Final Environmental Assessment

CAPE COD GATEWAY AIRPORT

MASTER PLAN IMPROVEMENT PROJECTS

November 2025

Epsilon ASSOCIATES INC.

This Environmental Assessment becomes a Federal document when evaluated, signed, and dated by the Responsible FAA Official.

Responsible FAA Official: Cheryl Quaine Date: 11/7/2025_____

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Final Environmental Assessment

CAPE COD GATEWAY AIRPORT

Cape Cod Gateway Airport
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Table of Contents

TABLE OF CONTENTS

1.0 INTRODUCTION 1-1

1.1 2022 Cape Cod Gateway Airport Master Plan Background 1-2

1.2 Purpose and Need 1-6

1.3 Airport Background 1-7

1.3.1 Airport History 1-9

1.3.2 Airport Classification 1-9

1.3.3 Airport Facilities 1-9

1.3.3.1 Airside Facilities 1-9

1.3.3.1.1 Runways 1-10

1.3.3.1.2 Taxiways 1-11

1.3.3.1.3 Ramps 1-12

1.3.3.2 Landside Facilities 1-12

1.3.3.2.1 Hangars 1-13

1.3.3.2.2 Airport Terminal Building 1-13

1.3.3.2.3 Vehicle Parking 1-13

1.4 Airport Activity 1-13

1.4.1 Commercial Passenger Enplanements 1-14

1.4.2 Operational Forecasts 1-15

1.4.2.1 Commercial Passenger Enplanement Forecasts 1-16

1.5 Environmental Review and Permitting 1-17

1.5.1 Permit and Approval Requirements 1-17

2.0 PURPOSE AND NEED 2-1

2.1 Purpose **2-1**

2.2 Need **2-1**

2.2.1 Airside Facilities 2-2

2.2.1.1 Construct Partial Parallel Taxiway D to Runway 15-33 2-2

2.2.1.2 Remove Taxiway E and Existing Runup Area/Construct an Engine Run-up Area for Partial Parallel Taxiway D 2-2

2.2.1.3 Relocate and Reconstruct Taxiway B 2-2

2.2.1.4 Extend Runway 15-33 2-5

2.2.1.5 Extend Taxiway A (including new Taxiway A1 and Taxiway A4) 2-15

2.2.1.6 Aeronautical Development Areas 2-15

2.2.2 Landside Improvements 2-21

2.2.2.1 Construct Electric Aircraft Support Equipment 2-21

2.2.3 Airspace Control Improvements 2-21

2.2.3.1 Runway 15-33 RSA and Runway Object Free Area Avigation Easements 2-21

2.2.3.2 Enhance Airport control over Runway Protection Zones 2-21

TABLE OF CONTENTS (CONTINUED)

3.0 PROPOSED ACTION DESCRIPTION 3-1

3.1 Airside Facilities 3-1

3.1.1 Construct Partial Parallel Taxiway D to Runway 15-33 3-1

3.1.2 Remove Taxiway E and Existing Runup Area/Construct a Runup Area for Partial Parallel Taxiway D 3-1

3.1.3 Realign and Reconstruction Taxiway B 3-1

3.1.4 Runway 15-33 and Taxiway A Extension 3-2

3.1.5 Aeronautical Development Areas 3-2

3.2 Landside Improvements 3-2

3.2.1 Construct Electric Aircraft Support Equipment 3-3

3.3 Airspace Control Improvements 3-3

3.3.1 Runway 33 RSA and Runway Object Free Area (ROFA) Avigation Easements 3-3

3.3.2 Enhance Airport control over off-Airport Property within Runway Protection Zones 3-3

3.4 Project Schedule 3-6

3.5 Summary of Impacts of Proposed Action 3-6

4.0 ALTERNATIVES ANALYSIS 4-1

4.1 Airside Alternatives 4-1

4.1.1 Runway 15-33 Extension 4-2

4.1.1.1 Runway 15-33 Alternative 1 – No-Build Alternative 4-2

4.1.1.2 Runway 15-33 Alternative 2 – 1,295-foot extension to Runway 15 end and 400-foot extension to Runway 33 end 4-2

4.1.1.3 Runway 15-33 Alternative 3 – 1,258-foot extension to the Runway 15 end and a 400-foot extension to the Runway 33 end (with increased displaced thresholds) 4-5

4.1.1.4 Runway 15-33 Alternative 4 – 895-foot extension to the Runway 15 end and a 400-foot extension to the Runway 33 end (6,550 feet) 4-5

4.1.1.5 Runway 15-33 Alternative 4A – 801-foot extension to the Runway 15 end only (total runway length of 6,054 feet) 4-5

4.1.1.6 Runway 15-33 Alternative 4B – 895-foot extension to the Runway 15 end only (total runway length of 6,148 feet) – Preferred Alternative 4-9

4.1.1.7 Runway 15-33 Alternative 5 – Extend Runway 6-24 4-9

4.1.1.8 Runway 15-33 Alternative 6 – Closure of Cape Gateway Airport and Operational Shift to Joint Base Cape Cod 4-9

TABLE OF CONTENTS (CONTINUED)

4.1.2 Taxiway Alternatives 4-15
4.1.2.1 Taxiway D 4-16
4.1.2.1.1 Taxiway D Alternative 1 – No-Build 4-17
4.1.2.1.2 Taxiway D Alternative 2 4-17
4.1.2.1.3 Taxiway D Alternative 3 – Reduced Length Partial Taxiway 4-21
4.1.2.1.4 Taxiway D Alternative 4 – 300' Separation Distance 4-21
4.1.2.1.5 Taxiway D Alternative 5 - No Service Road (Preferred Alternative) 4-21
4.1.2.2 Taxiway B 4-23
4.1.2.2.1 Alternative 1 – No-Build Alternative 4-23
4.1.2.2.2 Alternative 2 – Preferred Alternative 4-23

4.2 Airspace Control Improvements 4-28

4.2.1 Runway 33 RSA and Runway Object Free Area (ROFA) Avigation Easements 4-28
4.2.1.1 Alternative 1 – No-Action Alternative 4-28
4.2.1.2 Alternative 2 – Acquire Easements 4-28
4.2.2 Enhance Airport Control Over RPZ Properties 4-28
4.2.2.1 Alternative 1 – No-Action Alternative 4-28
4.2.2.2 Alternative 2 – Preferred Alternative 4-28
4.2.3 Alternative Analysis for North and East Ramp Hangar Development 4-28
4.2.3.1 Hangar and Ramp Development – No-Build Alternative 4-29
4.2.3.2 Alternative 1: Northfield Development 4-29
4.2.3.3 Alternative 2: East and North Ramp Development – Preferred Alternative 4-30

5.0 AFFECTED ENVIRONMENT 5-1

5.1 Introduction 5-1

5.2 Project Area 5-1

5.3 Soils/Farmland 5-1

5.4 Water Resources 5-3

5.4.1 Surface Waters 5-3
5.4.2 Wetlands 5-5
5.4.3 Groundwater 5-5
5.4.3.1 Existing and Potential Public Drinking Water Wells 5-10
5.4.4 Wild and Scenic Rivers 5-10
5.4.5 Floodplains 5-10

5.5 Coastal Resources 5-12

TABLE OF CONTENTS (CONTINUED)

5.6 Air Quality 5-12
5.6.1 Regulatory Framework 5-12
5.6.2 Attainment Status and Conformity 5-14
5.6.3 Background Air Quality 5-15
5.7 Greenhouse Gas Emissions 5-15
5.8 Natural Resources and Energy Supply 5-16
5.9 Noise 5-17
5.9.1 FAA Land Use Compatibility 5-17
5.9.2 Existing Noise Conditions 5-17
5.9.2.1 Noise Model Inputs 5-18
5.9.2.2 Day Night Average Sound Level Results 5-19
5.10 Biological Resources (Fish, Wildlife, and Plants) 5-20
5.10.1 Threatened and endangered species 5-20
5.10.1.1 Federally protected species and critical habitat 5-20
5.10.1.2 State protected species and priority habitat 5-20
5.10.2 Wildlife 5-23
5.10.3 Vegetation 5-24
5.11 Transportation 5-25
5.11.1 Existing Condition 5-25
5.11.1.1 Airport Vehicle Access and Circulation 5-25
5.11.1.2 Existing Traffic Volumes 5-26
5.11.1.3 Existing Public Transit 5-26
5.12 Visual Environment (Including Light Emissions) 5-30
5.13 Historical, Architectural, Archaeological, and Cultural Resources 5-30
5.14 Section 4(f) Resources 5-30
5.15 Land Use 5-30
5.15.1 Existing Zoning 5-34
5.15.2 Runway Approaches and Protection Zones 5-34
5.16 Socioeconomics, Children's Environmental Health and Safety Risks 5-37
5.16.1 Socioeconomics 5-37
5.16.2 Children's Environmental Health and Safety Risks 5-40
5.17 Hazardous Materials, Solid Waste, and Pollution Prevention 5-41
5.17.1 Fuel Storage 5-41
5.17.1.1 OHM Storage 5-41
5.17.2 Database Reviews 5-44
5.17.2.1 Airport Property: Closed Sites 5-44
5.17.2.2 Adjacent to the Airport Property: Open Sites 5-44
5.17.2.3 Adjacent to the Airport Property: Closed Sites 5-44
5.17.3 Per- and Polyfluoroalkyl Substances 5-48
5.17.3.1 Standards and Guidelines 5-48
5.17.3.2 Airport Regulatory History 5-49

