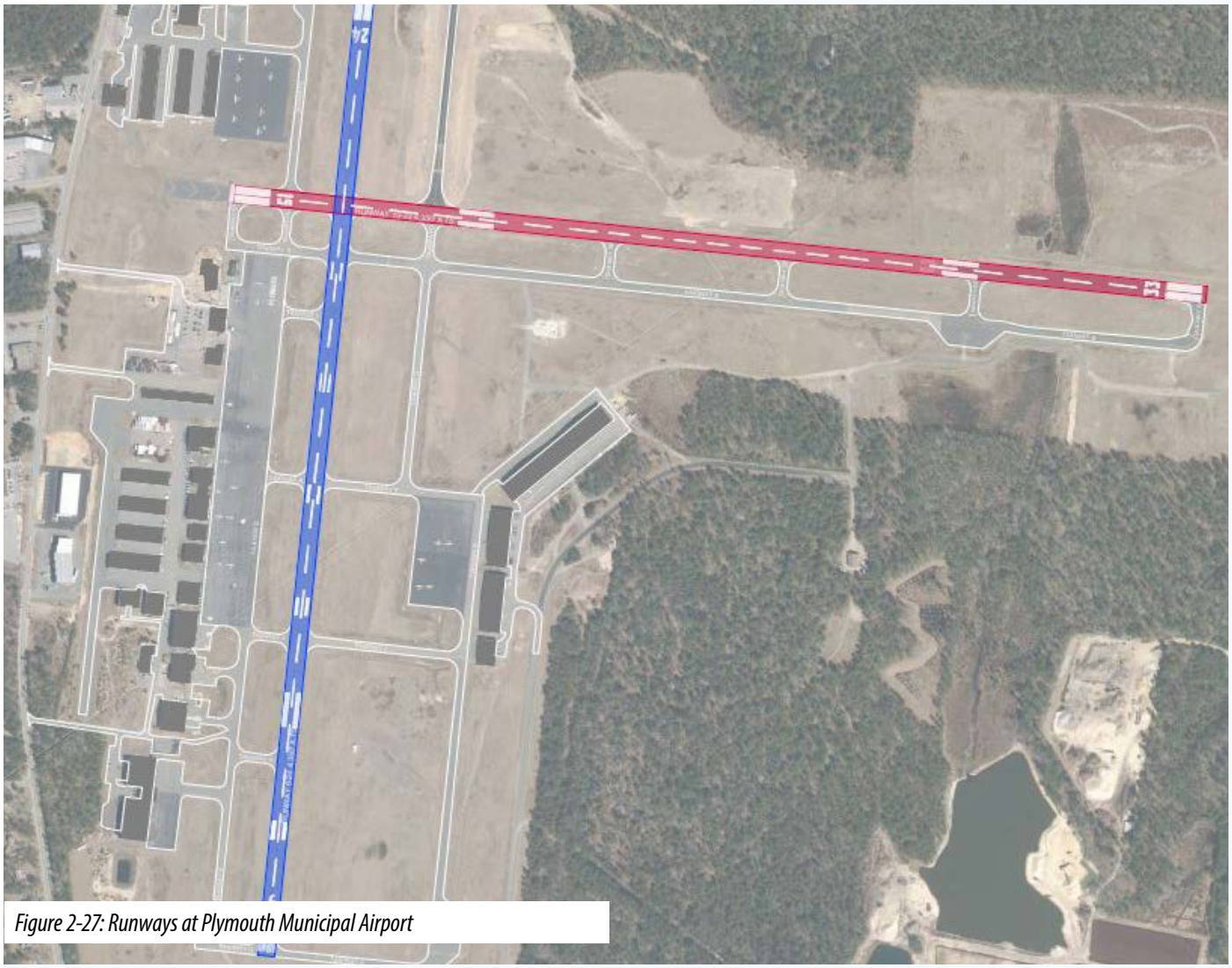


Figure 2-27: Runways at Plymouth Municipal Airport

runway and the airport will need to consider a full depth reconstruction. The Airport's PCN numbers have not been calculated for pavements constructed prior to the most recent construction of pavement on Taxiways E and S which have PCN values of 25/F/A/X/T and 30/F/A/X/T. These PCN values are consistent with the requirements of B-II category aircraft which currently operate at Plymouth.

2.9.3 Taxiways

The Airport is served by a number of taxiways, strategically positioned to provide the greatest access to all airport development areas. Two full length parallel taxiways serve the runway ends. Taxiway E runs parallel to Runway 6/24, while Taxiway S serves Runway 15/33.

Taxiway E provides access to existing hangars, a brand new general aviation administration facility and the main ramp. It spans 4,650-ft by 35-ft on the north side of the runway. The current width of taxiway E satisfies FAA design criteria for Group II aircraft (minimum 35-ft width). However, for the majority of the taxiway's length (3,475-ft) it has a 200-ft separation from the runway centerline; the FAA requires a 240-ft separation for Group II aircraft. Only the southwestern-most portion of Taxiway E meets the required separation distance of 240-ft. Taxiway S, which serves Runway 15/33 spans 4,350-ft by 40-ft located to the south side of the runway.

A series of taxiway stubs connect Runway 6/24 to various developments along the runway length. These taxiways are G (which connects E to the approach end of Runway 6), J and K, (which serve the north side of the airport and were extended in 2005 to reach the more recently developed south side), L (the primary taxiway serving the terminal area), S (which is the crossing full length parallel taxiway), and N (which connects E to the approach end of Runway 24). Finally, A Taxilane connects K and the southern development area to the approach end of Runway 6.

Runway 15/33 also has a series of taxiway stubs starting on the south end with S1, S2, S3, S4, Taxiway D (connecting K to the approach end of Runway 24), E (the crossing full length parallel) and S5 (connecting S to the approach end of Runway 15).

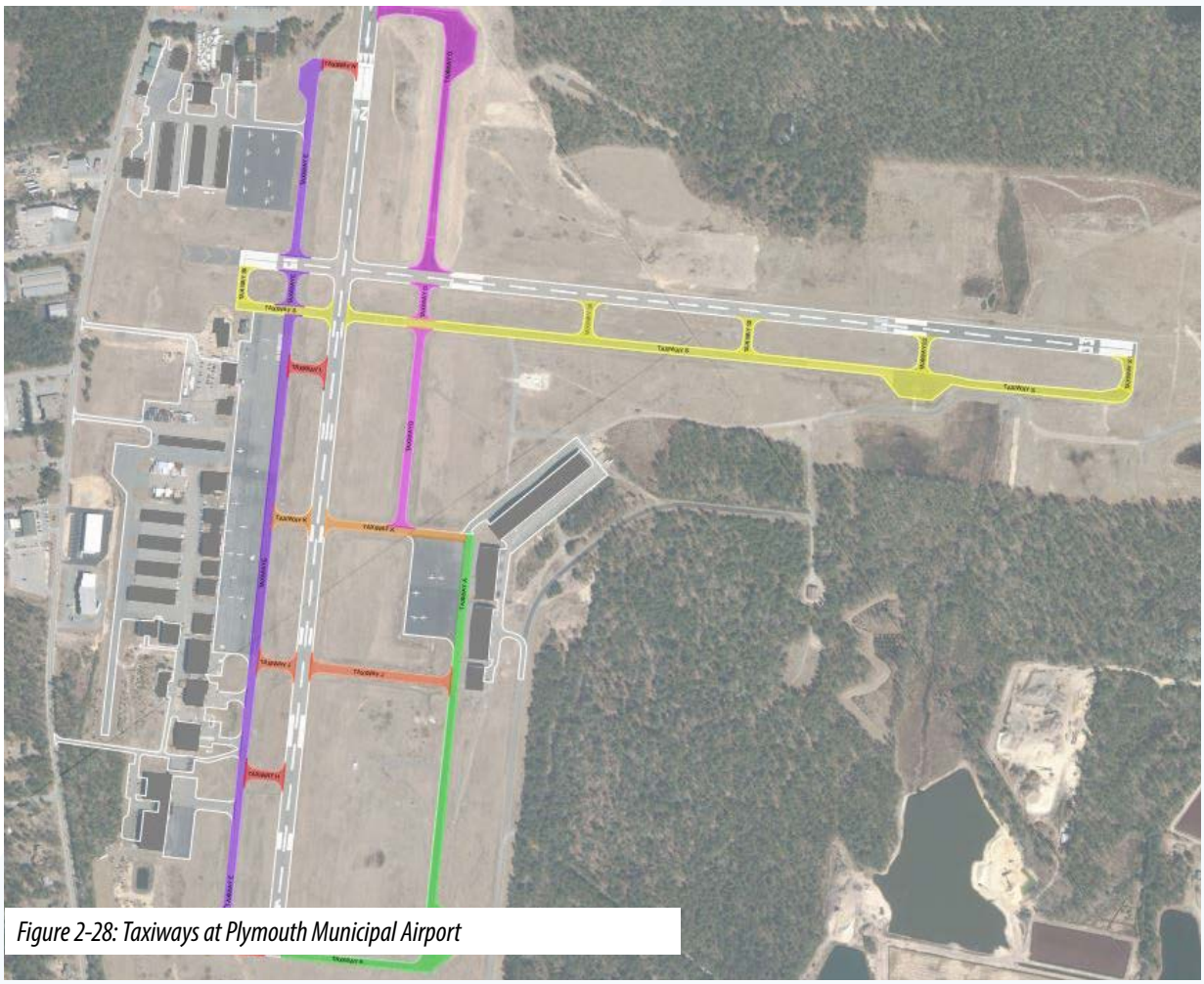


Figure 2-28: Taxiways at Plymouth Municipal Airport

These taxiway designs allow aircraft to exit the runways quickly after arrival, ensuring capacity delays are not caused by extended rollouts by landing aircraft.

2.9.4 Aprons

Plymouth has 63,100-sy of apron, split between three separate areas. The Main Apron spans the northwest portion of the airport and serves the terminal building, fueling area, corporate and T-hangars. It is heavily used by transient aircraft, of all sizes, and provides 45 tie-downs. 43 tie-downs are built to Group I standards, with 2 larger jet tie-downs in front of the terminal building. 5 tie-downs are dedicated to transient overnight parking and 6 are dedicated to restaurant parking. The main apron comprises 44,000-sy and though it allows excellent accessibility to the administration area, it is narrow and makes maneuvering to the taxiways more challenging than wider aprons.

The Northeast ramp, which is located across Runway 15/33 from the terminal provides access to several t-hangar and boxed hangar units. Parking for up to 40 based aircraft is available on this 14,700-sy paved apron, which was completed in 1995.

The Southeast ramp serves the newest expansion area at Plymouth Airport and was completed in 2005. It is located south of Runway 6/24 across from the Administration building. This 4400 sq. yard ramp services several new hangar facilities and many of the Airport's growing businesses. Additionally, 18 Group I tie-downs are available on this apron.

2.9.5 Hangars

Most hangars at Plymouth are privately owned, built on land leased to the hangar owners by the airport. As of this writing, these privately owned hangars pay a land lease rate based on a sliding scale, averaging $.36-sf/yr for private aircraft storage or a sliding scale averaging $.48-sf/

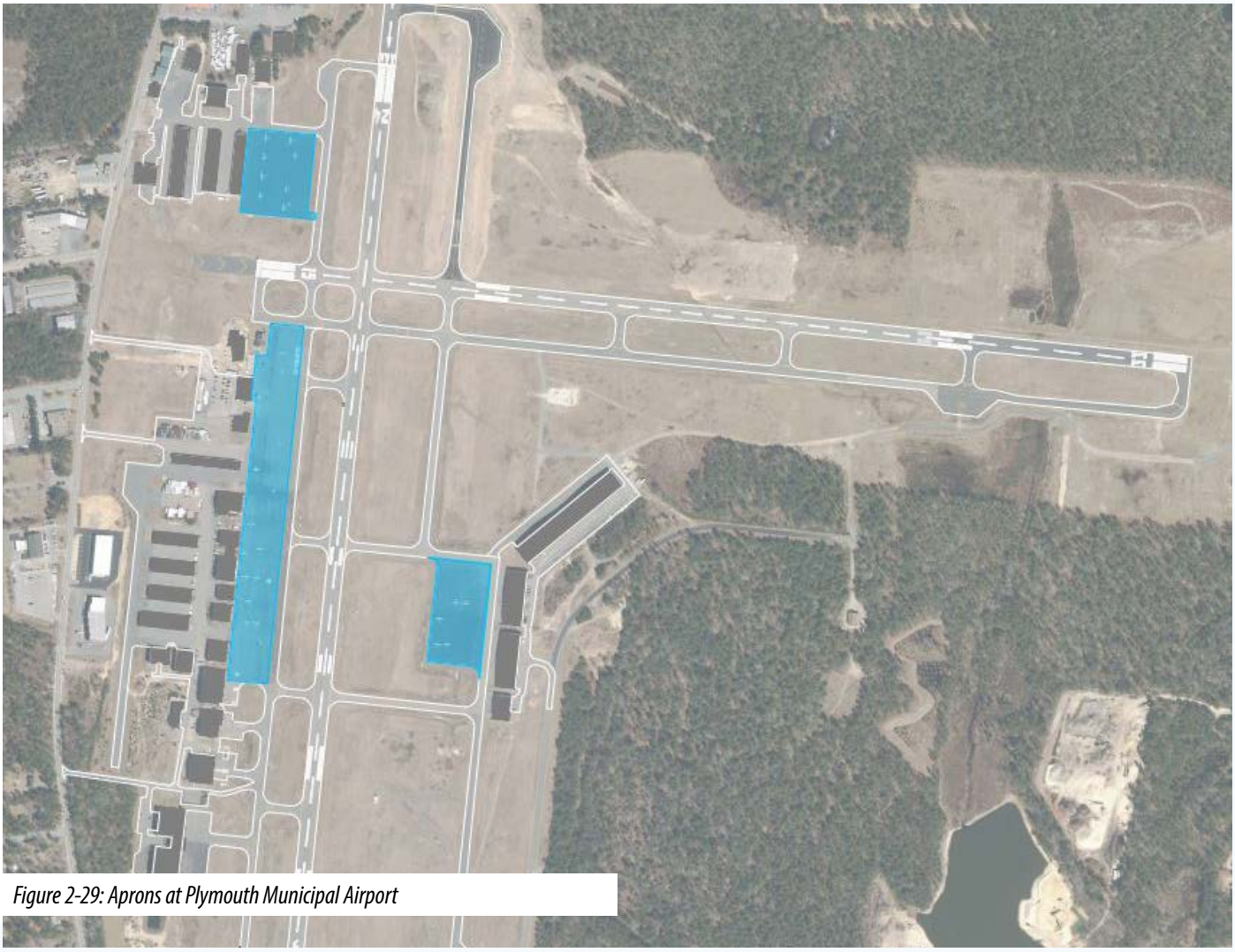


Figure 2-29: Aprons at Plymouth Municipal Airport

yr for a commercial space land lease, as well as taxes to the Town of Plymouth. At present, just the collection of taxes on 60 buildings on the airport creates an annual revenue for the Towns of Plymouth and Carver of approximately $450,000.

On the Northwest Apron, closest to the runway on the "front line" several FBO companies have secured prime locations. Among these are Pro-Air, Medflight, Alpha One, and Yankee. Behind the mainline on the northwest section are several square storage hangars and 4 long T-Hangars (housing light twins and single engines). Each of these T- hangars has 14 bays. There are also 18 hangars geared towards smaller single-engine aircraft.

On the Northeast apron, there are 4 square storage hangars housing Heliops, 135 Rotary Wing, Northeast Aircraft Maintenance, Kelley Air, Turner, and 3 bay luxury hangars. There are also 3 t-hangars with 14 bays in each.

On the Southwest Apron, there are 5 larger storage hangars, of which, 4 have 3 bays to house B-II size aircraft. These bays are utilized by Cape Cod Community College, Technology Service Corporation / Avwatch (DOD R&D), Nexair Avionics, and Mike Goulian Aviation.

Two hangars have been built since the previous Master Plan Update measuring 80 X 70 sq- ft and 100 X 70-sf. One non-aviation building (120 X 60 sq- ft) has been constructed as well. There are currently three hangars in the permit process, waiting for steel prices to decrease before construction.

Figure 2-30: Hangars at Plymouth Municipal Airport

2.9.6 Navaids

Navigational Aids are typically electronic or visual in nature and assist crewmembers in the safe and efficient movement of aircraft during taxi, takeoff, landing and enroute. Plymouth has multiple forms of Navigation/ Visual aids and lighting.

Airport lighting at Plymouth begins with medium intensity edge lighting on both 6/24 and 15/33. This lighting is pilot controlled and is activated on 122.9 via a series of clicks with the in-cockpit or hand-held microphone, 3 for low-level lighting, 5 for medium-level lighting and 7 for high-level lighting. This is standard at most non-towered airports with runway lighting. Additionally, Runway 6 has a MASLF, a medium intensity approach lighting system, in support of the precision approach to Runway 6. The MALSF provides a visual reference to the runway centerline in a variety of weather conditions. Runway 24 has a set of REILs (runway end identifier lights), that flash to provide identification of the runway end. Three of the four runway ends 6, 24 and 33 have PAPIs (Precision Approach Path Indicator), to assist pilots in vertical navigation in VFR (Visual Flight Rule) conditions and the completion of the landing from the bottom of an Instrument Approach to the runway in IFR (Instrument Flight Rule) conditions. While Runway 24 PAPI provides a 4.00 degree glideslope due to obstructions, the Runway 33 and Runway 6 PAPIs provide a standard 3.00 degree glideslope.

Figure 2-31: Rotating Beacon

A rotating beacon, located on a metal structure adjacent to the terminal building, allows pilots to locate the airport via sequenced green and white beams of lights, which represent a civilian- land airport. Two lighted wind cones along Runway 6/24, one unlighted wind cone along runway 15/33, and an unlighted segmented circle allow users to view the wind direction, wind speed, and direction.

An electronic Navigational Aid known as ILS (Instrument Landing System) is located at Runway 6 and provides both horizontal and vertical guidance for pilots landing in IFR conditions. The localizer, which provides horizontal guidance for the ILS system is located 1,000 feet from the threshold of Runway 24 and is aligned with Runway 6/24, while the glideslope which provides vertical guidance for the ILS system is located near the threshold of runway 6. These two antennas transmit radio signals allowing pilots to track inbound within precise vertical and lateral constraints.

Another electronic NAVAID at the airport is the ASOS, Automated Surface Observation System. The weather system provides crucial weather information specific to Plymouth Airport. It offers wind speed and direction, visibility, cloud ceiling heights and sky coverage, temperature/dewpoint, barometric pressure in the form of an altimeter setting and other weather hazards like precipitation and thunderstorms. The ASOS at Plymouth releases minute-by-minute updates and is serviced and monitored by the National Weather Service. This ASOS also allows the weather to be transmitted, via the internet, in the form of METARS (Meteorological Aerodrome Report) to assist in flight planning procedures. The transcribed ASOS is also available via a radio frequency and telephone. ASOS systems are owned and maintained by the National Weather Service which minimizes costs to the airport.

Off-airport land based navigational aids assist a pilot in determining location and direction from various points. Local navigational aids called VORs (Very High Omnidirectional Range) are located at Martha's Vineyard (MVY), Providence (PVD), Boston (BOS) and North Truro (LFV). Though the majority of today's aircraft navigate by GPS (Global Positioning System), the VORs assist by providing an alternate form of navigation.

2.9.7 ADS-B

As part of the FAA's NextGen program to enhance how aircraft navigate, new technologies, such as the automatic dependent surveillance-broadcast (ADS-B), have been deployed. ADS-B provides in-flight information from an aircraft, including airspeed and location, to air traffic control and to nearby aircraft that are equipped with receivers, through a system of satellites and ground stations. Ultimately, this system will replace expensive ground radar and will include complete coverage of Massachusetts. Presently, there are only 7 ADS-B ground stations within Massachusetts, with 3 additional towers in neighboring Rhode Island. There is currently no ADS-B ground station within 30 miles of the Plymouth Airport. ADS-B ground stations are owned, operated and maintained by the FAA at no expense to the airport. This could provide great value to the airport as it increases safety through improved situational awareness and visibility for pilots of general aviation and commercial aircraft operators when utilizing PYM during all weather conditions.

2.9.8 Instrument Approaches

There are five instrument approaches at Plymouth that serve the airport during inclement weather. Four of these approaches are considered non-precision RNAV (area navigation) approaches and use GPS for navigation. These GPS approaches align pilots with each of the four runway ends (6, 24, 15 and 33). The remaining precision approach is an ILS to Runway 6.

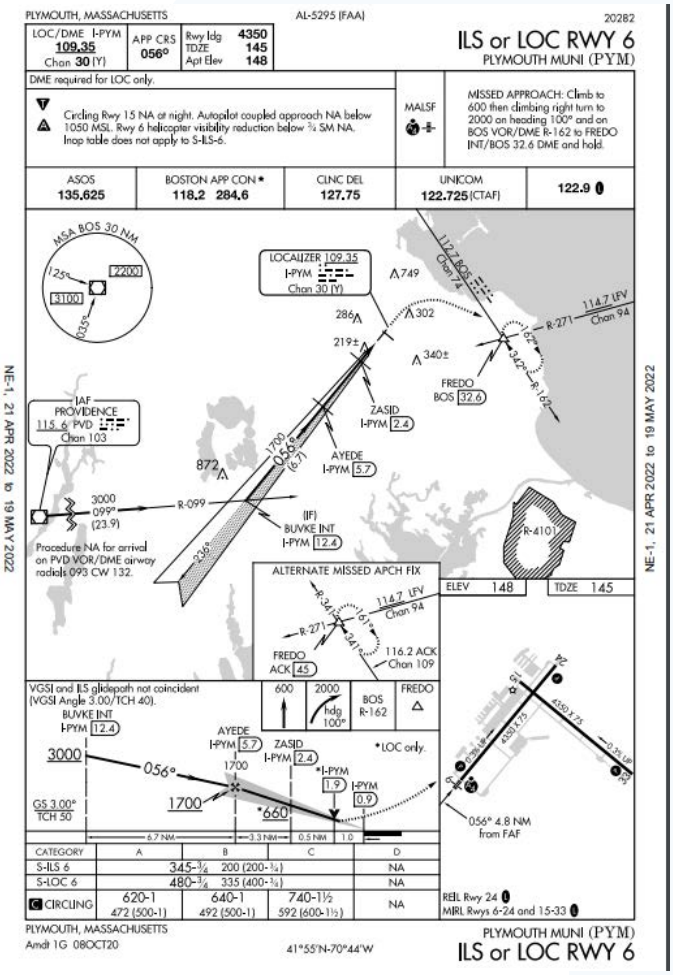


Figure 2-32: ILS Terminal Chart for RWY 6

The ILS/ LOC weather minimums for RW 6 are 345-ft and ¾-nm visibility for approach categories A, B, and C. This means that landing aircraft can descend to 200 ft above the ground before having visual sight of the runway

environment. The approach has a note that circling at night to runway 15 is not authorized.

The RNAV approach to runway 6 minimums are 345 ft Mean Sea Level (MSL) and ¾ -nm. This is a Localizer Precision Approach with Vertical Guidance (LPV) which means the GPS equipment will provide not only horizontal guidance to align the aircraft with the runway but will also provide vertical guidance on a sloped path to the runway threshold. The RNAV approaches to runway 24 and 33 are also LPV approaches and have minimums of 446-ft and 1-nm and 393-ft and ¾-nm respectively.

The RNAV approach to runway 15 minimums are 500-ft and 1-nm visibility. This approach is an LP/ LNAV only. This means it is a localizer performance/ lateral navigation approach and only provides horizontal guidance.

Future Approach modifications could include an LPV Approach to Runway 15 and the lowering of minimum on the LPV to Runway 24, which would require obstruction mitigation and Easement Acquisition.

2.9.9 Local Procedures/Noise Abatement

In one of many efforts to be a good neighbor, Plymouth has extensive voluntary noise abatement procedures in place. The goal in determining multiple noise abatement routes is to discourage flight over dense areas of housing. Procedures for corporate and general aviation traffic have been created to direct pilots to preferred areas for departures and traffic patterns. Drawings of noise abatement procedures at Plymouth are included in Appendix D. In addition, the airport management regularly conducts safety meetings with area pilots in which noise abatement procedures are explained in detail.

2.10 Landside Facilities

2.10.1 Administration Building

A newly constructed Administration Building located at the main entrance of the airport provides airport services and hosts a well known and beloved restaurant called Plane Jane's Place. Main Parking is located outside the Administration Building/ restaurant.

The building was constructed in 2020, funded by MASSDOT and houses administration offices, a conference room, pilot lounge and flight planning center, kitchen and waiting area. The entrance is beautifully designed and decorated, inviting the public to feel welcome at the airport and sharing unique artifacts relating to the airport and its history. The entire terminal building was constructed and decorated with efficiency, usability and visual appeal.

Figure 2-33: Newly Constructed Administration Building

Figure 2-34: Plane Jane's Restaurant

2.10.2 Fuel Farm

The airport has a newly constructed fuel farm (2019) with the onsite fuel capacity to hold 20,000 gallons of Jet A and 15,000 gallons of Avgas in two above-ground storage tanks located near the Administration building. All fuel is full serve only and is administered via fuel truck. The fuel supplier for PYM is Avfuel. Maintenance

Plymouth sells fuel year around with December through February typically becoming the slower months. During 2020 Plymouth reported selling 280,922 gallons of Jet A and 104,709 gallons of 100LL.

Figure 2-35:. Fuel Farm

2.10.3 Snow Removal Equipment Building

The snow removal equipment building is located west of the airport maintenance building and administration building. It houses a John Deere 744 bucket loader, an Oshkosh Runway plow, (4) ¾ ton pickups with plows and a Runway sander. The airport provides exemplary snow removal during the harsh New England winter months, allowing users to rely on the airport's regular accessibility.

2.11 Zoning/Easement Review

2.11.1 Zoning

The FAA defines compatible land use for airports as those "that can coexist with a nearby airport without constraining the safe and efficient operation of the airport, or exposing people living or working nearby to significant noise impacts of hazards." This definition can be interpreted in multiple ways by local Town governments but typically constitutes limiting residential areas in the vicinity of an airport. Often, the regular use of an airport can be disturbing to neighbors in close proximity to the airport, or its approaches. Land uses that are often most compatible with airports include industrial, commercial, farmland and open space.

As the Plymouth Municipal Airport comprises land in both the Town of Plymouth and the Town of Carver, an effort was made to incorporate zoning language into both Town Plans.

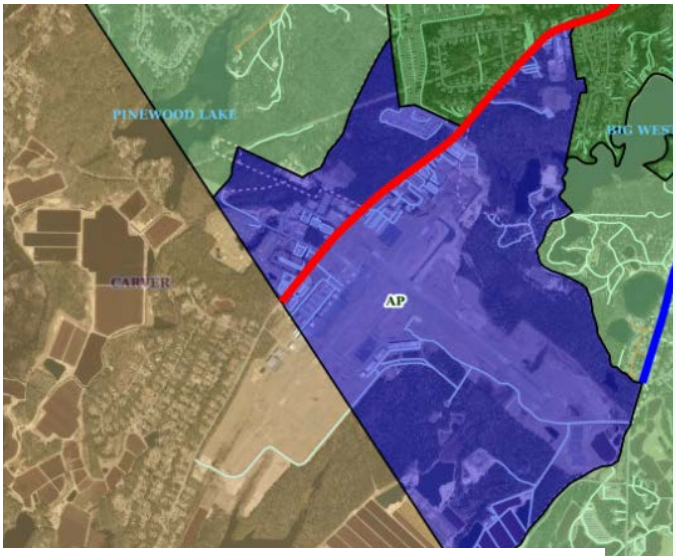


Figure 2-36: Excerpt of Plymouth's Zoning Map. AP = Airport Zone

Although the majority of airport property resides in the Town of Plymouth, the approach end of Runway 6 lies in Carver which means aircraft fly VFR traffic patterns and IFR approaches in the airspace overlying both towns. The following sections contain excerpts to review the zoning elements of both Plymouth and Carver, which have not changed, in reference to the airport, since the previous Master Plan Update.

Plymouth

Plymouth Municipal Airport is located on the western border of the Town of Plymouth, and all but 250 of the Airport's total 750-acres are located within the Town of Plymouth. Currently, the developed lands surrounding the Airport include areas adjacent to South Meadow Road and areas along Federal Furnace Road to the east. Three of the four airport approaches extend over the Town of Plymouth. Each of these three approaches has an associated Instrument Approach.

The Town of Plymouth has incorporated the Airport Zone to protect the airspace surrounding the airport. This zone was created to:

> *"1. To provide for a wide range of by-right and light-intensity Industrial and Commercial Uses of a nonpolluting nature, and to allow by Special Permit more intensive Industrial Uses.*
> *2. To provide for future expansion of the existing airport facility to serve community needs.*
> *3. To encourage Uses that support or are compatible with airport operation."*

Existing developed land within the Town of Plymouth Airport Zone includes a mixture of cranberry bogs, office space associated with the Plymouth Municipal Airport, residential development and some industrial/commercial development along South Meadow Road.

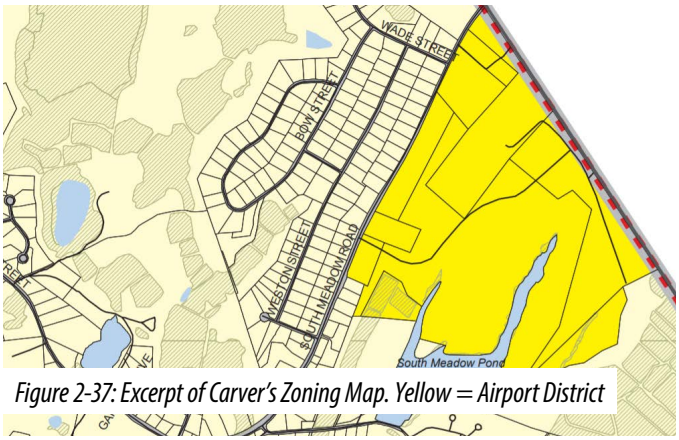


Figure 2-37: Excerpt of Carver's Zoning Map. Yellow = Airport District

Carver

The Town of Carver, which is home to 250 acres of Airport property, also has an Airport District in place to protect the surrounding airspace. Though the language is not as specific in the Town of Carver Plan, and does not specify the protection of part 77 surfaces, it does reference the protection of FAA zones in general. Carver has issued height restrictions on buildings in all zoning districts, calling for prior approval by the FAA and Plymouth Airport commission, to prevent the erection of structures that would cause hazardous obstructions to air navigation due to height. The precision instrument approach to Runway 6 extends southwest over portions of the Town of Carver. Properties under the approach to Runway 6 include land Residential, Agriculture and Businesses. There is residential development beneath the Approach Surface with neighborhoods located off of South Meadow Road.

Neither Plymouth, nor Carver, has an airspace overlay development plan which would be used to identify the buildable areas in the vicinity Plymouth in compliance with FAA's land-use compatibility grant assurance. A recommendation for Airspace Overlay will be included in the Facilities Needs Chapter.

2.11.2 Easement Review

The FAA defines the Runway Protection Zone as "an area at ground level prior to the threshold or beyond the runway end to enhance the safety and protection of people and property on the ground." The FAA encourages airports to have control over their Runway Protection Zones (RPZ) but understands that in certain situations owning the entire RPZ may not be feasible. In these cases the FAA "expects airport sponsors to take all possible measures to protect against and remove or mitigate incompatible land uses." Compatible land uses inside the RPZ that do not require further evaluation include; Farming that meets airport design standards, Irrigation channels that meet the requirements of AC 150/5200-33 and FAA/USDA manual, Wildlife Hazard Management at Airports, Airport service roads, as long as they are not public roads and are directly controlled by the airport operator, Underground facilities, as long as they meet other design criteria, such as RSA requirements, as applicable and Unstaffed NAVAIDs and facilities, such as equipment for airport facilities that are considered fixed-by-function in regard to the RPZ.

Currently, the RPZs for Runway 33 and Runway 6 are protected as the airport owns the property inside the RPZs. The Runway 15 RPZ is covered by a group of easements, except one small portion, which is slotted for easement acquisition on the Exhibit A. The Runway 24 RPZ is currently owned by the airport, however, once the AGIS (Airport Geographic Information Systems) survey that is currently being conducted is complete and Runway 6/24 has published declared distances, the RPZ will be extended eastbound and additional easements will be required to maintain control of the entire RPZ.

Since the previous Master Plan Update, 43 acres were acquired adjacent to the southeast sector of the airport that was put into a conservation easement in 2012. In 2016 the Natural Heritage Wildlife Habitat Plan was developed, which set aside areas for future airport development.

2.12 ENVIRONMENTAL OVERVIEW

2.12.1 Environmental Overview

An Environmental Overview was conducted in accordance with FAA Order 1050.1F, Environmental Impacts: Policies and Procedures and FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions. Current conditions were evaluated under this order, however, an Environmental Assessment may be required prior to future projects.

2.12.2 Topography, Geology, and Soils

Soils that exhibit good drainage are typically considered by the US Department of Agriculture (USDA) to be prime farmland. Specifically, the USDA defines prime farmland as "land that has the best combination of

physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses." Generally speaking, according to the USDA, soils that constitute prime farmland have an adequate and dependable supply of moisture from precipitation (or consistent irrigation), a favorable temperature relative to the growing season for particular crops, acceptable acidity or alkalinity (again for the particular crops), an acceptable salt/sodium content, and few or no rocks that would impede plant growth or cultivation. In addition, prime farmland soils are not excessively prone to either erosion or saturation for long periods of time, such that either would impede the growth or cultivation of crops. Finally, prime farmland soils either do not flood frequently, or are adequately protected from flooding.

The interactive MassMapper program identifies soil composition in accordance with the June 2020 soils data release from the NRCS. The physical construction of the pavement, drainage, grading for any potential runway extension(s) will all take place on land already owned by the Airport and in use for airport activities. Accordingly, the extents of the Airport property includes the following soil classification names with alphanumeric map symbol:

- Rainberry 11A
- Massasoit 37A
- Carver 252A
- Carver 252B
- Deerfield 256A
- Deerfield 256B0
- Carver 259A
- Carver 259B
- Urban Land 602B
- Udorthents 655B
- Udipsamments 665B
- Freetown 704A

Of these soils, only Freetown 704A soils are recognized by the NRCS among its designated "Prime and Other Important Farmlands" soils, as being "Farmland of unique importance" (2020 listing). These soils are described by the NRCS as "Freetown and Swansea coarse sands, 0 to 3 percent slopes, sanded surface and inactive."

"Farmland of unique importance" is the third-level class of Prime and Other Important Farmlands, below "Prime farmland" and "Farmland of Statewide Importance." According to the NRCS, this is land other than that is used for the production of specific high value food and fiber crops. In Massachusetts, soil map units suited and used for the production of cranberries have been identified as farmland of unique importance.
The mapped area of Freetown 704A soils comprises 0.95 acres of Airport-owned property, 550 feet to the south of Runway 33 (i.e., not in line with the southeastern orientation of Runway 33).

2.12.3 Air Quality

Under the Clean Air Act, the US Environmental Protection Agency (EPA) developed the National Ambient Air Quality Standards (NAAQS) for six common air pollutants. These six pollutants are referred to as "criteria pollutants" and consist of carbon monoxide (CO), nitrogen dioxide (NO2), ozone (O3), particulate matter (PM), sulfur dioxide (SO2), and lead (Pb). The EPA regulates these pollutants through human health-based (primary standards) and environmental-based (secondary standards) criteria. Those areas that have ambient concentrations of criteria pollutants above the NAAQS permissible levels are considered as "nonattainment areas". Within the Airport Service Area (ASA), which consists of the counties of Plymouth, Norfolk, Bristol, and Barnstable, the criteria pollutants measured by the EPA have been listed as in attainment.

2.12.4 Climate

The Airport is located within a "subtropical highland" according to the Koppen climate classification (Cfb – subset of oceanic climate featuring cool summers and winters). According to the National Weather Service (NWS NOWData, February 2022; source: PYM ASOS), summer temperatures on occasion reach the upper 90 degrees Fahrenheit (F) temperature range, but the highest average daily high temperature typically reached in July and is 82.1 degrees F. The lowest average low temperature of 20.3 degrees F occurs in January. Precipitation is evenly distributed throughout the year with historic averages of 48 inches per year.

Figure 2-38: Bystanders in the Rain at PYM

The primary concern related to airports is the influence of operations on climate change that revolves around Greenhouse Gases (GHG) and their influence on climate, temperature regimes, and resulting effects. GHG gases include carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). CO2 is often tracked as the primary anthropogenic GHG due to its presence in the atmosphere for up to 100 years. GHG emissions result from a variety of sources that include combustion of fossil fuels, including several sources that originate from aviation operations.

If any proposed alternatives affect operations, any increases in GHG emissions compared to the no action alternatives should be considered. Projects and alternatives that would not increase operations are not likely to result in increased negative climate impacts, but need to take into account the specific types and numbers of aircraft.

2.12.5 Coastal Resources

Federal activities involving coastal resources are governed by the Coastal Barriers Resources Act (CBRA), the Coastal Zone Management Act (CZMA), and Environmental Order (E.O.) 13089, Coral Reef Protection. Due to the geographic location of the Plymouth airport, no coastal barrier resources or coastal zones will be affected by any proposed airfield development, whether by direct physical impact to beaches, coastal waters, subaqueous lands, coastal strips, or by runoff pollution.