TABLE OF CONTENTS (CONTINUED)

5.17.3.3 PFAS Source(s) 5-49
5.17.3.4 Soil and Groundwater Investigations 5-53
5.17.4 Solid Waste 5-54
5.17.5 Asbestos 5-55

6.0 ENVIRONMENTAL CONSEQUENCES 6-1
6.1 Water Resources 6-1
6.1.1 No-Build Alternative 6-2
6.1.2 Preferred Alternative 6-2
6.1.2.1 Groundwater 6-2
6.1.2.2 Surface Waters and Wetlands 6-2
6.1.3 Indirect Impacts 6-4
6.1.4 Construction Impacts 6-4
6.1.4.1 Stormwater 6-4
6.1.4.2 Wastewater Management 6-6
6.1.4.3 Soils Management 6-6
6.1.5 Mitigation Measures 6-6
6.1.5.1 Wetland Replication 6-6
6.1.5.2 Stormwater 6-7
6.1.6 Impact Summary 6-7
6.2 Coastal Resources 6-6
6.3 Air Quality 6-8
6.3.1 No-Build Alternative 6-8
6.3.2 Proposed Action 6-8
6.3.3 Construction Impacts 6-8
6.3.4 Mitigation Measures 6-8
6.3.5 Impact Summary 6-9
6.4 Climate and Greenhouse Gas Emissions 6-9
6.4.1 Greenhouse Gas Analysis 6-9
6.4.1.1 GHG Analysis - Stationary Source Mitigation Commitments 6-9
6.4.1.2 GHG Analysis - Mobile Source Assessment 6-10
6.4.2 Infrastructure Resiliency 6-11
6.4.3 Mitigation Measures 6-12
6.4.4 Impact Summary 6-12
6.5 Natural Resources and Energy Supply 6-13
6.5.1 No-Build Alternative 6-13
6.5.2 Proposed Action 6-13
6.5.3 Impact Summary 6-14
6.6 Noise and Compatible Land Use 6-14
6.6.1 No-Build Alternative 6-15
6.6.2 Proposed Action 6-16
6.6.3 Construction Noise Impacts 6-16
6.6.4 Indirect/Secondary Impacts 6-19

TABLE OF CONTENTS (CONTINUED)

6.6.5 Mitigation Measures 6-19
6.6.6 Impact Summary 6-19
6.7 Biological Resources (including fish, wildlife, and plants) 6-19
6.7.1 No-Build Alternative 6-19
6.7.2 Proposed Action 6-20
6.7.2.1 Threatened and Endangered Species 6-20
6.7.2.2 Wildlife 6-20
6.7.3 Impact Summary 6-20
6.8 Transportation 6-21
6.8.1 No-Build Alternative 6-21
6.8.2 Proposed Action 6-21
6.8.2.1 Project Trip Generation 6-21
6.8.2.2 Trip Distribution 6-22
6.8.2.3 Trip Assignment and Impact to Area Roadways 6-22
6.8.2.4 Parking 6-23
6.8.2.5 Other Airport Vehicle Activity 6-23
6.8.3 Construction Impacts 6-23
6.8.4 Mitigation Measures 6-23
6.8.5 Impact Summary 6-24
6.9 Socioeconomics and Children's Environmental Health and Safety Risks 6-24
6.9.1 No-Build Alternative 6-24
6.9.2 Proposed Action 6-24
6.9.2.1 Socioeconomics 6-24
6.9.2.2 Children's Environmental Health and Safety Risks 6-25
6.9.3 Impact Summary 6-25
6.10 Historical, Architectural, Archaeological, and Cultural Resources 6-25
6.10.1 No-Build Alternative 6-25
6.10.2 Proposed Action 6-25
6.10.3 Construction Impacts 6-25
6.10.4 Mitigation Measures 6-25
6.10.5 Impact Summary 6-25
6.11 Land Use 6-26
6.11.1 No-Build Alternative 6-26
6.11.2 Proposed Action 6-26
6.11.3 Impact Summary 6-26
6.12 Hazardous Materials, Solid Waste, and Pollution Prevention 6-26
6.12.1 No-Build Alternative 6-26
6.12.2 Taxiway D 6-26
6.12.3 Taxiway B Relocation 6-27

TABLE OF CONTENTS (CONTINUED)

	6.12.4	Runway 15 and Taxiway A Extension	6-27
	6.12.5	North Ramp Aviation Development Area	6-29
	6.12.6	East Ramp General Aviation Development	6-29
	6.12.7	Proposed Electrical Aircraft Charging Area	6-30
	6.12.8	Solid Waste	6-30
	6.12.9	Pollution Prevention	6-30
	6.12.10	Impact Summary	6-30
6.13	**Light Emissions and Visual Effects (including Open Space, Scenic Values)**		**6-30**
	6.13.1	No-Build Alternative	6-30
	6.13.2	Proposed Action	6-31
	6.13.3	Construction Impacts	6-31
	6.13.4	Impact Summary	6-31
6.14	**Cumulative Impacts**		**6-31**
	6.14.1	Past Projects	6-32
	6.14.2	Current Projects (2023 through 2029)	6-32
	6.14.3	Future Projects (2030-2040)	6-32
7.0	**MITIGATION MEASURES**		**7-1**
8.0	**REGULATORY COMPLIANCE**		**8-1**
8.1	Summary of Regulatory Compliance		**8-1**
9.0	**PUBLIC AND AGENCY COORDINATION**		**9-1**
9.1	**Consultation with Agencies**		**9-1**
9.2	**Public Outreach**		**9-1**
10.0	**LIST OF PREPARERS**		**10-1**

LIST OF APPENDICES

Appendix A: Secretary's Certificate on the Final EIR (state)
Appendix B: Response to Comments on the Draft EA/EIR
Appendix C: Circulation List
Appendix D: Airport Layout Plan
Appendix E: Bathymetric Survey of Upper Gate Pond
Appendix F: Airport NPDES ID MAR 053164 Permit
Appendix G: Upper Gate Pond Permanent Solution Statement
Appendix H: SEL Noise Analysis
Appendix I: USFS iPaC list
Appendix J: Jet Blue Letter
Appendix K: EJ Screen Community Report
Appendix L: Stormwater Pollution Prevention Plan (2021)
Appendix M: Spill Prevention and Pollution Control Plan

TABLE OF CONTENTS (CONTINUED)

Appendix N: Database Reviews
Appendix O: EDR Report
Appendix P: Phase IV Report for Cape Cod Gateway Airport RTN 4-26347
Appendix Q: Final Environmental Impact Report, September 16, 2024
Appendix R: 2022 Cape Cod Gateway Airport Master Plan (Chapters 4 to 6) and FAA Forecast Approval

LIST OF TABLES

Table 1.1-1	Public Meetings and Outreach Efforts	1-2
Table 1.2-1	Airfield Geometry Needs at Cape Cod Gateway	1-6
Table 1.3-1	Economic Output of Airport	1-7
Table 1.3-2	Existing Airport Runways	1-10
Table 1.3-3	Declared Distances	1-10
Table 1.3-4	Existing Taxiways	1-11
Table 1.3-5	Airport Assets - Buildings	1-12
Table 1.4-1	2008-2023 Historical Aircraft Operations (Calendar Year)	1-13
Table 1.4-2	HYA Passenger Enplanements Between 2008 and 2022	1-14
Graph 1.4-1	HYA and National Enplanement Data Trends	1-14
Table 1.4-3	Annual Operations Forecast by Type	1-15
Table 1.4-4	Peaking Characteristics	1-15
Table 1.4-5	Forecasted Commercial Passenger Enplanements	1-16
Table 1.5-1	Environmental Permits and Approvals Required for the Project	1-16
Table 2.2-1	Cape Cod Gateway Airport TFMSC Annual Operations by AAC/ADG (2018-2022)	2-9
Table 2.2-2	Total Annual Operations of ADG III Aircraft (2022)	2-9
Table 2.2-3	FAA Runway Length Recommendation	2-11
Table 2.2-4	Runway Length Analysis	2-12
Table 2.2-5	Summary of Need and Purpose of Proposed Projects	2-16
Table 3.3-1	ROFA Penetrations	3-3
Table 3.3-2	Avigation Easements Needed for Proposed Conditions associated with Runway 15 Extension	3-3
Table 3.4-1	Proposed Project Schedule (Calendar Year)	3-6
Table 3.5-1	Land Impacts of Proposed Actions	3-6
Table 4.1-1	Runway 15-33 Extension Alternatives (FAA AC 150/5325-4B, Runway Length Requirements for Airport Design)	4-13
Table 4.1-2	Taxiway Design Standards for Safety Areas, Object Free Area, and Separation Areas	4-16

LIST OF TABLES (CONTINUED)

Table 4.1-3	Taxiway Design Group – Design Width Standards	4-16
Table 4.1-4	Taxiway D – Non-Standard Geometry/Design Conditions	4-17
Table 4.1-5	Wetland Resource Area Impacts for Alternative 2 Options	4-18
Table 4.1-6	Summary of Taxiway B and D Alternatives	4-26
Table 4.2-1	Aircraft Hangar Demand	4-29
Table 4.2-2	Hangar Development Summary	4-32
Table 5.6-1	National Ambient Air Quality Standards (NAAQS)	5-14
Table 5.6-2	Attainment Status for Barnstable County	5-14
Table 5.6-3	Observed Ambient Air Quality Concentrations and Background Levels	5-15
Table 5.9-1	2019 Existing Conditions Operations Data	5-17
Table 5.9-2	2019 Runway Utilization	5-18
Table 5.10-1	Common Mammal Species found at Cape Cod Gateway Airport	5-21
Table 5.10-2	Migratory Bird Species at Cape Cod Gateway Airport	5-23
Table 5.10-3	Common Plant Species found at the Airport	5-24
Table 5.11-1	Peak Hour Vehicle Assumptions	5-26
Table 5.11-2	Average Daily Traffic Summary	5-26
Table 5.11-3	Existing Public Transit Services	5-27
Table 5.15-1	RPZ Dimensions Per Runway End	5-37
Table 5.16-1	Socioeconomics	5-37
Table 5.16-2	Economic Activity and Income	5-38
Table 5.16-3	Population Demographics for the Town of Barnstable, Town of Yarmouth, Town of Mashpee, and Sandwich	5-38
Table 5.16-4	Employment and Home Ownership Statistics	5-39
Table 5.17-1	Airport Virgin Petroleum Storage	5-40
Table 5.17-2	Airport and Tenant Mobile Refuelers	5-40
Table 5.17-3	Other Airport OHM Storage Locations	5-41
Table 6.1-1	Taxiway D Impacts to Upper Gate Pond	6-3
Table 6.1-2	Proposed Work Effect on Immediate Environment and Methods of Management	6-5
Table 6.4-1	Mobile Source CO2 Emissions	6-10
Table 6.5-1	Cut/Fill Volumes	6-13
Table 6.6-1	2040 Runway Utilization	6-15
Table 6.8-1	Travel Mode Shares and AVOs	6-21
Table 6.8-2	Daily and Peak Vehicle Trips under Baseline Condition and Preferred Alternative Condition with Various Terminal Activity Levels	6-21
Table 6.8-3	Airport Vehicle Trip Distribution	6-22
Table 6.8-4	New Project Vehicle Trips under 50% Growth Scenario	6-22
Table 6.8-5	New Project Vehicle Trips under 100% Growth Scenario	6-22
Table 6.15-1	Past Projects	6-37
Table 7.1-1	Summary of Mitigation Measures	7-2

LIST OF TABLES (CONTINUED)

Table 8-1	List of Federal, State and Local Permits	8-2
Table 9.2-1	Summary of Communications to Community and General Public	9-1
Table 9.2-2	Summary of Public Meetings	9-2

LIST OF FIGURES

Figure 1.1-1	USGS Locus Map	1-3
Figure 1.1-2	Existing Airport Conditions	1-4
Figure 1.1-3	Proposed Master Plan Projects	1-5
Figure 1.3-1	Current Airport Facilities	1-18
Figure 2.2-1	Proposed Partial Parallel Taxiway D	2-3
Figure 2.2-2	Proposed Taxiway B Relocation	2-4
Figure 2.2-3	Proposed Runway 15-33 Extension	2-7
Figure 2.2-4	FAA Airport Reference Code Designations	2-10
Figure 2.2-5	Current Family of Aircraft at the Airport	2-14
Figure 2.2-6	Runway Length Analysis Summary	2-17
Figure 2.2-7	Conceptual Layout of East Ramp Development	2-19
Figure 2.2-8	Conceptual Layout of North Ramp Aircraft Tie-Down and Parking	2-20
Figure 3.3-1	Runway 33 ROFA Easements and Proposed RPZ Easements for Existing Conditions	3-4
Figure 3.3-2	Runway 15 Proposed RPZ Easements Acquisition for Runway Extension	3-5
Figure 4.1-1	Runway 15-33 Alternative 2: 1,295-foot Extension to RW 15 End and 400-foot Extension to RW 33 End (Master Plan Preferred Alternative)	4-4
Figure 4.1-2	Runway 15-33 Alternative 3: 1,258-foot Extension to RW 15 End and 400-foot Extension to RW 33 End	4-6
Figure 4.1-3	Runway 15-33 Alternative 4: 895-foot Extension to RW 15 End and 400-foot Extension to RW 33 End	4-7
Figure 4.1-4	Alternative 4A Runway 15-33: 801-Foot Extension to RW 15 End	4-8
Figure 4.1-5	Alternative 4B Runway 15-33: 895-Foot Extension to RW 15 End	4-10
Figure 4.1-6	Alternative 6 Joint Base Cape Cod	4-12
Figure 4.1-7	Side Slope Alternatives for Taxiway D	4-19
Figure 4.1-8	Alternative 2A - Standard side slope (4:1)	4-20
Figure 4.1-9	Taxiway D Alternative 3 Reduced Length Alternative	4-22
Figure 4.1-10	Taxiway D Alternative 4 No Pond Impact	4-24
Figure 4.1-11	Taxiway D Alternative 5 No Service Road Alternative	4-25
Figure 4.2-1	Northfield Hangar Development Alternative	4-31

LIST OF FIGURES (CONTINUED)

Figure 5.3-1	Mapped Farmland Soils	5-2
Figure 5.4-1	Wetlands Resource Areas, FEMA Flood Hazard Areas, and Chapter 91 Tidelands Jurisdiction	5-4
Figure 5.4-2A	Groundwater Contours	5-6
Figure 5.4-2B	Groundwater Resources	5-7
Figure 5.4-2C	Water Supply 5-Miles	5-8
Figure 5.4-2D	Barnstable Wellhead Protection Overlay District	5-9
Figure 5.4 3	Environmental Constraints: FEMA Flood Hazard Areas	5-11
Figure 5.5-1	Coastal Zone Management Resources	5-13
Figure 5.9-1	Existing Aircraft Only Annual Day Night Level (2019)	5-19
Figure 5.10-1	NHESP Habitat	5-22
Figure 5-11-1	Roadway Network	5-28
Figure 5.11-2	Existing Public Transportation Services	5-29
Figure 5.12-1	Open Space	5-32
Figure 5.13-1	Historic Resources	5-33
Figure 5.15-1	Land Use	5-35
Figure 5.15-2	Zoning	5-36
Figure 5.17-1	Summary of MASSDEP Disposal Sites	5-46
Figure 5.17-2	Active MassDEP Disposal Site Boundaries Within and Adjacent to the Airport Property	5-47
Figure 5.17-3	Deployment Area and the Airport Rescue and Fire Fighting/Snow Removal Equipment (ARFF/SRE) Building Area Caps	5-52
Figure 5.17-4	PFAS Monitoring Wells	5-54
Figure 6.1-1	Taxiway D Impacts to Upper Gate Pond	6-5
Figure 6.1-2	Wetland Replication Area	6-7
Figure 6.6-1	Aircraft Only Annual Day Night Level - No Build Alternative	6-17
Figure 6.6-2	Aircraft Only Annual Day Night Level - Proposed Action	6-18
Figure 6.12-1	Approximate Disposal Site Boundaries at Proposed Construction Areas	6-28

LIST OF ACRONYMS

AAC	Aircraft Approach Category
AADT	Annual Average Daily Traffic
AAGR	Average Annual Growth Rate
AARFF	Aircraft Rescue and Fire Fighting
AC	Advisory Circular
ACBM	Asbestos Containing Building Materials
ACEC	Area of Critical Environmental Concern
ACM	Asbestos Containing Materials
ADC	Air Data Computer
ADG	Airplane Design Group
AED	Adult Entertainment District
AEDT	Aviation Environment Design Tool
AFFF	Aqueous Film Forming Foam
AIP	Airport Improvement Program
ALP	Airport Layout Plan
AMA	Aero Management Association
AMP	Airport Master Plan
APE	Area of Potential Effect
ARC	Airport Reference Code
ARFF	Airport Rescue and Fire Fighting
ASAPP	Archaeological Site Avoidance and Protection Plan
ASDA	Accelerated Stop Distance Available
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
ATC	Air Traffic Control
ATCT	Airport Traffic Control Tower
ATF	Aerodrome Traffic Frequency
ATR	Automatic Traffic Recorder
AUL	Activity Use Limitation
AVGAS	Aviation Gasoline
AVO	Average Vehicle Occupancy
BBJ	Boeing Business Jets
BMP	Best Management Practices
BTEX	benzene, toluene, ethylbenzene, and xylene
BVW	Bordering Vegetated Wetlands
BWC	Barnstable Water Company
BWSC	Bureau of Waste Site Cleanup