2.12.6 Compatible Land Use*

*See also 2.11.1, Zoning, in the Chapter 2 Inventory of Existing Conditions

In accordance with the Zoning Map adopted in 2012, the Airport property and several surrounding properties are within the AP-Airport Zoning District. Land uses within the AP District include a mix of commercial, light industrial residential and agricultural uses, as well as recreation open space use (approximately one-half of the Village Links Golf Club).

The Town of Carver has an Airport District as well, where the 250 acres of the 750 total acres of Airport property are located, plus surrounding agricultural uses and forested areas. The 5-acre Carver State Forest, which is protected in perpetuity but owned by the Airport, is located within Carver's Airport District.

Areas immediately surrounding both of these communities' Airport districts are zoned Rural Residential (RR) on the Plymouth side and Residential/Agricultural (RA) on the Carver side. Both zones are the least dense of the Residential land use zones in both towns. Also, Medium Lot Residential (R-25) zoning exists in the Town of Plymouth to the northeast of the Airport on the approach to Runway 24.

Residentially developed land within the Town of Plymouth includes areas adjacent to South Meadow Road beneath the Runway 24 approach and adjacent to the Runway 33 approach along Federal Furnace Road to the east. Residentially developed land near the Airport within the Town of Carver is located off of South Meadow Road beneath the Runway 6 approach surface. As a result of this development, there are areas of non-compatible residential land uses adjacent to the Airport. The approach to Runway 15 contains some light industrial development (e.g., light manufacturing) and non-retail commercial uses (e.g., mini-storage), which are considered compatible land uses. The approach to Runway 33 contains open space, Myles Standish State Park, and Southers Marsh Golf Club. The approach to Runway 24 includes West Plymouth Recreation Area Park, one half mile to the east. These open spaces are considered to be compatible land uses with the Airport development and operations.

In 2016, a solar field of approximately four (4) acres in footprint area was installed on Piney Wood Cranberry Company property. The nearest corner of this solar field is 632 feet southeast of Runway 33. Glint and glare from solar arrays can cause unwanted visual impacts to pilots.

As part of the 2011 Master Plan development, neighborhoods adjacent to the Airport had expressed concern about the existing impacts of airport operation and are concerned about additional future impacts. This resulted in the formation, in 2011, of the Plymouth Airport Advisory Group (PAAG) directed by the Consensus Building Institute that provided a recommendation to limit airfield development in order to mitigate the adverse impacts of continued airport operation on the community.

After a year-long mediation process, a consensus was reached and it was determined that Runway 15-33 be extended 1000-ft with a 300-ft stopway. A 300-ft stopway was also added to the end of the Runway 6-24, which provided a runway length of 4350-ft, plus a 300-ft stopway on both runways. These improvements allowed turbine powered aircraft to use Runway 15-33 as well as Runway 6-24, giving airport management flexibility in routing

traffic to the different approach, to either fly over the areas with more land use compatibility (the approaches to Runway 15-33 generally have more compatible land uses) or to balance the air traffic impacts to the community utilizing all the Airport's approach and departures.

Figure 2-39: Public Meeting

Any additional residential development in the vicinity of the Airport approaches could increase the amount of non-compatible land uses, which could further lead to potential adverse impacts by airport operations. However, by establishing the Airport zoning districts, the towns of Plymouth and Carver have reduced the likelihood of the development of additional incompatible land uses along either runway approach. This is evident by analysis of historical imagery (Google Earth) of the pre- and post-construction area near the southward extension of Runway 15-33 and the addition of the stopways.Furthermore, FAA Policy under Part 150 prohibits the use of federal funds for noise mitigation for building construction after 1998. Thus, any new residential development within the 65DNL would not be eligible for federal reimbursement for noise mitigation. No off-airport structures are within the 65DNL line for existing or future conditions.

It should be noted that South Shore Early Education is adjacent to the Airport property on South Meadow Road. Also, Federal Furnace Elementary School is located near the Airport (approximately 0.9 miles southeast of the Runway 33 threshold). Carver Middle School (located approximately one mile southwest of the Airport) as well as Carver High School (located approximately 1.5 miles southwest of the Airport) are both on South Meadow Road and are within the approach to Runway 6. The Church of Jesus Christ of Latter Day Saints constructed a temple on Federal Furnace Road in 2017, approximately 0.4 miles to the south of the Runway 33 threshold.

2.12.7 Department of Transportation (DOT) Section 303/4(f)

Section 4(f) of the DOT Act, as codified in Title 49, Section 303 of the US Code, provides that the Secretary MAY APPROVE a transportation program or project (other than any project for a park road or parkway under section 204 [1] of title 23) requiring the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance (as determined by the Federal, State, or local officials having jurisdiction over the park, area, refuge, or site) ONLY IF: (1) there is no prudent and feasible alternative to using that land; and (2) the program or project includes all possible planning to minimize harm to the park, recreation area, wildlife and waterfowl refuge, or historic site resulting from the use.

Any potential construction on Airport property would not require the use of publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance.

As mentioned in section 2.12.4, the 5-acre former Carver State Forest was previously state-owned but is now owned by the Airport. It is now owned and actively managed by the Airport, and is located within Carver's Airport District.

2.12.8 Farmland

The Farmland Protection Policy Act (FPPA) requires coordination with the local office of the Natural Resources Conservation Service (NRCS) if the proposed project entails irreversible conversion of prime farmland to non-agricultural uses. Farmland subject to this requirement does not have to be currently used for cropland; it can also be forestland or pastureland, but not urban or built-up land. This requirement is intended to monitor the impact that Federal programs, or projects that are federally funded, have on the conversion of this resource. There are no active agricultural uses on the Airport and, therefore, no proposed conversion of farmland.

2.12.9 Fish, Wildlife, and Plants

The FAA, the USFWS, and other federal agencies have a Memorandum of Agreement (MOA) that acknowledges their respective missions in protecting aviation from wildlife hazards. Though airports have large open spaces

that provide suitable habitats for wildlife, plants, and other taxa, the agencies have established procedures necessary to coordinate their missions to address the future environmental conditions contributing to collisions between wildlife and aircraft (FAA AC 150/5200-33C).

The consideration of endangered and threatened species is required under multiple regulations for actions that would directly or in some cases, indirectly impact listed species or affect critical habitats. These include the Endangered Species Act as amended (50 CFR Parts 17 and 402), the Fish and Wildlife Coordination Act (16 USC §§ 661-667d), the Migratory Bird Treaty Act (50 CFR part 22), and the Bald and Golden Eagle Protection Act (50 CFR Part 22).

According to the United States Fish and Wildlife Service (USFWS) IPaC (Information for Planning and Consultation) database, there may be three listed species on or immediately adjacent to the Airport property, and 11 migratory birds may visit or travel through the area of the Airport property or its vicinity.

The three listed species per IPaC that may be on or immediately adjacent to the Airport property are:

- Northern Long-Eared Bat (Myotia septentrionalis)
- Plymouth Redbelly Turtle (Pseudemys rubriventris bangsi)
- Monarch Butterfly (Danaus plexippus) [Candidate species]

The 11 migratory birds that may visit or travel through the area of the Airport property or its vicinity are as follows:

- Bald Eagle (Haliaeetus leucocephalus)
- Black-billed Cuckoo (Coccyzus erythropthalmus)
- Blue-winged Warbler (Vermivora pinus)
- Eastern Whip-poor-will (Antrostomus vociferous)
- Hudsonian Godwit (Limosa haemastica)
- Lesser Yellowlegs (Tringa flavipes)
- Prairie Warbler (Dendroica discolor)
- Ruddy Turnstone (Arenaria interpres morinella)
- Rusty Blackbird (Euphagus carolinus)
- Willet (Tringa semipalmata)
- Wood Thrush (Hylocichla mustelina)

All of these birds, except for the Bald Eagle, are on the USFWS list of Birds of Conservation Concern (BCC). The Bald Eagle is considered "Vulnerable" under the Bald and Golden Eagle Protection Act.

There may be other species that are not currently known or expected to occur on or immediately adjacent to the Airport property, but are covered by the Endangered Species Act (ESA) wherever they are found. To this end, the Airport property could be surveyed by a regional environmental expert to determine if any federally listed endangered or threatened species of flora or fauna are located on the property.

In addition, because most of the Airport is within the regulatory Priority Habitat of Rare Species (PH591) the Massachusetts Division of Fisheries and Wildlife (MassWildlife) Natural Heritage and Endangered Species Program (NHESP) would need to review projects for compliance with the Massachusetts Endangered Species Act (MESA).

Further, the NHESP and The Nature Conservancy's Massachusetts Program's BioMap2 identifies "Core Habitat" areas and "Critical Natural Landscape." The interactive Mass Mapper program identifies these BioMap2 Core Habitat and Critical Landscape Areas. Much of the Airport property, including the current extents of all runways, is included within the Core Habitat area (this area is co-located with the Species of Critical Concern overlay). Critical Landscape Areas are identified to the east of Runway 24, associated with the waters and surrounding lands of Spring Pond, Grassy West Pond, and Big West Pond. These Critical Landscape Areas are also identified on MassMapper as BioMap2 Aquatic Core Habitat. Grassy West Pond is also identified as Core Habitat Priority Natural Communities and Core Habitat Wetlands. Portions of these ponds are also mapped with Upland Buffer Aquatic Core and Wetland overlays. The interactive Mass Mapper program also identifies features associated with the NHESP.

Figure 2-40: PYM Grassland

Mass Mapper identifies three (3) NHESP Certified Vernal Pools to the south of Runway 33, approximately 600 feet, 700 feet and 1,350 feet from the end of Runway 33. Such seasonal pools of water may provide habitat for distinctive plants and animals. MassMapper also includes the central portion of the Airport property, inclusive of the runways, as well as the ponds to the east, as Priority Habitats of Rare Species. (This Priority Habitats of Rare Species area is roughly similar to the combined BioMap 2 Core Habitat and Critical Landscape Areas noted above.)

2.12.10 Floodplains

A review of FEMA Flood Insurance Rate Maps (FIRMs) for the vicinity of Plymouth Municipal Airport indicates that there is a band of Zone A (without Base Flood Elevation information) that crosses the existing Runway 15-33 (FIRM panels 25023C0361K, 25023C0362K, 25023C0363K, and 25023C0364K, effective 7/2021), where Runway 33 was extended in 2016. This Zone A band is subject to inundation by a 1-percent-annual-chance flood event.

This Zone A area is in approximately the same location as mapped DEP wetlands (per MassMapper). There are no other floodplain areas indicated beyond the ends of any of the runways. Therefore, any project planning involving runway extension would not impact any 100-year floodplains.

2.12.11 Hazardous Materials, Pollution Prevention, and Solid Waste Impacts

Airport actions that relate only to airfield development (runways, taxiways, and related items) will not normally include any direct relationship to solid waste collection, control, or disposal other than that associated with the construction itself.

General aviation airports are not typically large generators of solid waste. Airport buildings include hangars for storage and maintenance of aircraft, office space and public terminal buildings. The solid waste impacts generated by the increased level of business activity in the community, as a result potential development of the Airport with corresponding increased air traffic, should be nominal and easily accommodated within the existing waste management programs.

Any remaining waste construction materials (i.e. scrap material, concrete, etc.) will be disposed of in accordance with local regulations. No hazardous material will be involved with the construction. Excavated unsuitable soils can be distributed elsewhere within airport property and should not be a concern. For these reasons, no solid waste impacts are anticipated as a result of the proposed development.

2.12.12 Historic, Architectural, Archeological, and Cultural Resources

This impact category examines the potential impact of federally funded development on properties eligible for inclusion on the National Register of Historic Places. This review category satisfies the requirements of the National Historic Preservation Act of 1966.

There are no historic districts within the immediate vicinity of the Airport. All of the historic landmarks within Plymouth are located in the historic district near the downtown harbor area and therefore will not be affected by Airport operations. Within Carver, the Massachusetts Historical Commission's MACRIS (Massachusetts Cultural Resource Information System) database identifies the nearest Inventoried Property as the circa 1773 Benjamin Ward House at 4 Carver Street (ID: CAV.606), located approximately 0.95 miles to the southwest, generally in-line with Runway 6.

Additional consultation with the Massachusetts Historical Commission (MHC) should confirm whether any historic, architectural or archeologically significant parcels are impacted by any proposed airfield development. This would need to be conducted in accordance with Section 106 and include the required coordination with tribal entities.

2.12.13 Light Emissions and Visual Impacts

Light emissions at PYM are associated with runway and taxiway edge lighting, a rotating beacon, PAPIs, approach lighting systems and other visual navigational aids that help a pilot locate the Airport and execute a safe landing. Additionally, apron ramp lighting and street lighting on access roadways create light emissions from the Airport. No parks, recreation areas, or other light-sensitive areas are located close enough to the Airport property to be significantly impacted by an increase in lighting. If necessary, measures can be taken to minimize light intrusion on residents and light-sensitive areas via the installation and/or maintenance of an evergreen tree buffer.

LED lights may be installed for approach lighting systems. In 2015, the FAA assembled a Significant Safety Issues (SSI) team and Safety Risk Management Panel (SRMP) to study the integration of LED lighting into the aviation system. The use of LED lighting will adhere to FAA regulations.

2.12.14 Natural Resources and Energy Supply

The "Natural Resource" category addresses the use of materials for runway and taxiway additions that require base materials (e.g., gravel/stone, sand, rocks, asphalt, fill). The existing condition is used as the baseline reference for any additions requiring sourcing additional natural resources for future Airport improvements.

Energy consumption at an airport consists predominantly of electricity and fuel for aircraft and ground vehicles. Any additional lighting associated with potential construction, such as for runways, associated taxiways, approach lighting system, terminal facilities, and ramp lighting would require additional energy but it should be easily accommodated within the regional network. Any improvements to the Airport's power distribution system and the use of new materials (e.g., fixtures, transformers and cables) will improve the efficiency and reduce energy requirements. In particular, the installation of LED light fixtures in new construction, or installation via retrofit of existing lighting, would reduce per-light energy use while increasing fixture longevity.

The use of aviation fuels at Plymouth Municipal Airport would increase due to increased use of the facility. Additional aviation demand may also result in the need for additional fueling infrastructure. Therefore, any such fuel usage increases would be tied directly to the growth of the aviation business. Additionally, during any future construction, there would be a temporary increase in energy/fuel consumption to power the construction that will be irrevocably lost to the project. However, this should be easily accommodated by the local supplies. For these reasons, impact to the energy supply and natural resources, such as the placement of additional base materials (e.g., crushed stone/gravel, asphalt) are anticipated to be minimal in conjunction with the proposed improvements.

2.12.15 Noise

As indicated in AC 150/5070-6B (605)(b), noise levels, along with air and water quality, are the most common environmental concern associated with airports.

The noise environment at Plymouth Municipal Airport was previously modeled to determine potential noise impacts in the Airport vicinity resulting from the forecasted operations over earlier the planning period. Noise contours were generated for the base year (2007), Year 2012, Year 2017, and Year 2027 operation levels using the Federal Aviation Administration (FAA) Integrated Noise Model (INM) Version 7.0.

The FAA standards prescribe Day-Night Average Sound Level (Ldn or DNL) as the commonly accepted method for describing cumulative noise exposure and identifying aircraft noise/land use compatibility issues. The DNL noise metric is a 24-hour logarithmic average of noise levels in A-weighted decibels, as recommended by the FAA for evaluating aircraft noise impacts. Sound occurring during the night hours (defined as between 10:00 p.m. and 7:00 a.m.) is typically found more intrusive due to low levels of ambient noise. Therefore, the DNL metric adds a 10-decibel penalty for any nighttime aircraft operation. According to FAA Order 5050.4B the 65 DNL exposure limits are used to evaluate potential adverse noise impacts to noise sensitive areas such as residential neighborhoods, educational, health or religious structures, or sites and outdoor recreational, cultural or historic sites.

The DNL generated by the INM does not delineate a strict demarcation between acceptable noise levels and unacceptable noise levels, rather the DNL contour line attempts to describe the general outline of expected noise impacts. Several simplifying assumptions have to be made while generating noise contours, such as flight tracks, aircraft types, day-night operational patterns, and arrival/departure flight profiles. Further, the DNL represents average annual conditions rather than single-event noise occurrences. Noise exposure on any given day may be greater or less than average depending on environmental factors and aircraft performance. However, the noise model does provide a useful and scientifically based method for comparing various noise levels and provides a reasonable basis for performing airport noise compatibility planning for the affected community.

The noise contour map generated for the base year (Year 2007) was based on existing aircraft operations, fleet mix, and runway orientation and is still an accurate portrayal of current noise at the airport. The INM models were conducted for Year 2012, Year 2017, and Year 2027 and were based on the preferred development plan as well as changes in operation levels and fleet mix. These contours are based on development and operation counts that exceed the current infrastructure and activity. The 2007 model was validated and it was determined that current operations at Plymouth remain within the 65 DNL contour and this contour remains within the airport boundary, therefore nothing has changed.

If operations were to increase at the airport, or additional infrastructure added, the potential for expanding non-compatible land-uses within the 65 DNL could present unwanted impacts to the local community. Local planning agencies should take steps to prevent incompatible land-uses within noise contours and other airport operating surfaces (i.e. critical areas, FAR Part 77 surfaces and RPZs). Appropriate zoning controls and development permit review processes should be continually assessed to protect the local community and airport operations, and allow the Airport to expand to meet forecasted demand.

2.12.16 Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks

As they pertain to Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks, the following goals are among those included in the National Plan of Integrated Airport Systems:

- Airports should be safe and efficient, located where people will use them, and developed and maintained to appropriate standards.
- Airports should be affordable to both users and the Government, relying primarily on producing self-sustaining revenue and placing minimal burden on the general revenues of the local, State, and Federal Governments.
- Airports should be compatible with surrounding communities, maintaining a balance between the needs of aviation, the environment, and the requirements of residents.
- The airport system should be extensive, providing as many people as possible with convenient access to air transportation
- Effects on the human environment are classified under social impacts, and encompass a wide range of activities. The principal social impacts considered with any proposed airport actions include relocation of residences and businesses, alteration of surface transportation patterns, disruption of established communities or planned developments, and significant changes in employment.

Additional aircraft forecasted to utilize the airfield could have some adverse noise impacts to the surrounding residential community, particularly on the final approach. There is some industrial development off the end of Runway 15, but as this type of development is considered to be compatible with airport operations, it should not be a concern for airport development.

EJScreen is an environmental justice mapping and screening tool provided by the EPA that combines environmental and demographic indicators and allows users to compare designated project areas with regional and a nationaldata. The EPA indicates that this is a "pre-decisional" tool to help identify areas that may warrant additional consideration, analysis, or outreach. A preliminary review using EJScreen indicates that the socioeconomic indicators of primary concern fall well below the State, EPA Region 1, and national averages.

2.12.17 Water Quality

Plymouth Municipal Airport is located in the Buzzards Bay watershed. Potential water quality impacts would be mitigated through effective stormwater management and soil erosion and sediment control measures implemented as part of the design process, in accordance with all governing local, state and federal requirements and oversight during any construction.

Erosion and Sediment Control Plans will need to be approved by the governing municipalities (Plymouth and/or Carver) and/or other governing agencies prior to any construction activities. Furthermore, all construction activities will need to comply with the latest FAA Advisory Circular 150/5370-10D (2008, or as updated) Standards for Specifying Construction on Airports.

The design and construction of any proposed facilities can be done in such a manner as to minimize or eliminate the potential of water quality degradation through a prudent storm water management program. The use of oil/water separators incorporated into the overall drainage system will help control the potential of any hazardous materials reaching the bay or groundwater, and allow for their appropriate disposal.

2.12.18 Wetlands

Massachusetts Department of Environmental Protection (DEP) mapping is available via MassMapper. It indicates a band of "Scrub-Shrub" (SS) wetlands crossing Runway 15-33, where Runway 33 was extended in 2016. It should be mentioned that there is a cranberry bog located south of Runway 33. Any future improvements would need to address these wetland areas and may require permits under the Massachusetts Wetlands Protection Act (MGL 131 §40) and appropriate steps will be taken to mitigate the effects on the nearby wetlands as much as possible.

2.12.19 Wild and Scenic Rivers

The United States Department of the Interior's Wild and Scenic River inventory has no registered Wild or Scenic Rivers within the vicinity of Plymouth Municipal Airport. The closest listing is approximately 14 miles to the north, a 9-mile long segment of the North River in Pembroke and Marshfield, MA.

2.12.20 Conclusion

A federal level EA in the Short-Term Planning phase for PYM would further address any projects within the 0-5 year planning horizon. This EA will examine the potential impacts to each impact category in greater detail. However, the proposed development plan is anticipated to have impacts in the following categories: Wetlands (minor), Construction (temporary), Natural Resources (for fill materials associated with any new runway, taxiway, or apron construction).

Some of the projects may be Categorically Excluded and it may be possible to apply for a Documented CATEX, which would possibly alleviate the need for an EA.

Chapter 3

3.1 Introduction

The purpose of this chapter of the Plymouth Technical Master Plan Update is to accurately forecast airport activity during the upcoming forecasting period (2021-2041). This will allow future infrastructure to align with airport use. The forecast will use local, regional and national forecasts to determine the various factors that may affect the upcoming growth of the airport. According to FAA Order 5090.3C, forecasts should:

- Be realistic
- Be based on the latest available data
- Reflect the current conditions at the airport
- Be supported by information in the study
- Provide an adequate justification for the airport planning and development

Plymouth Airport is not currently serviced by a scheduled commercial operator. Therefore, only the following items will be considered in the forecast:

- Based Aircraft
- Fleet Mix
- Aircraft Operations
- Critical Design Aircraft

3.2 Industry Trends

As Plymouth is a General Aviation airport the continuing trends in the General Aviation Industry were reviewed and considered as part of this forecast. Though the airline industry saw an end to eleven years of profitability, halted by the COVID-19 pandemic, the general aviation industry was less affected. The pandemic brought about an increase in business aviation as passengers unable to travel to their destinations utilizing the airlines, took to corporate jet travel. The outlook for general aviation is promising, calling for a 0.1% increase in fleet size during the forecasting period (2021-2041).

3.3 Forecasting Methods/Rationale

The FAA suggests several forecasting methods applicable to airport operational growth. These methods include:

- **Regression analysis–**A statistical technique that ties aviation demand to economic measures. Regression analysis should be restricted to relatively simple models with independent variables for which reliable forecasts are available.
- **Trend analysis and extrapolation–**Typically the historical pattern of activity projects this trend into the future. This approach is useful where unusual local conditions differentiate the study airport from other airports in the region.
- **Market share analysis or rational analysis–**This technique assumes a top-down relationship between national, regional, and local forecasts. Local forecasts are a market share percentage of regional forecasts, which are a market share percentage of national forecasts. Historical market shares are calculated and used as a basis for projecting future market shares.
- **Smoothing–**A statistical technique applied to historical data, given greater weight to the latest trend and conditions at the airport; it can be effective in generating short-term forecasts.
- **Expert Judgment–**This effort simply looks to utilize a combination of the methods presented above, but applies a level of expert judgment from local, regional, and national aviation industry knowledge.

In the wake of the COVID-19 crisis, forecasting the rate at which airports recover from the downturn in operations has been challenging worldwide. FAA direction is to give close consideration to recent factors at the individual airport and surrounding community. All airports and regions will be progressing at their own pace and so we will heavily weigh the recent activity at Plymouth and the surrounding area to forecast future growth. With this in mind, this forecast will rely on Trend Analysis, Smoothing, and Expert Judgment to lay out the next 20 years of projections.

The forecast pulls data from a variety of sources and several references to national forecasts.

Included in this report are:

Table 3-1: Description of Data Source	
Source	**Description**
FAA Traffic Flow Management System Counts Data (TFMSC)	The TFMSC includes data collected from flight plans. These operations are categorized by aircraft type and can be used to identify trends in the PYM fleet mix. The advantage of the TFMSC data is its degree of detail and insight into the itinerant aircraft users at PYM. A disadvantage of TFMSC data is that it does not include local operations or operations that do not participate in Air Traffic Control services. The TFMSC data was used primarily to distinguish fleet mix among larger aircraft.
FAA Terminal Area Forecasts (TAF)	The FAA TAF, published in May 2021, provides historical records and forecasts for passenger enplanements, aircraft operations and based aircraft at PYM. These forecasts serve as a comparison for forecasts prepared as part of this planning effort and provide historical information on aircraft activity.
FAA Aerospace Forecast	The Aerospace Forecast 2021-2041 is a national-level forecast of aviation activity. The Aerospace Forecast helps guide local forecasts by serving as a point of comparison between local and national trends.
Socioeconomic Data	Socioeconomic data was retrieved from sources including the US Bureau of Labor and US Census 2020. It includes population growth and density, unemployment and labor rate comparisons, measures of income and business climate. This section allows the forecasting to include assumptions about disposable income inside the Airport Service Area.
Stakeholder Interviews	The Consultant conducted interviews with stakeholders during site visits. Interviews included terminal and airfield tenants, airport management, Plymouth Airport Commission, Professional Airways, and other airport businesses.
Massachusetts State Airport System Plan 2010	MassDOT Department of Aeronautics is "responsible for being an effective steward for a statewide airport system". The purpose of the system plan is to "provide an analysis of the statewide airport system that will produce an extensive assessment of the condition of the current system, as well as a plan for meeting its current and future needs."

3.4 Current Conditions

3.4.1 Based Aircraft

Historical data provided by the FAA TAF, shows a decrease in based aircraft at Plymouth over the previous 25 year period. Prior to the turn of the century, Plymouth boasted 179 based aircraft, which fluctuated over the next 20 years, decreasing rapidly after the 2008 recession, climbing again in 2015 and decreasing once more by 2020.

Table 3-2: Historical Based Aircraft Count	
Year	**Based Aircraft**
1995	179
2000	179
2005	168
2010	133
2015	163
2020	93
2021	105
Historical Average	146

Table 3-3: Current Based Aircraft	
Based Aircraft	**Count**
Single Engine Recip	79
Multi Engine Recip	10
Turbo-Prop	7
Turbo-Jet	5
Rotorcraft	4
Glider	0
Light Sport	0
Military	0
Electric	0
Total	105

A review of the current FAA Master Record, 5010, BasedAircraft.com, and discussions with Airport Management revealed 105 aircraft based at Plymouth in 2021. This is a 13% increase from the FAA TAF which forecasted 93 based aircraft in 2021. Seventy-nine single engine aircraft used for recreation, training, commuting, aerobatics make up the majority of PYM's based aircraft. There are ten multi-engine aircraft based on the field, five turbine-powered aircraft, and four rotorcraft.

3.4.2 Aircraft Operations

Table 3-4 represents a sample of year increments in the FAA TAF data. A comparison of this data to fuel sales at PYM indicates a rather constant operational count over the previous 20 years fluctuating with changes in the economy.

Aircraft Operational counts include both takeoffs and landings at an airport. There is not a precise method to determine aircraft operations at an airfield that is non-towered so the operations for Plymouth have been estimated. In an effort to produce the most accurate operational baseline a variety of sources were consulted.

Table 3-4: Historical TAF Operations Summary			
	Local	**Itinerant**	**Total**
2000	26,500	40,000	66,500
2010	30,000	23,200	53,200
2020	30,000	21,000	51,000
Historical Average	34,750	36,517	71,267
2021	33,103	27,918	61,021

Source-FAA TAF and DuBois & King

TFMSC

The FAA Traffic Flow Management System Count (TFMSC) offers a count of all aircraft that utilize the air traffic control system to access Plymouth. This system accurately captures all operations that are conducted on an instrument flight plan but it does not always capture aircraft flying locally or those that choose not to use the Air Traffic control system. This method of counting operations was useful in determining fleet mix but was not accurate when determining total aircraft operations.

FAA 5010

The FAA 5010 system provides operational estimations by the airport management and MassDOT Aeronautics. The annual estimate provided as of July 2021 on the FAA 5010 form was 65,900.

GARD ADS-B

Plymouth Airport additionally has an Invisible Intelligence system (GARD ADS-B) that captures Automatic Dependent Surveillance-Broadcast (ADS-B) operations utilizing the airport. This system is typically an accurate method of capturing actual aircraft operations, although it is limited by aircraft that have installed ADS-B. According to the Aircraft Owner and Pilots Association (AOPA), approximately 47% of the general aviation fleet have installed ADS-B on their aircraft. The GARD data at Plymouth produced 26,387 aircraft operations during 2021. Assuming that accounts for 47% of the fleet, the estimated annual operations for Plymouth based on GARD data would be 56,142.

Operational Summary

Given the limitations of certain data sources an average of Invisible Intelligence GARD data and FAA 5010 data was used to form the accepted baseline, which was compared to FAA TAF and MassDOT System Plan forecasts for accuracy. The average baseline for 2021 is 60,021. This baseline was used to create the forecast for aircraft operations for Plymouth for the forecast period (2021–2041).

Table 3-5: 2021 Baseline Operations	
5010	65,900
GARD*	56,142
TFMSC	2,430
FAA TAF**	51,000
MASSDOT**	64,579
Baseline	61,021

** Adjusted for 47% GA leet installed with ADSB
* Projections

The baseline operations can further be defined by fleet mix. Table 3-6 depicts the number and percentage of the total operations of 61,021 as aircraft types. 68% of the operations are conducted by single-engine aircraft, with the next highest aircraft type shown as Turbo-props.

Table 3-6: PYM Operations by Aircraft Type		
	Operations	% Ops
Single Engine	41,494	68.0%
Multi Engine	5,492	9.0%
Turbo-Prop	7,323	12.0%
Turbo-Jet	4,271	7.0%
Rotorcraft	2,441	4.0%
Glider	0	0.0%
Light Sport	0	0.0%
Military	0	0.0%
Electric	0	0.0%
Total	61,021	

Source: GARD Data and DuBois & King

Additionally, the operational data can be separated by Aircraft Approach Category and Airplane Design Group. The Airplane Design Group (ADG) is an FAA-defined grouping of aircraft types based on wingspan and tail height, while the Aircraft Approach Category is an FAA-defined grouping based on aircraft approach speed. PYM is currently designated as a B-II airport and each runway, taxiway, taxilane and apron are designed with this in mind. Table 3-7 - PYM Operations by Design Group depicts the breakdown of operations by AAC/ADG.

Table 3-7: Operations by FAA Grouping		
AAC/ADG	Ops	% Ops
A-I	58,595	96.00%
A-II	697	1.10%
A-III	3	0.00%
B-I	384	0.60%
B-II	1,122	1.80%
B-III	3	0.00%
C-I	90	0.10%
C-II	96	0.20%
C-III	2	0.00%
Total	61,021	

Source: GARD Data and DuBois & King

Table 3-8 depicts the Local/Itinerant Operations Split. The average split is derived from historical data from 1995 to 2020, reported values from airport management and the FAA 2021-2041 TAF. The Airport indicated that the split of local to itinerant operations is estimated to be 55% local and 45% itinerant. The FAA 2021-2041 TAF provided a split of 59% local and 41% itinerant, while the historical data shows an average of 49% local and 51% itinerant. The average used to determine the current split is 54% local and 46% itinerant.

Table 3-8: Local/Itinerant Operations Split		
Source	Local	Itinerant
Historical 1995-2020	49%	51%
Airport (2021)	55%	45%
FAA TAF	59%	41%
Average	54%	46%

Source: FAA TAF and DuBois & King

3.4.3 Current Conditions Summary

The information presented in the previous sections can be used to characterize the airport as follows:

- Without an air traffic control tower, airport operations have been predominantly estimated over the years through interviews with airport management and airport users. The traffic monitoring system provided by Invisible Intelligence (GARD), allows a more accurate estimation of operations. This accuracy will continue to increase as additional aircraft in the general aviation fleet become equipped with ADSB. Baseline operations are 61,021 and consist primarily of a single-engine piston; with multi-engines, turbo-props, turbo-jets, and helicopters rounding out the fleet.

- Though A-I aircraft represent 96% of the traffic at Plymouth there is a regular flow of B-II traffic, giving the airport its B-II reference code.
- The baseline split is 54% local and 46% itinerant.
- Plymouth reported 105 based aircraft in 2021.

3.5 Current Critical Aircraft/Runway Design Code

As discussed previously in Chapter 2, Existing Conditions, the Critical Aircraft serving Plymouth is the Falcon 2000. The runway design code is B-II.

The critical, or design aircraft is defined as the most demanding aircraft that either operates or is projected to operate at least 500 or more itinerant operations annually. Itinerant operations are defined as operations between one location and another, and therefore local operations that begin and end at PYM are not considered in this calculation. At many small airports, a single aircraft type does not meet the 500 operation minimum and so the FAA allows a composite of several aircraft types to meet the minimum operational number. At Plymouth, we have developed such a composite of aircraft that operate in and out of Plymouth regularly. (See Figure 2-24) From the composite, the Falcon 2000 is the most demanding aircraft and is therefore considered the critical aircraft for Plymouth.

3.6 Charter Service Assumptions

Several charter operators conduct regular operations at Plymouth Municipal Airport. Nationwide operators including NetJets and Wheels Up contribute to the transient charter traffic and account for approximately 40% of these operations. Professional Airways, a charter operator based at PYM currently owns and operates two

Table 3-9: Summary of Baseline Data

Based Aircraft (Table 3-3)	**105**		
Local Itinerant Split (Table 3-4)	**Local**	**Itinerant**	**Total**
	33,103	**27,918**	**61,021**
Operations by Aircraft Type (Table 3-6)	**Operations**	**% Total Operations**	
Single Engine	**41,494**	**68.0%**	
Multi Engine	**5,492**	**9.0%**	
Turbo-Prop	**7,323**	**12.0%**	
Turbo-Jet	**4,271**	**7.0%**	
Rotorcraft	**2,441**	**4.0%**	
Glider	**0**	**0.0%**	
Light Sport	**0**	**0.0%**	
Military	**0**	**0.0%**	
Operations by FAA Grouping (Table 3-7)			
AAC/ADG	**Operations**	**% Total Operations**	
A-I	**58,595**	**96.00%**	
A-II	**697**	**1.10%**	
A-III	**3**	**0.00%**	
B-I	**384**	**0.60%**	
B-II	**1,122**	**1.80%**	
B-III	**3**	**0.00%**	
C-I	**90**	**0.10%**	
C-II	**96**	**0.20%**	
C-III	**2**	**0.00%**	

Source: DuBois & King

Falcon 2000's a Hawker 1000, a Hawker 4000, and Falcon 900EX. Each of these are B category aircraft with the Falcons and Hawker 4000 listed as B-II. Annually, Professional AIrways accounts for approximately 250 of the airport's B-II operations with their owned and operated aircraft. Discussion with Professional Airways Management leads to the assumption that charter operations will not decrease throughout the planning period and could in fact increase should infrastructure changes be made to accommodate their aircraft under all flight conditions. Currently, their fleet operates under restrictions based on runway length available

3.7 Forecast Scenarios

3.7.1 Based Aircraft Forecast

Based aircraft at Plymouth are currently 105. Utilizing the FAA Aerospace Forecast for Growth rate based on aircraft fleet mix a projected forecast was created for the 20 year planning period 2021-2041. Though the FAA Aerospace forecast shows a projected growth rate among single and multi-engine piston aircraft, it shows a 0.6% growth rate among Turbo-props, and a 2.3% growth rate among Turbo-jet aircraft. The average 20-year growth rate for all categories in the fleet is -0.24%.

Table 3-10: PYM Based Aircraft Fleet Mix Annual Growth Rate

Based Aircraft	Annual Growth Rate
Single Engine	-0.90%
Multi Engine	-0.40%
Turbo-Prop	0.60%
Turbo-Jet	2.30%
Rotorcraft	1.40%
Glider	0.00%
Light Sport	2.40%
Military	0.00%
Electric	0.18%
Average 20 Year Growth Rate	-0.24%

Source: FAA TAF and DuBois & King

Projecting the FAA Aerospace growth rates out over the 20 year period shows a decline in based aircraft at Plymouth, consistent with that of most GA airports in the upcoming forecast period. Single-engine piston aircraft are expected to decline by 14 over the next 20 years resulting in 65 based single-engine aircraft. Multi-engine aircraft are also expected to decline resulting in 9, rather than 10 based aircraft. Turbo-props climb by 1, showing 8 based turbo-props by 2041 and turbine aircraft grow by 3, forecasting 8 jet aircraft based at Plymouth by the end of the forecast period. Finally, rotorcraft are expected to climb by 1 over the next 20 years, forecasted at 5 by 2041. These fleet mix forecasts combine to reflect 96 based aircraft by 2041, a decrease of 7 from the current baseline.

Although no electric aircraft are forecasted to be based at Plymouth in this grouping due to a current count of zero, it is unlikely that in the next 20 years there remains zero-based electric aircraft in the fleet. It is expected that multiple electric aircraft will be added to the fleet in the next several years and that the number will continue to increase per the provided growth rate of 0.18%.

Table 3-11: Based Aircraft Forecast

Aircraft Category	2021	2026	2031	2041
Single Engine	79	75	72	65
Multi Engine	10	10	10	9
Turbo-Prop	7	7	8	8
Turbo-Jet	5	6	6	8
Rotorcraft	4	4	5	5
Glider	0	0	0	0
Light Sport	0	0	0	0
Military	0	0	0	0
Electric	0	0	0	0
Total	105	102	102	98

Source: DuBois & King

3.7.2 Aircraft Operations Forecast

There are several options when developing forecasts for operations. Statistical methodologies are typically used to forecast operations based on available historical information. For purposes of this forecasting effort, the following statistical methodologies were considered:

- Trend Line analysis is done using historical data and identifying trends in the data and how it pertains to activity at an airport.
- Growth rates extrapolated from 2021-2041 FAA Aerospace Forecast and the 2020-2045 Terminal Area Forecast.