LIST OF ACRONYMS (CONTINUED)

CAA	Clean Air Act
CATEX	Categorical Exclusions
CCC	Cape Cod Commission
CCF	Centum Cubic Feet
CCGA	Cape Cod Gateway Airport
CCGAC	Cape Cod Gateway Airport Commission
CCRT	Cape Cod Rail Trail
CCRTA	Cape Cod Regional Transit Authority
CCTA	Cape Cod Regional Transit Authority
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGP	Construction General Permit
CIP	Capital Improvement Plan
CMP	Construction Management Plan
CMR	Code of Massachusetts Regulations
CO	Carbon Monoxide
COC	Contaminants of Concern
CSA	Comprehensive Site Assessment
CVP	Certified Vernal Pool
CWA	Clean Water Act
CY	cubic yards
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
dBA	decibels A
DC	Direct Current
DEIR	Draft Environmental Impact Report
DER	Division of Ecological Restoration
DFW	Division of Fisheries and Wildlife
DGA	Designated Geographic Area
DME	Distance Measuring Equipment
DNL	Day Night Average Sound Level
DOT	Department of Transportation
DPH	Department of Public Health
DPS	Downgradient Property Status
DRI	Developments of Regional Impact
EA	Environmental Assessment
EDR	Environmental Data Resources

LIST OF ACRONYMS (CONTINUED)

EEA	Energy and Environmental Affairs
EH	Estimated Habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EJ	Environmental Justice
EMAS	Engineered Material Arresting System
ENF	Environmental Notification Form
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Environmental Site Assessment
EV	Electric Vehicles
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FBO	Fixed-Base Operator
FCTV	Falmouth Community Television
FEMA	Federal Emergency Management Agency
FFRMS	Federal Flood Risk Management Standard
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
Ft	Feet
GA	General Aviation
GHG	Greenhouse Gases
GIS	Geographical Information Systems
GPD	Gallons per day
HA	Health Advisories
HB	Highway Business
HG	Hyannis Gateway
HIRL	High Intensity Runway Edge Lights
HTC	Hyannis Transportation Center
HWG	Horsley Witten Group
HYA	Cape Cod Gateway Airport
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IND	Industrial
IRA	Immediate Response Action
ISI	Initial Site Investigation
ISO	Independent System Operator

LIST OF ACRONYMS (CONTINUED)

JBCC	Joint Base Cape Cod
LBP	Lead Based Paint
LBW	Low Birth Weight
LDA	Landing Distance Available
LF	Linear Feet
LSP	License Site Professional
LTBI	Location to be Investigated
LUHPPL	Land Uses with Higher Potential Pollutant Loads
LUW	Land Under Water
MALSF	medium intensity approach lighting system with sequenced flashers
MALSR	medium intensity approach lighting system with runway alignment indicator lights
MassDEP	Massachusetts Department of Environmental
MBTA	Massachusetts Bay Transit Authority
MC-FRM	Massachusetts Coast Flood Risk Model
MCL	Maximum Contaminant Level
MCP	Massachusetts Contingency Plan
MEMA	Massachusetts Emergency Management Agency
MEPA	Massachusetts Environmental Policy Act
MESA	Massachusetts Endangered Species Act
MHC	Massachusetts Historical Commission
MITL	Medium Intensity Taxiway Lights
MOHML	Massachusetts Oil and Hazardous Material List
MOS	Modification of Standards
MSGP	Multi-Sector General Permit
MSL	Mean Sea Level
MT	Metric Tons
MTCO2E	Million Tonnes of Carbon Dioxide Equivalent
MTOW	Maximum Takeoff Weight
MVP	Municipal Vulnerability Preparedness
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NAVAIDS	Navigational Aids
NDS	Not a Disposal Site
NEM	Noise Exposure Maps
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Pollutants

LIST OF ACRONYMS (CONTINUED)

NFA	No Further Action
NHESP	No Further Action
NLEB	Northern Long Eared Bat
NM	Nautical Mile
NMFS	Natural Heritage and Endangered Species Program
NO	Northern Long Eared Bat
NO2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOR	Notice of Responsibility
NPDES	National Pollutant Discharge Elimination System
NPIAS	National Plan of Integrated Airports System
NRCC	Natural Resource Conservation Service
NRCS	Natural Resource Conservation Service
NRI	Nationwide Rivers Inventory
NWSR	National Wild and Scenic River System
O3	Ozone
OHM	Oil and Hazardous Materials
ORW	Outstanding Resource Waters
OWS	Oil Water Separator
PAH	Polycyclic Aromatic Hydrocarbons
PAPI	Precision Approach Path Indicators
PAVE	Perimeter Acquisition Vehicle Entry
PAWS	Phased Array Warning System
Pb	Lead
PFAS	Per- and polyfluoroalkyl substances
PFBS	Perfluorobutanesulfonic acid
PFDA	Perfluorodecanoic Acid
PFHpA	Perfluoroheptanoic Acid
PFHxS	Perfluorohexanesulfonic Acid
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PH	Priority Habitat
PM	Particulate Matter
PSC	Permanent Solution with Conditions
PSNC	Permanent Solution with no Conditions

LIST OF ACRONYMS (CONTINUED)

PV	Passenger Vehicle
PVP	Potential Vernal Pools
RAO	Response Action Outcome
RCS	Reportable Concentration for Soil
RDC	Runway Design Code
RMAT	Resilient MA Action Team
RNF	Release Notification Form
ROFA	Release Notification Form
RP	Runway Object Free Area
RPP	Regional Policy Plan
RPZ	Runway Protection Zones
RSA	Runway Safety Area
RTN	Release Tracking Number
RVR	Runway Visual Range
RVZ	Runway Visibility Zone
RWY	Runway
SEL	Sound Exposure Level
SF	square foot
SHMCAP	State Hazard Mitigation and Climate Adaptation Plan
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMART	Strengthening Mobility and Revolutionizing Transportation
SMS	Stormwater Standards
SO2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasure
SRE	Snow Removal Equipment
SSA	Sole Source Aquifer
SSC	Species of Special Concern
SW	Southwest
SWPPP	Stormwater Pollution Prevention Plan
SY	Square Yards
TCDS	Traffic Count Database System
TDG	Taxiway Design Group
TDM	Transportation Demand Measures
TFMSC	Traffic Flow Management System Counts
THPO	Tribal Historic Preservations Office
TLOFA	Taxilane Object Free Areas

LIST OF ACRONYMS (CONTINUED)

TNC	Transportation Network Company
TODA	Takeoff Distance Available
TOFA	Taxiway Object Free Area
TORA	Takeoff Run Available
TPH	Total Petroleum Hydrocarbons
TRI	Toxic Release Inventory
TSA	Taxiway Safety Areas
TSA office	Transportation Security Administration
TSS	Total Suspended Solids
TWY	Taxiway
UHI	Urban Heat Island
UIC	Underground Injection Control
URAM	Utility Release Abatement Measure
US	United States
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
UST	Underground Storage Tanks
VFR	Visual Flight Rule
VMT	Vehicle Miles Travelled
VOC	Volatile Organic Compounds
WMA	Wildlife Management Area
WP	Wellhead Protection
WPA	Wetlands Protection Act
WQC	Water Quality Certification
WSS	Web Soil Survey
WWTP	Wastewater Treatment Plant

Chapter 1.0

Introduction

1.0 INTRODUCTION

Cape Cod Gateway Airport Commission (the Commission) proposes to implement a series of airport improvement projects identified in the Federal Aviation Administration (FAA)-approved 2022 Cape Cod Gateway Airport Master Plan Update (the Projects). The 2022 Master Plan Update provides a framework to guide future Airport development that will enhance safety, cost-effectively satisfy current and future aviation demand, meet FAA standards for airport design and geometry for the families of aircraft that use the airport, while considering potential environmental and socioeconomic impacts.

The Cape Cod Gateway Airport (HYA or the Airport) is located in the village of Hyannis in the Town of Barnstable, Massachusetts, and is owned and operated by the Town of Barnstable as an Enterprise Fund within the Town of Barnstable (see **Figure 1.1-1**). As such, the Airport sets rates and charges for the services offered to cover its operating expenses. The Town of Barnstable's General Operating Fund and citizen taxes are not used to operate the airport or to supplement funding for the Airports operation. As the owner and operator, the Town of Barnstable is also identified by the FAA as the designated Sponsor of the airport and accepts federal and state grants and the associated grant assurances. The Airport also serves as an important regional transportation hub to area attractions and recreational venues and provides a key role in emergency response activities. The Airport is identified in the National Plan of Integrated Airports System (NPIAS) with a service level of Non-Hub Commercial Service.

The analysis presented in this Final Environmental Assessment (EA), for the projects recommended in the Master Plan, provides a focused analysis of environmental impacts and proposed mitigation measures of these Projects. The FAA is aware of the Council on Environmental Quality's (CEQ) rescission of the NEPA regulations at 40 CFR Parts 1500-1508 in response to several judicial decisions finding the CEQ did not have authority to issue such regulations. However, because this EA was in development well before the court decisions invalidating the NEPA regulations and before the CEQ regulations implementing NEPA were rescinded[1], action, the FAA elected to follow those regulations at 40 CFR parts 1500–1508, in addition to the FAA's policies and procedures implementing NEPA at FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* (July 16, 2015), to meet the agency's obligations under NEPA, 42 U.S.C. §§ 4321 *et seq*. to avoid adding additional delays to remove analysis and discussion that had been developed with the regulations remained in effect.

This document has been prepared in accordance with FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, FAA's 1050.1F Desk Reference, and FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions, the MEPA Certificate on the Draft Environmental Impact Report dated February 16, 2024 (**Appendix A**) and MEPA Regulations (301 Code of Massachusetts Regulations [CMR] 11.07), [2] and most importantly, feedback and comments received through the public engagement process.

The proposed Projects are based on the recent 2022 Airport Master Plan (AMP) and Airport Layout Plan (ALP). The AMP and ALP serve as the framework for planning future development at the Airport and identify not only airport components that do not meet current design criteria established by the FAA, but also address forecasted demand, capacity requirements, and operational improvements. The previous ALP update was conducted as part of a Master Plan Update in 2008, and since then the Airport has undergone several changes in the form of facilities, operations, and other issues that need to be formally documented. The 2022 AMP and ALP allow for the planning necessary to preserve the Airport's role in the state, region, and national transportation system and to reaffirm and maintain the future function of the Airport.

This Final EA will provide a brief description of the Airport and contents in the EA (Chapter 1.0); a discussion of the purpose and need for the Proposed Action (Chapter 2.0); a description of the Proposed Projects (Chapter 3.0); an overview of the identification and screening of alternatives considered as part of the environmental evaluation process (Chapter 4.0); a description of existing environmental conditions within the Project and general study areas (Chapter 5.0); an evaluation of the environmental impacts associated with the Proposed Action, the No Action alternative, and other alternatives considered for analysis (Chapter 6.0); mitigation or avoidance/minimization measures (Chapter 7.0); a description of compliance with applicable federal, state, and local regulations (Chapter 8.0); coordination and public involvement associated with the EA process (Chapter 9.0); responses to comments received during the public comment period (Chapter 10.0); and a list of individuals involved in preparing the EA (Chapter 11.0).

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[1] https://www.federalregister.gov/documents/2025/02/25/2025-03014/removal-of-national-environmental-policy-act-implementing-regulations 90 Fed.Reg. 10610 (February 25, 2025)

[2] Massachusetts is a state with a NEPA-like statute, the MEPA, which has similar but not identical requirements to NEPA. This document is prepared to satisfy the requirements of NEPA only. To the extent that this document, its appendices and other attachments contain content specific to the MEPA process and that is not relevant or required for NEPA compliance, the FAA does not adopt such text, analysis, or information as part of the Federal EA, nor will the FAA rely on such text, analysis, or information in reaching significance conclusions or decisions regarding the approval of the proposed project.

The Proponent began outreach efforts in October 2022 and continues to engage the public and interested stakeholders through a series of virtual and in person public meetings and feedback opportunities during the environmental review process. The Airport has assembled a communications and outreach team to enhance public participation as part of the EA process. Public participation is a key tenant throughout the entire EA process, providing opportunities for the public to receive information on the proposed Projects as well as to provide feedback and comments to the Airport. Outreach and public participation opportunities have been provided in addition to the regulatory required public meetings and comment periods.

A list of past meetings is provided in **Table 1.1-1**. Additional details are provided in Chapter 9.0 regarding all public outreach efforts.

Table 1.1-1 Public Meetings and Outreach Efforts

Date	Outreach/Meeting	Description
October 27, 2022	Public Meeting #1	Public meeting held at the Airport to introduce EJ communities to the Projects and answer questions and comments.
November 30, 2022	Environmental Notification Form	Noticed in Environmental Monitor on December 7, 2022. 30-day review period with agency and public comment period through January 12, 2023.
January 5, 2023	MEPA Site Visit & Public Meeting #2	Meetings were held both in person at the airport and virtually at separate times.
June 21, 2023	Public Meeting #3	Meetings were held both in person at Barnstable Town Hall in the afternoon and virtually in the evening.
December 12, 2023	Public Meeting #4	Meetings will be held both virtually in the afternoon and at Barnstable Town Hall in the evening.
August 27, 2024	Public Meeting #5	Meetings were held both virtually in the afternoon and at Barnstable Town Hall in the evening.

1.1 2022 Cape Cod Gateway Airport Master Plan Background

Public-use airports periodically conduct Master Plan update planning in conjunction with the FAA and state aeronautical agencies (Massachusetts Department of Transportation Aeronautics [MassDOT Aeronautics]) to identify critical airport development needs, determine funding, and plan construction scheduling for future projects. The 2022 Master Plan identified a list of recommendations for airside and landside safety and efficiency enhancements needed to meet current and future needs of the airport. The recommendations developed during the Master Plan Update planning process are reviewed and approved by FAA and MassDOT Aeronautics before they can proceed to subsequent phases including environmental review and permitting.

As part of its Master Plan long-term planning efforts, the Airport evaluated its current infrastructure for compliance with FAA design standards and ability to meet safety and efficiency needs of the facility for existing and anticipated future users (see **Figure 1.1-2** Existing Airport Conditions). Aviation demand forecasts, facility requirements, Airport access, Airport geometry, and navigation aids over a 20-year planning horizon were assessed, resulting in the development of a list of recommendations for future airport infrastructure investments. Projects discussed in this document are those that have been identified as occurring in the reasonably foreseeable future, including those whose design and permitting will occur within the next 5-7 years. Individual Master Plan projects that are to be implemented beyond this time frame are identified on this list with a * but not analyzed or discussed further in this document and will be the subject of future NEPA analysis and documentation. Master Plan Projects to be implemented over the next 20-year period include:

- Airside:
  - Runway 15 Extension;
  - Runway Safety Area Enhancements;* and
  - Taxiway Modifications;
- Landside:
  - Terminal Improvements;*
  - General Aviation (GA) Improvements;
  - Snow Removal Equipment and Storage Building*;and
  - Non-Aeronautical Land Use Development Areas.
- Airspace Safety Improvements:
  - Runway Safety Area (RSA) and Runway Object Free Area (ROFA) Avigation Easements
  - Airport control over Runway Protection Zone (RPZ) Properties

In May 2022, the Proponent, MassDOT Aeronautics Division, and the FAA conditionally approved the Airport Layout Plan identifying these projects. Please see **Figure 1.1-3** for the locations of these proposed Projects. The

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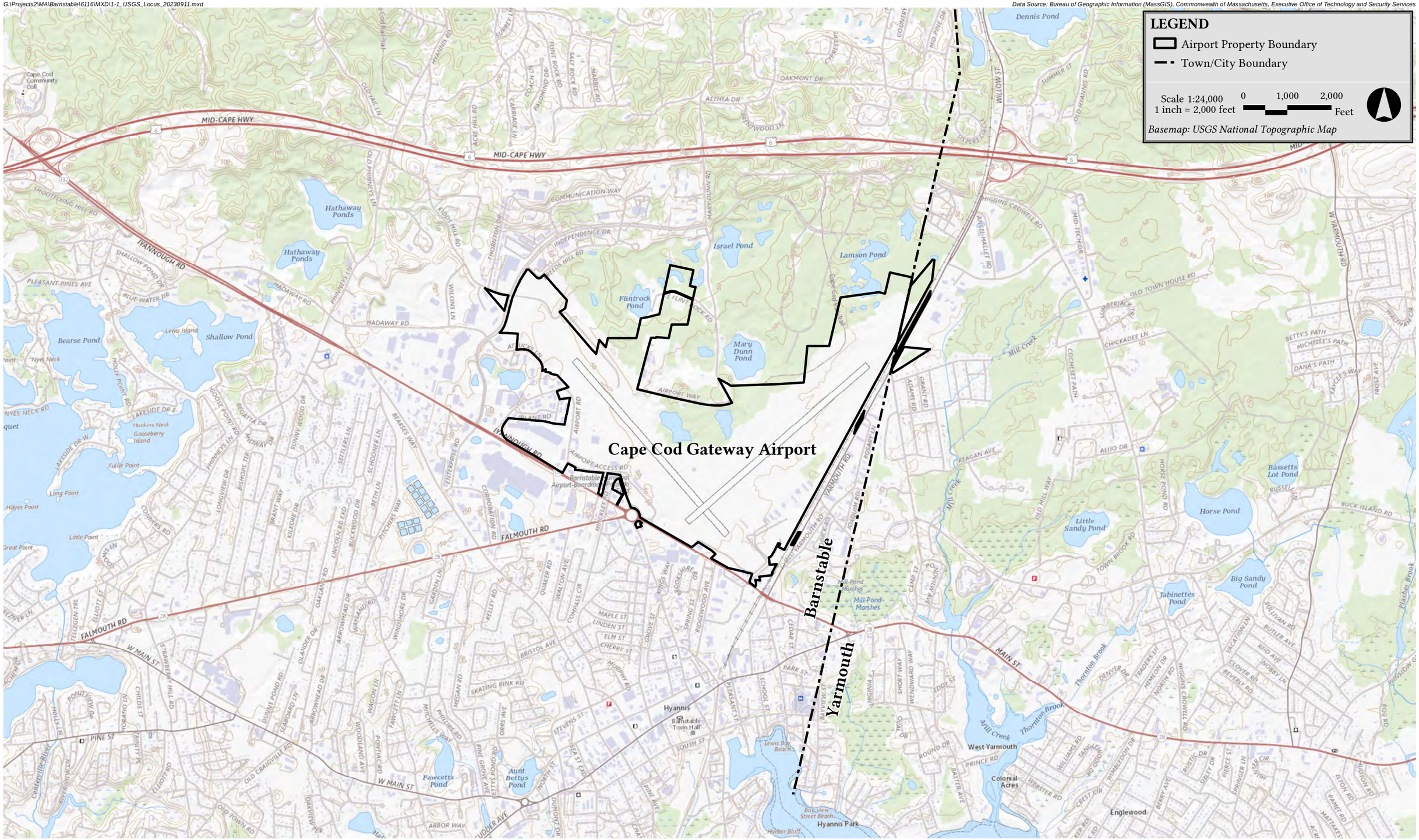
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport **Barnstable, Massachusetts**