Trend Line Analysis–Historical data that was available for Plymouth consists of operational data and based aircraft counts. Historical data for based aircraft and operations were collected between 1995 and 2020. This data provides a view of activity over that period.

Historical data showed that operations between 1995 and 2020 fluctuated, mirroring similar fluctuations in the economy.

FAA Growth Rates–Growth rates were gathered from two sources of FAA forecasts; the FAA 2021-2041 Aerospace Forecasts and the FAA 2020-2045 Terminal Area Forecast summary. The growth rates are shown below:

FAA 2021–2041 Aerospace Forecasts

- GA Fleet Growth = 0.1%
- FAA Active Aircraft = 0.43%
- FAA Fuel Consumption = 2.7%

Notes -

1. 0.43% is an average Active Aircraft growth rate for the planning period of 2021 - 2041.
2. 2.7% is an average Fuel Consumption growth rate for the planning period of 2021 - 2041.

FAA 2020–2045 Terminal Area Forecast

- National Forecast Trends for Itinerant General Aviation = 1.1%
- National Forecast Trends for Local General Aviation = 0.7%

Table 3-12: Summary of General Aviation Activity Forecast

	2021	2026	2031	2041
FAA GA Fleet Growth	61,021	61,327	61,634	62,253
FAA Active GA Growth	61,021	62,344	63,696	66,489
FAA Fuel Consumption Growth	61,021	69,716	79,650	103,965
National Trend Total	61,021	63,766	66,640	72,805
OPBA	61,021	60,684	59,341	57,113

Source: DuBois & King

The analyses generated a range of forecasts from low to high.

Given that various methodologies generated similar projections, a number of forecasts were eliminated from further analysis. The FAA fuel consumption forecasts presented a significant increase and was eliminated.

The remaining three forecasts (FAA GA Fleet Growth, FAA Active GA Growth, and National Trend) use regional and local data and represent a potential range of activity over the twenty-year planning period. The forecasts were defined as the low, moderate, and high growth scenarios for the airport. The recommended projection of activity for Plymouth Municipal Airport is shown in Table 3-13 Range of Aviation Activity Forecasts.

Table 3-13: Range of Aviation Activity

	2021	2026	2031	2041
Low Growth FAA GA Fleet Growth	61,021	61,327	61,634	62,253
Moderate GrowthFAA Active GA Growth	61,021	63,766	63,6896	66,489
High Growth National Trend	61,021	63,766	66,640	72,805

Source: DuBois & King

The Moderate Growth forecast was chosen to represent Plymouth operations in the forecast period. Plymouth is a bustling General Aviation Airport as seen by its numerous businesses, steady traffic flow, and historical development. Despite the COVID-19 pandemic, the airport continues to see a steady rise in annual operations and continues to attract new hangar owners and businesses to the airfield. Plymouth is not expected to see a sharp rise in activity but is expected to continue with a moderate rise in operations.

3.7.3 Fleet Mix Forecast

A breakdown by aircraft type was done to provide a general understanding of how the activity will be distributed operationally. It was assumed based on the increase in the turbine fleet and the turbine based aircraft, Plymouth would see a slight increase in jet activity. Distribution was then applied and projected through 2041 using the Moderate Growth Forecast. The resulting forecast breakdown is shown in Table 3-14.

Table 3-14: Adjusted Forecast of Activity by Aircraft Type								
	2021		2026		2031		2041	
Aircraft Type	Local	Itinerant	Local	Itinerant	Local	Itinerant	Local	Itinerant
Single Engine	22,510	18,984	22,970	19,372	23,445	19,751	24,397	20,535
Multi Engine	2,979	2,513	3,034	2,558	3,058	2,590	3,150	2,685
Turbo-Prop	3,972	3,350	4,069	3,431	4,168	3,515	4,362	3,679
Turbo-Jet	2,317	1,954	2,370	1,998	2,458	2,073	2,630	2,217
Rotorcraft	1,324	1,117	1,379	1,163	1,432	1,207	1,539	1,295
Glider	0	0	0	0	0	0	0	0
Light Sport	0	0	0	0	0	0	0	0
Military	0	0	0	0	0	0	0	0
Electric	0	0	0	0	0	0	0	0
Total	61,021		62,344		63,696		66,489	

Source: DuBois & King

Additionally, a breakout of operations using current grouping percentages was performed. Table 3-15, Forecasted Operations by FAA Grouping shows that A-I aircraft continue to dominate the fleet at Plymouth, but that B-II aircraft continue to reach 500 annual operations leading to a B-II categorization for the airport throughout the forecast period.

Table 3-15: Forecasted Operations by FAA Grouping		
AAC/ADG	Operations	% Total Operations
A-I	63,845	96.00%
A-II	759	1.10%
A-III	3	0.00%
B-I	419	0.60%
B-II	1,222	1.80%
B-III	3	0.00%
C-I	98	0.10%
C-II	105	0.20%
C-III	3	0.00%

Source: GARD Data and DuBois & King

3.8 Forecast Summary

The information presented in the previous sections can be used to characterize the airport as follows for the end of the forecast period, the year 2041:

- Forecasted annual operations are expected to increase from 61,021 to 66,489 and consist primarily of single engine piston, with multi-engines, turboprops, turbines, and helicopters rounding out the fleet.
- Though A-I aircraft continue to represent the majority of traffic at Plymouth there is still forecasted to be a regular flow of B-II traffic, giving the airport its B-II reference code. Other ADGs are not expected to change significantly in a way that would suggest Plymouth becoming another category airport in the 20 year forecast period.
- The baseline split is expected to remain consistent between local and itinerant traffic.
- The based aircraft forecasted for Plymouth is 96 in 2041.

Table 3-16: Summary of Baseline Data			
Based Aircraft (Table 3-11)	96		
Local Itinerant Split (Table 3-14)	**Local**	**Itinerant**	**Total**
	36,078	30,411	66,489
Operations by Aircraft Type (Table 3-14)	**Operations**	**% Total Operations**	
Single Engine	44,932	67.6%	
Multi Engine	5,835	8.8%	
Turbo-Prop	8,041	12.1%	
Turbo-Jet	4,847	7.3%	
Rotorcraft	2,834	4.3%	
Glider	0	0.0%	
Light Sport	0	0.0%	
Military	0	0.0%	
Operations by FAA Grouping (Table 3-7)			
AAC/ADG	**Operations**	**% Total Operations**	
A-I	63,845	96.00%	
A-II	759	1.10%	
A-III	3	0.00%	
B-I	419	0.60%	
B-II	1,222	1.80%	
B-III	3	0.00%	
C-I	98	0.10%	
C-II	105	0.20%	
C-III	3	0.00%	

Source: DuBois & King

3.9 Forecast Comparison with FAA TAF/MassDOT System Plan

3.9.1 TAF Comparison

For each airport in the National Plan of Integrated Airport System (NPIAS), the FAA develops an annual forecast of aircraft operations and based aircraft. Historical data from the FAA's Airport Master Record (Form 5010) is used to create the TAF. While the Master Record is typically utilized to provide an estimate of activity it may not represent actual operations. These estimates at uncontrolled airports have historically come from airport management.

The FAA TAF, issued in May 2021 is shown in Table 3-15 for Plymouth Municipal. Condensed to show 5-year increments throughout the forecasting period it shows no growth over the next 20 years. This is not consistent with the FAA Aerospace forecast or the Socioeconomic data collected for Plymouth and the Airport Service Area. The forecast presented in this chapter depicts 66,489 operations compared to the TAF forecast of 51,000 by 2041 which is a 30% difference. Based aircraft in this forecast do depict a decrease by 2041, with 96 based aircraft at PYM. This compares to 93 based aircraft included in the TAF which is a 3.3% difference.

The operational forecast does not align with the FAA TAF forecast, as the TAF projects no change in operations over the 20 year forecasting period. A stagnant growth at Plymouth is unlikely considering the active local fleet, the increasing turbine operations that are forecasted, the waiting list to build new hangars on the field and the positive outlook for the South Shore region. Though a stark upward trend in activity is not predicted in this section, with the decrease in based aircraft and decrease in piston fleet size; the increase in the turbine fleet and general aviation attractions at Plymouth indicate a continuing gradual increase in operations.

The airport recently installed a GARD Invisible Intelligence system to more accurately track airport operations. Previously the operational counts used to create the TAF forecast were estimated by the airport. Moving forward, utilizing the GARD operational data will create an accurate operational baseline to use for forecasting.

Table 3-17: APO Terminal Area Forecast Detail Report (Issued May, 2021)

Aircraft Operations
REGION: ANE STATE: MA LOCID: PYM CITY: Plymoth AIRPORT: Plymouth Municipal

	Enplanements			Itinerant Operation					Local Operations					
Fiscal Year	Air Carrier	Commuter	Total	Air Carrier	Air Taxi & Commuter	GA	Military	Total	Civil	Military	Total	Total Operations	Total Tracon Operations	Based Aircraft
2021	0	20	20	0	600	20,000	400	21,000	30,000	0	30,000	51,000	0	93
2025	0	20	20	0	600	20,000	400	21,000	30,000	0	30,000	51,000	0	93
2030	0	20	20	0	600	20,000	400	21,000	30,000	0	30,000	51,000	0	93
2035	0	20	20	0	600	20,000	400	21,000	30,000	0	30,000	51,000	0	93
2040	0	20	20	0	600	20,000	400	21,000	30,000	0	30,000	51,000	0	93
2041	0	20	20	0	600	20,000	400	21,000	30,000	0	30,000	51,000	0	93

Source: FAA TAF

3.9.2 Massachusetts Statewide System Plan 2010 Comparison

The Massachusetts Statewide System Plan, published in 2010, categorizes Plymouth per the National Plan of Integrated Airport System as a General Aviation (GA) airport. It defines General Aviation airports as either publicly or privately owned, public-use airports that primarily serve general aviation users. Additionally, the MSSP assigned Plymouth the role of Corporate/Business airport which "serve a primary role in regional economic activities, connecting to state and national economies. They accommodate a full range of regional and local business activities, as well as most types of general aviation aircraft including corporate jet and multi-engine activity." This is representative of the Plymouth fleet which typically includes recreational, corporate, and charter aircraft, both piston and turbine. The system plan forecasted the following for based aircraft and annual operations.

The 2010 system plan forecasts 65,882 operations by the year 2030, while the data presented in this chapter forecasts 63,424 annual operations, a difference of only 3.5%. Based aircraft forecasts climb in the MassDOT system plan and are forecasted at 142 in 2030 while the Based Aircraft forecast for Plymouth, based on the FAA Aerospace growth rates depicts 103, a 38% difference.

The general aviation market has changed substantially in the previous 11 years, which may account for the discrepancies between these forecasts.

Table 3-18: MASSDOT Operations/Based Aircraft Forecast

	2008/2009	2015	2020	2030
Operations	65,500	63,937	64,579	65,882
Based Aircraft	136	138	139	142

Source: DuBois & King

3.10 Future Critical Aircraft/ Runway Design Code

Based on the previous forecasts for Aircraft Operations it is clear that throughout the 20 year forecast period B-II aircraft operations will continue to increase. Although all turbine aircraft operations will increase, it is not expected that any Design Group aircraft larger than B-II will achieve 500 annual operations within the 20 year forecast period. The current charter operator, Professional Airways has noted that they have purchased an additional Falcon 2000EX and plan to continue operations with their Falcon 2000 fleet into the future. Therefore, the future critical aircraft for Plymouth is expected to remain the Falcon 2000 and the Runway Design Group is expected to remain B-II, with a Taxiway Design Group of 2. Based on the above, FAA Design Standards call for a runway width of 75-ft and taxiway widths of 35-ft.

Chapter 4

4.1 General

The objective of this element is to determine existing and future airside and landside requirements for the Plymouth Municipal Airport (PYM). The scope of the Technical Master Plan Update (TMPU) calls for a focus on the primary Runway 6-24, taxiways associated with the primary runway, NAVAIDs, airspace requirements, instrument approach procedures, and additional general aviation requirements. Utilizing the data developed from the previous elements, an analysis was performed to verify the runway environment requirements necessary to meet projected demand.

1. **In Chapter 1, Introduction**–The Plymouth Airport Commission (PAC) worked to update a series of guiding principles that would lead the Airport into the next 10 years and beyond. The development of the focused Facilities Needs for Plymouth Airport will be directed by these guiding principles. They are:
2. **Transparent Track**–Through this TMPU process the PAC strived to be transparent and encouraged feedback from PYM stakeholders. Through a series of three public engagement meetings, regular posting of previous presentations on the Airport's website, and the addressing of public comments and questions, the Airport Commission was able to understand and take into consideration the needs of the current airport users, Town, neighbors, and other airport stakeholders.
3. **Appropriate Capacity**–This will review current runway standards and call out any facilities that need to be updated in order to provide appropriate capacity for current and future use of the Airport.
4. **Appropriate Design Requirements**–The Facilities Chapter will highlight any current or future conditions that do not comply with the FAA design standards.
5. **Safety Opportunities**–This chapter will highlight opportunities to increase safety for both airport users and the surrounding communities.
6. **Environmentally Viable Solutions**–Facilities Needs will be developed for the future of the airport and the ability to invest in clean energy opportunities.
7. **Economic Driver**–Facility requirements will be determined and implemented efficiently so that PYM serves as an economic driver and contributes to the growth of the Town of Plymouth and the surrounding communities.

4.2 Runway Requirements (6/24)

As stated previously, the scope of this Technical Master Plan update is limited to Runway 6/24, and therefore 15/33 requirements have not been included as part of these facility needs.

4.2.1 Runway Design

The following steps were used, as instructed by AC 150/5325-4B, Runway Length Requirements for Airport Design, in the development of a recommended runway length for Plymouth Municipal Airport.

1. Identify the critical aircraft
2. Identify the family grouping of airplanes that the critical aircraft belongs to (this assumes that the critical aircraft has a maximum takeoff weight of more than 12,500 lbs and less than 60,000 lbs)
3. Use the tables provided in AC 150/5325-4B to determine the method used for establishing runway length
4. Select the recommended runway length
5. Apply any necessary adjustments to the selected runway length

As previously determined in Chapter 3, Forecasting, the critical aircraft at PYM now, and throughout the 20- year planning period is the Falcon 2000. AC 150/5325-4B provides guidance on runway length calculations for aircraft greater than 12,500 lbs and less than 60,000 lbs such as the Falcon 2000. The Falcon 2000 is listed in Table 3-2; the Remaining 25 Percent of Airplanes That Make Up 100 Percent of the Fleet.

A runway length analysis was conducted utilizing the Falcon 2000 as the critical aircraft. The mean daily maximum temperature of the hottest month at Plymouth airport, 82º, and an airport elevation of 148 feet revealed an unconstrained runway length of 5,500-ft. This considers the required runway length for the Falcon 2000 and similar demanding aircraft at 60% useful load and has been adjusted for runway gradient and contaminated runway conditions as per the AC. At 90% useful load the unconstrained runway length for the Falcon 2000 is 8050-ft. This length is not feasible given the current property boundaries of the airport, and thus Alternatives will be developed utilizing the 5,500-ft length for 60% useful load.

The unconstrained runway length of 5,500-ft represents the 2011 Technical Master Plan Update (TMPU). When data was collected for the 2011 TMPU, the Hawker 850 was the critical aircraft operating at PYM and the unconstrained runway length recommended was 5,500-ft. Throughout the last 10 years, the Falcon 2000 bypassed the Hawker 850 as the critical aircraft, having the greatest number of operations at PYM within its category of aircraft. The Hawker 850 and the Falcon 2000 have similar performance characteristics and are both listed in Table 3-2; Remaining 25 Percent of Airplanes That Make Up 100 Percent of Fleet, of AC 150/5325-4B. As Plymouth Municipal continues as a B-II airport, it is logical that the unconstrained runway length recommended has not changed. Although B-II aircraft are continuing to operate regularly at PYM, they are doing so with significant operational limitations.

Table 4-1: Runway Length Analysis Summary

Airport Reference Code	Critical Design Aircraft	Unconstrained Runway Length*
B-II	Falcon 2000	5,500

*Note: The unconstrained runway length is a length that has not yet considered the physical constraints of the airport's surrounding environment.

RWY 6/24 at Plymouth are 4650-ft long and 75-ft wide. AC 150/5300-13B states that the minimum runway length for a B-II category airport should reflect the needs of the critical aircraft while the minimum width of the runway should be 75-ft. Therefore the primary runway is short of the unconstrained runway length recommendation by 850-ft. Alternatives will be developed to include a No Build Alternative, extending the primary RWY 6/24 to a length meeting the recommended length, and two additional alternatives that consider local constraints.

Table 4-2: Runway Length Comparison

Runway	Current Length	Unconstrained Recommended Runway Length*
6/24	4650-ft	5,500-ft

*Note: The unconstrained runway length is a length that has not yet considered the physical constraints of the airport's surrounding environment.

4.2.2 Runway Protection

Runways have certain clearing standards set by the FAA per AC 150/5300-13B, Airport Design. These standards provide a safe and efficient environment for takeoff and landing. Within these surfaces and zones requirements for obstacle clearance or restriction exist to establish safe areas for aircraft to operate, both under normal circumstances and in the event of emergency operations. The size and shape of these surfaces are dependent on the Runway Design Code (RDC). As RWY 6/24 and every other surface at PYM have been designed to comply with B-II standards, the following table represents the Runway Protection areas and zones associated with RWY 6/24.

Table 4-3: Runway Protection Requirements

Item	Length	Width
Runway Safety Area	Beyond Departure: 300 - ft Prior to Threshold: 300 - ft	150 - ft
Runway Object Free Area	Beyond Departure: 300 - ft Prior to Threshold: 300 - ft	500 - ft
Runway Obstacle Free Zone	Start Beyond Departure: 200 - ft Start Before Threshold: 200 - ft	400 ft
Approach Runway Protection Zone Runway 6	1700-ft	Inner: 1000 - ft Outer: 1510 - ft
Approach Runway Protection Zone Runway 24	1000-ft	Inner: 500 - ft Outer: 700 - ft
Departure Runway Protection Zone	1000-ft	Inner: 500 - ft Outer: 700 - ft

4.2.3 Pavement Conditions

In 2017 MassDOT conducted a Statewide inventory as part of their Statewide Pavement Management System. Pavement Condition Index (PCI) ratings were given for each section of airport pavement and a sliding scale shows estimates of pavement condition on an annual basis for the next five years.

The 2022 pavement strength projections for Plymouth are shown in Figure 4-1. Like most airports, PYM has a variety of pavement strengths based on phased construction over the life of the airport. Figure 4-1 shows the newest pavement constructed on the RWY 33 approach, and adjoining taxiways along the southwest portion of the airport. Additionally, 300-ft of pavement on the ends of RWY 6/24 and parallel taxiway E extensions to join the end of the new runways have been constructed post pavement inventory and would also show as green (PCI > 85) on the map. The remaining runway areas are shown in yellow, depicting a PCI between 41-55. Both 6/24 and 15/33 are programmed to be rehabilitated in the 5-year CIP.

While the main ramp depicts a PCI 56-70, it is not scheduled to be rehabilitated per the CIP until 2029. The pavement in most need of reconstruction at Plymouth appears in the north side hangar development, where the critical pavement just east of the terminal automobile parking, shows a PCI of 0.

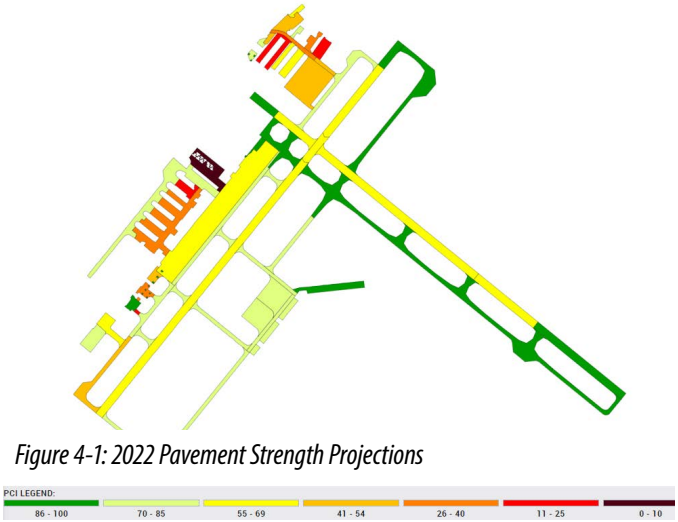


Figure 4-1: 2022 Pavement Strength Projections

4.2.4 Runway Orientation

The runway orientation at PYM is 6/24 and 15/33. RWY 6/24 serves as the primary runway and is the major consideration of this chapter. As discussed in Chapter 2, Existing Conditions, a wind analysis was conducted to verify that wind conditions are covered by the current runway configuration. It was determined that RWY 6/24 and RWY 15/33 together provide all-weather coverage for all aircraft utilizing Plymouth airport.

4.2.5 Runway Requirements Summary

The following table summarizes the runway requirements for RWY 6/24. A thorough analysis of the runway environment concluded that the only deficient characteristic associated with RWY 6/24 is runway length. A series of Alternatives to address this deficiency will be provided at the conclusion of this chapter.

Table 4-4: Runway 6/24 Requirement Summary Plymouth Municipal Airport

Airport Features	Adequate	Deficient	Recommended Action
Airfield Facility Requirements			
Runway Orientation	X		No Action Recommended
Runway Line of Sight	X		No Action Recommended
Runway Designation	X		No Action Recommended
Runway Length		X	The current runway lengths do not accommodate the critical aircraft. Suggest lengthening the runway to meet recommended 60% load of the critical aircraft as per the runway length analysis.
Runway Width	X		No Action Recommended
Runway Shoulders	X		No Action Recommended
RSA Compliance	X		No Action Recommended
ROFA	X		No Action Recommended
ROFZ	X		No Action Recommended
Runway to Taxiway Separation	X		No Action Recommended

Source: DuBois & King

4.3 Taxiway Requirements (6/24)

As runway facilities change, taxiway support for RWY 6/24 will need to be adjusted as well. Following is a review of the current taxiway facilities at PYM. The taxiways at Plymouth fall under Design Group 2A.

4.3.1 Taxiway Dimensions

Plymouth has constructed standard taxiways for a B-II airport. The taxiways are 35-ft wide with a 79-ft safety area and are shown in alphabetical order below. Taxiway E is the primary parallel taxiway at Plymouth and would need to be modified to accommodate any runway extension of RWY 6/24.

Table 4-5: Taxiway

TWY	TOFA	Width	Surface	Airplane Design Group (ADG)	TWY Safety Area (TSA)
E	124-ft	35-ft	Asphalt	II	79-ft
G	124-ft	35-ft	Asphalt	II	79-ft
H	124-ft	35-ft	Asphalt	II	79-ft
J	124-ft	35-ft	Asphalt	II	79-ft
K	124-ft	35-ft	Asphalt	II	79-ft
L	124-ft	35-ft	Asphalt	II	79-ft
S	124-ft	35-ft	Asphalt	II	79-ft

Source: DuBois & King

4.3.2 Taxiway Conditions

A thorough analysis of the taxiway conditions at PYM revealed discrepancies based on changes to the recently released version -13B of AC 150/ 5300-13 Airport Design. Previous taxiways that were built to an aged design standard are now out of compliance. As taxiways are updated, changed, repaved, or rebuilt at PYM they will need to conform to the newly revised standards. Below, Table 4-6 shows that the only items that are out of compliance related to taxiways at PYM are the taxiway fillets.

4.4 Airspace Requirements

Surrounding the airport are imaginary surfaces as defined in FAA AC 150/5300-13B, Airport Design, and 14 CFR Part 77, Objects Affecting Navigable Airspace that must be protected from penetrations. FAA Grant Assurances require an airport to do everything in their power to assure that the airspace is protected. Below is a description of these surfaces as applicable to RWY 6/24 at Plymouth Municipal.

4.4.1 Approach and Departure Surfaces

The parameters of the approach and departure surfaces defined in AC 150/5300-13B vary among visual and instrument runways. Instrument runways are dependent on the instrument approach minimums associated with the runway end. Table 4-7 below shows the approach surface parameters for Runway 6/24 at PYM.

Table 4-6: Taxiway Requirement Summary

Taxiway Width	X		**No Action Recommended**
Taxiway Fillets		X	**Aerial images would suggest that most taxiways connecting to RWY 6/24 do not meet the current design standard.**
Taxiway Shoulders	X		**No Action Recommended**
TSA Compliance	X		**No Action Recommended**
TOFA Compliance	X		**No Action Recommended**
Taxiway to Taxilane/Taxiway Centerline Separation	X		**No Action Recommended**
Taxiway System Configuration	X		**No Action Recommended**

Source: DuBois & King

Table 4-7			
Runway	Approach Type	Surface per Table 3-2 AC 150/5300-13B	Slope
Runway 6	ILS	5/6	20:1/30:1
Runway 24	LPV	5/6	20:1/30:1

Source: DuBois & King

Currently the 20:1 and 30:1 surfaces on the approach to RWY 6 are clear of obstacles.

Figure 4-2: Runway 24 20:1 Penetrations

RWY 24 has penetrations in the 20:1 surface (Figure 4-2) which are within an area covered by an avigation easement and should be removed. Additional penetrations exist in the 30:1 surface (Figure 4-3) that are not covered by an Avigation Easement. The airport should pursue easements or acquire property on the approach to RWY 24 in order to properly protect the approach and departure surfaces and maintain compliance with FAA AIP Grant Assurance 20 Hazard Removal and Mitigation. These easements/ acquisitions to be considered are shown on the Airport's Exhibit A.

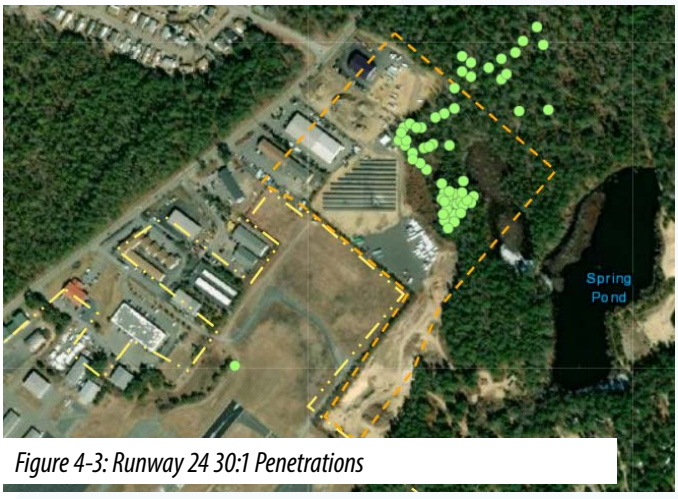


Figure 4-3: Runway 24 30:1 Penetrations

4.5 Navaid Requirements

4.5.1 PAPIs/Lighting

The Precision Approach Path Indicator (PAPI), provides visual glide slope guidance in a non-precision approach environment. Two red and two white lights are visible when on proper glide path angle of approach. Light combinations indicate when slightly high (three white lights and one red light), significantly high (four white lights), slightly low (three red lights and one white light), and significantly low (four red lights). These systems have an effective visual range of at least 3 miles during the day and up to 20 miles at night. RWY 6/24 has a PAPI system located to the left of each runway, adjacent to the touchdown markings. The PAPI's on runway 6 provides a 3.00-degree glide path with a threshold crossing of 50-ft. The PAPI on RWY 24 provides a 4.00-degree glide path with a threshold crossing height of 60-ft.

Additionally, RWY 6 has a 1,400-ft long array of lights known as a Medium-intensity Approach Lighting System with Sequence Flashing lights (MALSF) installed as part of the Instrument Landing System (ILS) that serves the runway. The MALSF is used to enhance the pilot's safety and situational awareness by identifying the runway environment faster and easier on the approach. It also allows pilots to descend to a lower altitude at a shallower approach angle to help identify the runway. RWY 24 does not have a similar system installed and as a result, has higher minimums on the Instrument approach.

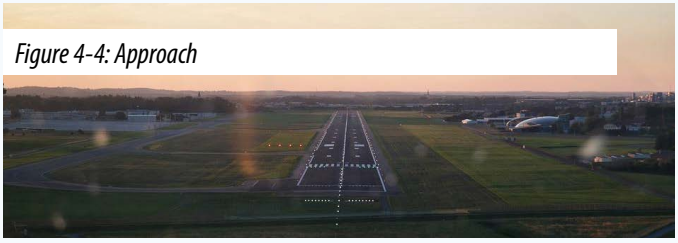


Figure 4-4: Approach

4.6 Instrument Approach Requirements

4.6.1 Runway 6

Runway 6 at PYM has two Instrument Approaches, the first providing the airport's only ILS approach. This approach allows aircraft to descend to 345-ft MSL (mean sea level), or 200-ft above the airport's surface before they are required to visually have the runway environment in sight. The approach required ¾ statute miles (SM) visibility. The ILS approach at PYM plays an important role in serving aircraft that are not equipped with the most modern GPS equipment.

Additionally, RWY 6 is served by an Area Navigation (RNAV), or GPS approach with Localizer Precision with Vertical Guidance (LPV). This approach provides the same minima as the ILS approach. RNAV approaches are the preferred approach for new development in the future as they do not utilize any ground-based equipment that would require maintenance or relocation should the runway end be relocated.

These approaches sufficiently serve RWY 6 in its current configuration but would need to be adjusted if the runway end location changed.

4.6.2 Runway 24

Runway 24 has an RNAV approach with LPV minima of 446-ft MSL (298-ft above the ground) and 1SM visibility. This approach sufficiently serves RWY 24.

It should be noted that all approaches that serve the Plymouth Municipal Airport do so with the following note: Circling Rwy 15 NA at night. This means that aircraft are not able to follow an approach to Runway 6, 24, or 33 and then circle to land on RWY 15, should the winds favor that runway. The restrictions are based on 20:1 penetrations to the approach surface of RWY 15. These penetrations should be evaluated and mitigated.

4.7 General Aviation Facility Requirements

4.7.1 General

Although the scope of this TMPU addressed the primary RWY 6/24, several additional Facilities Needs were discussed throughout the process, amongst the Plymouth Airport Commission, and in Public Engagement Meetings. These initiatives are briefly discussed below.

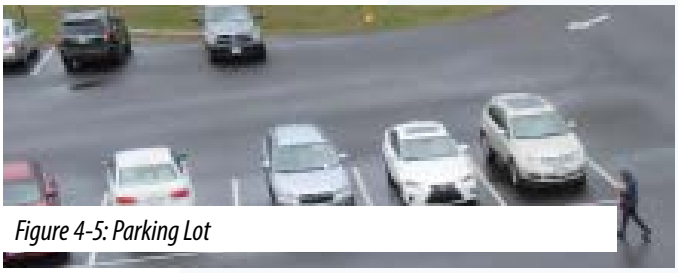


Figure 4-5: Parking Lot

4.7.2 Automobile Parking

The main parking lot at Plymouth Municipal serves the new Administration building, the on-field restaurant Plane Jane's, and several Town-owned equipment buildings. The parking lot also serves the Town's voting precinct. Recent fuel farm upgrades replaced a series of parking spaces in this parking lot, which is often full. The PAC is currently addressing this issue by developing a plan for additional parking.

Figure 4-6: Fuel Shelter

4.7.3 Fuel-Self-Serve

Currently fuel is offered between 0600-2200 daily. Fuel is distributed via fuel trucks and these fuel trucks will likely continue to serve the flying public for a large percentage of fuel sales. However, PYM may be losing fuel sales that occur after hours, or by crew members who prefer to self-fuel, either for financial or operational reasons. A self-serve fuel kiosk could provide additional fuel revenue for the Airport.

4.7.5 Electric Aircraft/ Vehicle Considerations

As electric aircraft and vehicles become more prominent the need for charging stations become prevalent. In order to accommodate these environmentally friendly vehicles, PYM Operations should determine appropriate locations for both electric aircraft and the expansion of electric vehicle charging stations, encouraging this next group of airport users to choose PYM as their preferred destination.

4.7.6 Solar Energy

The Airport is looking for compatible solar projects that fit with other environmental facets including natural heritage. An area for solar development should be included on the Airport Layout Plan. The Airport currently averages a $55,000 power bill that requires 550 panels which would cover just over ½ an acre.

4.8 Facility Requirements Summary

Table 4-8 shows a comprehensive list of the facilities that were evaluated as part of this Technical Master Plan update. Priority items that should be addressed include Runway length, updated taxiway standards per the newest changes to AC 150/5300-13B, and obstruction removal on

Table 4-8: Facility Requirement Summary Plymouth Municipal Airport			
Airport Features	**Adequate**	**Deficient**	**Recommended Action**
Airfield Facility Requirements			
Runway Orientation	X		No Action Recommended
Runway Line of Sight	X		No Action Recommended
Runway Designation	X		No Action Recommended
Runway Length		X	The current runway lengths do not accommodate the critical aircraft. Suggest lengthening the runway to meet recommended 60% load of the critical aircraft as per the runway length analysis conducted in Chapter 2.
Runway Width	X		No Action Recommended
Runway Shoulders	X		No Action Recommended
RSA Compliance	X		No Action Recommended
ROFA	X		No Action Recommended
ROFZ	X		No Action Recommended
Runway to Taxiway Separation	X		No Action Recommended
Taxiway Width	X		No Action Recommended
Taxiway Fillets		X	Aerial images would suggest that most taxiways connecting to RWY 6/24 do not meet the current design standard.
Taxiway Shoulders	X		No Action Recommended
TSA Compliance	X		No Action Recommended
TOFA Compliance	X		No Action Recommended
Taxiway to Taxilane/Taxiway Centerline Separation	X		No Action Recommended
Taxiway System Configuration	X		No Action Recommended
Airfield Markings	X		No Action Recommended
Airfield Lighting	X		No Action Recommended
Weather Facility (ASOS)	X		No Action Recommended
Airfield Pavement	X		No Action Recommended at this time.
Airspace Requirements			
Approach Lights/ Navigational Aids	X		No Action Recommended
Approaches		X	Recommend removing obstructions on the approach to 24.
Tower Requirements	X		No Action Recommended
Obstruction Surfaces		X	Part 77 surfaces will always need to be surveyed and protected. Continued monitoring of vegetation growth and neighboring infrastructure development will need to be an ongoing priority.

Source: DuBois & King

Chapter 5

5.1 Introduction

A series of runway alternatives were developed to meet the current and future needs of the Plymouth Municipal Airport (PYM). It is assumed in the development of these alternatives that PYM will remain a B-II category, general aviation airport throughout the planning period. These alternatives focus on the airport's primary deficiency, which is the current inability to serve the critical aircraft. The alternatives have been evaluated based on air safety, ability to serve the critical aircraft, impact on adjacent land use, environmental considerations, and financial impact. The evaluation criteria are defined as follows:

Air Safety–The first criterion evaluates whether the alternative meets current FAA standards in accordance with AC 150/5300-13B. The FAA requires all public airports to adhere to these standards to protect the safety of the Airport's users. This evaluation results in a "Yes" or "No" determination.

Ability to Serve the Critical Aircraft–The second criterion evaluated whether the alternative effectively meets the current and projected needs of the facility based on the projections outlined in Chapter 3: Aviation Forecast and Chapter 4: Facility Requirements. The ability is evaluated with a Yes or No determination.

Impact on Adjacent Land–The third criterion evaluates whether the alternative would have any negative impacts on adjacent land and landowners. The Plymouth Airport Commission (PAC) values its neighbors and prides itself on maintaining positive relationships with the community. The impact that alternatives have on adjacent properties is evaluated carefully. Impacts to adjacent lands are gauged from No Impact to Significant Impact.

Environmental Impacts–The fourth criterion evaluates whether the alternative has any negative environmental impacts as defined under the National Environmental Policy Act (NEPA). Environmental impacts are gauged on a scale from No Impact to Significant Impact. Environmental impacts include multiple categories, such as wetlands, Bordering Vegetated Wetlands (BVW), bogs, and drainage ditches/swales. BVWs also include a 100' state-jurisdictional buffer zone), other water resources (ponds, aquifers), grassed turf areas, forested vegetation (tree obstructions), noise, and air quality. Additional environmental categories and parameters may need to be considered during the NEPA process.

Financial Impact–Finally the costs associated with this alternative are evaluated. These costs are shown as estimated values with a standard 20% contingency.

5.2 Alternative 1— No-Build Alternative

A no-build scenario is one in which an airport does nothing and the PYM remains the same. In this context, the runway length of 4,650-ft would remain the same and PYM would continue to operate in the way it currently does, serving the same or similar aircraft at reduced capacities.

Alternative 1 (Figure 5-1) involves no property acquisitions, no obstruction removal, does not require the attainment of any easements, and is generally described as follows:

- Runway 6-24 remains at a length of 4,650-ft,
- Plymouth Airport continues to remain a B-II airport, serving primarily aircraft in Airplane Design Groups (ADG) A and B.

Air Safety

Runway 6/24 currently meets all FAA safety requirements in accordance with AC 150/5300-13B. Although increasing the length of the runway pavement will in turn increase safety margins, the current runway length is not unsafe for aircraft adhering to capacity restrictions.

Ability to Serve the Critical Aircraft

Alternative 1 does not change the current runway length and does not fulfill the minimum runway length requirement for the critical aircraft, the Falcon 2000. Though the critical aircraft operates regularly from PYM, they do so at reduced capacity. Therefore, Alternative 1 does not meet the project's Purpose & Need.