Figure 1.1-1
USGS Locus Map

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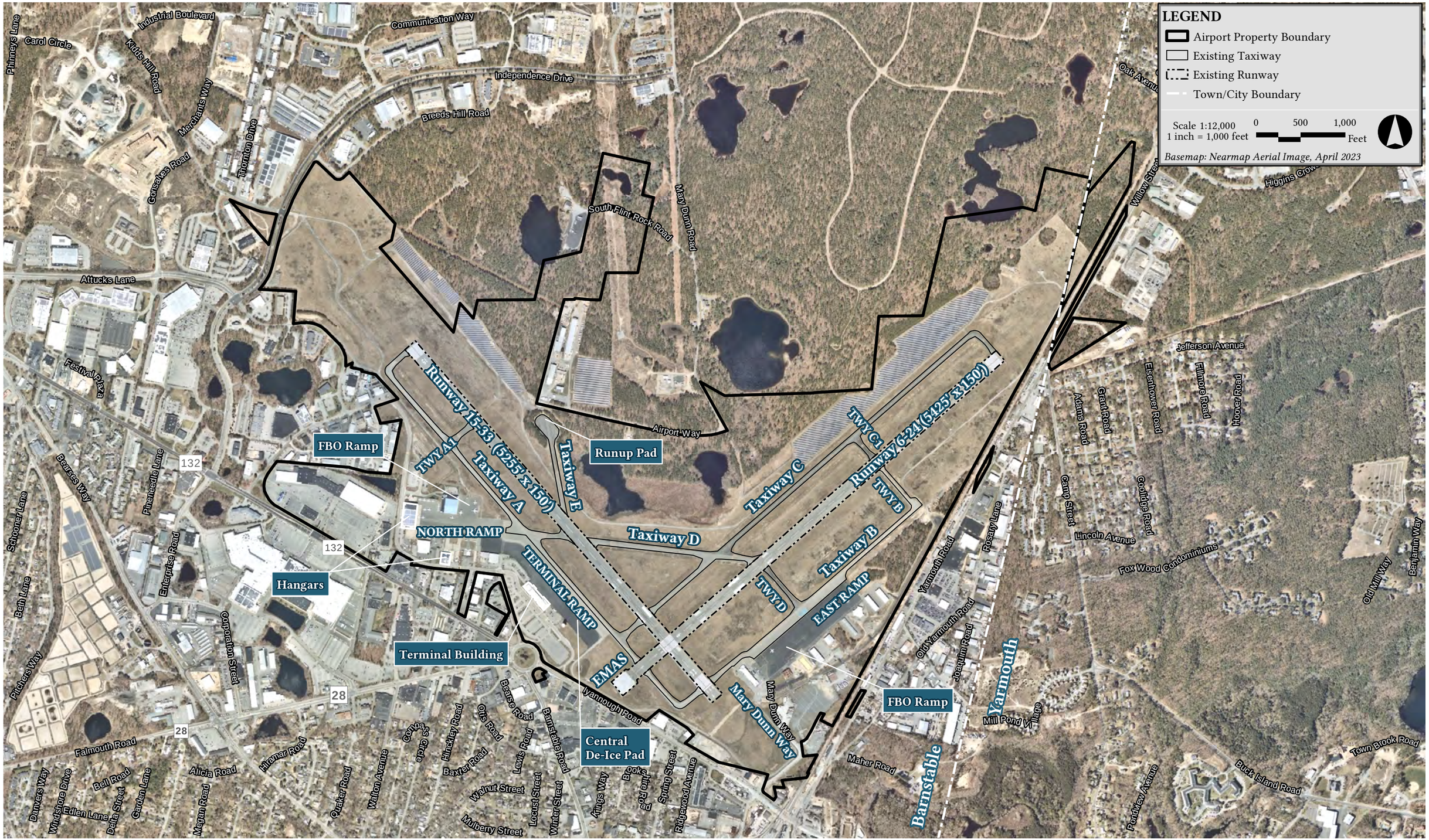
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 1.1-2
Existing Conditions

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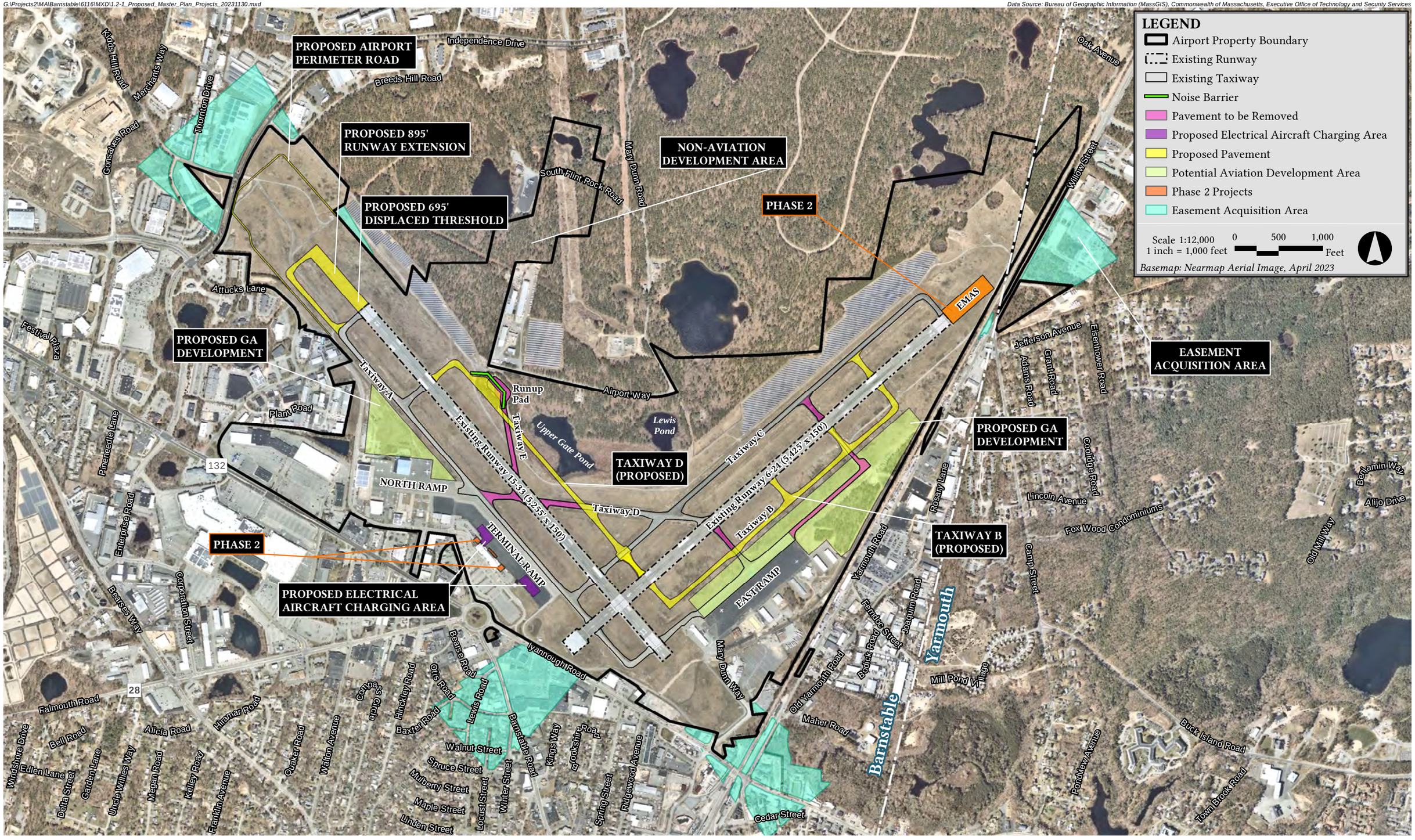
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 1.1-3
Proposed Master Plan Projects

Airport intends to apply all practicable mitigation measures to prevent, avoid, and minimize anticipated environmental impacts. Mitigation measures are discussed in greater detail in Chapters 6.0 and 7.0 of this document.