Impact on Adjacent Land Uses

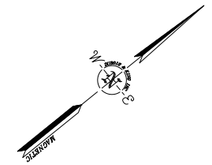
The No-Build Alternative does not produce any additional impacts on adjacent land uses.

Environmental Considerations

Alternative 1 does not increase or decrease the environmental impacts based on the existing conditions remaining the same. This alternative assumes there are no changes in baseline airport use or aircraft type. Therefore, the vegetated areas, obstructions/tree removal, wetland and drainage areas and patterns, water resources and aquifer effects, noise, and air quality will not vary.

Financial Impact

The No-Build alternative infers no design or construction costs.



LEGEND

- AIRPORT PROPERTY LINE
- OFA — OBJECT FREE AREA
- MARKING – TAXIWAY AND RUNWAY
- HOLDING POSITION MARKING
- RUNWAY SAFETY AREA
- RUNWAY OBJECT FREE ZONE AND RUNWAY PROTECTION ZONE
- GLIDESLOPE CRITICAL AREA
- EXISTING CHAIN-LINK FENCE
- WETLAND
- EXISTING ROADWAY

HORIZONTAL SCALE
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PLYMOUTH MUNICIPAL AIRPORT

246 SOUTH MEADOW RD., PLYMOUTH, MA 02360

PLYMOUTH TMPU ALTERNATIVES

PLYMOUTH, MASSACHUSETTS

SHEET TITLE

RW 6 EXTENSION ALTERNATIVE 1:

NO BUILD

DRAWN BY	DATE
IYA	FEB. 2022
CHECKED BY	D&K PROJECT #
JLR	327066
PROJ. ENG.	D&K ARCHIVE #
RLT	

SHEET NUMBER

C1.1

SHEET 1 OF 4

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5.3 Alternative 2 — 351-ft Extension

Alternative 2 (Figure 5-2) involves the extension of the RWY 6 approach end, southwestward by 351-ft for a total runway length of 5001-ft. Alternative 2 is generally described as follows:

- Construct a 351-ft long, 75-ft wide extension on the approach to Runway 6 for a total runway length of 5001-ft;
- Construct a 351-ft long, 35-ft wide extension to the parallel taxiway (E) in order to serve the runway with a full-length parallel taxiway as required by 4.6.1 Parallel Taxiway Standards of AC/5300-13B in order to maintain less than mile visibility on Precision Approaches or Approaches with vertical guidance;
- No additional easements are required to be obtained;
- One obstruction is currently within 10-ft of the approach surface and could be required to be removed in order to maintain a clear and unobstructed approach path to RWY 6 as per AC 5300-13B Tables 3-2 through 3-5 in the future. Currently, there are no obstructions that would penetrate the approach surface to RWY 6 with the 351-ft extension;
- Relocated medium intensity runway lighting (MIRL), Medium Intensity Approach Light System with Sequenced Flashing Lights (MALSF), Precision Approach Path Indicator (PAPI), and Runway End Identifier Lights (REILS) on RWY 6.

Air Safety

Runway 6/24 with a 351-ft extension meets all FAA safety requirements in accordance with AC 150/5300-13B.

Ability to Serve the Critical Aircraft

A 351-ft extension increases the total runway length of Runway 6/24 to 5,001-ft. This length does not meet the recommended 60% useful load runway length of 5,500-ft for the critical aircraft, but does provide increased pavement use and increases safety margins while allowing aircraft to take a higher payload, including more fuel which would lead to higher revenue for the airport.

Impact on Adjacent Land Uses

Alternative 2 does not produce any additional direct impacts on adjacent land uses. There are no additional obstruction removal project that will be associated with this extension. The approach path to Runway 6 will be slightly lower than the current approach path but is not expected to be noticeable by those properties west of the airport. The departure path from Runway 6 will place aircraft slightly higher than the current path as aircraft will begin their takeoff roll 351-ft earlier. This could reduce noise above the properties northeast of the airfield.

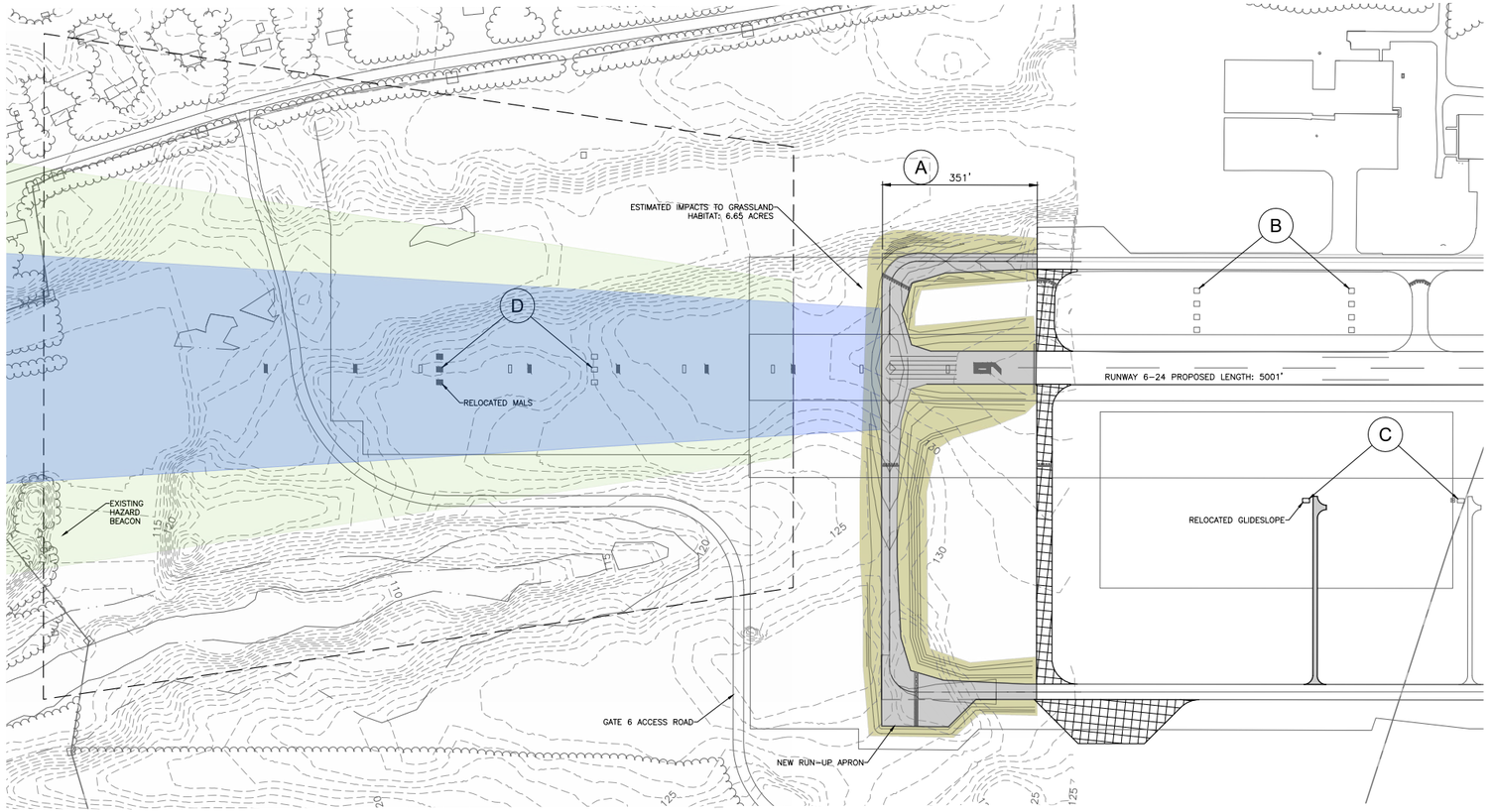
Environmental Considerations

Alternative 2 includes potential impacts to several environmental resource categories that would require further evaluation. There are several locations where Commonwealth and/or local jurisdictional wetlands and/or 100-ft buffer zones may be impacted. These would need to be field-delineated to determine the exact amount of impact and any impacts to the resource or buffer would require permitting. There is an EPA-designated Sole Source Aquifer (SSA) underlying the entire airport that would need to be considered under NEPA for federally funded projects. There is a single off-airport obstruction (tree) within 10-ft of the approach surface area. The installation of new pavement would negatively impact the herbaceous vegetated grassland turf areas but would be positively impacted when the current pavement surfaces of Taxiway G, the run-up area off Taxilane A, and the paved surface connecting Runway 6 to Taxilane A are removed. Areas, where grassland exists that would be regraded or replaced as part of the construction, would be temporary and would likely revert to grassland to be maintained as such, so these are currently considered to be temporary in nature. The majority of the Airport is within a Massachusetts Designated Priority Habitat (PH591), so appropriate agency consultation, coordination, permitting, and possible mitigation would need to be considered prior to construction.

Financial Impact

The financial impacts of Alternative 2 are demonstrated by an "opinion of probable costs", based upon the consultant's knowledge of contractors, construction material suppliers, and work performed at comparable facilities as well as coordination with the Town of Plymouth and MassDOT.

The objective of quantifying construction costs was to provide a preliminary cost comparison among the alternatives under consideration. In order to accomplish this in a practical manner, major cost items associated with airside and landside improvements were included in the computations. The construction costs shown for Alternative 2 are not to be considered the final total cost of each alternative but are meant to provide a means of comparison. It is important to note that the costs presented are only for major items contained in the runway safety improvement alternatives, and do not include costs associated with operating and maintaining the facility. The estimated costs for Alternative 2 are captured in Table 5-1 with a contingency calculation.



PROJECT WORK ELEMENTS:

A — 351' EXTENSION OF RUNWAY 6-24

B — RELOCATION OF PRECISION APPROACH PATH INDICATOR.

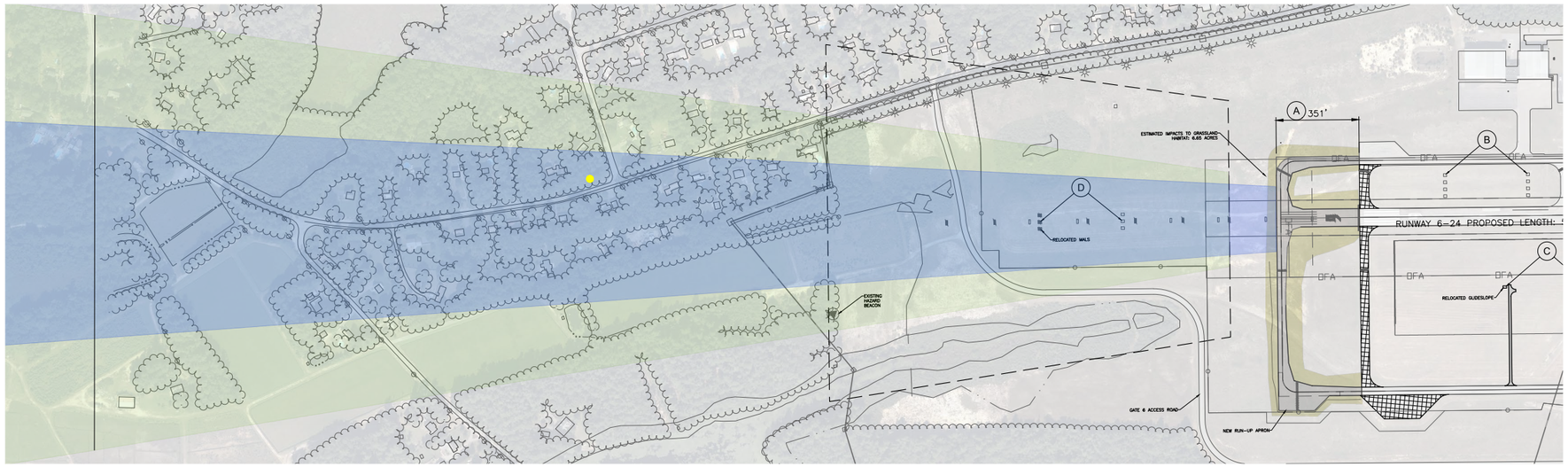
C — RELOCATION OF GLIDESLOPE, GLIDESLOPE ACCESS ROAD, AND CRITICAL AREA.

D — RELOCATION OF MEDIUM INTENSITY APPROACH LIGHTING SYSTEM.

LEGEND

- A — PROJECT WORK ELEMENT
- AIRPORT PROPERTY LINE
- OFA — OBJECT FREE AREA
- MARKING – TAXIWAY AND RUNWAY
- RUNWAY SAFETY AREA
- RUNWAY OBJECT FREE ZONE AND RUNWAY PROTECTION ZONE
- GLIDESLOPE CRITICAL AREA (RELOCATED)
- PROPOSED CHAIN-LINK FENCE
- WETLAND
- EXISTING EDGE OF PAVEMENT
- PROPOSED NEW PAVEMENT
- PROPOSED PAVEMENT REMOVAL

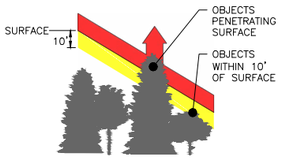
HORIZONTAL SCALE
0 75 150 300
1"=150'



SURFACE LEGEND

- AC 150/5300-13A TABLE 3-2 ROW 4 OBSTACLE CLEARANCE SURFACE
- AC 150/5300-13A TABLE 3-2 ROW 6 OBSTACLE CLEARANCE SURFACE
- VEGETATIVE OBSTRUCTION (REFER TO PENETRATION KEY)

VEGETATIVE PENETRATION KEY



HORIZONTAL SCALE
0 125 250 500
1"=250'

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SHEET TITLE

RW 6 EXTENSION ALTERNATIVE 2:

351' EXTENSION

DRAWN BY	DATE
IYA	JUNE 2022
CHECKED BY	D&K PROJECT #
JLR	327066
PROJ. ENG.	D&K ARCHIVE #
RLT	

SHEET NUMBER

C1.2

SHEET 2 OF 4

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Table 5-1: Opinions of Probable Costs Alternative 2	
Item	**Cost**
Runway/Taxiway Reconstruction/Markings	**$5,600,000**
NAVAIDS Relocation (PAPI, MALSF, Glideslope)	**$1,100,000**
Engineering	**$900,000**
TOTAL (rounded)	**$7,600,000**

Notes:

1. The costs presented do not include operation and maintenance costs or capital equipment purchases necessary for the continued operation of the facility and are based on the assumptions described herein.
2. A 20% contingency was added to the overall costs.
3. These costs are subject to change depending on the implementation date, changes in construction/supply costs, etc.

Source: DuBois & King

Alternative 2 is considered a reasonable and feasible alternative to evaluate further. It satisfies the runway safety area requirements and requires no additional obstruction mitigation or easement negotiation in order to maintain clear approach surfaces. It should be noted that the recommended unconstrained runway length, conducted for the critical design aircraft in the runway length analysis is 5,500-ft, which this Alternative does not meet.

5.4 Alternative 3—550-ft Extension

Alternative 3 (Figure 5-3) involves the extension of Runway 6 approach end, southwestward by 550-ft. Alternative 3 is generally described as follows:

- Construct a 550-ft extension on the Approach to Runway 6.
- Construct a 550-ft extension to the parallel taxiway (E) in order to serve the runway with a full-length parallel taxiway as required by 4.6.1 Parallel Taxiway Standards of AC/5300-13B in order to maintain less than mile visibility on Precision Approaches or Approaches with vertical guidance).
- Currently one easement is needed for the removal of a single tree (or group of trees, in order to maintain a clear approach. Two additional easements could be required, should trees that are within 10-ft of the approach surface continue to grow into the surface.
- One tree (or group of trees) currently obstructs the approach surface and would be required to be removed in order to maintain a clear and unobstructed approach path to Runway 6 as per AC 5300-13B Tables 3-2 through 3-5. Five additional trees (or groups of trees) are currently growing within the 10-ft buffer and may need to be removed in the future to maintain clear approaches. One of the obstructions is on airport property while the remaining obstructions are located on three properties along South Meadow Road.
- Relocated MIRL, MALSF, PAPI, and REILS on RWY 6.

Air Safety

Runway 6/24 with a 550-ft extension meets all FAA safety requirements in accordance with AC 150/5300-13B.

Ability to Serve the Critical Aircraft

A 550-ft extension increases the total runway length of RWY 6/24 to 5,200-ft. This length does not meet the recommended unconstrained runway length of 5,500-ft, but does provide increased pavement use and increases safety margins while allowing aircraft to take a higher payload, including more fuel which would lead to higher revenue for the airport.

Impact on Adjacent Land Uses

Alternative 3 produces a moderate impact on adjacent land uses. There is 1 tree (or group of trees) that would need to be removed as part of this extension project. This obstruction is located off the Airport property along South Meadow Road. There are 5 additional trees (or groups of trees) that are within a 10-ft buffer of the approach surface. These are only potential obstructions and would need to be removed if they continue to grow into the approach surface. One of these trees (or group of trees) is located on airport property while the remaining are located on three separate properties along Airport road. The approach path to RWY 6 will be slightly lower than the current approach path but is not expected to be noticeable by those properties west of the airport. The departure path from RWY 6 will place aircraft slightly higher than the current path as aircraft would begin their takeoff roll 550-ft earlier. This should reduce noise above the properties northeast of the airfield.

Environmental Considerations

Alternative 3 includes potential impacts to several environmental resource categories that would require further evaluation. There are several locations where commonwealth and/or local jurisdictional wetlands and/or 100-ft buffer zones may be impacted. These would need to be field-delineated to determine the exact amount of impact and any impacts to the resource or buffer would require permitting. There is an EPA-designated Sole Source Aquifer (SSA) underlying the entire Airport that

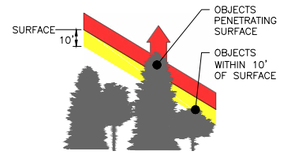
LEGEND

- A — PROJECT WORK ELEMENT
- AIRPORT PROPERTY LINE
- OFA — OBJECT FREE AREA
- MARKING – TAXIWAY AND RUNWAY
- RUNWAY SAFETY AREA
- RUNWAY OBJECT FREE ZONE AND RUNWAY PROTECTION ZONE
- GLIDESLOPE CRITICAL AREA (RELOCATED)
- PROPOSED CHAIN–LINK FENCE
- WETLAND
- EXISTING EDGE OF PAVEMENT
- PROPOSED NEW PAVEMENT
- PROPOSED PAVEMENT REMOVAL

SURFACE LEGEND

- AC 150/5300–13A TABLE 3–2 ROW 4 OBSTACLE CLEARANCE SURFACE
- AC 150/5300–13A TABLE 3–2 ROW 6 OBSTACLE CLEARANCE SURFACE
- VEGETATIVE OBSTRUCTION (REFER TO PENETRATION KEY)

VEGETATIVE PENETRATION KEY



HORIZONTAL SCALE
0 75 150 300

550' EXTENSION PROPERTY ANALYSIS

ADDRESS	ADDRESSEE ON FILE	NO. OF OBSTRUCTIONS	ELEVATION OF OBSTRUCTIONS (FT)
2 BOULTON ST. CARVER, ME 02330	AHMED, ESLAH	2	228.31 (A) 214.94 (B)
117 SOUTH MEADOW RD, CARVER, ME 02330	PETERS, CLIFFORD A.	2	194.08 (C) 190.81 (D)
119 SOUTH MEADOW RD, CARVER, ME 02330	LINDSAY, WILLIAM	1	188.29 (E)
0 SOUTH MEADOW RD, CARVER, ME 02330	TOWN OF PLYMOUTH	1	184.00 (F)

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PLYMOUTH TMPU ALTERNATIVES

PLYMOUTH, MASSACHUSETTS

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OBSTRUCTION PROPERTY INFORMATION

DRAWN BY	DATE
IYA	JUNE 2022
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JLR	327066
PROJ. ENG.	D&K ARCHIVE #
RLT	

SHEET NUMBER

SHEET - OF 4

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would need to be considered under NEPA for federally funded projects. There are multiple off-airport and on-airport obstructions (trees) within 10-ft of the approach surface area and a single obstruction within the approach surface. The installation of new pavement would negatively impact the herbaceous vegetated grassland turf areas but would be positively impacted when the current pavement surfaces of Taxiway G, the run-up area off Taxilane A, and the paved surface connecting Runway 6 to Taxilane A are removed. Areas, where grassland exists that would be regraded or replaced as part of the construction, would be temporary and would likely revert to grassland to be maintained as such, so these are currently considered to be temporary in nature. The majority of the Airport is within a Massachusetts Designated Priority Habitat (PH591), so appropriate agency consultation, coordination, permitting, and possible mitigation would need to be considered prior to construction.

Financial Impact

The financial impacts of Alternative 3 are demonstrated by an "opinion of probable costs", based upon the consultant's knowledge of contractors, construction material suppliers, and work performed at comparable facilities as well as coordination with the Town of Plymouth and MassDOT.

The objective of quantifying construction costs was to provide a preliminary cost comparison among the alternatives under consideration. In order to accomplish this in a practical manner, major cost items associated with airside and landside improvements were included in the computations. The construction costs shown for Alternative 3 are not to be considered the final total cost of each alternative but are meant to provide a means of comparison. It is important to note that the costs presented are only for major items contained in the runway safety improvement alternatives, and do not include costs associated with operating and maintaining the facility. The estimated costs for Alternative 3 are captured in Table 5-2 with a 20% contingency calculation.

Table 5-2: Opinions of Probable Costs Alternative 3

Item	ALT 3
Runway/Taxiway Reconstruction/Markings	$7,200,000
NAVAIDS Relocation (PAPI, MALSF, Glideslope)	$1,100,000
Engineering	$1,000,000
TOTAL (rounded)	$9,300,000

Notes:

4. The costs presented do not include operation and maintenance costs or capital equipment purchases necessary for the continued operation of the facility and are based on the assumptions described herein.
5. A 20% contingency was added to the overall costs.
6. These costs are subject to change depending on the implementation date, changes in construction/supply costs, etc.

Source: DuBois & King

Alternative 3 is considered a reasonable and feasible alternative. It satisfies the runway safety area requirements and requires moderate easement negotiation and obstruction removal in order to maintain clear approach surfaces. It should be noted that the recommended unconstrained, runway length, according to the conducted runway length analysis is 5,500-ft, which this Alternative does not meet.

5.5 Alternative 4—850-ft Extension

Alternative 4 (Figure 5-4) involves the extension of the Runway 6 approach end, southwestward by 850-ft for a total runway length of 5,500-ft. Alternative 4 is generally described as follows:

- Construct an 850-ft extension (5,500-ft total) on the Approach to RWY 6.
- Construct an 850-ft extension to the parallel taxiway (E) in order to serve the runway with a full-length parallel taxiway as required by 4.6.1 Parallel Taxiway Standards of AC/5300-13B in order to maintain less than mile visibility on Precision Approaches or Approaches with vertical guidance.
- Four easements would be required to maintain clear approaches on an 850-ft extension to RWY 6. Easements to clear obstructions within 12-15 additional properties may need to be to mitigate trees that are currently growing within 10-ft of the approach surface.
- Eight trees (or groups of trees) would immediately be obstructions and would be required to be removed in order to maintain a clear and unobstructed approach path to RWY 6 as per AC 5300-13B Tables 3-2

through 3-5. A significant number of additional obstructions are currently within the 10-ft buffer and may need to be removed in the future.
- Relocated MIRL, MALSF, PAPI, and REILS on RWY 6.

Air Safety
Runway 6/24 with an 850-ft extension meets all FAA safety requirements in accordance with AC 150/5300-13B.
Ability to Serve the Critical Aircraft

Alternative 4 meets the demands of the critical aircraft, the Falcon 2000. The Runway Length Analysis conducted in Chapter 4, Facility Needs, revealed a recommended runway length of 5500-ft. The 850-ft extension meets that runway length and would serve the Falcon 2000 at 60% capacity.

Impact on Adjacent Land Uses
Alternative 4 produces a significant impact on adjacent land uses. There are eight trees (or groups of trees) that would be required to be removed as part of this extension project. These trees are located on four properties, with the remaining existing on airport property. Additionally, there are numerous trees within 10-ft of the approach surface that may need to be mitigated in the future. These trees span over 12-15 properties. Due to the number of properties that would be impacted, the number of easements that need to be acquired, and the number of obstacles that would need to be mitigated, the PAC opted not to move forward with this Alternative.

Environmental Considerations
Alternative 4 includes potential impacts to several environmental resource categories that would require further evaluation. There are several locations where Commonwealth and/or local jurisdictional wetlands and/or 100-ft buffer zones may be impacted. These would need to be field-delineated to determine the exact amount of impact and any impacts to the resource or buffer would require permitting. There is an EPA-designated Sole Source Aquifer (SSA) underlying the entire Airport that would need to be considered under NEPA for federally funded projects. There are numerous off-airport and on-airport obstructions (trees) within 10-ft of the approach surface area and dozens of obstructions that would need to be removed within the approach surface. The installation of new pavement would negatively impact the herbaceous vegetated grassland turf areas but would be positively impacted when the current pavement surfaces of Taxiway G, the run-up area off Taxilane A, and the paved surface connecting Runway 6 to Taxilane A are removed. Areas, where grassland exists that would be regraded or replaced as part of the construction, would be temporary and would likely revert to grassland to be maintained as such, so these are currently considered to be temporary in nature. The majority of the Airport is within a Massachusetts Designated Priority Habitat (PH591), so appropriate agency consultation, coordination, permitting, and possible mitigation would need to be considered prior to construction.

Financial Impact
Alternative 4 was not considered reasonable or feasible due to environmental impacts and therefore was not evaluated financially in this update. Although it satisfies the runway safety area requirements and meets the need of the critical aircraft at 60% capacity it would require significant easement negotiation in order to maintain clear approach surfaces. After a series of informative sessions with the PAC and the public, the Commission decided not to continue developing Alternative 4, considering the extensive property and environmental impacts, including wetland impacts, and the cost associated with these mitigation requirements.

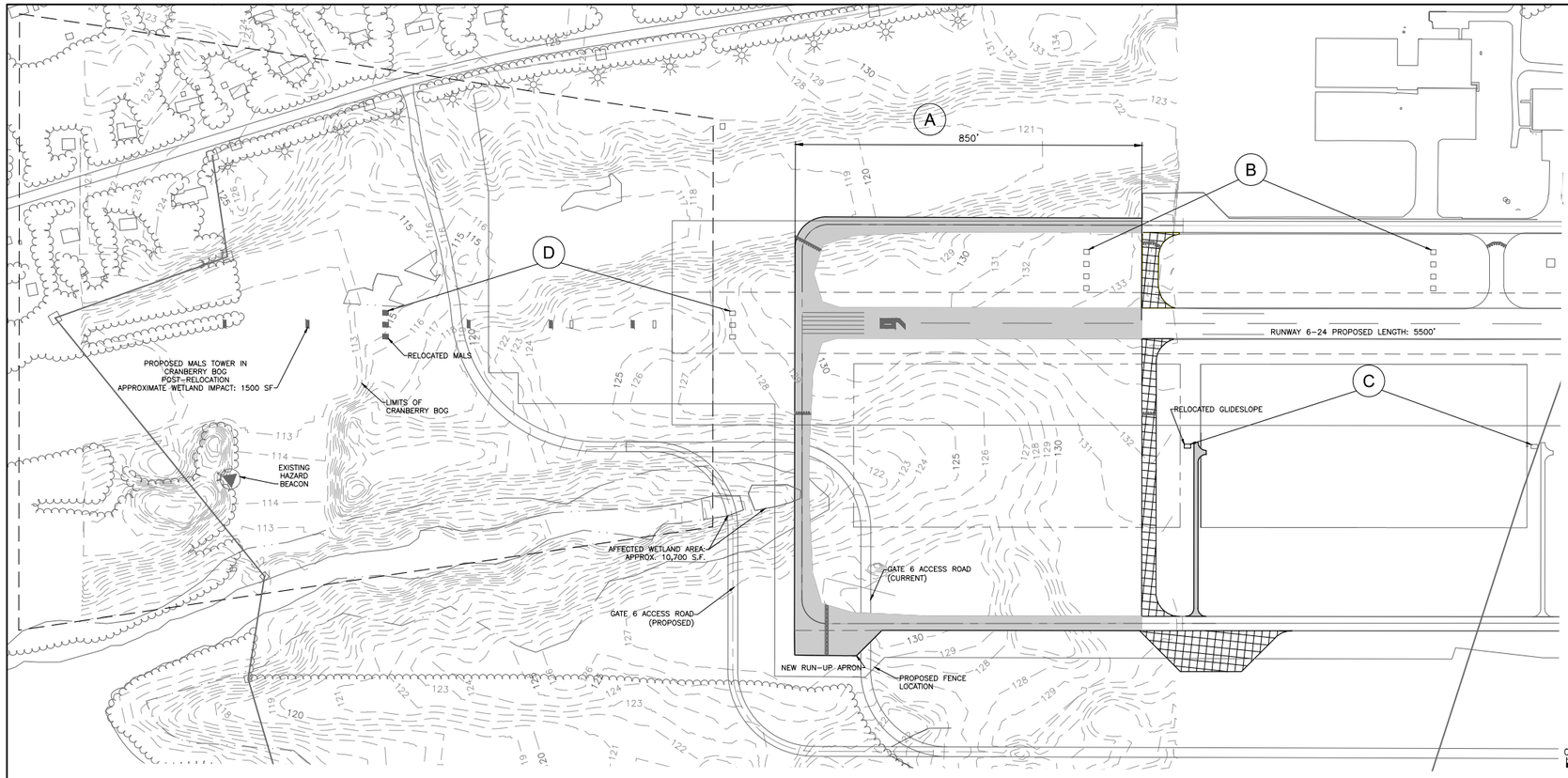
5.6 Alternative Comparison
A financial comparison of Alternatives 2 and 3 is prepared in Table 5-3. The financial cost of a 500-ft extension as compared to a 351-ft extension is approximately $2,000,000.

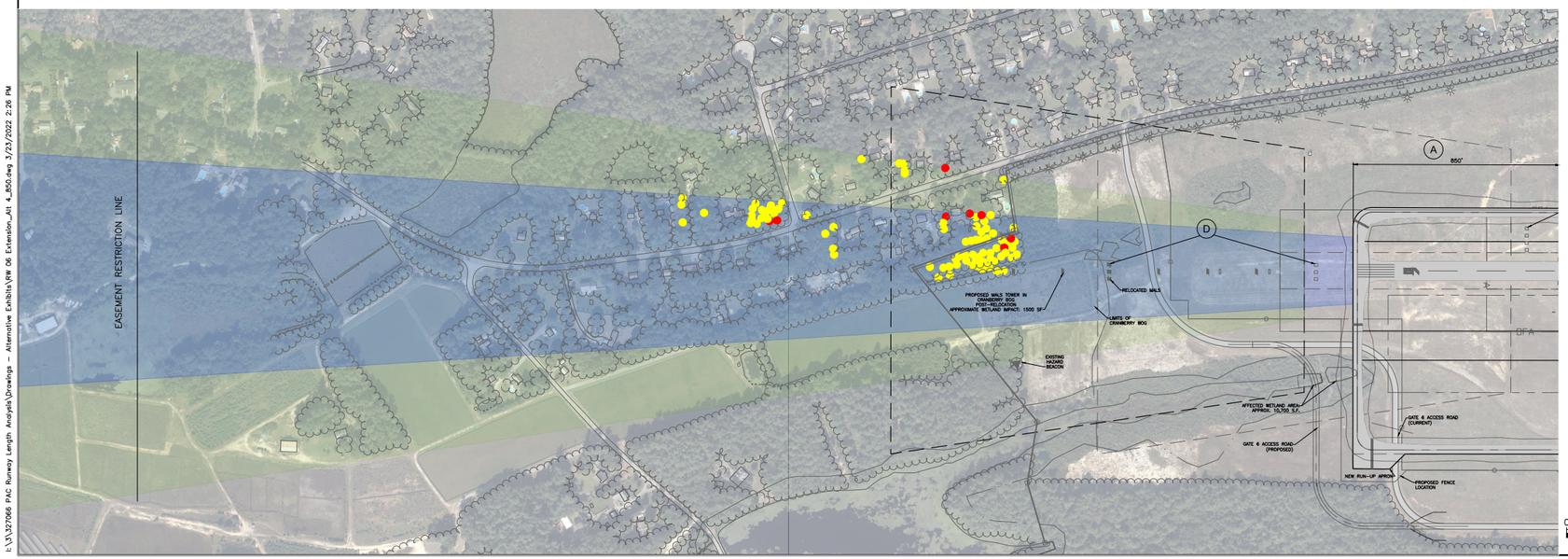
Table 5-3: Plymouth Municipal Airport Opinion of Probable Construction Costs (2022 Dollars)

Item	ALT 2	ALT 3
Runway / Taxiway Reconstruction / Markings	$5,600,000	$7,200,000
NAVAIDS Relocation (PAPI, MALSF, Glideslope)	$1,100,000	$1,100,000
Engineering	$900,000	$1,000,000
TOTAL (rounded)	$7,600,000	$9,300,000

Notes:
7. The costs presented do not include operation and maintenance costs or capital equipment purchases necessary for the continued operation of the facility and are based on the assumptions described herein.
8. A 20% contingency was added to the overall costs.
9. These costs are subject to change depending on the implementation date, changes in construction/supply costs, etc.

Source: DuBois & King





LEGEND

- A — PROJECT WORK ELEMENT
- AIRPORT PROPERTY LINE
- OFA — OBJECT FREE AREA
- MARKING – TAXIWAY AND RUNWAY
- RUNWAY SAFETY AREA
- RUNWAY OBJECT FREE ZONE AND RUNWAY PROTECTION ZONE
- GLIDESLOPE CRITICAL AREA (RELOCATED)
- PROPOSED CHAIN-LINK FENCE
- WETLAND
- EXISTING EDGE OF PAVEMENT
- PROPOSED ACCESS ROAD
- PROPOSED NEW PAVEMENT
- PROPOSED PAVEMENT REMOVAL

PROJECT WORK ELEMENTS:

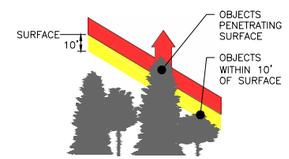
- A — 850' EXTENSION OF RUNWAY 6-24
- B — RELOCATION OF PRECISION APPROACH PATH INDICATOR.
- C — RELOCATION OF GLIDESLOPE, GLIDESLOPE ACCESS ROAD, AND CRITICAL AREA.
- D — RELOCATION OF MEDIUM INTENSITY APPROACH LIGHTING SYSTEM.

HORIZONTAL SCALE
0 75 150 300

SURFACE LEGEND

- AC 150/5300-13A TABLE 3-2 ROW 4 OBSTACLE CLEARANCE SURFACE
- AC 150/5300-13A TABLE 3-2 ROW 6 OBSTACLE CLEARANCE SURFACE
- VEGETATIVE OBSTRUCTION (REFER TO PENETRATION KEY)

VEGETATIVE PENETRATION KEY



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PLYMOUTH, MASSACHUSETTS

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RW 6 EXTENSION ALTERNATIVE 4:

850' EXTENSION

DRAWN BY	DATE
IYA	FEB. 2022
CHECKED BY	D&K PROJECT #
JLR	327066
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SHEET 4 OF 4

Table 5-4: Summary of Alternatives				
	Alternative 1 No-Build	Alternative 2 351-ft ext.	Alternative 3 550-ft ext.	Alternative 4 850-ft ext
Air Safety	Yes	Yes	Yes	Yes
Ability to Serve the Critical Aircraft	No	No	No	Yes
Impact on Adjacent Land Use	None	Low	Moderate	Significant
Environmental Considerations	None	Low	Moderate	Significant
Financial Impact	None	Low	Moderate	Significant

A complete summary of the 4 Alternatives is provided in Table 5-4. This comparison, paired with consultation within the PAC and feedback from the public through multiple public engagement meetings. Alternative 1, No-Build, and Alternative 4, the 850-ft extension were immediately discounted due to the inability of Alternative 1 to meet the purpose of this narrative and the significant environmental impacts of Alternative 4.

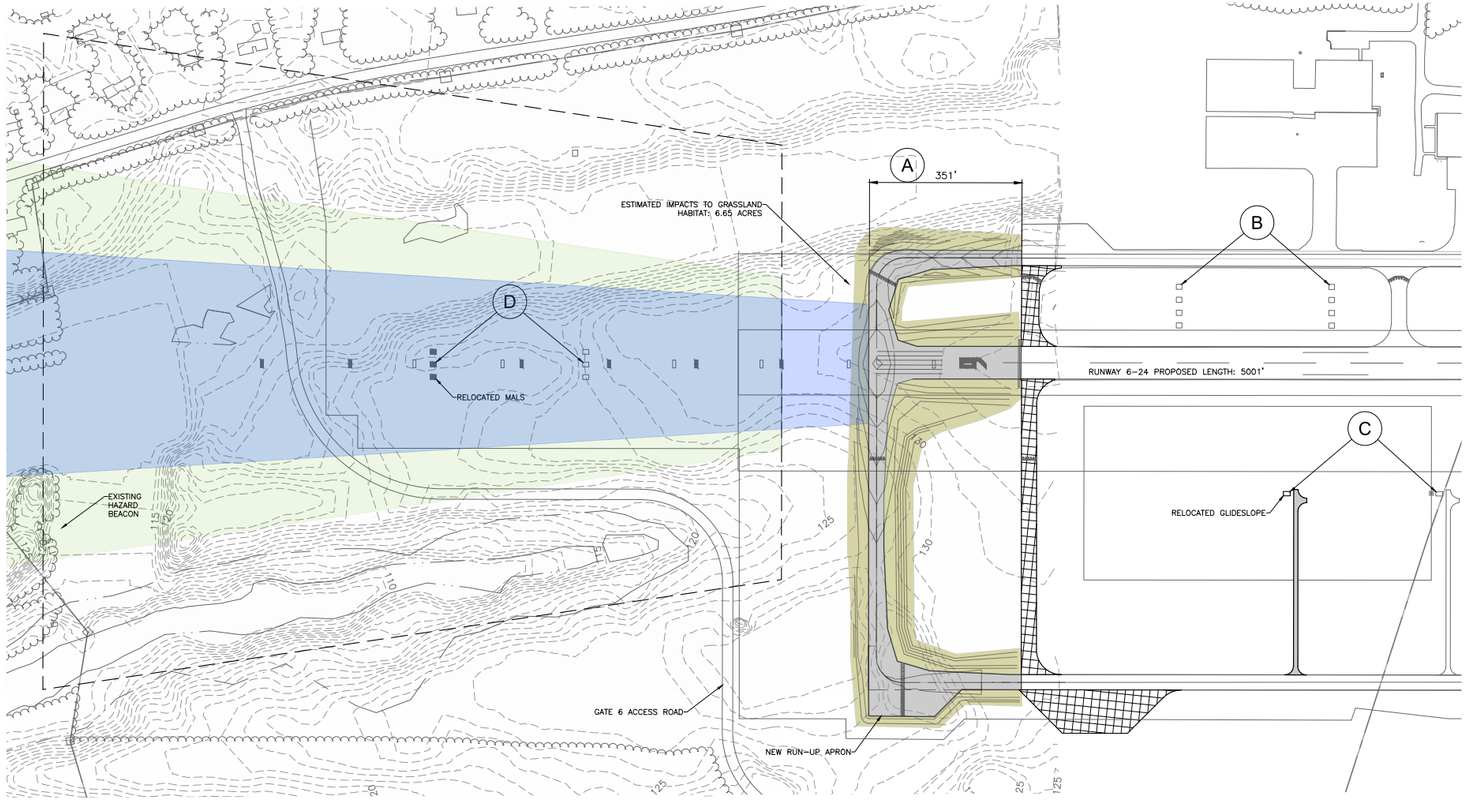
5.7 Preferred Alternative—351-ft Extension

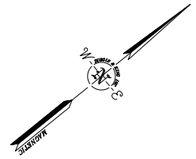
Three public meetings were held at the Plymouth Municipal Airport, after which 30 days were given for public comment. Summaries of those meetings can be reviewed in Appendix B. Reviewing comments from the public, neighbors, airport users, local businesses, the Town of Plymouth, and Airport Management, the Plymouth Airport Commission decided to move ahead with an Alternative 2 - 351-ft extension.

To recap: Alternative 2 (Figure 5-5) involves the extension of the RWY 6 end, southwestward by 351-ft for a total length of 5,001-ft. Alternative 2 is generally described as follows:

- Construct a 351-ft long, 75-ft wide extension on the approach to RWY 6 for a total runway length of 5001- ft.
- Construct a 351-ft long, 35-ft wide extension to the parallel taxiway (E) in order to serve the runway with a full-length parallel taxiway as required by 4.6.1 Parallel Taxiway Standards of AC/5300-13B in order to maintain less than mile visibility on precision approaches or approaches with vertical guidance.
- No additional easements are required to be obtained.
- One obstruction is currently within 10-ft of the approach surface and could be required to be removed in order to maintain a clear and unobstructed approach path to RWY 6 as per AC 5300-13B Tables 3-2 through 3-5 in the future. Currently, there are no obstructions that would penetrate the approach surface to RWY 6 with the 351-ft extension.
- Relocated MIRL, MALSF, PAPI, andREILS on RWY 6.

Alternative 2 is deemed the most appropriate solution to allow the airport to serve existing and future operations while not creating a large burden on the surrounding neighborhood properties. It will lessen capacity restrictions on the current users, increase safety margins, and allow aircraft to continue to use the runway even in contaminated conditions. It satisfies the runway safety area requirements and requires no additional obstruction mitigation or easement negotiation in order to maintain clear approach surfaces. It should be noted that the recommended unconstrained runway length for 60% load of the critical aircraft, according to the conducted runway length analysis is 5,500-ft, which this Alternative does not meet.





PROJECT WORK ELEMENTS:

A 351' EXTENSION OF RUNWAY 6-24

B RELOCATION OF PRECISION APPROACH PATH INDICATOR.

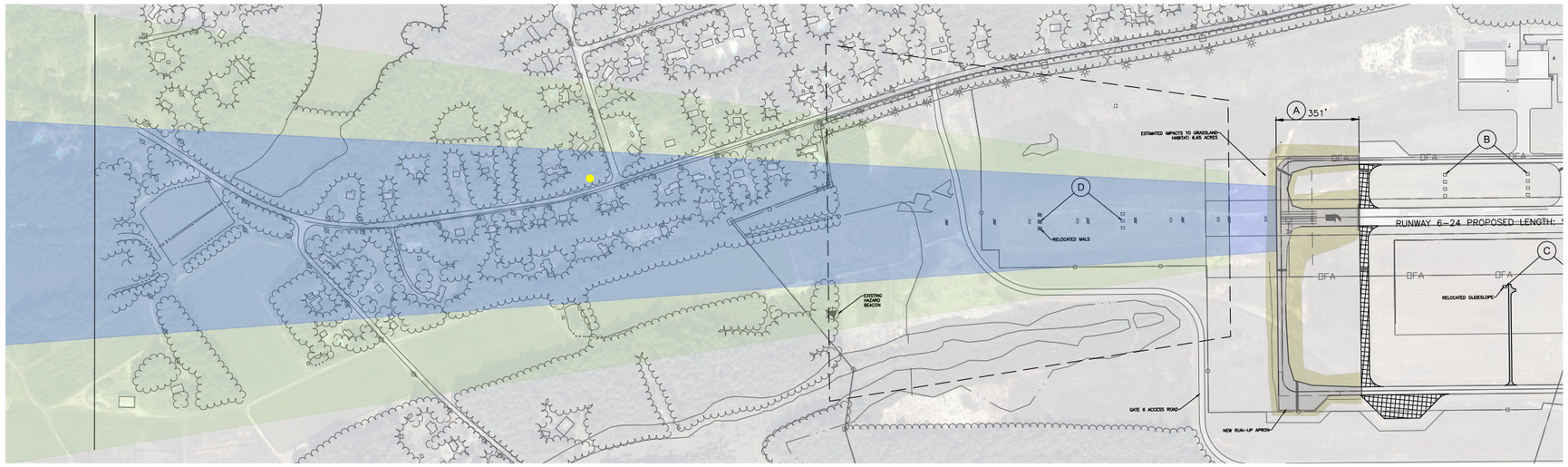
C RELOCATION OF GLIDESLOPE, GLIDESLOPE ACCESS ROAD, AND CRITICAL AREA.

D RELOCATION OF MEDIUM INTENSITY APPROACH LIGHTING SYSTEM.

LEGEND

- A — PROJECT WORK ELEMENT
- AIRPORT PROPERTY LINE
- OFA — OBJECT FREE AREA
- MARKING – TAXIWAY AND RUNWAY
- RUNWAY SAFETY AREA
- RUNWAY OBJECT FREE ZONE AND RUNWAY PROTECTION ZONE
- GLIDESLOPE CRITICAL AREA (RELOCATED)
- PROPOSED CHAIN-LINK FENCE
- WETLAND
- EXISTING EDGE OF PAVEMENT
- PROPOSED NEW PAVEMENT
- PROPOSED PAVEMENT REMOVAL

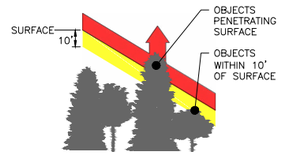
HORIZONTAL SCALE
0 75 150 300
1"=150'



SURFACE LEGEND

- AC 150/5300-13A TABLE 3-2 ROW 4 OBSTACLE CLEARANCE SURFACE
- AC 150/5300-13A TABLE 3-2 ROW 6 OBSTACLE CLEARANCE SURFACE
- VEGETATIVE OBSTRUCTION (REFER TO PENETRATION KEY)

VEGETATIVE PENETRATION KEY



HORIZONTAL SCALE
0 125 250 500
1"=250'

DuBois & King inc.
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SO. BURLINGTON, VT
GILFORD, NH

PROFESSIONAL SEAL

NOT FOR CONSTRUCTION PRELIMINARY PLANS

NO.	DATE	DESCRIPTION	BY	CK'D

PLYMOUTH MUNICIPAL AIRPORT

246 SOUTH MEADOW RD., PLYMOUTH, MA 02360

PLYMOUTH TMPU ALTERNATIVES

PLYMOUTH, MASSACHUSETTS

SHEET TITLE

RW 6 EXTENSION ALTERNATIVE 2:

351' EXTENSION

DRAWN BY	DATE
IYA	JUNE 2022
CHECKED BY	D&K PROJECT #
JLR	327066
PROJ. ENG.	D&K ARCHIVE #
RLT	

SHEET NUMBER

C1.2

SHEET 2 OF 4

I:\J\327066 PAC Runway Length Analysis\Drawings – Alternative Exhibits\RW 06 Extension_Alt 2_351.dwg 7/14/2022 3:40 PM

Chapter 6

6.1 General

The Airport Layout Plan (ALP) set is a graphical representation of the existing and future conditions of the Airport, airspace and surrounding environment. The purpose of this plan set is to enhance safety and show graphically the phased approach for the 20- year forecast period. All of the sheets that comprise this plan set comply with FAA AC 150/5300-13B and applicable design and airspace protection standards.

The ALP plan set is included in this document and utilized by Airport Management and Operations, the Plymouth Airport Commission (PAC), MASSDOT, FAA, and the general public.

Once conditionally approved by the FAA with evidence of eligibility and justification, projects included on the ALP can be eligible for FAA AIP funding. Projects on the ALP are considered conditionally approved until they have received environmental clearance, whether requiring an Environmental Assessment, Categorical Exclusion or other applicable environmental determination.

This ALP set is comprised of six sheets which are briefly described below.

6.2 Cover Sheet (Sheet 1)

The Cover sheet provided in this ALP set includes a listing of sheets that comprise the ALP set, location and vicinity maps, and FAA and MassDOT project grant identification numbers.

6.3 Existing Airport Layout (Sheet 2)

The Existing Airport Layout drawing depicts the current airport layout in accordance with the FAA New England Region ALP checklist directives. The Existing Airport Layout becomes a record of changes as projects are completed at the airport and should be updated accordingly. Its format and layout match that of the Ultimate ALP but present existing conditions only.

6.4 Ultimate Airport Layout Plan (Sheet 3)

The Ultimate ALP has been developed in accordance with industry and FAA guidelines. The drawing depicts the recommended development identified in the Preferred Alternative and all pertinent data blocks as required in accordance with New England Region ALP checklist. This sheet provides guidance for future airport development and includes the phasing of projects throughout the 20- year planning period. As this Technical Master Plan Update (TMPU) focus was on the runway environment the previous Ultimate ALP has been updated to include the developed runway Alternative. It is understood, when viewing the Ultimate ALP that the projects shown will be phased over time, should the forecast remain true and the need to progress infrastructure improvements exist. The projects should be advanced on a timeline appropriate to the airport's growing needs.

6.5 Terminal Area Plan (Sheet 4)

The terminal area plan presents a scaled version of the Ultimate ALP with a specific focus on the Terminal Area. This allows for detail that is not easily included in the ALP to be viewed, including tiedown and taxiway lines; as well as parking lots, gates, and access points. It includes building heights and project elevations. The drawing includes those features required by the New England Region ALP checklist.

6.6 Airport Airspace Plan (Sheet 5)

The Airport Airspace Plan depicts all ultimate FAA Part 77 imaginary surfaces, including approach and departure slopes, primary, transitional, conical, and horizontal surfaces. The FAA Form 7460 "Notification of Proposed Construction or Alteration" notification area is also depicted to help evaluate off-airport development impacts. The drawing includes those features in accordance with the New England Region ALP checklist.

6.7 Inner Portion of the Approach Surface Drawing (Sheet 6)

The Inner Portion of the Approach Surface drawing includes runway protection zones and Part 77 Approach Surfaces for each runway end. The sheet depicts a plan and profile of the ultimate runway protection zones and inner approach surface areas showing the controlling obstructions therein, their top elevations, and proposed disposition. The drawing will include those features in accordance with the New England Region ALP checklist such as the Runway End Siting Surface, 14 CFR Part 77 Surfaces, and AC 150/5300-13B Airport Design.

The ALP plan set has been included half size on the following pages, was distributed to the Airport in a 24-inch x 36-inch format. The ALP set was uploaded into the FAA's OE/AAA system for approval.

Chapter 7

7.1 General

The Financial and Implementation Chapter develops opinions of probable costs for elements of the preferred alternative and a listing of airport development projects necessary to implement a phased development. The recommended projects associated with an obstruction removal program, in relation to the preferred Alternative are included. The phases are organized, and for each project, design and construction cost estimates and funding sources are identified. The resulting draft Capital Improvement Plan is compatible with FAA's Airport Capital Improvement Plan (ACIP) requirements and the Airport's Capital Improvement Plan.

7.2 Phases

The extension project for Runway 6 shall be accomplished in two phases: First Phase - Design and Permit Runway 6 and applicable Taxiways (E and A) extensions and Second Phase - Construct Runway 6 and applicable Taxiways (E and A) extensions. An Environmental Assessment for this project will be undertaken beginning in January of 2023. It is estimated that design for the runway extension will begin in late 2023.

7.3 Selected Alternative Probable Costs

The probable costs, as discussed in Chapter 5, Alternatives, for the 351-ft Runway extension totals $7,600,000. These costs are explained in table 6-1 below.

Table 6-1 Opinion of Probable Costs Alternative 2

Item	Cost
Runway/ Taxiway Extension/Markings	$5,600,000
NAVAIDS Relocation (PAPI, MALSF, Glideslope)	$1,100,000
Engineering	$900,000
TOTAL (rounded)	$7,600,000

Notes:

1. The costs presented do not include operation and maintenance costs or capital equipment purchases necessary for the continued operation of the facility and are based on the assumptions described herein.
2. A 20% contingency was added to the overall costs.
3. These costs are subject to change depending on the implementation date, changes in construction/supply costs, etc.

Source: DuBois & King

7.4 Obstructions

Alternative 2, the 351-ft extension requires no immediate obstruction removal for the approach end of Runway 6, one of the alluring factors for choosing this alternative. During the recent Airports Surveying Geographic Information System (AGIS) survey of the Airport, obstructions were noted for the current 24 runway end.

7.4.1 Obstruction Identification

The AGIS survey completed in October of 2021 located obstructions in the Table 3-2 Approach Surfaces. The two approach surfaces applicable to Runway 24 are Row 5 and Row 6. The Row 5 surface covers the "Approach end of runways providing ILS, MMLS, PAR, and localizer type directional aid with glidepath, LPV, LNAV/VNAV, RNP, or GLS." Runway 24 at PYM provides a Localizer Precision Approach with Vertical Guidance (LPV) which is covered by this surface. This approach surface is 200 feet from the runway end. It is 400 feet wide at the inner surface and 3,400 feet wide at the outer surface, is 10,000 feet long and has a slope of 20:1 for runways with approach minimums greater than or equal to ¾ statute mile.

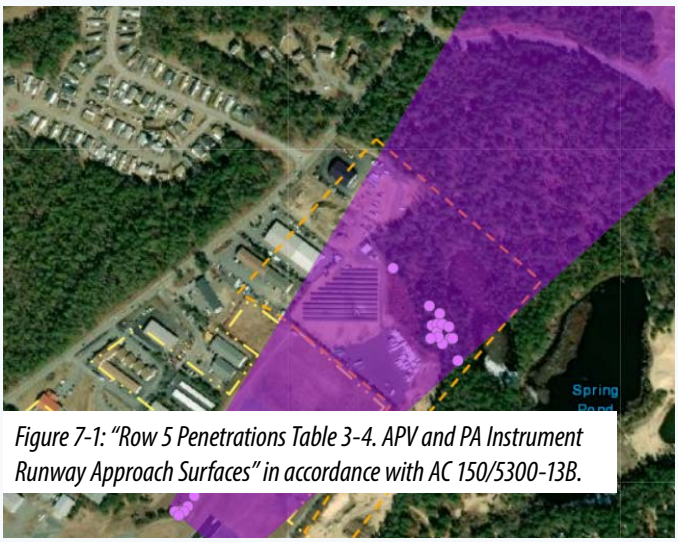


Figure 7-1: "Row 5 Penetrations Table 3-4. APV and PA Instrument Runway Approach Surfaces" in accordance with AC 150/5300-13B.

After evaluating this 436-acre surface, our findings indicated 24 penetrations to the 20:1 surface. 10 of these obstructions were mitigated as part of the Taxiway E extension on Runway 24. The remaining 14 obstructions are not on airport property but do lie within an easement granted to the airport. These penetrations are depicted in Figure 7-1.

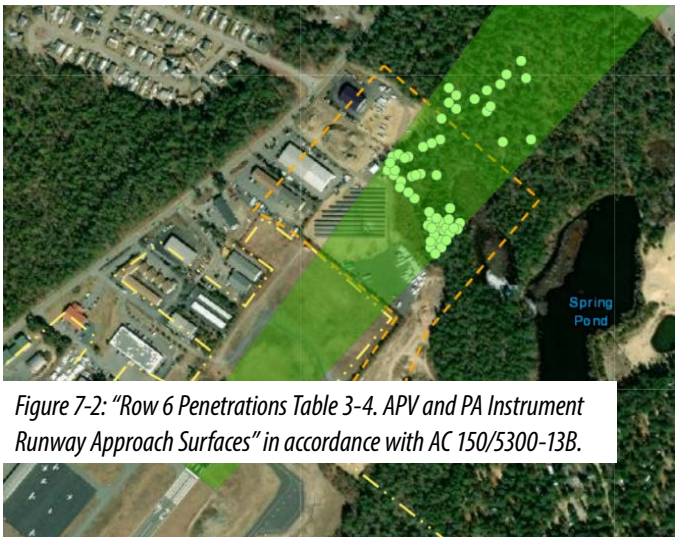


Figure 7-2: "Row 6 Penetrations Table 3-4. APV and PA Instrument Runway Approach Surfaces" in accordance with AC 150/5300-13B.

The Row 6 surface is applicable to the "approach end of runways providing ILS, MMLS, PAR, and localizer type directional aid with glidepath, LPV, LNAV/VNAV, RNP, or GLS. For approaches with minimums greater than or equal to ¾ statute mile visibility, a 30:1 approach surface protection is necessary. The Row 6 surface begins at the runway threshold and is 200 feet wider than the width of the runway. It extends 10,200 feet beyond the runway threshold and is 1,520 feet wide at the outer surface. In this 206- acre are 36 additional penetrations to the 30:1 slope, 22 of which lie within an easement. The remaining 14 obstructions are outside of the current control of the Airport. These obstructions are shown in Figure 7-2.

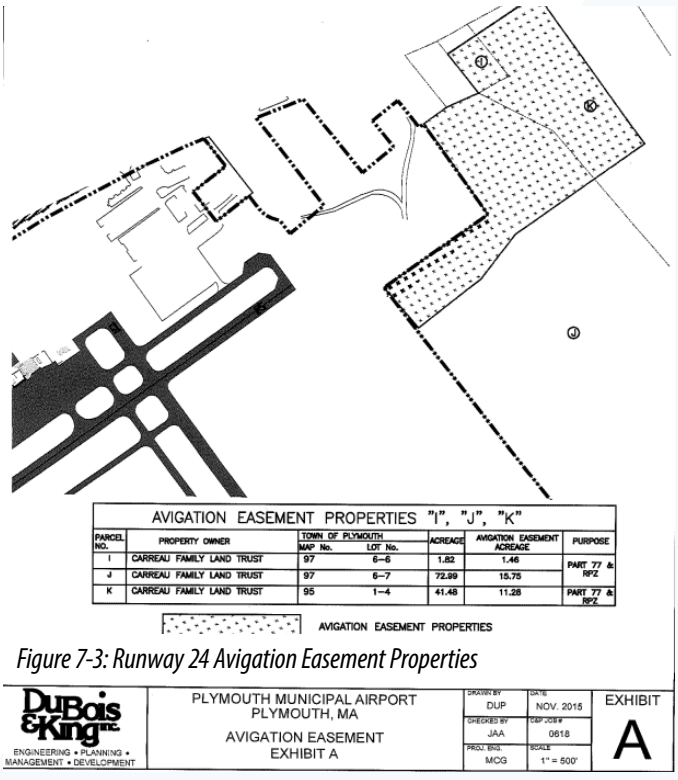


Figure 7-3: Runway 24 Avigation Easement Properties

7.4.2 Current Easement Descriptions

Obstructions listed for Runway 24 are either located on airport property or within the Carreau family trust easements shown in Figure 7-3, an excerpt from the current Airport Exhibit A. The easement on properties I, J, and K, all owned by the Carreau Family Trust allow for the topping of trees within this area.

7.4.3 Recommended Plan

The obstructions currently penetrating the protected surfaces on the approach to Runway 24 must be mitigated. An official obstruction action plan is recommended to properly detail and mitigate these obstructions, providing clear and safe approaches to the airport.

7.5 CIP

7.5.1 Short-Term, 5-year Program (2023-2027)

The short-term planning period is separated into single years. This is to allow the Airport Capital Improvement Plan (ACIP) to be coordinated with the five-year planning cycle and anticipated funding sources with the FAA and MassDOT. If any of these projects cannot be funded in the time frame indicated, the Airport should consider the project for the following year. Plans called out during this timeframe are very specific regarding actual planning, design. and construction.

The following provides a detailed breakdown of each project within FY 2023 through 2027. Several projects listed within this CIP were not included in the scope of this Technical Master Plan Update. They have been reviewed by FAA and MassDOT and are included in this section,to depict a comprehensive plan for the airport. The CIP includes FY 2023 projects to be consistent with the current ACIP submitted to the FAA, resulting in a total of 5 years.

Environmental Assessment Runway 6/ 24/ Taxiway E/A Extensions-2023 (BIL)

This project includes a focused environmental study of the Runway 6 approach end and associated extensions of Taxiway E/A. This project will be funded with BIL (Bipartisan Infrastructure Law) funds.

Cost Estimate: $350,000.

Design and Permit Runway 6/24 Extension/ Taxiway E/A Extension-2024 (BIL)

This project involves the design and permitting of a 351-ft x 75-ft runway extension on the approach to Runway 6. Additionally, it includes the design and permitting of an extension of 700-ft x 35- ft Taxiway E to join the new approach end of Runway 6 and an 1000 ft x 35 ft extension of Taxiway A. BIL funding will likely be used to fund this project.

Cost Estimate: $480,000.

Water/ Wastewater Upgrades Sewer Main–2024 (ASMP)

When the sewer treatment plant was constructed 20 years ago there was no development on the southwest side of the airport. Due to funding constraints at that time, the construction of a gravity sewer main for the southwest side was not feasible. The airport now is experiencing significant growth on the southwest side and the need for a gravity sewer main is critical to provide sewer service for additional development. This project involves the construction of 3000 LF of sewer main and associated appurtenances.

Cost Estimate: $700,000.

Construct Runway 6/24 Extension–2025 (Discretionary)

This project involves the construction of the Runway 6/24 extension. It will require a temporary runway shutdown during construction. Discretionary funding will likely be required to fund this project.

Cost Estimate: $4,600,000.

Construct Taxiway E Extension–2025 (Discretionary)

This project involves the construction of the Taxiway E extension. It will require a temporary taxiway shutdown during construction. Discretionary funding will likely be required to fund this project.

Cost Estimate: $3,000,000.

Gate 3 Taxilane Reconstruction–2025 (BIL)

This project involves the reconstruction of the Gate 3 taxilane immediately adjacent to the porta-port hangars. A 50,000 SF area has been identified for rehabilitation and the current PCI of this pavement is 6. BIL/AIG funding will likely be used to fund this project.

Cost Estimate: $525,000.

Reconstruction Runway 06-24 (4350' x 75)–2026 (Discretionary)

In the most recent Pavement Condition Index (PCI) study conducted by MassDOT the PCI listed for a 4350' x 75' section of Runway 6/24 is 54. In accordance with the plan's recommendations Runway 06-24 should be reconstructed in 2026.

Cost Estimate: $5,700,000.

Emergency Generator Airside Infrastructure–2026 (ASMP)

The airport currently has no backup power supply to operate airside infrastructure during a power outage. This project would purchase a generator for this purpose. ASMP funding will likely be used to fund this project.
Cost Estimate: $275,000.

5-Year ACIP Summary

Projects included in the 5-Year ACIP are aimed at meeting the forecasted facility needs, will continue to improve the overall safety, security, and capacity of the airfield, and expand the ability of the airport to generate more revenue while reducing operating expenses. The total investment necessary for the 5-Year ACIP is approximately $15,630,000. About $13,437,000 is programmed for federal funding assistance, $1,289,000 is scheduled for state funding assistance. The remaining $886,500 is to be provided through local sources of financing.

Table 6-1: Proposed 5-Year Capital Improvement Plan (2023-2017)					
Planning Period (FFY)	Project	Estimated Project Cost	Estimated FAA Funding	Estimated MassDOT Match	Estimated Local Match
2023	Runway 6/24/ Taxiway E Extension Environmental Assessment	$350,000	$315,000	$17,500	$17,500
2024	Design and Permit RWY 6 Extension/ Taxiway E	$480,000	$432,000	$24,000	$24,000
2024	Water/Wastewater Upgrades Sewer Main	$700,000	$0	$560,000	$140,000
2025	Extend RWY 6/24 (351' x 75')	$4,600,000	$4,140,000	$230,000	$230,000
2025	Extend Taxiway E/A (700'x35')	$3,000,000	$2,700,000	$150,000	$150,000
2025	Gate 3 Taxilane Reconstruction	$525,000	$472,500	$26,250	$26,250
2026	Reconstruction RWY 6/24	$5,700,000	$5,130,000	$285,000	$285,000
2026	Emergency Generator Airside Infrastructure	$275,000	$247,500	$13,750	$13,750
5-Year ACIP Total		$15,630,000	$13,437,000	$1,289,000	$886,500

Source: DuBois & King

The CIP presented in this chapter is intended as a road map of airport improvements to help guide the Town of Plymouth, the FAA, and MassDOT. The plan as presented will accommodate demand at Plymouth Municipal Airport over the next 5 years and beyond. The five-year CIP shows the annual schedule for projects. The sequence of projects may change due to the availability of funds or changing priorities. Nonetheless, this is a comprehensive list of capital projects the airport should consider in the next 5 years.

7.5.2 Capital Improvement Funding Sources

The following sources of funds are recommended to be used to finance airport development in this 5-year CIP:

- Airport cash flow;
- Federal/state/local grants.

Access to these sources of financing varies widely among airports, with some large airports maintaining substantial cash reserves and the smaller commercial service and general aviation airports often requiring subsidies from local governments to fund operating expenses and finance modest improvements. Financing capital improvements at the Airport will not rely solely on the financial resources of the Airport's Enterprise fund. Capital improvement funding is available through various grant-in-aid programs

on both the federal and state levels. Historically, the Plymouth Municipal Airport has received federal and state grants. While some years more funds could be available, the CIP was developed with project phasing to remain realistic and within the range of anticipated grant assistance and has been coordinated with the FAA and MassDOT. The following discussion outlines key sources of funding potentially available for capital improvements at the Airport.

Federal Grants

Through federal legislation over the years, various grant-in-aid programs have been established to develop and maintain a system of public use airports across the United States. The purpose of this system and its federally based funding is to support national defense and to promote interstate commerce. The most recent legislation affecting federal funding is titled the FAA Reauthorization Act of 2018 (Public Law 115-254).

Non-Primary Entitlement (NPE) Funds

The passage of the Wendell H. Ford Aviation Investment and Reform Act for 21st Century (AIR-21), introduced a new funding source for general aviation airports, Non-Primary Entitlement. The subsequent AIP re-authorizations including the FAA Reauthorization Act of 2018 (Public Law 115-254) retained Non-Primary Entitlement funding with changes. Non-Primary entitlement funds are specifically for general aviation airports listed in the latest published National Plan of Integrated Airports '(NPIAS) that show needed airfield development. General aviation airports with an identified need are eligible to receive the lesser value of 20% of the 5-year cost of their current NPIAS value or $150,000 annually. A condition of Non-Primary Entitlement funding is that Congress must appropriate $3.2 billion or more for non-primary entitlement funds to existing airports in that fiscal year.

Bipartisan Infrastructure Law (BIL) Funding

Various federal funding programs have been developed since the onset of the COVID-19 pandemic in 2019. Some of these additional funding sources covered 100% of project costs. As of this planning study a few recent key Federal Acts and Laws have played a major role in airport development and funding during the past few years. It is important to take advantage of these opportunities for additional funding when they present themselves. According to the FAA, the Bipartisan Infrastructure Law "provides $15 billion for airport-related projects as defined under the existing Airport Improvement Grant and Passenger Facility Charge criteria. The money can be invested in runways, taxiways, safety and sustainability projects, as well as terminal, airport-transit connections and roadway projects." Over a five-year period, starting in FY22, these funds are distributed to airports across the country and can be utilized the same way that discretionary or non- primary entitlement awards can be used. In FY22 Plymouth was granted BIL funds of $295,000. These annual funds can be used once awarded and applied to an eligible project, or they can be saved and combined with future BIL awards to be dedicated to larger projects.

Discretionary Funds

Remaining AIP funds are distributed by the FAA based on the priority of the project for which they have requested federal assistance through discretionary apportionments. A national priority ranking system is used to evaluate and rank each airport project. Those projects with the highest priority from airports across the country are given preference in funding. High priority projects include those related to meeting design standards, capacity improvements, and other safety enhancements.

Under the AIP program, examples of eligible development projects include the airfield, public aprons, and access roads. Additional buildings and structures may qualify if the function of the structure is to serve airport operations in a non-revenue generating capacity, such as maintenance facilities. Some revenue-enhancing structures, such as t-hangars and fuel farms, may be eligible if all airfield improvements have been made; however, the priority ranking of these facilities are low. At the Plymouth Municipal Airport, funding for these types of projects should be considered carefully in the near term. During the 5-year, short term plan only the construction of the Runway 6 extension, Taxiway E/A extensions and the Rehabilitation of Runway 6/24 are expected to require Discretionary funds.

Whereas entitlement monies are guaranteed (subject to annual appropriations) on an annual basis, discretionary funds are not. If the combination of entitlement, discretionary, and airport sponsor match does not provide enough capital for planned development, projects may be delayed although a project that is "shovel-ready" may be considered by the FAA for end of year money.

AIP Grant Obligations

When Sponsors receive Federal assistance, they also accept certain obligations and conditions associated with that support. Sponsors may incur these obligations by contract,

or by restrictive covenants within property deeds. These generally involve one of the following:

- Agreements issued under Federal grant programs
- Instruments of approved property transfers
- Deeds of conveyance

Airport owners and operators who accept a Federal grant are obligated to maintain and operate their facility in a safe and efficient manner for a specific amount of time based on the type of project. Acceptance of the subsidy also invokes certain conditions and assurances for which the sponsor must comply. These terms and guarantees become binding contractual obligations between the sponsor and the United States.

The FAA administers the following development program:

- Airport Improvement Program (AIP)

Airport owners should be aware that obligations incurred under each program or conveyance document can vary. The following list identifies some of the general responsibilities of an airport owner. This list is not inclusive of all such incurred Federal obligations.

- Prohibition on Exclusive Rights
- Utilization of Airport Revenue
- Proper Maintenance and Operation of Airport Facilities
- Protection of Approaches
- Maintaining Good Title of airport property
- Compatible Land Use
- Availability of Fair and Reasonable Terms without unjust discrimination
- Adherence to the approved Airport Layout Plan
- Sale or Disposal of Federally acquired property
- Preserving Rights and Powers
- Maintaining acceptable accounting and record keeping systems
- Compliance with Civil Rights requirements
- Compliance with Disadvantaged Business Enterprise (DBE) requirements

The FAA and MassDOT encourage airport owners to thoroughly review and understand each executed agreement and conveyance document to verify the obligations they have accepted. The Administration also helps Airport owners to establish a central point for record keeping purposes that permit readily available reference to their obligations. Annual reviews of all such agreements will significantly aid Sponsor efforts in complying with their Federal obligations.

State Funding

MassDOT Aeronautics division provides a Safety and Maintenance Program (ASMP) that supports airport planning and development projects not FAA eligible but may still be a priority for the State and the Airport. These grants provide additional funding of up to 80% with a 20% local match for most projects. The current CIP projects ASMP funds could be utilized for the water/wastewater upgrades to the sewer system.

Local Funding

The balance of project costs, after consideration has been given to other sources of financing described above, must be funded through local resources. The Plymouth Municipal Airport is operated under an Enterprise account and receives income from airport lease revenue and fuel sales. Once airport expenses have been covered, the remaining funds can be used as a match for federally or state funded projects or used to cover projects in their entirety.

7.5.3 Proposed Implementation

To implement the recommendations in this Plan, it is key to recognize that planning is a continuous process and does not end with acceptance and/or approval of this document. The airport should implement measures that allow them to track various demand indicators, such as based aircraft, hangar demand, and operations. The issues that this Plan identifies will remain valid for some years. The primary goal is for the Airport to safely serve the air transportation needs of the region best while continuing to be economically self-sufficient. Sustainability is a complex topic and may refer to environmental and financial. Financially sustainable airports have the ability to generate enough revenue to offset/balance their operational costs.

The value of any plan is keeping the issues and objectives at the forefront of leadership. In addition to adjustments in aviation demand, when to undertake the improvements recommended in this Plan will impact how long the plan remains valid. The format of this program reduces the need for regular and costly updates by just adjusting the timing of project implementation. Updating can be done by the manager, thereby improving the plan's effectiveness.

In summary, the planning process requires the Plymouth Airport Commission to consistently monitor the progress of the Plymouth Municipal Airport regarding aircraft operations, based aircraft and future infrastructure needs.

Appendices

Appendix A: Airport Technical Master Plan Update Public Engagement Plan

PUBLIC ENGAGEMENT PLAN

Plymouth Municipal Airport
Plymouth, MA
Technical Master Plan Update

I. Objectives of the Public Participation Plan

i. Ensure that a completely open and candid process is in place to familiarize the general public, including local private groups, and government agencies at local and state levels, with the proposed Plymouth Technical Master Plan Update project. It is expected that the successful implementation of the Public Engagement Plan will promote and foster an atmosphere of cooperation that increases the successful completion of the project.
ii. Provide a forum for the reception and consideration of public input regarding the Master Plan Update. The desired input includes not only opinions but also other data that is not formally collected as part of the project initiation.
iii. Clarify or describe the potential effects of the alternatives under consideration for the Master Plan Update.
iv. Collect pre-existing resource data regarding the Airport. It is expected that the data will be collected from a multitude of agencies and citizens.
v. Receive written comments and consider them in the decision-making process.

II. Techniques to Facilitate and Promote Participation

i. Propose and get approval for Public Engagement Plan from Plymouth Airport Commission.
ii. Publish notification on the Town website informing Stakeholders of the meeting schedule. Stakeholder Meeting 1–Hold a meeting with all Stakeholders to discuss the objectives and purpose of the Master Plan Update, outline the process and ensure Stakeholders understand the series of steps involved in a Master Plan Update and any future improvements.
iii. Stakeholder Meeting 2–Hold a meeting with all Stakeholders to discuss and inform the Stakeholders of the overall process in developing the Master Plan Update and to provide information concerning the objectives and purpose of the Study. This meeting will also be used to present the findings of the Runway Length Analysis, seek input on developed alternatives, concerns, and opportunities. This meeting will reinforce and assure the public that although alternatives have been developed, many steps remain in the process including addressing concerns, choosing an alternative, completing environmental reviews and obtaining funding/permits for the chosen Alternative if necessary.
iv. Stakeholder Meeting 3–Hold a meeting with all Stakeholders regarding the final Technical Master Plan Update Report. The focus of the meeting will be on the preferred alternative for Plymouth Municipal Airport and discuss how to implement the plan to meet the objectives defined by the preferred alternative. Solicit written comments from all Stakeholders regarding the final Master Plan Report.
v. Provide status update of the final Master Plan Report and publish on the Airport website.
vi. Collect e-mail address lists during Stakeholder/ public meetings to allow for electronic notifications and updates.

III. Schedule of Public Participation Support activities and Responsible Party

i. On-going–Various Planning Meetings and Teleconferences between the TownPAC, planning team, FAA and MASSDOT Aeronautics Bureau. This will include Monthly meetings with FAA/ MASSDOT.
ii. Responsible–D&K Planning Team, Airport Management and TownPAC.
iii. Stakeholder Meeting #1– hursday, January 13th @ 7:00 PM,
iv. Responsible–D&K Planning Team, Airport Management and PAC.
v. Stakeholder Meeting #2–Wednesday, April, 27th @ 7:00 PM
vi. Responsible–D&K Planning Team, Airport Management and PAC.
vii. Stakeholder Meeting #3–Thursday, July 21st @ 7:00 PM
viii. Responsible–D&K Planning Team, Airport Management and PAC.