1.2 Purpose and Need

The Projects are designed to meet safety and efficiency standards for the aircraft family operating at the Airport, both currently and within future planning horizons, and to support the financial self-sufficiency of the Airport. The Projects are designed to meet the operational and efficiency requirements of the existing and future design Critical Aircraft as required by FAA.

In general, the Projects in the EA are designed to address areas of airfield geometry that are either non-standard based on current FAA airport design criteria or are deficient for both the existing and the future critical design aircraft identified above. These improvement needs are detailed in **Table 1.2-1**. Landside improvements are proposed to better meet operational forecasts and Airport needs. In addition, the Airport is addressing future needs of the Airport due to provided forecasts, changing markets resulting from industry-wide shifts in aviation, as well as more local travel nuances due to COVID- and post-COVID motivated behavioral shifts.

As summarized below and with more detail provided in Chapter 2.0, the Airport is not seeking to meet airfield geometry standards for a larger class of aircraft but to meet recommendations for runway length and FAA safety and design criteria (for the current family of aircraft operating at the Airport) deficiencies such as runway length, taxiway configurations, and safety area geometry.

Determining an existing Critical Aircraft and a future Critical Aircraft are required by FAA during the master planning process to apply the most up-to-date FAA design criteria. The existing Critical Aircraft determination is based on current aeronautical use. For future Critical Aircraft, the determination is made based on an FAA-approved forecast that considers aircraft "highly likely" or "expected" to regularly use the airport (i.e., minimum 500 operations per year). Future Critical Aircraft may often be different than the existing Critical Aircraft, due to the airport's operational growth, and the industry's changes in fleet (e.g., retirement of older aircraft types), and the introduction of newer efficient aircraft. Airports with a stable fleet mix and operations, may have one aircraft type (or grouping with similar characteristics) for both the existing and future Critical Aircraft.

Airports should consider plans by operators to retire aircraft and replace them with new types. This is the case at HYA, with the imminent retirement of the Embraer 190 (E190) as operated by JetBlue as they transition to the Airbus 220 (A220) as well as Cape Air with the shift to the Tecnam P2012. To ensure the safety of future operations, the future Critical Aircraft determination must consider ongoing trends in the aircraft fleet. This consideration applies to both general aviation (particularly business aviation) and commercial airline operations. Based on the range of the most demanding aircraft that operate at HYA (described in detail in Section 2.2.1), two critical design aircraft were identified for HYA: one representing general aviation activities and one representing commercial service activities. The future general aviation critical aircraft remains the Gulfstream V/G500 while the future commercial design aircraft shifts to the Airbus 220 due to the indicated retirement of the E190 by Jet Blue.

The future design critical aircraft maintain the same approach speed category (C/D) and design group (III) as existing aircraft and there is no change in the design criteria requirements for the existing versus future design aircraft.

Table 1.2-1 Airfield Geometry Needs at Cape Cod Gateway

FAA Guideline	Airport Need	Design Criteria
Airfield Capacity	Existing capacity is only 12-27% of the maximum weight for Class C/III aircraft in wet pavement conditions	FAA AC 150/5300-13B – meet capacity to extent feasible to improve safety
Runway Length	Extend runway to meet existing design critical aircraft needs to 6,000 feet.	FAA AC 150/5325-4B Runway Length Requirements for Airport Design
Runway Width	Current conditions meet requirements	n/a
Direct Access to Runway	Taxiway D at RW 15-33	AC 150/5300-13B – remove direct access
Runway / Taxiway high energy intersections and/or low visibility	RWY 15-33 at TWYs D & E RWY 6-24 at TWY D (RWY 24 & RWY 6 departures) RWY 6-24 at TWYs B & C1	AC 150/5300-13B – remove non-standard angles and improve visibility
Runway Protection Zones (RPZ)	Areas within the RPZ may have current or future incompatible land uses.	Enhance airport control over RPZs for existing conditions and future runway length

Table 1.2-1 Airfield Geometry Needs at Cape Cod Gateway (continued)

FAA Guideline	Airport Need	Design Criteria
Runway Safety Area (RSA) Improvements	Penetrations into safety areas and non-standard configurations	FAA AC 150/5300-13B, FAA Order 5200.8 – RSA Program
Runway Object Free Areas (ROFA)	Multiple penetrations	Existing modifications to standards need to be updated every 5 years per Order 5300.1G. Acquire easements as feasible.
Taxiway Object Free Areas (TOFA)	East Ramp contains areas with only clearances for ADG 1 aircraft	AC 150 5300-13B – Correct non-standard taxilane widths by east ramp through relocation of Taxiway B
General Aviation Hangars	Currently has waiting list of over 25 applicants	Identify additional areas of ramp space for hangar construction by relocating TWY B.

1.3 Airport Background

Cape Cod Gateway Airport (the Airport or "Project site") is located on Cape Cod in Hyannis, Massachusetts, one of seven villages in the Town of Barnstable (see **Figure 1.1-1** USGS Locus Map). The Airport is bordered by a Massachusetts Fish and Wildlife designated conservation area (Hyannis Ponds Wildlife Management Area) and Route 6 to the north, Barnstable Road (Route 132) to the south, Yarmouth Road to the east, and an industrial park (Independence Park) to the west. Access to the Airport is provided by state highway Route 28 and Route 132 (Iyannough Road), which connects Route 6 to the Airport. Local access to the Airport is provided by Hinckley Road, Barnstable Road, and Mary Dunn Way.

The Airport encompasses 639 acres of land, of which approximately 140 acres make up developed areas for Airport facilities and operations including runways, taxiways, an approximately 43,097 square foot (sf) Passenger Terminal Building, Air Traffic Control Tower (ATCT), parking facilities, aircraft ramps, hangars, an Airport Rescue and Fire Fighting (ARFF) building, and an aircraft fuel farm. The remaining approximately 460 acres of Airport property are undeveloped areas.

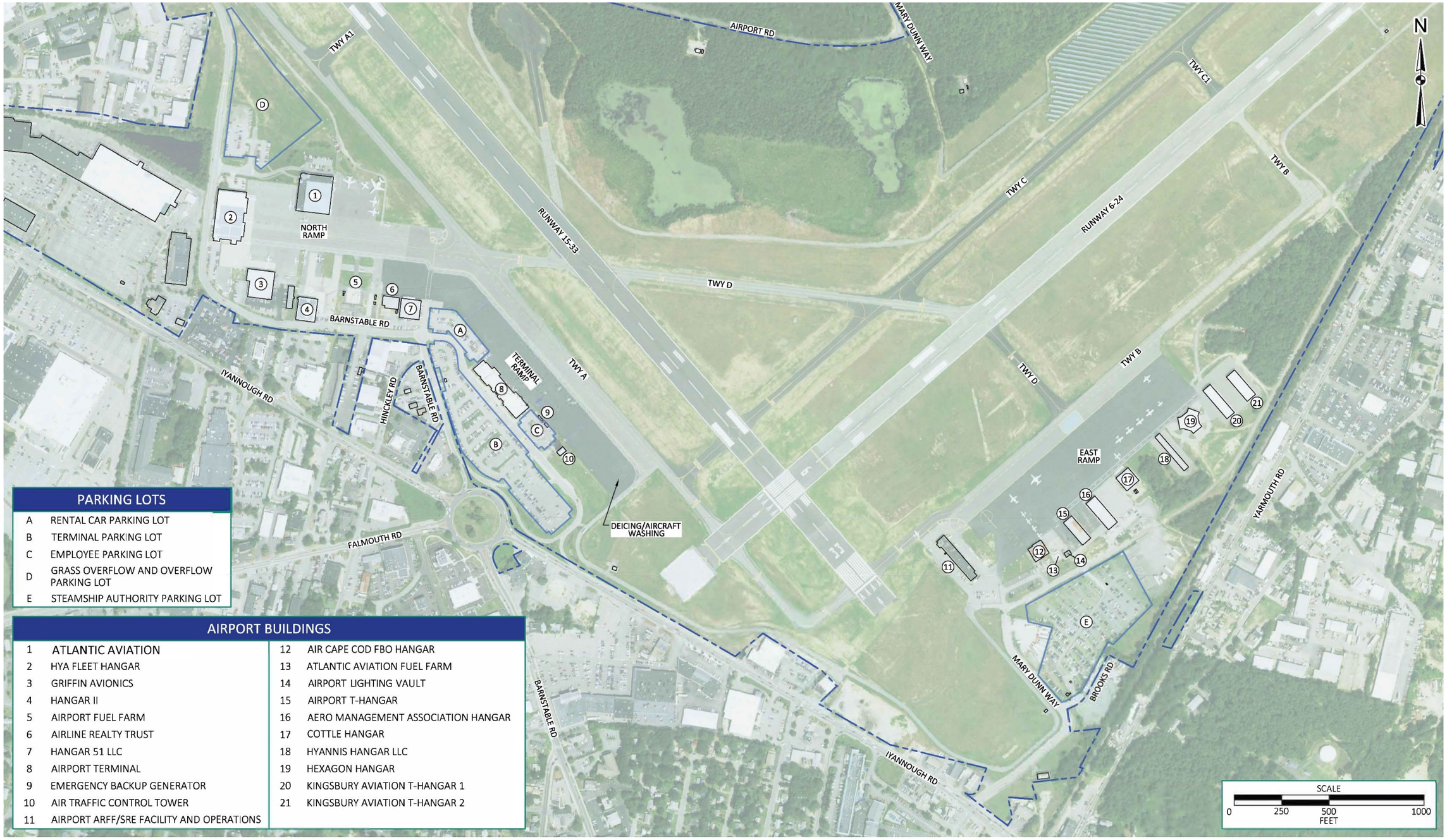
The Airport is owned by the Town of Barnstable and managed by the seven member Cape Cod Gateway Airport Commission and Airport staff. The Airport provides general aviation and both year-round and seasonal commercial services to Boston, New York, the islands of Martha's Vineyard and Nantucket, and beyond. It is home to Cape Air and Nantucket Airlines along with other charter, corporate, and general aviation aircraft operators. JetBlue operates daily seasonal service (May – October) to JFK-New York and LGA-New York. MedFlight operates out of the Airport, providing key emergency response medical services, along with the U.S. Coast Guard (USCG). More than 45 private tenants lease space at the Airport (see **Figure 1.3-1** Current Airport Facilities).