IV. Monitoring and Plan Revisions:

At the completion of each of the following milestones, a review of the Public Participation Plan will be made, and any needed changes will be made at that time:

Public Participation Plan Approved:

_____
PAC

Date: _____

Appendix B: PYM TMPU Meeting Notes and Public Comments

Plymouth Airport Technical Master Plan Public Meeting #1

01/13/2022 7 PM
Held virtually, via Zoom

Attendees:

Tom Mahr -PYM Airport, Matt Cardillo - PYM Airport, Ken Fosdick - PAC, Doug Crociati - PAC, Guy Rouelle - D&K, Jen Ricciardi - D&K, Chris Merrill- PAC, Tom Hurley- PAC, Karin Goulian- PAC, Dennis Smith- PAC, Paul Worcester- PAC, Paul Tassinari, Tom Constantine, Matt B, Jim 007, Bob Frye- Professional AIrways, Chris Hyldburg- Alpha One, Walter Powell, Fire Dude, Jonathon Chesky, Arlene, Shift CDR, David Dinneen-Gale Associates, JamesE4, Gordon O'Donnell, Hans, Zachary Palmer, Chris Kluckhuhn, Margaret Guarnotta, Jong, and Michael Sasso

The meeting started at 7:05 PM EST, as participants were still joining.

Meeting Introduction: (Ken Fosdick- Chairman of the Plymouth Airport Commission)

Plymouth Airport Commission Chairman Ken Fosdick gave an introduction discussing the FAA planning process and MASSDOT's involvement with the project. He said we are to answer questions and get to the next stage. Dubois and King's representatives are here today to explain the process and how it works. He introduced Guy Rouelle from D&K, Director of Aviation to discuss the Technical Master Plan Process.

Presentation: (Guy Rouelle-DuBois & King)

Slide #1 Agenda

Guy: We will spend some time going through the Master Planning process in order to share the steps required. It has been a while since the last master plan was done. PYM has accomplished all of the projects on the previous master plan and it is time to reevaluate the airport's needs.

- Meet the Team
- Project Highlights
- The purpose of the Master Plan-principles that if we look at something that might be a possibility, we go back to guiding principles to confirm we are following them -Master Plan Process- A discussion will follow on what should the public expect. -Timeline- How long will this master planning process take?
- Questions- Please provide questions at the end. The plan is to take about 25 minutes and then take all the questions at the end.

Team

Guy talked about the importance of including all stakeholders. The team includes the PAC and Airport, FAA and MASSDOT, the public, and D&K.

- Airport and the PAC
- FAA - Funds 90%, 5% MASSDOT, 5% local match
- Public - Having public input at the very beginning, the ability of the public to express their desires and concerns is extremely important. As we work through alternatives, we will certainly implement any suggestions that make sense and align with the overall goals.

History

Guy gave a briefing on Airport history that included the original grass field airport to the purchase of the airport by the Navy, to the Town of Plymouth Purchase, the development of the PAC, a series of improvements up to the recent construction of the new Administration building.

Project Highlights

Guy touched on some of the recent project highlights that have been accomplished since the previous Master Plan Update including Taxiway reconstruction and extension, the addition of stopways, Obstruction Removal, a new Fuel Farm, Administration Building Development, and Snow Removal Equipment. He commented that the Airport does a fantastic job with snow removal.

Purpose of a Technical Master Plan

Guy listed a series of purposes that the Technical Master Plan serves, including:

- Ensure the Airport's future aligns with the Town/ Community: people have different passions. The PAC

wants to make sure that the airport's future aligns with the community's wants and needs. Plymouth is the Gateway to the Community.

- Incorporate Public Involvement: It is the hope of the PAC that the community chooses to get involved with the process.
- Evaluate Safety Needs which includes a Runway Length Analysis: There was an OSHA comparison given. OSHA comes in and makes sure safety needs are met. This is the same type of process. We will evaluate the safety needs of the airport. Within this evaluation, we will evaluate runway length and affirm the runway meets the safety needs of the current operators.
- Economic Development Opportunities: we will seek out economic opportunities and make suggestions for the future.
- Determine Sustainable Infrastructure Needs. There are two types of sustainability, one is environmental sustainability and the other is economic sustainability. Recommendations will be made about how the airport is operated and different ways to be efficient. There will also be an opportunity to look at how to increase revenue.
- Create an Efficient Timeline for the Airport's future: The goal here is to prioritize the future projects

Guiding Principles

1. Create a transparent track to encourage public involvement in the Master Planning process to affirm that airport Stakeholders have the opportunity to provide input on the future direction of the airport.
2. Affirm all facilities at Plymouth Municipal airport are built to the appropriate capacity necessary to service the existing and likely operational requirements without overbuilding infrastructure. This does not mean overbuilding but instead building to suit the current needs of the airport and community.
3. Assess existing airfield conditions and identify future conditions that currently do not or will not meet FAA design requirements as stated in Advisory Circular 150/5300-13A. This advisory circular, because this airport has accepted federal funds, is the playbook of design standards that must be followed in order to meet federal grant obligations.
4. Strive to take advantage of any and all opportunities to increase safety for both airport users and the surrounding communities. We want to make sure the facilities allow users to safely operate.
5. Consider environmentally viable solutions for the future of the airport and invest in Clean Energy opportunities. We will research Clean energy opportunities such as replacing incandescent lights with LED, solar applications, or even water recapture systems. 6. Ensure that Plymouth Municipal Airport continues to be an economic driver for the community and contributes to the growth of the Town of Plymouth and the surrounding communities.

Every time we do recommend something in the Master Plan we will go back and reference these principles.

There is no intention of changing this airport to a different design code. The airport will continue to be designed to B-II standards and the PAC is not looking to change this. This includes aircraft with approach speeds on average of 100 mph and wingspans on average of 60-ft. If changes are made, you will likely continue to see aircraft of the same size and type utilizing the airport.

Master Planning Process

First, the PAC went to the Selectboard to discuss the plans to undertake this Technical Master Plan Update. It is always good to include your elected officials at the beginning of the planning process and the Selectboard was supportive of the plan.

Guy then discussed the different chapters of the Technical Master Plan.

- **Intro–**simply an introduction to the process and the airport.
- Existing Conditions: A chapter where we pay close attention to detail. A detailed look into the existing conditions as they have changed since the last master plan will be provided.
- **Forecast–**This will be submitted to FAA, MASSDOT, and PAC. The Forecast must be approved by FAA and it will include how many based aircraft and how many operations are forecasted to utilize the airport in the 20-yr future.
- **Facility Needs–**Facility needs will be developed and they must be supported by the forecast and aligned with the goals.

After the facility needs are developed a Second Public Meeting will be held. Basically, after the forecast is approved and facility needs are addressed we come back to the public for a whiteboard session so that we can continue to develop the preferred alternative with public input. There will be a comment period and these comments will be included in the Appendices. If appropriate, comments will be incorporated into the plan.

A preferred alternative will be developed from the facility's needs and public comment.

Finally, D&K will update the Airport Layout Plan which will need to be approved by the FAA, and will put together Financial and Implementation Considerations and Probable Costs.

Next, a Third Meeting will be held to discuss the preferred alternative and completion of the Master Plan chapters. Public comments will be taken again.

Timeline

Today is the background and first public meeting. This is a relatively aggressive plan as we plan to develop Alternatives and have a second public meeting by March. The preferred alternative will be selected based on public comment and the final public meeting will be held in May. The Implementation Plan date is TBD as it will need to reflect the developed preferred alternative.

Guy opened the meeting up to questions, and the participants politely unmuted their mics when they were ready to speak and took turns asking the following questions:

Questions:

1. How long is the airport runway and do you need FAA approval to lengthen it?" Ken: 4650 feet and yes the FAA will need to approve any changes to the runway.

> Guy: *The commission agreed 10 years ago to wait until now, 10 years later, to evaluate an appropriate runway length. As part of this process, they will make good on their promise to do this analysis.*

2. Walter Powell-What is the amount of this contract? How many are on your team and are you the Principal?

> Guy: *We will get back to you with the exact monetary amount. There are 6 people directly on the team with an entire firm (120 employees) to assist as needed.*

3. Shift CDR-Is there any plan to develop a control tower or am I jumping the gun?

> Guy: *FAA is not interested in adding more control towers. There are airports with many more operations than Plymouth that have tried unsuccessfully to implement a control tower and we can definitively state that the evaluation of a control tower is not part of this plan.*

4. Tom Maher-Is there likely to be noise contours developed as part of this project?

> Guy: *As Ken had mentioned that the category of the airport will not change. We will do a noise graphic and I suspect that the noise will be similar to what it is now. We have done an AGIS survey and the runway that was built likely provides more space for aircraft to take off, allowing them to use lower power settings and creating less noise.*

5. Walter Powell-Given the rapid growth in PYM- do you expect a large volume of public input as Covid decreases? Have there been any other concerns?

> Guy: *11 years ago the PAC agreed to wait 10 years before evaluating the runway length. In the previous 10 years, aircraft and engines, etc have changed. We will do a runway length analysis to make sure the airport operators have an airport where safety is maximized.*

6. Chris Hyldburg-The airport has had challenges in the past. What is your plan to reach out and to make sure that we get to all people who may be affected by this Master Plan update and the alternatives developed? How do we bring their interest and needs to the table?

> Guy: *I am going to write this down and bring it to the PAC and the Town. We want and need to maximize participation whether it be in the newspaper, or the internet, however, the select board notices their meetings. We will make sure that there is a solid plan to increase participation and get the message out. We have put together a public participation plan and we will pause, take a look at it and make sure that it reaches as many as possible.*
>
> Ken: *We will be working on getting the information out. We shall also be reaching out to Carver and maybe meeting with the Selectboard.*
> Guy: *D&K would be happy to go over the plan with the Carver Selectboard if the PAC is interested. The next Public Meeting will happen in March but the date has not been chosen.*

7. Walter Powell-The schedule looks aggressive. Is there time to get Public Involvement?

> Guy: *We will be working diligently, we are going to be extremely efficient, we have a whole team to work on it.*

8. Tom Constantine-As time compresses- it won't be long before we have electrically powered aircraft. Has D&K given any thought to upgrading the airport's electrical needs?

> Guy: *We are very involved in new technology. He listed several examples.*

9. Tom Constantine-Could the grass be improved next to 15/33 for take-off and landing with tailwheel aircraft?

> Ken: *Bird population is an issue. We are concentrating this Technical Master Plan Update on paved surfaces but we can look at the grass strip.*

Conclusion: We will see you all again soon in March. Please send an email to PlymouthAirportMasterPlan@gmail.com and we will add you to the distribution list.

Plymouth Airport Technical Master Plan Public Meeting #2

April 27, 2022, 7 PM

The Plymouth Airport Commission held a meeting regarding the Plymouth Airport Technical Master Plan Update on Wednesday, April 27, 2022, at 7:00 P.M. in the Hangar Conference Room at the Plymouth Municipal Airport.

Present were Chairman Kenneth E. Fosdick, Vice-Chairman, Douglas R. Crociati and Commissioners Karin A.R. Goulian, Thomas W. Hurley, Dennis R. Smith, Chris Merrill, and Paul G. Worcester. Also present were Airport Manager Thomas Maher, Airport Coordinator Matt Cardillo, Guy Rouelle & Brenda Bhatti, D&K, Ed James, Jim O'Brien, Joe Mortland, Bill Carpenito, John Steele, Stephen Oakman, Bill Richardson, Ed Foley, Eleanor Watson, Cheryl LaVallee, Jen Easton, Susan Pastore, Bob Frye, Tony Caruso, Bob Johnson, Dick Bryant, Ryan Staszko, Donald Staszko, Chris Hyldburg, Peter Connor, Jane Grenell, Jen Hanlon, Paul Hanlon, Jonathan Nearman, Joe McLaughlin, Tim Helm, Candyce McEnroe, Sue Pinnelli, Judy Barber, Robert Wallace, Jon Greenlaw, and others.

Disclosure: These minutes are not verbatim – they are the secretary's interpretation of what took place at the meeting. - Open Meeting Law, G.L. c. 30A§22.

ANNOUNCEMENTS
The minutes of this meeting are being recorded by Kim Johnson.

OPEN MEETING
Second Public meeting regarding the Plymouth Airport Technical Master Plan Update. This meeting will show the public alternatives that are under consideration and will review and request public comment regarding these airport runway alternatives. The Airport Commission is requesting this input from the public including neighbors, airport users, and Town officials to assist the Airport Commission in the process of ultimately selecting a preferred alternative. The Airport Commission will not be making an alternative selection at this meeting but would take any input from the public as part of the analysis to eventually make a selection at a future public meeting. Chairman Fosdick of the Plymouth Airport Commission introduced himself and said that no decision would be made at this meeting and that it was a meeting to discuss alternatives regarding the Technical Master Plan. Guy Rouelle of Dubois & King gave a presentation on the data. He explained that a Master Plan is a full comprehensive review of the airport, then he talked about the Plymouth Airport and its attributes. He explained that a model aircraft, the Falcon 2000, was used to do the runway length analysis and it was determined that the Falcon 2000 needs an unconstrained runway length of 5500 feet, according to the FAA. Plymouth Airport's runway 6-24 is 4650 feet. Mr. Rouelle talked about the four alternatives:

Alternative 1 – Everything remains the same.

Alternative 2 – Get the airport to a runway length that the Falcon 2000 could use 60% of its load. To do this there would be some changes to the taxiways and the relocation of a couple of navigational aids, and there would be no penetrations and no impacts to properties off the airport. That length would be 5001 feet.

Alternative 3 – Get the airport to a runway length that the Falcon 2000 could use 90% of its load. 90% means they could take more fuel and more passengers. This length would be 5200 feet. To do this there would be some changes to the taxiways and the relocation of a couple of navigational aids, and there would be minor penetrations.

Alternative 4 – To get to the unconstrained runway length of 5500 feet, it would be an 850-foot extension and there would be multiple penetrations, along with changes to the taxiways and navigational aids.

Mr. Rouelle answered questions from the audience, and some are listed below:

Will the homeowner have to pay for any cutting to be done on trees?

Mr. Roulle answered no.

Is there liability on the homeowner?

Mr. Rouelle said no.

Why do they need to lengthen the runway for a plane that has been working out of here for x number of years, why is it now unsafe for them?

Mr. Rouelle said it is not unsafe. They are flying safely, and they are leaving very light, and are not able to utilize the full ability of the aircraft. Since they are leaving light, they are not buying fuel here, which is

a detriment to the Plymouth Airport, and they are most times leaving without passengers because they can't take on any additional load in the airplane, so it means they are conducting their business elsewhere.

If the runway gets lengthened, does the new length of the runway put the Airport in a new class?

Mr. Rouelle said that it does not. He said that even at the option with the longest length, the airport will still be a B2.

The meeting concluded at 8:12 PM.

Plymouth Airport Technical Master Plan Public Meeting #3

July 21, 2022, 7 PM

Approximately 20 people were in attendance

Attendance List:

Bob Frye, Jim Dial, Rick Gronberg, Ken Kessel, Ros Kessel, Michelle Arnold, Ed James, Tim Helm, Ryan Staszko, Jen Hanlon, Jane Grennell, Donald Staszko, Tom Hurley, Paul Worcester, Ken Fosdick, Doug Crociati, Matt Cardillo, Kim Johnson, Guy Rouelle, and Jen Ricciardi.

Ken Fosdick, Plymouth Airport Commission Chairman gave an introduction promptly at 7 PM. He shared with those in attendance that the PAC has not made a decision about the preferred Alternative. They decided we needed to continue the discussion with stakeholders and do what is in the best interest if everyone, including airport users, the Town of Plymouth, neighbors, and other interested parties. He introduced Guy Rouelle of Dubois and King who would discuss the developed Alternatives 2 & 3. The PAC and Dubois and King had dismissed Alternative 4 due to environmental concerns and impacts on neighboring properties. He let the audience know that once the PAC decides on an Alternative and that an Alternative is presented to the FAA a long process is started to include an Environmental Assessment where continued Public input will be solicited.

Guy Rouelle D&K: Guy talked about the Airport Commission looking for public comment. He said they have done a stellar job being transparent, putting in much more effort than many airports. Guy noted that there may be some repeats with this presentation but that he wanted to be sure that those who were not present at the first or second meeting were able to fully understand the process. Guy reiterated that there are 3 Alternatives as FAA always considers a no build Alternative as an option.

A slideshow presentation begins.

Agenda Slide: Guy discusses forecast approval needed by FAA. Goes through Agenda.

Public Involvement Slide: Noted there were 23 questions and comments that have been posted and answered on the website. A reminder that this is a safety-related project.

Technical Master Plan Team Slide: Discussion of the team. Noted that the Commission has engaged with select boards in Carver and Plymouth.

Plymouth Airport Highlights Slide: Noted that the Airport has gone out of their way to be a good friend to the environment. PAC has discussed noise at every monthly meeting to ensure they are being good neighbors.

Plymouth Non-Aeronautical Development Slide: Noted that on the other side of the airport there is room for non-aeronautical development that will bring tax revenue to the town.

Purpose of Technical Master Plan Slide: Discussed points on slide.

Master Planning Process Slide: Discuss points on slides.

Forecast Slide: Decrease in based aircraft of 8% and increase in operations of 8%.

ALP Slide: A Quick presentation of the ALP was given to show different parts of the airport.

Runway Length Analysis Slide: Discussion about the Critical aircraft, Falcon 2000, unconstrained runway length of 5500-ft.

Typical Runway Length Requirements Slides: The surrounding area will not allow the full 5500-ft due to environmental concerns and property impacts.

Alternative Overview Slide: High-level overview was given

Alternative #1 No Build: Nothing changes.

Alternative #2 351-ft extension: 5001-ft no penetration.

Alternative #3 550-ft extension: One penetration, a mature tree could be topped cut down.

Alternative #4 850-ft: Lots of penetration and environmental impacts.

Additional Impacts: Evaluated areas for a grid-tied

solar array, water collection system to reuse for watching airplanes, etc.

Timeline: brief the timeline, tbd implementation plan.

Questions/ Comments

1. Could you utilize 33/15 for the extension rather than 6/24?

No. The ILS is already set up on 6 and the FAA would not entertain moving it.

2. You are not extending the runway on the 24 end. You won't climb any differently on a departure from 24?

This led to a detailed discussion on departure profiles noting that the departure from 24 would likely remain the same and the departure from runway 6 could lead to higher takeoff profiled with respect to the distance from the airport.

3. Will Runway 6 be the preferred runway with the new length?

The preferred runway is 6 for instrument conditions currently and will continue to be.

Follow-up: What about with good weather? Will we be increasing jet traffic over our homes?

T*he change will be less than 1% per year, of which you would likely not notice.*

Follow up: What is this based on?

Scientific data from the GARD system and other forecasts provided by the FAA. The highest traffic you will see on the runway is 8% increase over 20 years.

4. You say the FAA wants moderate growth, will they accept 8% or will they want more?

Growth to the FAA is reaching critical mass. The FAA wants the airport to be 100% sustainable. This airport has done a great job with this. The FAA is interested in growth to sustainability. The airport over the next 20 years is looking for hangars and this runway extension.

5. We are all ok with the small planes but we don't want to be the next Providence or the next Hyannis?

This airport is in a unique situation. The limits (the property limits) preclude the airport from growing beyond a B-II airport. Without expanding property the airport can not grow into a Commercial Service Airport.

6. Can we have in writing that the airport will not expand? Where do we fall legally if the airport starts growing beyond what the community is comfortable with?

If you reach too much traffic, is there an ability to stop the growth?

There is no way to limit the traffic if it were to happen. However, the growth has never exceeded what has been projected.

7. I think one of the concerns is creeping up to Hyannis.

This can't happen, it isn't just the runway length. You would have to change everything, every runway, taxiway, property boundary etc. The primary surface would need to increase which would push all of the buildings parallel to Runway 6/24 back another 500-ft. Additionally, the Commission would have to decide whether or not to be a commercial airport. The Commission would need to choose this path and they have decided not to.

8. What are the time rules as far as taking off and landing?

Because we are a public airport we can not prevent operations in the middle of the night. We can say that we prefer that operators follow certain guidelines. We discourage late-night and early-morning flying, but we aren't able to stop it. Typically state police and med flight are flying early.

A suggestion to make noise complaints to the airport so they can contact certain users and see if concessions can be made. The Airport can typically address these complaints within two days. A discussion was had regarding the published noise abatement procedures.

9. Noise wise it is much different now than when we moved in? Do you take that into consideration when making plans to move forward?

During the Environmental process, the noise average will be considered around the airport and we will show the relationship to the 65dnl line, which is the line marking what FAA considers compatible vs. non-compatible noise.

10. I am concerned that with the Environmental study not everything is considered, does it cover other things as I am worried about cancer?

In addition to noise, we will evaluate, hazmat, gases, air quality, emissions, and everything else covered under the NEPA process.

11. What is the percentage of the airport is in Carver?

As shown on the ALP a smaller section in Carver exists. The PAC went to the selectboard in Carver and also South Meadow Village to discuss the Technical Master Plan Update.

12. How are we increasing parking?

We are addressing parking outside the master plan. The FAA pays for airside development, we know that we need more parking and we are tackling this on our own.

13. If you are currently operating Falcon 2000s. Is the runway length we have now creating a safety hazard for you?

Yes, we don't take as much fuel and don't have as much room for emergencies if we were to lose an engine on takeoff. A longer runway would provide a safety factor, and be quieter for the neighbors by allowing us to pull back to climb power early.

14. I have difficulty wrapping my head ethically that we are helping one company while decreasing the health and wellness of the neighbors.

The businesses that benefit on the airport pay taxes to the Town, thus increasing Town revenue. Additionally, the runway will allow the airport to sell more fuel, also a benefit to the Town's economy. The airport creates jobs for the people of Plymouth and Carver. This runway extension will increase the safety factor, and decrease noise under the departure from Runway 6. As newer aircraft are utilizing the runway emissions and noise will continue to decrease over time.

15. Will there be any difference in landing noise under the approach to Runway 6?

There is an 18 ft difference 1 mile from the runway on the approach to Runway 6 which is negligible from South Meadow Village.

5. The med flight and state police, is it them who are running late at night?

The Airport discourages this. Sometimes the state police have to do training times and sometimes they are called out at night. Other neighbors noted that if their children were lost they would certainly want the State Police out looking for them. The Airport has worked with local users to make this better for neighbors.

Ken Fosdick thanks everyone for attending and apologizes for the air conditioning. He notes that they will be addressing issues in the building.

Written Questions and Answers

Plymouth Master Plan Update Questions/ Comments/Answers 2022

Public Meeting Questions:

1. How long is the airport runway and do you need FAA approval to lengthen it?"

Answer: *4,650 feet and if the FAA provides funding, yes the FAA will need to approve any changes to the runway.*

2. What is the amount of this contract? How many are on your team and are you the Principal?

Answer: *The Master Plan Update contract amount is $250,000. There are 6 people directly on the team with an entire firm (120 employees) to assist as needed.*

3. Is there any plan to develop a control tower or am I jumping the gun?

Answer: *The FAA is not interested in adding more control towers. There are airports with many more operations than Plymouth that have tried unsuccessfully to implement a control tower and we can definitively state that the evaluation of a control tower is not part of this plan.*

4. Is there likely to be noise contours developed as part of this project?

Answer: *The category of the airport will not change. We will do a noise graphic and the Commission suspects that the noise will be similar to what it is now. We have done an AGIS (Airports Geographic Information Systems) survey which helps the airport identify and analyze what is in its airspace, what is on the surface, and what lies below the ground. With that survey it was determined that the possible design alternatives likely would provide more space for aircraft to take off, allowing them to use lower power settings and creating less noise.*

5. Given the rapid growth in PYM- do you expect a large volume of public input as Covid decreases? Have there been any other concerns?

Answer: *We have received a large amount of input from abutters, tenants, and users of the airport. We have also met with multiple groups including the residents of South Meadow Village as well as the West Plymouth Steering Committee. Covid did not seem to*

have an impact on the amount of feedback that was provided. Having a centralized email address helped capture any questions that could not be answered at a public meeting.

6. The airport has had challenges in the past. What is your plan to reach out and to make sure that we get to all people who may be affected by this Master Plan update and the alternatives developed? How do we bring their interest and needs to the table?

Answer: *It is the Commission's intent and desire to maximize participation whether it be in the newspaper, the internet and, the select board who provided notice to the public of their meetings. There is a solid plan to increase participation and get the message out. We have put together a public participation plan and we will continuously look for ways to improve our process and make sure that it reaches as many as possible. There was also an article in the Old Colony Memorial Newspaper following the second public meeting. All members of the community are invited to attend our in-person meetings and/or write to us at our email address.*

7. The schedule looks aggressive. Is there time to get Public Involvement?

Answer: *This project will be task-oriented with the goal of maximizing public participation. This project was conceived in the fall of 2021 and began the public phase four months ago which continues to this day. During this time many questions have been asked and addressed. In addition, the Commission is grateful to those who made a number of suggestions and will consider each of them. We will be working diligently, we are going to be extremely efficient, and we have a whole team to work on it.*

8. As time compresses- it won't be long before we have electrically powered aircraft. Has D&K given any thought to upgrading the airport's electrical needs?

Answer: *D&K is very involved in new technology and will recommend numerous options for the airport. Several examples were given.*

9. Could the grass be improved next to 15/33 for take-off and landing with tailwheel aircraft?

Answer: *We are concentrating this Technical Master Plan Update on paved surfaces.*

Public Meeting Conclusion:

Please send an email to PlymouthAirportMasterPlan@gmail.com and we will add you to the distribution list.

Emailed Questions and Comments:

1. Would it be possible to add vegetation along the tree line that runs parallel to South Meadow Rd?

Answer: *Previously the FAA paid for vegetation along South Meadow road. Is there a particular spot where the vegetation is thin or has not survived that you feel it needs to be replaced?*

2. Would it be possible to change the pattern for take-off so that the planes are using the opposite run-up pad to runway 6? (circled in black in the attached photo)

Answer: *Aircraft use run-up areas depending on which part of the airport they are originating from and which direction the wind is blowing. From a safety perspective, it would add significant risk to have aircraft cross an active runway into oncoming traffic from the opposite direction to utilize the opposing runway pad. Jet aircraft do not require a runup but can be idling at the end of the runway while they wait to take off. The Commission will be looking into ways to mitigate without compromising FAA safety standards.*

3. Lastly, if option 2 or 3 of the proposal would create more opportunities for runway 24 to be used more frequently, we would be in support of either.

Answer: *Lengthening the runway should not have an impact on the direction of the traffic. It may however increase the height at which aircraft departing on 24 flies over the surrounding terrain, and shift the location of the traffic pattern to runway 6 just slightly to the south.*

4. Dear Commissioners I have been a neighbor of the airport during various stages of the past 40+ years. Honestly, I have usually enjoyed the planes. And honestly, if the airport bothered us that much, my husband and I never would have bought a home in West Plymouth in 2005, then to the home, my parents built a couple of streets over. Yes, sometimes we feel the planes and jets are too low. Yes, we really do not appreciate those 5:45 am jets. We attended last week's meeting and have had time to think, digest, and discuss with other neighbors. As a result, a few questions have come up that we are hoping can be answered please A. Should the commission opt for plan 3 or 4, can you please give more detail about what the easement on the Carver resident's property would entail? Would it be for just that tree (or those trees)? Would it

be for any tree and structure on the properties identified? How many properties would then have an easement? Why wouldn't the airport commission consider working with those neighbors and pruning the affected trees vs removing them?

Answer: *Depending on which runway alternative the Commission chooses as 5the preferred alternative, the Airport would indeed work with the neighbors to determine the best solution for protecting that airspace while preserving the aesthetics of the neighborhood. It was determined that Alternative 4 was not feasible, due to a number of impacts, and therefore the Commission elected not to proceed with #4. This leaves Alternative 2 and 3 for consideration. At this point, it appears that alternative 2 does not require any tree removal/topping. Alternative 3, at this level of planning, shows only one tree that penetrates the approach surface. This tree has been physically inspected and confirmed that it is indeed only one. The balance of trees (5 total) do not currently penetrate the approach surface and it is not certain at this point that any easements would be required for Alternative 3. The Environmental review will evaluate multiple ways to potentially mitigate these trees and these mitigation strategies would be presented in future public meetings. Topping trees rather than removing them is oftentimes an option. An easement is another option and protects airspace from environmental penetrations such as trees. The Airport will evaluate the need for the removal/topping of trees and would work with the landowners to acquire an easement that would limit the growth of trees above a certain height.*

5. Would an expansion of the runway increase air traffic? COULD an expansion of the runway increase air traffic? Neighbors are concerned with the possibility of a horse racing/casino facility coming to town and drawing more travel to town via the airport. We are concerned with having an increase in the frequency of jets over the neighborhood, during the day as well as all hours of the night. COULD a runway extension mean that neighbors could have private jets flying constantly day and night?

Answer: *There is always the potential for an increase in air traffic, with or without the added runway length. However, the goal of an extension of this length is to increase the safety of the aircraft currently using Plymouth. Many aircraft currently utilizing the airport (Plymouth Airport businesses) are operating with moderate to significant limitations due to the current runway length. These limitations are exacerbated when the runway is contaminated with rain or snow. The Plymouth Airport Commission and Plymouth Airport Management will continue to work with the flying public to encourage adherence to the published noise abatement procedures, including a discouragement of early morning and nighttime arrivals and departures. The airport is obligated to allow operations at night, however, the airport has historically been successful in encouraging operations that are amenable to the community. A safer runway environment may attract increased traffic over what is seen today. Remember, though, that traffic has decreased 7% over the past ten years. So any increase would likely not be greater than the traffic we have had in the past. We strive for a stable, safe, sustainable airport. This Master Plan Update does not allow for larger aircraft to use the airport. Larger, heavier aircraft require wider runways, taxiways, and thicker pavement. None of this is being considered. A runway extension to the "west" would result in aircraft taking off in an easterly direction, departing runway 06, towards the West Plymouth neighborhood, to be at a higher altitude at any given point in the departure. The higher altitude would depend on the specific aircraft but would likely be in the range of 100-180 feet higher altitude throughout the departure. Departures on runway 24, towards the west would be exactly the same as current. Landings on runway 24, coming in over the West Plymouth neighborhood would be exactly the same as current as the touchdown point would be exactly the same location, no change. Development projects such as the race track are often proposed in Plymouth. This Master Plan Update is not connected to any other proposal but will be our best estimate of the community and aviation needs in the future. The possibility of a horse racing/casino facility is not within the purview of the airport nor is it or will be mentioned in the Airport Master Plan. We can definitively say, with authority, that the extension of the runway has nothing to do with such a potential facility as you alluded to. Other airports located near these smaller regional casinos or horse racing facilities do not attract additional air traffic. Large, national casinos and race tracks may attract air traffic but would not apply if a small facility were to be built in this area. We have spoken to the airport located near Foxwoods CT. and the airport reports that casino patrons do not fly in, they drive in.*

6. There was an agreement between neighbors and the commission back in 2010/2011. I believe there was an entire Airport Advisory Group that was comprised of all walks of the airport and surrounding areas. There had

been a proposal at that time to extend the runway to 5000 ft and it was decided that indeed it would not be extended. What is so different now that it needs to be extended? Many of the neighbors are the same, in fact, Matthews Landing has one of the lowest rates of home turnover, so I can venture to say we have many of the same residents over here. If neighbors did not want the extension back then, and the commission said no to the extension, why is it happening again?

Answer: *The previous agreement was the product of the PAAG which served its purpose by providing a ten-year look-ahead for the airport. The Master Plan Study conducted between 2007 and 2011 suggested an extension of the runway in an easterly direction, towards the West Plymouth neighborhood. At the time, the PAAG made a recommendation that the Commission adopted to not move forward with an extension to 5,000 feet. The decision by the Airport Commission and Airport Advisory Group suggested the plan be revisited no sooner than 10 years. That 10 years is now up, safety regulations have changed and the opportunities to increase safety and efficiency at the airport are being reevaluated. Under FAA guidance the runway configuration is still balanced with the selection of any runway lengthening alternative. During the 2007 Master Plan Study, a primary concern was to "Balance' the two runways in length. For safety concerns. The adopted 2011Plan accomplished that. We now have two balanced runways. The additions that are being suggested today will not unbalance the runways. They will only enhance the Instrument approach runway when landing conditions are not ideal (ie rain, snow, slush). It is a good example of the transparency of the Airport Commission which holds monthly public meetings to gain community input on a wide range of topics. Community members have actively participated in more than 120 meetings since the PAAG met and many of the changes at the airport are a result of continuing community input.*

7. Why was there no mention of this previous agreement during the public hearing?

Answer: *The previous agreement expired and the need to update the Airport Master Plan is timely. The 10 years of significant and positive improvements to the airport were mentioned.*

8. Why is okay to increase the income of a private business while decreasing the property value of neighbors, ie literally taking money away from neighbors? I am asking that the airport commission stand by their previous agreement made with neighbors when this was reviewed previously, and not vote for an action that could, in any way, increase air traffic to a point where their neighbors would not feel comfortable in their own homes.

Answer: *We appreciate your comments and questions, and the intent of these public meetings is to evaluate the support and concerns of the community. The airport serves the entire community, encourages visitors who spend money in the towns of Plymouth and Carver, and provides nearly half a million dollars in tax revenue for the towns. Please know that the Airport Commission is considering the impact on the entire community throughout this process. We understand the concerns regarding potential increases in activity but as noted previously, it is unlikely that any small increase in activity will come close to offsetting overall decreases in activity seen in recent decades.*

9. Is the current proposal for only a runway extension to the west in the town of Carver?

Answer: *Yes, at this time the Alternatives are only considering extensions on the west end of Runway 6/24.*

10. Will there be any runway extension to the East in the town of Plymouth with this current proposal?

Answer: *This Master Plan will not include a runway extension to the East.*

11. With this extension, will aircraft be flying any lower than they currently are, over homes on approach to landing in the Town of Plymouth?

Answer: *On the approach to Runway 24 (over the Town of Plymouth land), aircraft will not be flying a different approach than they currently fly. On the departure from Runway 6 (also over the Town of Plymouth land) aircraft could be flying higher than they are currently should the PAC choose an Alternative that extends the runway westbound, allowing for a takeoff roll starting further to the West.*

Comment Via Email: *As the Director of Operations of a Beech Kingair350, turbo-prop based at the Plymouth Airport for the past 15+ years, I would like to support the Airport Commission in the proposed master plan update. Our aircraft is a very quiet, twin-engine, corporate 9-passenger airplane. The additional runway will better allow aircraft like mine to stop on the runway in the event of a rejected takeoff. I feel strongly that the proposed alternatives to lengthen runway 6/24 are appropriate to enhance the safe operation of small corporate aircraft such as mine. The proposed small runway extensions in the westerly*

direction appear to be a fair means of balancing the previous extension to the east some 10 years ago and will enhance safety while minimizing noise. I feel the proposed extensions will reduce noise from departing aircraft by starting the take-off roll further to the west, maximizing their altitude as they cross into the West Plymouth area. I support the Airport Commission's need to find an appropriate balance with all facets involving the airport.

12. When they talk about an extension providing more height on departures....what is the extension length are they speaking of?

Answer: *Any of the extension options will provide additional departure height for aircraft.*

13. How many accidents has the airport had in the last 10 years due to the runway not being long enough?

Answer: *There have not been any runway length-related accidents in the previous 10 years. There are, however, significant limitations on aircraft currently using the runway due to the runway length. These aircraft do not operate on the runway during certain weather conditions, maintaining a high safety rate. One accident is too many and it is imperative that the airport complies with FAA standards and continues to improve safety.*

14. The airport refers to a 7% decline in air traffic over the last 10 years. Could you please provide to me what that percentage was PRIOR to March 2020. In other words, take March 2020 to present out of the equation.

Answer: *Although the Airport saw a decrease in total operations by about 7-8% over the last 20 years, it did not see a decrease in operations between March 2020 through the present.*

15. When will neighbors be able to speak? Will the vote be taking place at the third public hearing or after?

Answer: *At the third public meeting, the Preferred Alternative will be presented and there will be time allotted for comments and questions. The final decision on which Alternative to pursue further will be made after hearing public comments at the third meeting.*

16. The commission met with a neighborhood in Carver (SMV) outside of a public hearing. Why wasn't the same offered to West Plymouth residents? Could it be?

Answer: *The Commission went to the Plymouth and Carver Select Boards and the West Plymouth Steering Committee to announce the process. We then held an open meeting at the Airport. We received an invitation to speak to an open meeting of the South Meadow Village Board, which was attended by many of their community members, we agreed to and did attend. We encourage the public to attend the next open meeting but would be agreeable to attend additional requested meetings if warranted. We have now set our next open to all meeting to be held on July 21 @ 7:00 PM at the Plymouth Airport.*

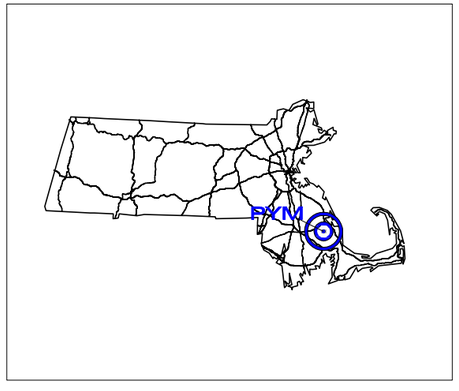
PLYMOUTH MUNICIPAL AIRPORT

PLYMOUTH, MASSACHUSETTS

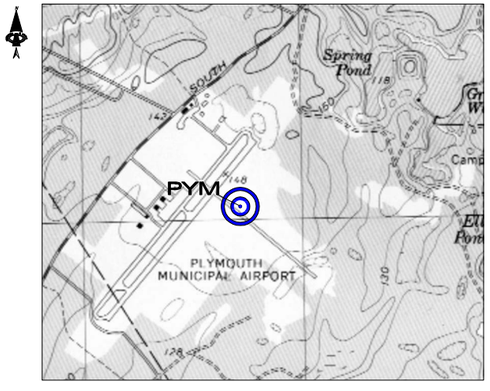
AIRPORT LAYOUT PLAN

AUGUST 2022

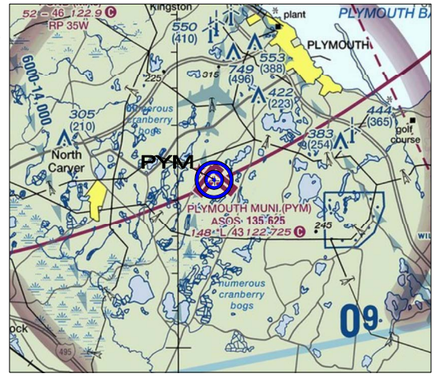
SHEET INDEX



LOCATION MAP
N.T.S



VICINITY MAP
N.T.S



AERONAUTICAL CHART
N.T.S

DuBois & King inc.

DESIGNED BY:
DATE: SEP 2022
DRAWN BY: DK
SCALE: AS SHOWN
CHECKED BY: MCG
D&K JOB NO. 327066
FILE NAME: SHEET 1

NO.	DATE	REVISIONS	BY	APPR.
1	08/18/2022	SHEETS UPDATED 1,2,3,4,5,6,7 & 12		

PLYMOUTH MUNICIPAL AIRPORT
PLYMOUTH, MASSACHUSETTS

TITLE SHEET

A.I.P. PROJECT NO.
3-25-0042-054-2021

SHEET NO.
1
OF
12

AIRPORT DATA TABLE

AIRPORT REFERENCE POINT	41°54'32.50"N (NAD 83) 70°43'43.60"W
MEAN DAILY MAX TEMPERATURE	82.4°F
COMBINED WIND COVERAGE (VFR/IFR %)	99.34%
AIRPORT MAGNETIC DECLINATION AND DATE	14°15' W - AUGUST 18,2022
AIRPORT REFERENCE CODE	RW 6-24 B-II; RW 15-33 B-II
NPIAS SERVICE LEVEL	GENERAL AVIATION
EQUIVALENT SERVICE ROLE	COMMUNITY
TAXIWAY LIGHTING	MITLS
VISUAL APPROACH AIDS	RW 06: PAPI-4, MALSF; RW 24 : PAPI-4; RW 33 PAPI-4. ALL: WINDCONES, ROTATING BEACON
RUNWAY 6 LONGITUDE RUNWAY 6 LATITUDE	41°54'15.25"N NAD 83 70°44'11.47"W NAD 83
RUNWAY 24 LONGITUDE RUNWAY 24 LATITUDE	41°54' 50.67"N NAD 83 70°43' 32.30"W NAD 83
RUNWAY 15 LONGITUDE RUNWAY 15 LATITUDE	41°54'43.926"N NAD 83 70°43'48.352"W NAD 83
RUNWAY 33 LONGITUDE RUNWAY 33 LATITUDE	41°54'16.54"N NAD 83 70°43'04.01"W NAD 83
RUNWAY 6 ELEVATION	135.1' MSL
RUNWAY 24 ELEVATION	144.8' MSL
RUNWAY 15 ELEVATION	144.9' MSL
RUNWAY 33 ELEVATION	132.92' MSL

RUNWAY DATA TABLE

EXISTING	
APPROACH VISUAL MINIMUMS	RW 6: >3/4MI; RW 24: >1MI; RW 15: >1MI;RW 33: > 3/4MI
FAR PART 77 CATEGORY	RW 6: PRECISION INSTR.; RW 24, 15, & 33 NPA
APPROACH SLOPE	RW 6: 50:1; RWs 24,15, & 33: 34:1
RUNWAY LENGTH / WIDTH	RW 6-24: 4,650' x 75' RW 15-33: 4,650' x 75'
PAVEMENT TYPE	BITUMINOUS CONCRETE
PAVEMENT DESIGN STRENGTH	30/F/X/T
LIGHTING	MIRL
MARKING	PRECISION
PERCENT GRADIENT	RW 6-24: 0.2% RW 15-33: 0.2%
ELECTRONIC NAVAIDS	RW 6: LOC, GLIDESLOPE; ALL: ASOS
CRITICAL AIRCRAFT	FALCON 2000
RUNWAY SAFETY AREA DIMENSIONS	RW 6-24: 5,250' x 150' RW 15-33: 5,250' x 150'
OBJECT FREE AREA DIMENSIONS	RW 6-24: 5,250' x 500' RW 15-33. 5,250' x 500'
OBSTACLE FREE ZONE DIMENSIONS	RW 6-24: 5,050' x 400' RW 15-33: 5,050' x 400'
OBSTACLE FREE ZONE PENETRATIONS	NONE
EFFECTIVE RUNWAY LENGTH	RW 6-24: 4,650'; RW 15-33: 4,650'
ESTIMATED AIRPORT ELEVATION	146.9' MSL
RUNWAY HIGH/LOW POINTS	H: 146.9' MSL, L: 130.2' MSL

LEGEND

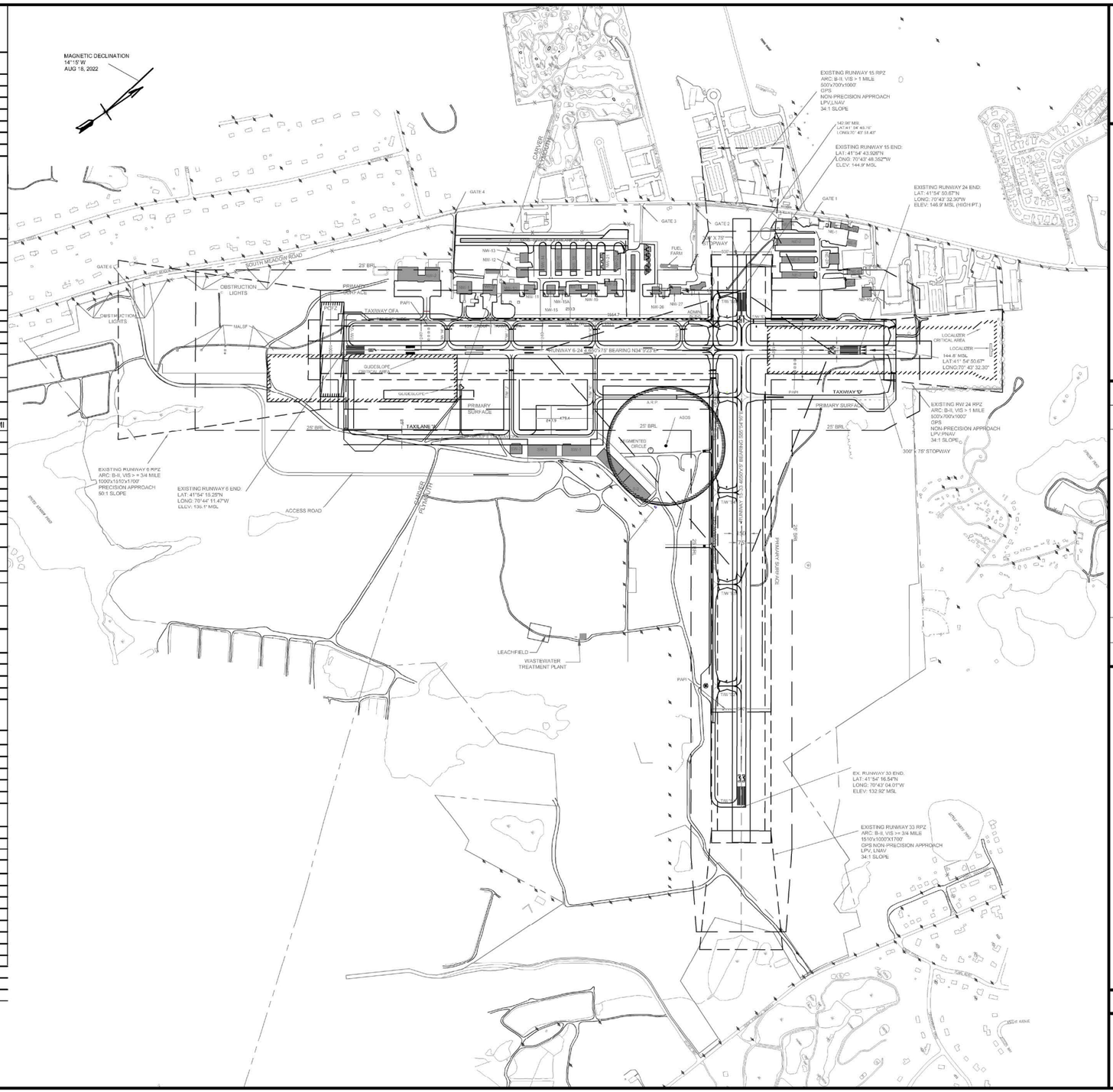
DESCRIPTION	SYMBOL
RUNWAY SAFETY AREA	
RUNWAY OBJECT FREE AREA	
RUNWAY PROTECTION ZONE	
ROADS WITHIN RPZ	
RUNWAY OBJECT FREE ZONE	
RPZ PROPERTY OUTSIDE AIRPORT OWNERSHIP	
CRITICAL AREAS	
TAXIWAY - TAXILANE OFA	
TAXIWAY CENTERLINE	
SPOT ELEVATIONS	✖170
AIRPORT PROPERTY LINE	
TREE LINE	
CONTOURS	
FENCELINE	
HOLD LINES	
ON AIRPORT BUILDINGS	
BUILDING RESTRICTION LINE	
MASLF	
OBSTRUCTION LIGHTS	
WATER	
EXISTING PAVEMENT	

GRAPHIC SCALE

400 0 200 400 800 1600

(IN FEET)

1" = 400'



DuBois & King inc.

DESIGNED BY:
DRAWN BY: DK
SCALE: AS SHOWN
DATE: AUG 2022
CHECKED BY: MCG
APPROVED BY:
D&K JOB NO. 327066
FILE NAME:
SHEET 2

REVISIONS

NO.	DATE	BY	APPR.

PLYMOUTH MUNICIPAL AIRPORT
PLYMOUTH, MASSACHUSETTS

EXISTING FACILITIES

A.I.P. PROJECT NO.

SHEET NO.
2
OF
12

I:\1111965 - pac misc\ALP Update\2022 ALF Update\AJG 2022 ALP UPDATE\2_ExistingFacilities_DK20220818.dwg 2/27/2023 12:34 PM

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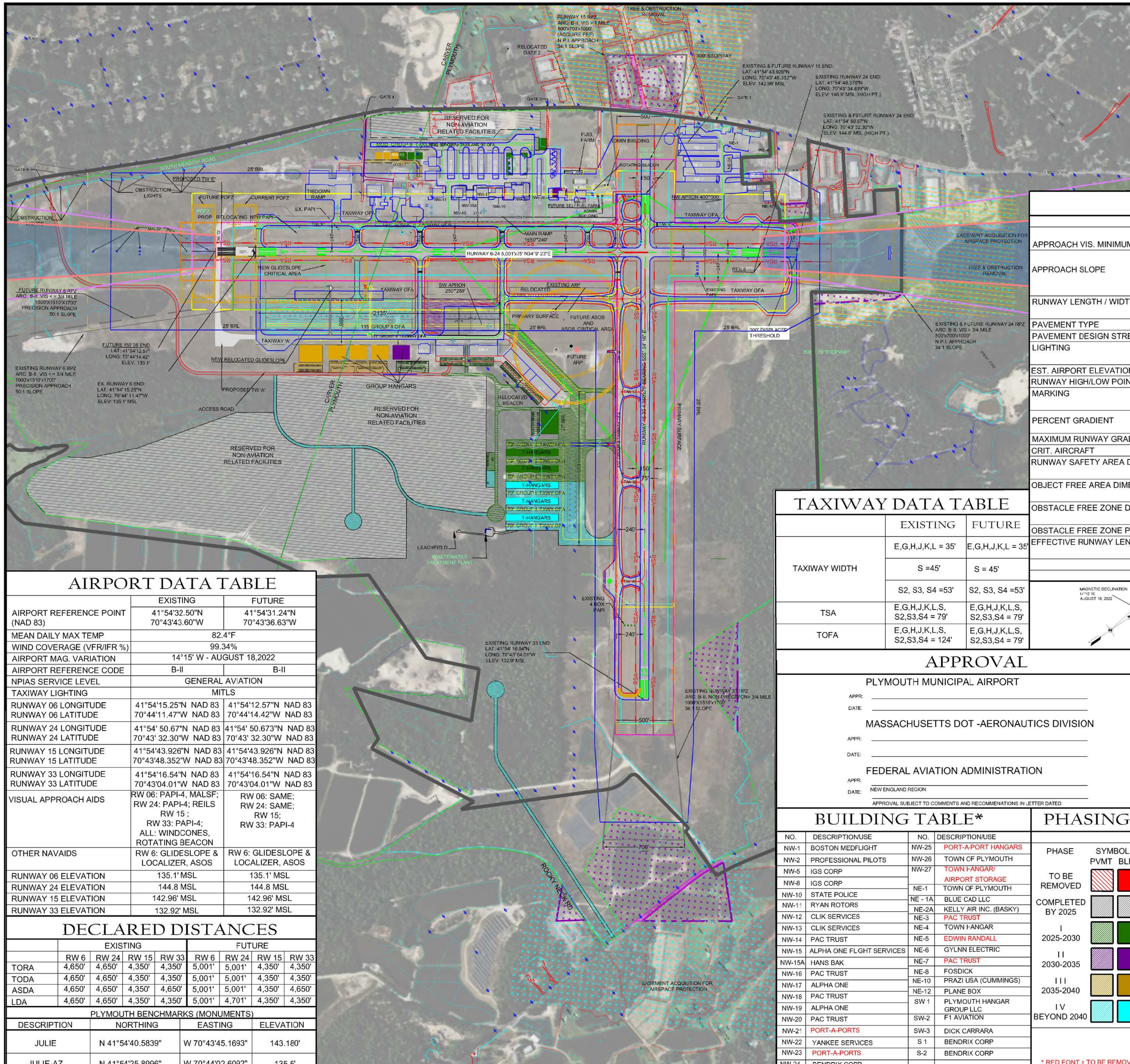


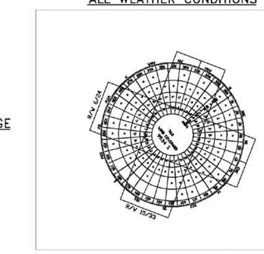
WIND ROSE

STATION: PLYMOUTH MA
RECORD PERIOD: 2011-2020
TOTAL OBSERVATIONS: 117,163

COMBINED RUNWAY WIND COVERAGE

10.5 Knot	97.89%
13 Knot	99.34%
16 Knot	99.85%

ALL WEATHER CONDITIONS



RUNWAY DATA TABLE

	EXISTING	FUTURE
APPROACH VIS. MINIMUMS	RW 6: ≥ 3/4 MI; RW 24 ≥ 1 MI RW 15: ≥ 1 MI; RW 33 ≥ 3/4 MI	RW 6: ≥ 3/4 MI; RW 24 ≥ 3/4 MI RW 33: ≥ 3/4 MI; RW 15 ≥ 1 MI
APPROACH SLOPE	SURFACE 5: RW 6,24&33) 20:1 SURFACE 6: RW 6,24&33) 30:1 SURFACE 6: RW 15) 20:1	SURFACE 5: RW 6,24&33) 20:1 SURFACE 6: RW 6,24&33) 30:1 SURFACE 6: RW 15) 20:1
RUNWAY LENGTH / WIDTH	RW 6-24: 4,349' x 75' RW 15-33: 4,350' x 75'	RW 6-24: 5,001' x 75' RW 15-33: 4,350' x 75'
PAVEMENT TYPE	BITUMINOUS CONCRETE	SAME
PAVEMENT DESIGN STRENGTH	12,500 LBS (SW)	30 FXT
LIGHTING	MIRL	RW 6-24 HIRL RW 15-33: MIRL
EST. AIRPORT ELEVATION	146.9' MSL	146.9' MSL
RUNWAY HIGH/LOW POINTS	H: 146.9' MSL; L: 130.2' MSL	H: 146.9' MSL; L: 130.2' MSL
MARKING	RW 6: PRECISION RW 33,15, 24 N.P.I APPROACH	RW 33, 15, 24: NONPRECISION RW 6: PRECISION
PERCENT GRADIENT	RW 6-24: 0.2% RW 15-33: 0.2%	RW 6-24: 0.22% RW 15-33: 0.26%
MAXIMUM RUNWAY GRADE	1.5%	1.5%
CRIT. AIRCRAFT	FALCON 2000	FALCON 2000
RUNWAY SAFETY AREA DIMENSIONS	RW 6-24: 4,949' x 150' RW 15-33: 5,250' x 120'	RW 6-24: 5,250' x 150' RW 15-33: 5,250' x 150'
OBJECT FREE AREA DIMENSIONS	RW 6-24: 4,949' x 500' RW 15-33: 5,250' x 400'	RW 6-24: 5,250' x 500' RW 15-33: 5,250' x 500'
OBSTACLE FREE ZONE DIMENSIONS	RW 6-24: 4,749' x 400' RW 15-33: 4,750' x 250'	RW 6-24: 5,050' x 400' RW 15-33:4,750 x 400'
OBSTACLE FREE ZONE PENETRATIONS	NONE	NONE
EFFECTIVE RUNWAY LENGTH	RW 15-33: 4,650' RW 6-24: 4,650 '	RW 15-33: 4,650' RW 6-24: 5,001 '

TAXIWAY DATA TABLE

	EXISTING	FUTURE
TAXIWAY WIDTH	E,G,H,J,K,L = 35'	E,G,H,J,K,L = 35'
	S =45'	S = 45'
	S2, S3, S4 =53'	S2, S3, S4 =53'
TSA	E,G,H,J,K,L,S, S2,S3,S4 = 79'	E,G,H,J,K,L,S, S2,S3,S4 = 79'
TOFA	E,G,H,J,K,L,S, S2,S3,S4 = 124'	E,G,H,J,K,L,S, S2,S3,S4 = 79'

MAGNETIC DECLINATION
14°15' W
AUGUST 18, 2022

GRAPHIC SCALE

400 0 200 400 800 1600

(IN FEET)
1" = 400'

AIRPORT DATA TABLE

	EXISTING	FUTURE
AIRPORT REFERENCE POINT (NAD 83)	41°54'32.50"N 70°43'43.60"W	41°54'31.24"N 70°43'36.63"W
MEAN DAILY MAX TEMP	82.4°F	
WIND COVERAGE (VFR/IFR %)	99.34%	
AIRPORT MAG. VARIATION	14°15' W - AUGUST 18,2022	
AIRPORT REFERENCE CODE	B-II	B-II
NPIAS SERVICE LEVEL	GENERAL AVIATION	
TAXIWAY LIGHTING	MITLS	
RUNWAY 06 LONGITUDE RUNWAY 06 LATITUDE	41°54'15.25"N NAD 83 70°44'11.47"W NAD 83	41°54'12.57"N NAD 83 70°44'14.42"W NAD 83
RUNWAY 24 LONGITUDE RUNWAY 24 LATITUDE	41°54' 50.67"N NAD 83 70°43' 32.30"W NAD 83	41°54' 50.673"N NAD 83 70°43' 32.30"W NAD 83
RUNWAY 15 LONGITUDE RUNWAY 15 LATITUDE	41°54'43.926"N NAD 83 70°43'48.352"W NAD 83	41°54'43.926"N NAD 83 70°43'48.352"W NAD 83
RUNWAY 33 LONGITUDE RUNWAY 33 LATITUDE	41°54'16.54"N NAD 83 70°43'04.01"W NAD 83	41°54'16.54"N NAD 83 70°43'04.01"W NAD 83
VISUAL APPROACH AIDS	RW 06: PAPI-4, MALSF; RW 24: PAPI-4; REILS RW 15 ; RW 33: PAPI-4; ALL: WINDCONES, ROTATING BEACON	RW 06: SAME; RW 24: SAME; RW 15; RW 33: PAPI-4
OTHER NAVAIDS	RW 6: GLIDESLOPE & LOCALIZER, ASOS	RW 6: GLIDESLOPE & LOCALIZER, ASOS
RUNWAY 06 ELEVATION	135.1' MSL	135.1' MSL
RUNWAY 24 ELEVATION	144.8 MSL	144.8 MSL
RUNWAY 15 ELEVATION	142.96' MSL	142.96' MSL
RUNWAY 33 ELEVATION	132.92' MSL	132.92' MSL

DECLARED DISTANCES

	EXISTING				FUTURE			
	RW 6	RW 24	RW 15	RW 33	RW 6	RW 24	RW 15	RW 33
TORA	4,650'	4,650'	4,350'	4,350'	5,001'	5,001'	4,350'	4,350'
TODA	4,650'	4,650'	4,350'	4,350'	5,001'	5,001'	4,350'	4,350'
ASDA	4,650'	4,650'	4,350'	4,650'	5,001'	5,001'	4,350'	4,650'
LDA	4,650'	4,650'	4,350'	4,350'	5,001'	4,701'	4,350'	4,350'

PLYMOUTH BENCHMARKS (MONUMENTS)

DESCRIPTION	NORTHING	EASTING	ELEVATION
JULIE	N 41°54'40.5839"	W 70°43'45.1693"	143.180'
JULIE-AZ	N 41°54'25.8996"	W 70°44'02.6092"	135.5'

APPROVAL

PLYMOUTH MUNICIPAL AIRPORT

APPR: ______________________

DATE: ______________________

MASSACHUSETTS DOT -AERONAUTICS DIVISION

APPR: ______________________

DATE: ______________________

FEDERAL AVIATION ADMINISTRATION

APPR: ______________________

DATE: NEW ENGLAND REGION ______________________

APPROVAL SUBJECT TO COMMENTS AND RECOMMENATIONS IN LETTER DATED:

BUILDING TABLE*

NO.	DESCRIPTION/USE	NO.	DESCRIPTION/USE
NW-1	BOSTON MEDFLIGHT	NW-25	PORT-A-PORT HANGARS
NW-2	PROFESSIONAL PILOTS	NW-26	TOWN OF PLYMOUTH
NW-5	IGS CORP	NW-27	TOWN HANGAR/ AIRPORT STORAGE
NW-8	IGS CORP	NE-1	TOWN OF PLYMOUTH
NW-10	STATE POLICE	NE - 1A	BLUE CAD LLC
NW-11	RYAN ROTORS	NE-2A	KELLY AIR INC. (BASKY)
NW-12	CLIK SERVICES	NE-3	PAC TRUST
NW-13	CLIK SERVICES	NE-4	TOWN HANGAR
NW-14	PAC TRUST	NE-5	EDWIN RANDALL
NW-15	ALPHA ONE FLGHT SERVICES	NE-6	GYLNN ELECTRIC
NW-15A	HANS BAK	NE-7	PAC TRUST
NW-16	PAC TRUST	NE-8	FOSDICK
NW-17	ALPHA ONE	NE-10	PRAZI USA (CUMMINGS)
NW-18	PAC TRUST	NE-12	PLANE BOX
NW-19	ALPHA ONE	SW 1	PLYMOUTH HANGAR GROUP LLC
NW-20	PAC TRUST	SW-2	F1 AVIATION
NW-21	PORT-A-PORTS	SW-3	DICK CARRARA
NW-22	YANKEE SERVICES	S 1	BENDRIX CORP
NW-23	PORT-A-PORTS	S-2	BENDRIX CORP
NW-24	BENDRIX CORP		

PHASING

PHASE	SYMBOL PVMT	SYMBOL BLDG
TO BE REMOVED		
COMPLETED BY 2025		
I 2025-2030		
II 2030-2035		
III 2035-2040		
IV BEYOND 2040		

* RED FONT = TO BE REMOVED

LEGEND

DESCRIPTION	EXISTING SYMBOL	FUTURE SYMBOL
RUNWAY SAFETY AREA		RSA
RUNWAY OBJECT FREE AREA		ROFA
RUNWAY PROTECTION ZONE		
BUILDING RESTRICTION LINE		SAME
TAXIWAY - TAXILANE OFA		SAME
TAXIWAY - TAXILANE CENTERLINE		SAME
SPOT ELEVATIONS	× 170	SAME
AIRPORT REFERENCE POINT		
AIRPORT PROPERTY LINE		SAME
RUNWAY VISIBILITY ZONE		SAME
TREE LINE		SAME
ROADWAYS		
10' CONTOURS		SAME
FENCELINE		
NON-AERONAUTICAL AREAS		
HOLD LINES		SAME
ON AIRPORT BUILDINGS		SEE PHASE
OFF AIRPORT BUILDINGS		SAME
ROADS WITHIN RPZ		SAME
FUTURE PROPERTY (FEE)		
FUTURE PROPERTY EASEMENT		
TREES TO BE REMOVED		
MALSF		
OBSTRUCTION LIGHT TOWERS		SAME
TOWN BOUNDARY		SAME
PRECISION OBSTACLE FREE ZONE		
PROPOSED RUNWAY & TAXIWAY PAVEMENT		
EXISTING RUNWAY & TAXIWAY PAVEMENT		

FAA'S APPROVAL OF THIS AIRPORT LAYOUT PLAN (ALP) REPRESENTS ACCEPTANCE OF THE GENERAL LOCATION OF FUTURE FACILITIES DEPICTED. DURING THE PRELIMINARY DESIGN PHASE, THE AIRPORT OWNER IS REQUIRED TO RESUBMIT FOR APPROVAL THE FINAL LOCATIONS, HEIGHTS, AND EXTERIOR FINISHES OF STRUCTURES. FAA'S CONCERNS ARE OBSTRUCTIONS, IMPACT ON ELECTRONIC AIDS AND ADVERSE EFFECT OF CONTROLLER VIEW OF AIRCRAFT APPROACHES AND GROUND MOVEMENTS WHICH WOULD ADVERSLY AFFECT THE SAFETY, EFFICIENCY OR UTILITY OF THE AIRPORT.

NO.	DATE	REVISIONS	BY	APPR.

DuBois & King inc.

DESIGNED BY:	DATE: SEP 2022
DRAWN BY: DK	SCALE: AS SHOWN
CHECKED BY: MCG	D&K JOB NO. 327066
	FILE NAME: SHEET 3

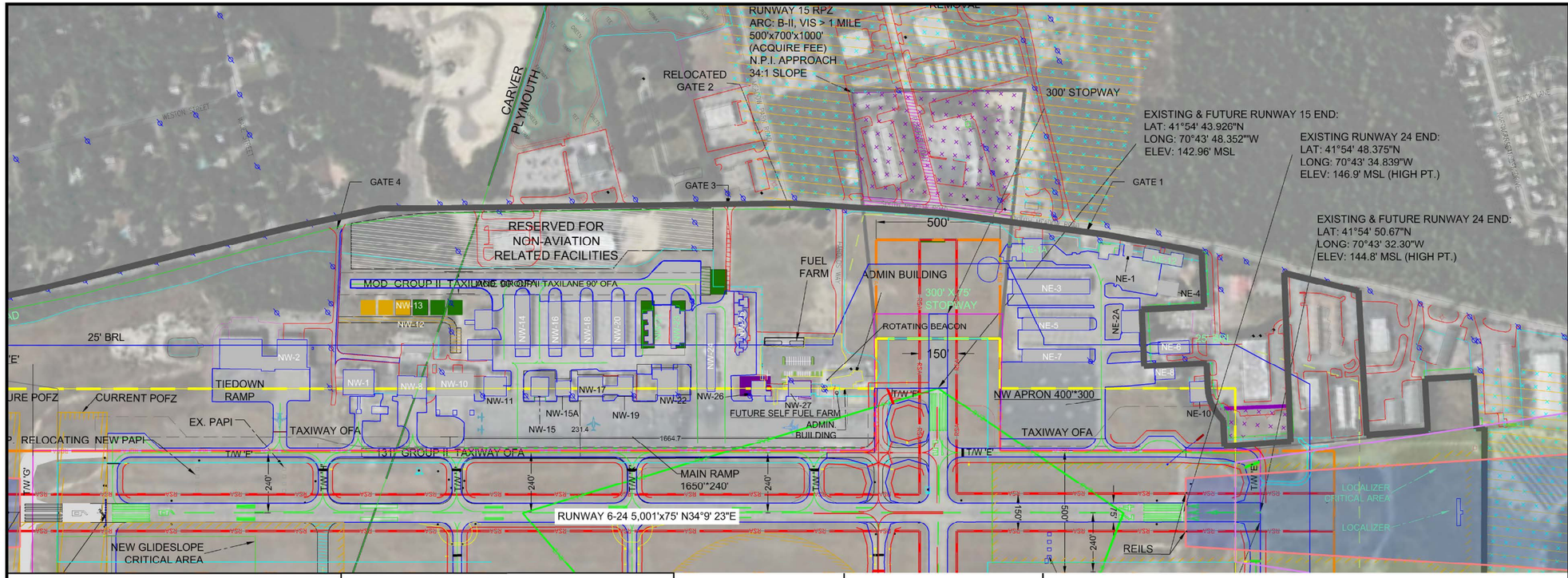
PLYMOUTH MUNICIPAL AIRPORT
PLYMOUTH, MASSACHUSETTS

AIRPORT LAYOUT PLAN

ULTIMATE AIRPORT LAYOUT PLAN

A.I.P. PROJECT NO.
3-25-0042-054-2021

SHEET NO.
3
OF
12



LEGEND

DESCRIPTION	EXISTING SYMBOL	FUTURE
RUNWAY SAFETY AREA		RSA
RUNWAY OBJECT FREE AREA		ROFA
RUNWAY PROTECTION ZONE		
SPOT ELEVATIONS	× 170	SAME
AIRPORT REFERENCE POINT		
AIRPORT PROPERTY LINE		
TREE LINE		SAME
ROADWAYS		
10' CONTOURS		SAME
FENCELINE		
NON-AERONAUTICAL AREAS		
HOLD LINES		
ON AIRPORT BUILDINGS		SEE PHASE
OFF AIRPORT BUILDINGS		SAME
WATER		SAME
ROADS WITHIN RPZ		
TREES TO BE REMOVED		
TAXIWAY-TAXILANE OFA		SAME

LEGEND

DESCRIPTION	EXISTING SYMBOL	FUTURE
RUNWAY & TAXIWAY PROPOSED PAVEMENT		
RUNWAY & TAXIWAY EXISTING PAVEMENT		

PHASING

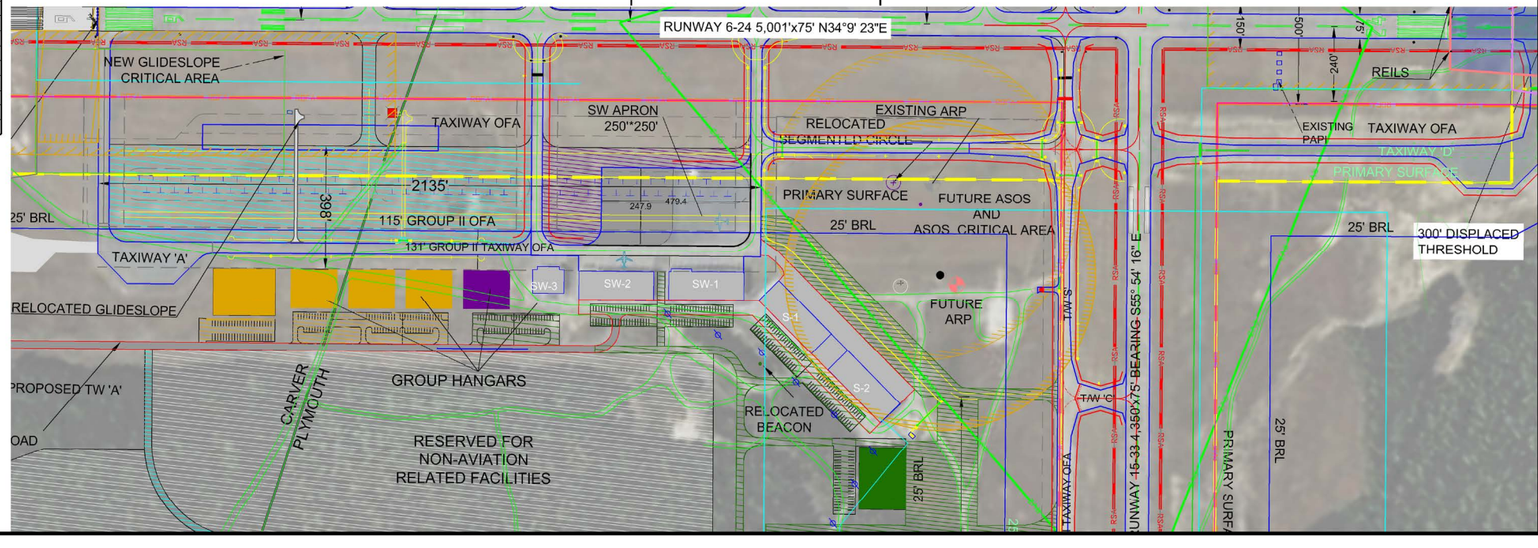
- TO BE REMOVED
- PHASE I 2025-2030
- PHASE I I 2030-2035
- PHASE I I I 2035-2040
- PHASE I V 2040+

MAGNETIC DECLINATION
14°15' W
AUGUST 18, 2022

GRAPHIC SCALE
200 0 100 200 400 800
(IN FEET)
1 inch = 200 ft.

BUILDING TABLE

BLDG. NO.	BUILDING NAME	TOP ELEV.
NV - 1	HANGAR ONE CORPORATION (MORGAN)	170.7'
NV - 2	PROFESSIONAL AIRWAYS LLC	166.8'
NV - 3	ACE REALTY TRUST (COCCILIO)	166.2'
NV - 8	IGS CORPORATION (AHEARN)	159.0'
NV - 10	STATE POLICE AIRWING (C3)	166.0'
NV - 11	ACE REALTY TRUST	158.4'
NV - 12	CLIK SERVICES	161.9'
NV - 13	CLIK SERVICES	161.1'
NV - 14	EDWIN E. RANDALL TRUSTEE OF PAC TRUST	158.6'
NV - 15	ALPHA ONE FLIGHT SERVICES	158.6'
NV - 15A	HANS BAK	157.0'
NV - 16	EDWIN E. RANDALL TRUSTEE OF PAC TRUST	159.4'
NV - 17	NORTHEAST AIRCRAFT MAINTENANCE CORPORATION	167.0'
NV - 18	EDWIN E. RANDALL TRUSTEE OF PAC TRUST	154.0'
NV - 19	NORTHEAST AIRCRAFT MAINTENANCE CORPORATION	162.4'
NV - 20	EDWIN E. RANDALL TRUSTEE OF PAC TRUST	153.0'
NV - 21	PORT-A-PORT HANGARS (TO BE REMOVED)	149.7'
NV - 22	YANKEE SERVICES (CONNOR)	164.4'
NV - 23	PORT-A-PORT HANGARS (TO BE REMOVED)	152.4'
NV - 24	BENDRIX CORP	161.5'
NV - 25	PORT-A-PORT HANGARS (TO BE REMOVED)	151.7'
NV - 26	TOWN OF PLYMOUTH	157.6'
NV - 27	TOWN HANGAR/ AIRPORT STORAGE (TO BE REMOVED)	183.0'
NE - 1	ALPHA ONE	165.1'
NE - 1A	BLUE CARD	172.2'
NE - 2A	KELLY AIR Inc. (BASKY)	167.8'
NE - 3	EDWIN E. RANDALL TRUSTEE OF PAC TRUST	166.0'
NE - 4	TOWN HANGAR	166.3'
NE - 5	EDWIN E. RANDALL TRUSTEE OF PAC TRUST	164.6'
NE - 6	RICHARD CARRERA	167.1'
NE - 7	EDWIN E. RANDALL TRUSTEE OF PAC TRUST	168.0'
NE - 8	CHET MOTYKA	162.8'
NE - 10	PRAXI USA (CUMMINGS)	162.6'
NE - 12	PLANE BOX	



DESIGNED BY: DK
DRAWN BY: DK
CHECKED BY: MCD
DATE: SEP 2022
SCALE: AS SHOWN
D&K JOB NO. 327066
FILE NAME: SHEET 4

REVISIONS
NO. | DATE | BY | APPR.

PLYMOUTH MUNICIPAL AIRPORT
PLYMOUTH, MASSACHUSETTS
AIRPORT LAYOUT PLAN

TERMINAL AREA PLAN

A.I.P. PROJECT NO.
3-25-0042-054-2021

SHEET NO.
4
OF
12

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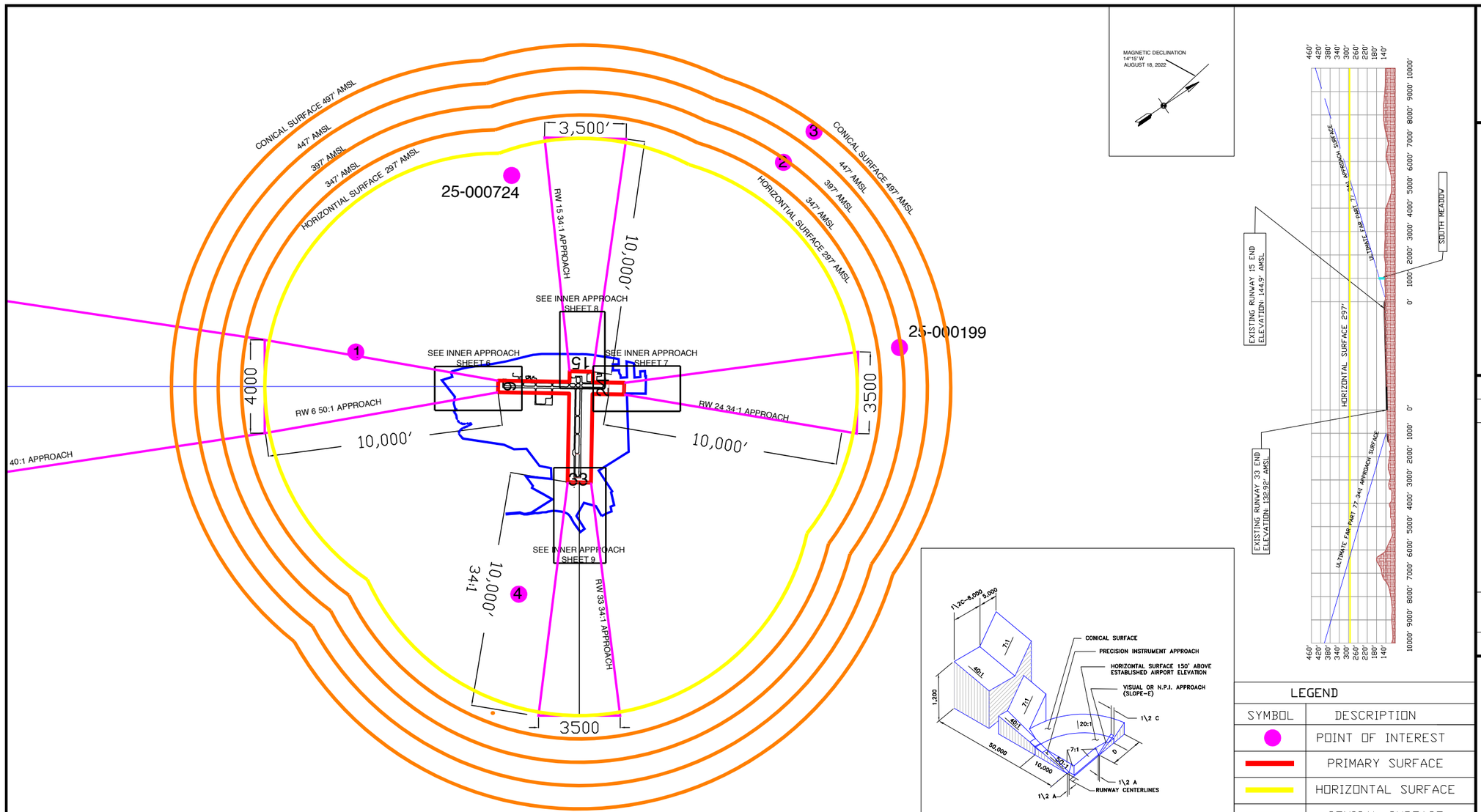
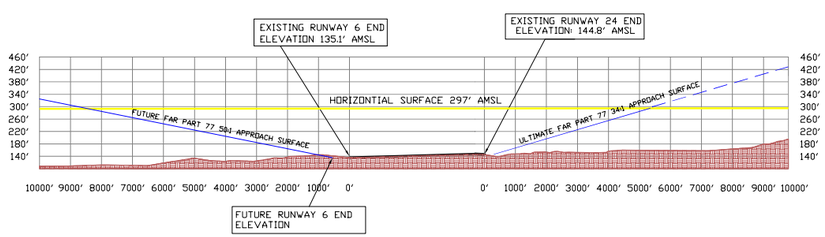


PART 77 SURFACES 3-D VIEW

*SOURCE www.ngs.noaa.gov/AERO/oisspec.html



GRAPHIC SCALE

2000 0 1000 2000 4000 8000

(IN FEET)
1 inch = 2000ft.

LEGEND

SYMBOL	DESCRIPTION
●	POINT OF INTEREST
	PRIMARY SURFACE
	HORIZONTAL SURFACE
	CONICAL SURFACE
	APPROACH SURFACE
	AIRPORT PROPERTY LINE

ID	TYPE	ELEVATION
25-000724	TOWER	294'
25-000199	TOWER	421'
1	CARVER HIGH SCHOOL	-
2	SACRED HEART HIGH SCHOOL	-
3	SACRED HEART MIDDLE SCHOOL	-
4	FEDERAL FURNACE ELEMENTARY	-

DuBois & King inc.

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CHECKED BY: MCG
DATE: SEP 2022
SCALE: AS SHOWN
D&K JOB NO. 327066
FILE NAME: SHEET 5

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PLYMOUTH MUNICIPAL AIRPORT
PLYMOUTH, MASSACHUSETTS

ULTIMATE PART 77 SURFACES

A.I.P. PROJECT NO.
3-25-0042-054-2021

SHEET NO.
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OF
12

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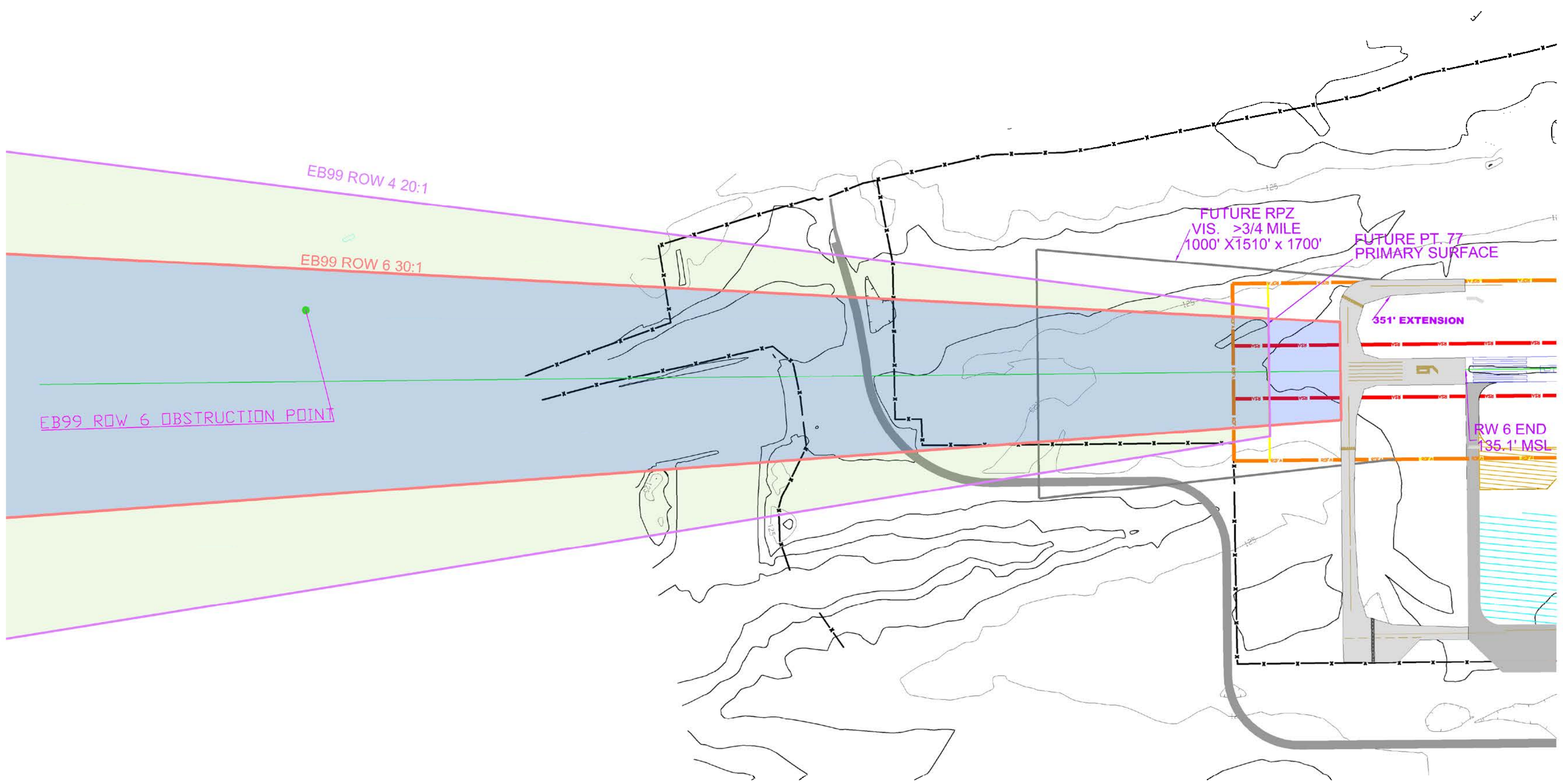
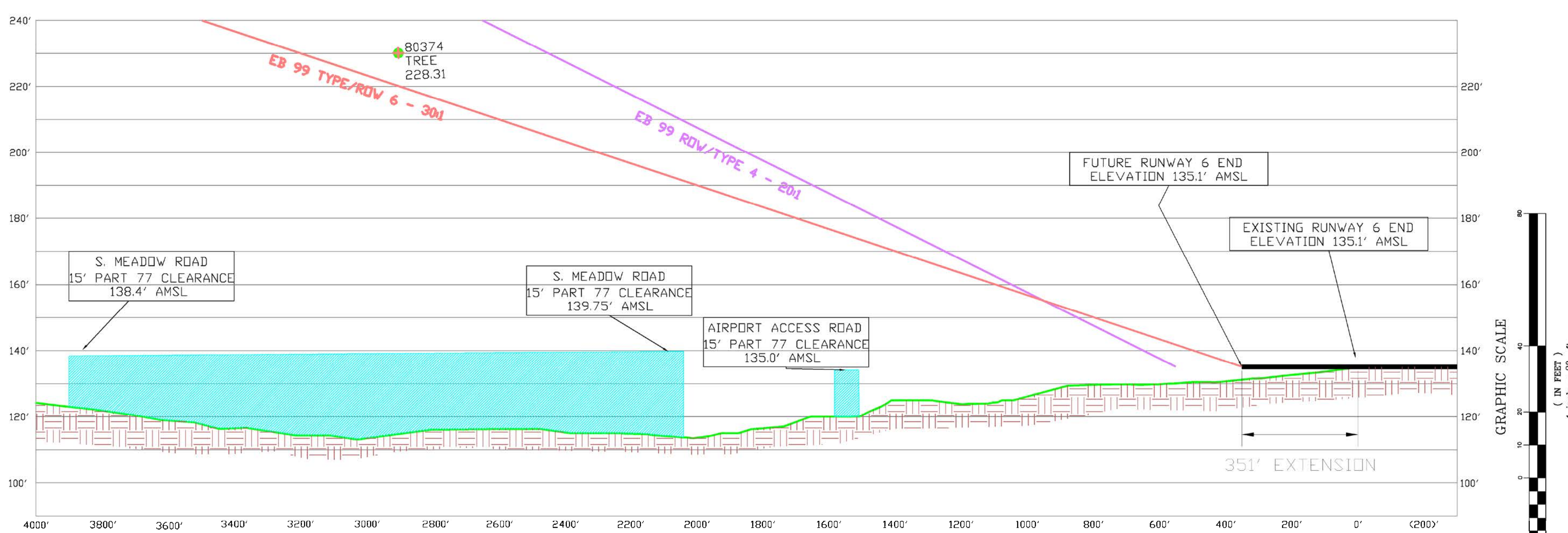


FUTURE OBSTRUCTION CONCERNS RELATIVE TO RW 6				
POINTNUMBER	TYPE	POINT ELEVATION	ESTIMATED EB99 ROW 6 30:1 PENETRATION — EXIST. 30:1 SURFACE	ESTIMATED EB99 ROW 6 30:1 PENETRATION — PROPOSED ACTION
80374.00	TREE	228.31	-3.6 (SURFACE ELEVATION ±231.9)	TREE IS MATURE

GRAPHIC SCALE
(IN FEET)
1 inch = 200 ft.

RUNWAY 6 PLANVIEW



LEGEND

- AIRPORT PROPERTY LINE
- FENCE
- CONTOURS
- BUILDING HEIGHT OR ROAD CLEARANCE HEIGHT
- EB99 OBSTRUCTION POINTS
- AREAS TO BE FILLED OR GRADED
- EB99 ROW 4 20:1 PLAN
- EB99 ROW 6 30:1 PLAN
- EB99 ROW 4 20:1 PROF.
- EB99 ROW 6 30:1 PROF.

GRAPHIC SCALE
(IN FEET)
1 inch = 200 ft.

RUNWAY 6 PROFILE VIEW

DuBois & King inc.

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DATE: AUGUST 2022
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D&K JOB NO. 327066
FILE NAME: SHEET 6

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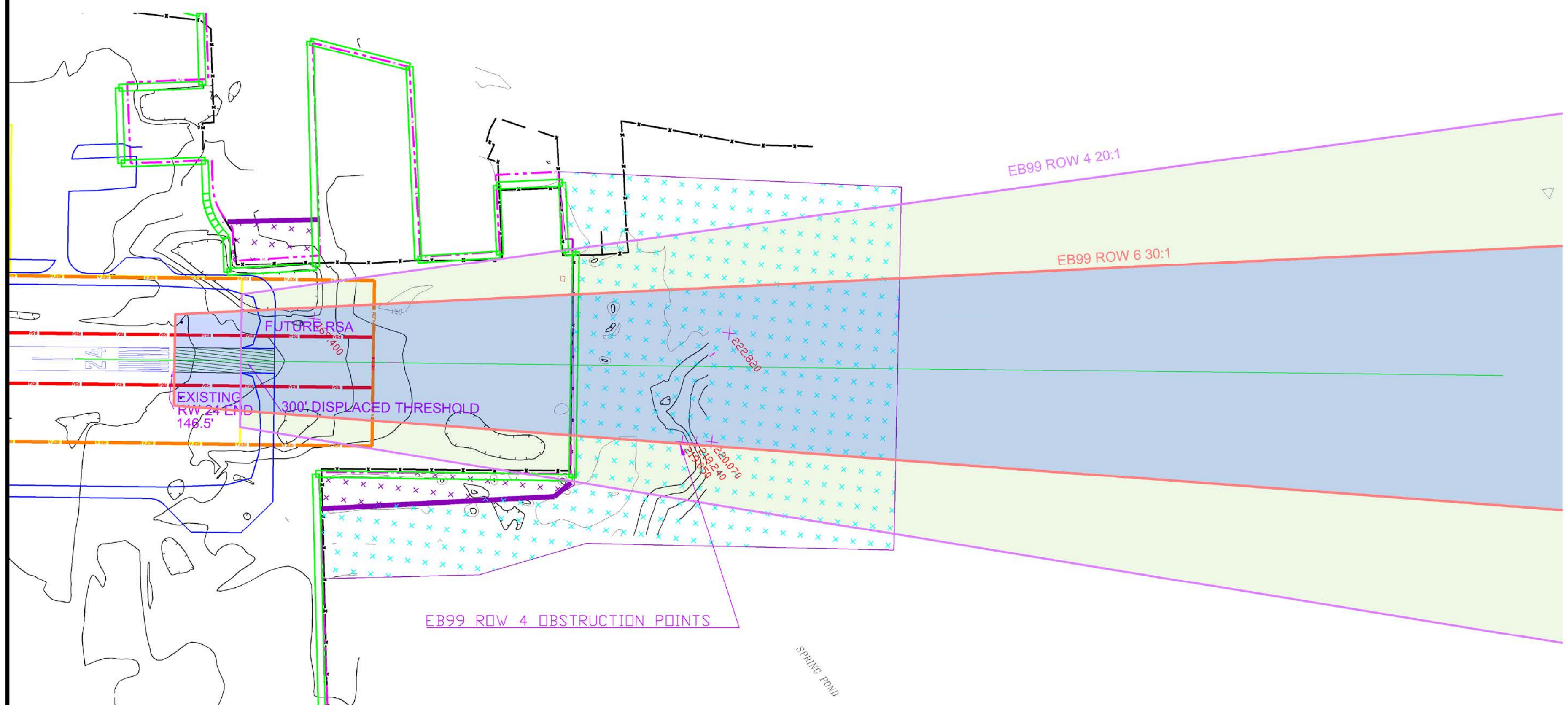
PLYMOUTH MUNICIPAL AIRPORT
PLYMOUTH, MASSACHUSETTS

INNER APPROACH SURFACE RUNWAY 6

A.I.P. PROJECT NO.

SHEET NO.
6 OF 12



BASE MAP: MARCH 2022 AERIAL PHOTOGRAMMETRIC MAPPING/SURVEY.

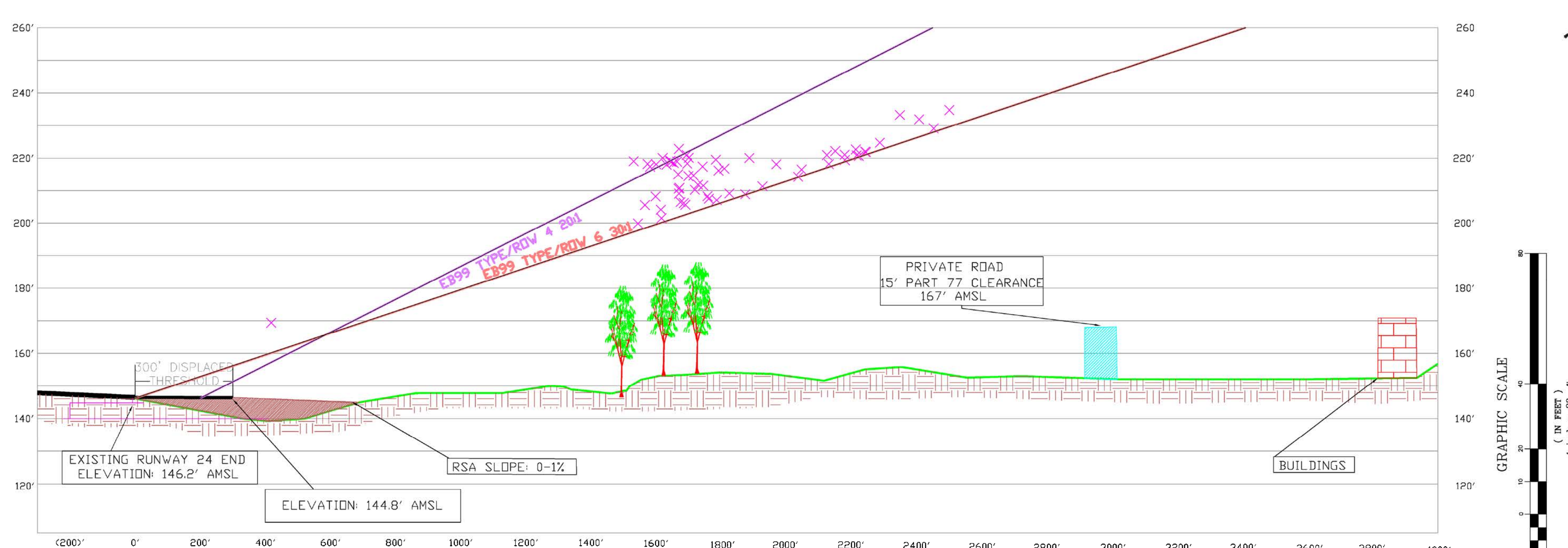
RUNWAY 24 PLANVIEW

EXISTING OBSTRUCTION CONCERNS RELATIVE TO RW 24				
POINTNUMBER	TYPE	POINT ELEVATION	ESTIMATED EB99 ROW 4 20:1 PENETRATION	
			EXIST. 20:1 SURFACE	PROPOSED ACTION
78394	TREE	217.94	3.4 (SURFACE ELEV. ±214.5)	REMOVE
78382	TREE	216.11	0.8 (SURFACE ELEV. ±215.3)	REMOVE
100966	TREE	218.55	1.8 (SURFACE ELEV. ±216.8)	REMOVE
78385	TREE	219.05	0.5 (SURFACE ELEV. ±218.5)	REMOVE
100945	TREE	217.62	-0.7 (SURFACE ELEV. ±218.3)	REMOVE

GRAPHIC SCALE
(IN FEET)
1 inch = 200 ft.

LEGEND

- EB99 OBSTRUCTION POINTS
- AIRPORT PROPERTY LINE
- FENCE
- CONTOURS
- BUILDING HEIGHT OR ROAD CLEARANCE HEIGHT
- AREAS TO BE FILLED OR GRADED
- EB99 TYPE/ROW 4 SLOPE 20:1 PROF.
- EB99 TYPE/ROW 4 SLOPE 30:1 PROF.
- EB99 TYPE/ROW 4 SLOPE 20:1 PLAN
- EB99 TYPE/ROW 4 SLOPE 30:1 PLAN



RUNWAY 24 PROFILE VIEW

GRAPHIC SCALE
(IN FEET)
1 inch = 200 ft.

DuBois & King inc.

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DATE: AUGUST 2022 | SCALE: AS SHOWN | D&K JOB NO. 327066 | FILE NAME: SHEET 7

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PLYMOUTH MUNICIPAL AIRPORT
PLYMOUTH, MASSACHUSETTS

INNER APPROACH SURFACE RUNWAY 24

A.I.P. PROJECT NO.

SHEET NO. 7 OF 12

BOW STREET
FRANK STREET
WESTON STREET
WADE STREET
CARVER
PLYMOUTH
SOUTH MEADOW ROAD
DUCK LANE
NARRAGANSETT DRIVE
PINEHURST DRIVE
2007
3" BIT. CONCRETE
5" CRUSHED AGG.
TERMINAL
AIRPORT
PARKING LOT
MAIN RAMP
NE TIEDOWN
RAMP
TW 'E' (2011)
TW 'E' (2021)
1997
MALSF
TW 'S' (2020)
2011
A.R.P.
SW TIEDOWN
RAMP
1999
TW 'D' (2018)
2007
3" BIT. CONCRETE
5" CRUSHED AGG.
CARVER
PLYMOUTH
1990
1999
RW '33' EXT. (2016)
CRANBERRY BOG

No Data
3" Bit. Concrete with 5" Crushed Agg. (1997)
3" Bit. Concrete with 5" Crushed Agg. (1999)
3" Bit. Concrete with 5" Crushed Agg. (1990)
3" Bit. Concrete with 5" Crushed Agg. (2011)
3" Bit. Concrete with 5" Crushed Agg. (2011)
Bit. Concrete with Crushed Agg. (2016)
Bit. Concrete with Crushed Agg. (2018)
4" Bit. Concrete with 6" Crushed Agg. (2020)
3" Bit. Concrete with 5" Crushed Agg. (2021)

GRAPHIC SCALE
200 0 100 200 400 800
(IN FEET)
1 inch = 200 ft.

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FILE NAME: SHEET 12

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PLYMOUTH MUNICIPAL AIRPORT
PLYMOUTH, MASSACHUSETTS

PAVEMENT HISTORY PLAN

A.I.P. PROJECT NO.
3-25-0042-054-2021

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12

Appendix D: Noise Abatement Procedures

Plymouth Municipal Airport Noise Abatement Procedures

In an effort to be a good neighbor and sensitive to the surrounding communities we ask for your cooperation in abiding by the guidelines outlined in our voluntary noise abatement procedures. The following are some techniques to minimize the noise impact produced by aircraft operating near the ground. These AOPA recommendations are general in nature, some may not be advisable for every aircraft in every situation. No noise reduction procedure should be done that would compromise flight safety.

General Aviation Users

a. If practical, avoid noise-sensitive areas, such as residential areas and open-air assemblies (e.g. sporting events, graduations, concerts). Make every effort to fly at or above 1,100 feet MSL with conventional piston type aircraft and 1,600 feet for turbo-prop and turbo-jet aircraft over the surface of such areas when overflight cannot be avoided.

b. Consider using reduced power setting if flight must be low because of cloud cover or overlying controlled airspace or when approaching the airport. Propellers generate more noise than engines; flying with the lowest practical rpm setting will reduce the aircraft's noise level substantially.

c. On take-off, gain altitude as quickly as possible without compromising safety.

d. Retract the landing gear as soon as a landing straight ahead on the runway can no longer be accomplished. If practical, maintain best-angle-of-climb airspeed until reaching 50 feet or an altitude that provides clearance from terrain or obstacles. Then accelerate to best-rate-of-climb airspeed. If consistent with safety, make the first power reduction at 500 feet.

e. Fly a tight landing pattern to keep noise as close to the airport as possible. Practice descent to the runway at low power settings and with as few power changes as possible.

f. Use Runway PAPI's. They will indicate a safe glide path and allow a smooth, quiet descent to the runway.

g. If possible, do not adjust the propeller control for flat pitch on the down ward leg; instead, wait until short final. This practice provides a quieter approach.

h. Avoid low-level, high-power approaches, which not only create high noise impacts, but also limit options in the event of engine failure.

i. Flying between 11:00 P.M. and 7:00 A.M. should be avoided whenever possible. (Most aircraft noise complaints are registered by residents whose sleep has been disturbed by noisy, low-flying aircraft)
The calm wind runway is 24
The preferred grass runway is ?
There are no straight out departures from runway 6

TURBO-JET BUSINESS AIRCRAFT

Pilots of turbo-jet business aircraft are requested to use NBAA recommended noise abatement procedures developed for take-off over close- in residential communities and for VFR and IFR approaches (the NBAA procedures manual is available in the airport manager's office).

Helicopters

Helicopter operators are requested to use HAI - Recommended Noise Abatement Measures.

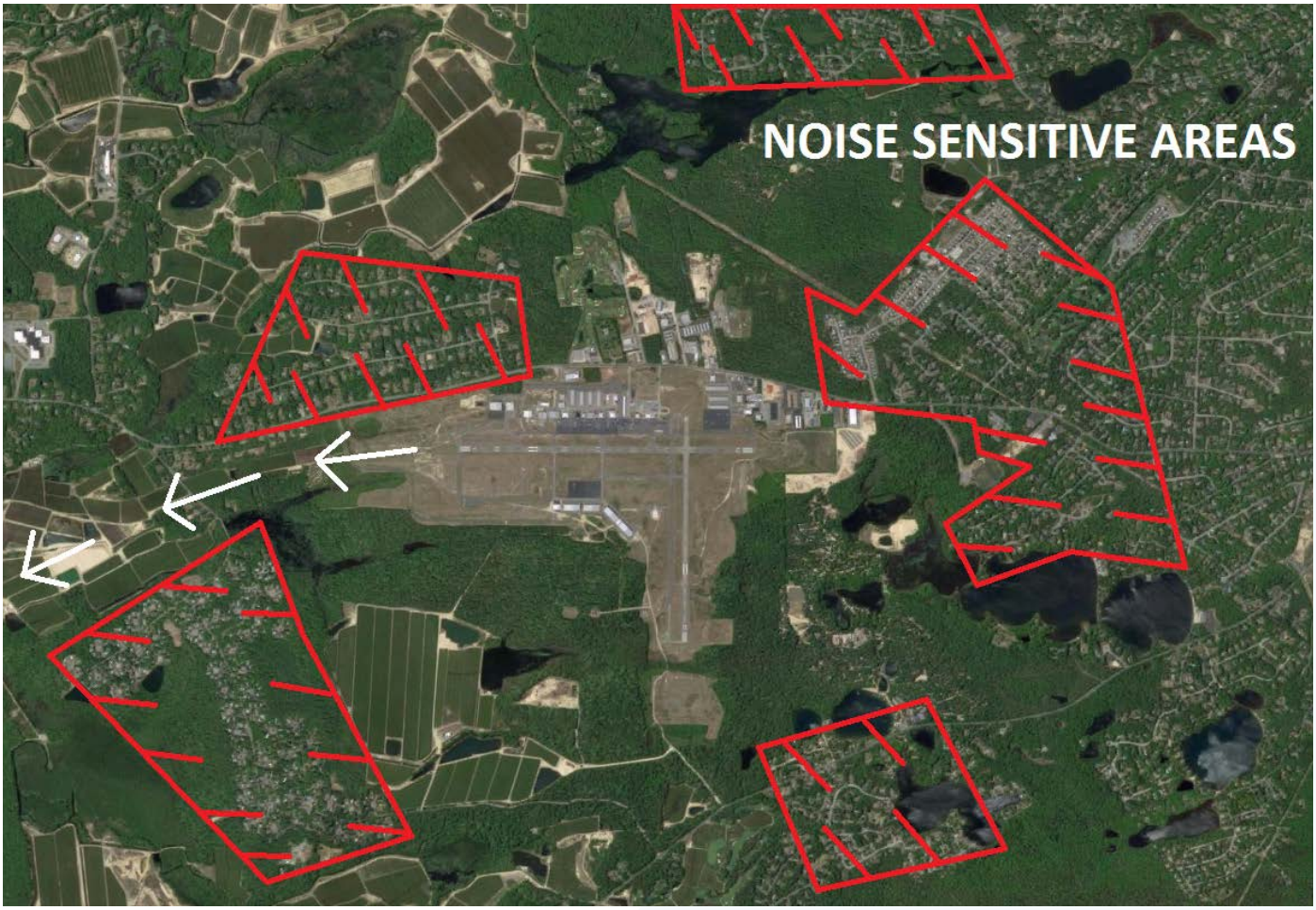
Helicopters shall fly a close pattern which stays on the airport property whenever possible. Flight paths near the tree line are helpful for noise abatement.
Hover times should be kept to 15 minutes or less if possible.
Helicopter training should be between 8.00am and 9.00pm.

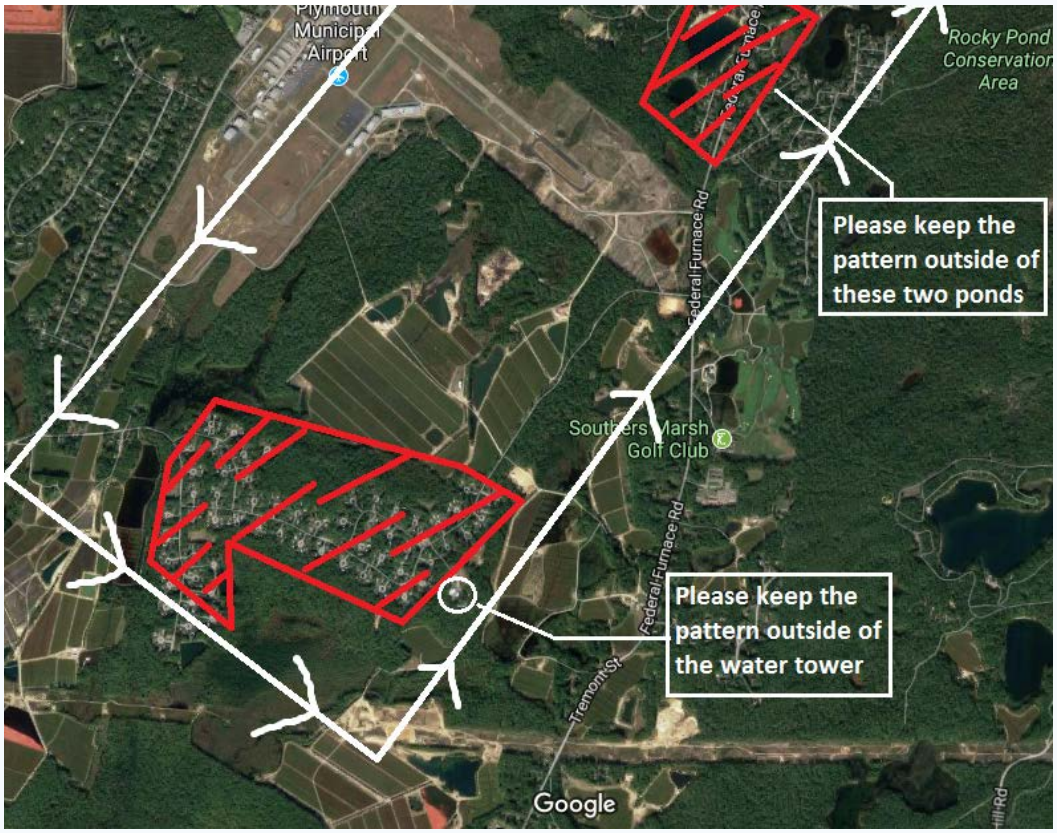
Maintenance Run-Ups

Maintenance run-ups should be conducted between the hours of 7:00 A.M. and 9:00 P.M.

Touch-and-Go Operations

a. Touch-and-go aircraft use best-rate-of-climb to pattern altitude as soon as possible.
b. Touch-and-go operations are not recommended from 9:00 P.M. to 7:00 A.M. c. Whenever possible, please avoid continuous overflight of the close-in noise sensitive areas shown on the map.


NOISE SENSITIVE AREAS


Plymouth Municipal Airport
Rocky Pond Conservation Area
Federal Furnace Rd
Please keep the pattern outside of these two ponds
Southers Marsh Golf Club
Federal Furnace Rd
Please keep the pattern outside of the water tower
Tremont St
Google

Appendix E: Abbreviations

14 CFR-Title 14 Code of Federal Regulations
AAC-Aircraft Approach Category
AC-FAA Advisory Circulars
ACIP or CIP-Airport Capital Improvement Plan
ACN-Aircraft Classification Number
ADG-Airplane Deign Group
ADS-B-Automatic Dependent Surveillance-Broadcast
AGIS-Airport Geographic Information Systems
AIP-Airport Improvement Program
ALP-Airport Layout Plan
AOPA-Airplane Owners and Pilots Association
Apron-Aircraft parking area
ARC-Airport Reference Code
ARFF-Aircraft Rescue & Fire Fighting
ASA-Airport Service Area
ASOS-Automated Surface Observation System
Avigation-Navigation of Aircraft
Avigation Easment-An easement or right of overflight in the airspace above or in the vicinity of a particular property.
BVW-Bordering Vegitated Wetlands
CARES Act-Coronavirus Aid, Relief, and Economic Security Act
CATEX-Catogorically Excluded
CBRA-Coastal Barriers Resources Act
CTAF-Common Traffic Advisory Frequency
CZMA-Coastal Zone Management Act
DEP-Massachusetts Department of Environmental Protection
DNL-Day/Night Sound Level
DOD-Department Of Defence
EA-Environmental Assesment
EAA-Experimental Aircraft Association
EPA-Envirpnmental Protection Agency
FAA-Federal Aviation Administration
FAA Form 7460-Notification of Proposed Construction or Alteration
FBO-Fix Based Operator
Fleet Mix-The varius types of aircraft that contribute to the airport operation data
Form FAA 5010-Airport Master Record
GA-General Aviation
GARD-A computer system that provides ADS-B data
GPS-Global Positioning System
IFR-Instrument Flight Rules
ILS-Instrument Landing System
Itinerant Operations-All aircraft operations other than local operations.
Knot(s)-Unit of speed. 1 knot is 1.15 miles per hour
LOC-Localizer Approach
Local Operations-Operations performed by aircraft which operate in the local traffic pattern or within sight of the airport; Are known to be departing for, or arriving from flight in local practice areas located within a 20-mile radius of the airport; or exicute simulated instrument approaches or low passes at the airport.
LPV-Localizer Approach with Vertival Guidance
MALSF-Medium Intensity Approach Landing System with Sequenced Flashing Lights
MAMA-Massachusetts Airport Management Association
MASSDOT-Massachusetts Department Of Transportation
MEPA -Massachusetts Environmental Policy Act
METARS -Meteorolical Aerodome Report
MPU-Master Plan Update
MSL-Mean Sea Level
NA-Not Avialible or Not Applicable
NAAQS-National Ambient Air Quality Standards
NAVAIDs-Navigational Aids
NEPA-National Environmental Policy Act
NPIAS-National Plan of Integrated Airport System
NRCS-Natural Resources Conservation Service
NWS-National Weather Service
OE/AAA-Obstruction Evaluation/Airport Airspace Analysis
OPBA-Operations Per Based Aircraft
PAAG-Plymouth Airport Advisory Group
PAC-Plymouth Airport Commission
PAPI-Precision Approach Path Indicators
Part 61-Certification: Pilots, Flight Instructors, and Ground Instructors under 14 CFR
Part 77-An imaginary surface for safe, efficient use, and preservation of the navigable airspace under 14 CFR
PCI-Pavement Condition Index
PCN-Pavement Classification Number
Priority Habitat-Based on the known geographical extent of habitat for all state-listed rare species, both plants and animals, and is codified under the Massachusetts Endangered Species Act (MESA).
PYM-Plymouth Municipal Airport
R&D-Research & Development
RDC-Runway Design Code
REILs-Runway End Identifier Lights
RNAV-Air Navigation
ROFA-Runway Object Free Area
ROFZ-Runway Object Free Zone
RPZ-Runway Protection Zone
RSA-Runway Safety Area
RWY-Runway
SRE-Snow Removal Equipment
SSA-Sole Source Aquifer
TAF-FAA Terminal Area Forecast
TFMSC-Traffic Flow Management System Counts
TMPU-Plymouth Municipal Airport Technical Master Plan Update
TOFA-Taxiway Object Free Area
TSA-Taxiway Safety Area
TWY-Taxiway
USDA-United States Department of Aggriculture
VFR-Visual Flight Rules
VOR-Very High Omnidirectional Range (NAVAID)
VSO-An aircraft's stalling speed or minumum steady flight speed in a landing configuration.