The leases and services offered at the Airport contribute to the economic output of the Airport and, more importantly, to Barnstable and the Cape Cod region as a whole. Cape Air is the third largest employer in Barnstable (behind only Cape Cod Hospital and the municipality itself).

Table 1.3-1 Economic Output of Airport

	Total Employment	Total Payroll	Total Output
Cape Cod Gateway	2,135	$85,358,000	$208,023,000

https://flyhya.com/wp-content/uploads/2021/08/MA-Statewide-Economic-Impact-Study_Exec-Summary-rdc.pdf



PARKING LOTS	
A	RENTAL CAR PARKING LOT
B	TERMINAL PARKING LOT
C	EMPLOYEE PARKING LOT
D	GRASS OVERFLOW AND OVERFLOW PARKING LOT
E	STEAMSHIP AUTHORITY PARKING LOT

AIRPORT BUILDINGS			
1	ATLANTIC AVIATION	12	AIR CAPE COD FBO HANGAR
2	HYA FLEET HANGAR	13	ATLANTIC AVIATION FUEL FARM
3	GRIFFIN AVIONICS	14	AIRPORT LIGHTING VAULT
4	HANGAR II	15	AIRPORT T-HANGAR
5	AIRPORT FUEL FARM	16	AERO MANAGEMENT ASSOCIATION HANGAR
6	AIRLINE REALTY TRUST	17	COTTLE HANGAR
7	HANGAR 51 LLC	18	HYANNIS HANGAR LLC
8	AIRPORT TERMINAL	19	HEXAGON HANGAR
9	EMERGENCY BACKUP GENERATOR	20	KINGSBURY AVIATION T-HANGAR 1
10	AIR TRAFFIC CONTROL TOWER	21	KINGSBURY AVIATION T-HANGAR 2
11	AIRPORT ARFF/SRE FACILITY AND OPERATIONS		

Figure 1.3-1
Current Airport Facilities

1.3.1 Airport History

The Airport, initially named Hyannis Airport, first opened as a single grass airstrip. The Airport saw the first landing on June 17, 1928. Scheduled air service began at the Airport on July 2, 1931. A plane left Hyannis at 7:45 a.m. every day, carrying five passengers to Boston. By 1937, an average of four planes were landing each day during the summer season. In the 1930s, the Town of Barnstable took ownership of the Airport and eventually renamed the Airport, "Barnstable Municipal Airport". The Airport gained popularity, seeing daily deliveries of the Boston Herald Traveler newspaper, and hosting numerous air shows, which attracted the public to the Airport.

In 1940, the Airport expanded to three 4,000-foot runways for armed forces use. The Navy assumed control of the Airport for pilot training during World War II, and after the war, the Airport reverted to its use as a municipal airport and resumed civilian flights in February 1946. In 1957, Runway 6-24 was extended to 5,600 feet and a new terminal was constructed and in 1961, a new ATCT was built.

Given increasing popularity and operations, the FAA and the Airport continued to improve infrastructure to accommodate capacity and ensure the safety of aviators and the public. In 2003, an Engineered Material Arresting System (EMAS) was installed at the end of Runway 6 to reduce the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

This engineered system requires significantly less land area than a traditional runway safety area and was the first EMAS installed in New England. Improvements to the Airport infrastructure continued throughout the 2000s, and between 2011 and 2012, the Airport demolished the old ATCT and Terminal Building and constructed new facilities as part of a $40 million Airport Improvement Program(AIP).

In 2021, Barnstable Municipal Airport was renamed Cape Cod Gateway Airport to reflect the airport's role connecting air travel destinations to the Cape Cod region.

1.3.2 Airport Classification

The NPIAS 2023-2027, published in September 2022, identifies nearly 3,300 public-use airports that are included in the national airport system, the roles they currently serve, and the amounts and types of airport development eligible for federal funding under the AIP. NPIAS classifies Cape Cod Gateway Airport as a Primary Non-Hub Commercial Service Airport.

- **Primary Airports** are Commercial Service Airports that have more than 10,000 passenger boardings each year. Hub categories for Primary Airports are defined as a percentage of total passenger boardings within the United States in the most current calendar year ending before the start of the current fiscal year.
- **Non-hub** is defined as receiving less than 0.05 percent but more than 10,000 of the annual U.S. commercial enplanement (passenger boardings at airports that receive scheduled passenger service).
- **Commercial Service Airports** are publicly owned airports that have at least 2,500 passenger boardings each calendar year and receive scheduled passenger service. Passenger boardings refer to revenue passenger boardings on an aircraft in service in air commerce, whether or not in scheduled service.

1.3.3 Airport Facilities

Airport facilities are generally categorized as airside facilities and landside facilities.. The facilities function and interact to ensure efficient and safe operations at the Airport. These facilities are further discussed below.

1.3.3.1 Airside Facilities

Airside facilities include Airport areas where aircraft movements take place between the air and ground. Typically, airside facilities include runways, taxiways, airport lighting and markings, and navigational aids. **Figure 1.1-2** depicts all airside facilities located at the Airport.

1.3.3.1.1 Runways

The Airport has two runways; Runway 15-33 and Runway 6-24. **Table 1.3-2** lists existing runways and their respective lengths and widths. Both runways have instrument approach aids and precision approach markings for Runway 15 and Runway 24 approaches, respectively. Detailed usage data for each runway is provided in Section 5.9.

Table 1.3-2 Existing Airport Runways

Runway	Function	Length (ft)	Width (ft)
RWY 15-33	Primary Instrument Flight Rules (IFR) runway	5,255	150
RWY 6-24	Primary Visual Flight Rule (VFR) runway	5,425	150

The conditions under which a runway will be utilized are based on a number of factors, including wind conditions. Aircraft generally will take off and land in the direction of the wind and the pilot will select the runway accordingly. However, runway characteristics including length and width, and weather conditions, will also influence a pilot's selection of a runway. Winds predominantly favor Runway 15-33 for approximately 75 percent of operations during the winter months, while winds favor Runway 6-24 for approximately 75 percent of operations during the summer months.

All runways have declared distances[2]which provide details regarding runway length usage for takeoff and landings due to current airport conditions.

Table 1.3-3 Declared Distances

Runway	6/24 (feet)	15/33 (feet)
Takeoff Run Available (TORA)	5,425 / 5,425	5,255 / 5,255
Takeoff Distance Available (TODA)	5,425 / 5,425	5,255 / 5,255
Accelerate-stop Distance Available (ASDA)	5,425 / 5,425	5,255 / 5,255
Landing Distance Available (LDA)	5,019 / 5,425	5,255 / 5,105

Source: FAA Form 5010-1, effective 2/27/2020 (viewed 3/23/2020), McFarland-Johnson 2022.

1.3.3.1.1.1 Runway 15-33

Runway 15-33 serves as the current primary instrument flight rules (IFR) runway. It measures 5,255 feet long by 150 feet wide and is generally aligned in a northwest to southeast direction. The runway is constructed of grooved asphalt and has high intensity runway edge lights (HIRL). Runway 15 is equipped with a 2,400-foot medium intensity approach lighting system with runway alignment indicator lights (MALSR). Runway 33 is equipped with 4-box precision approach path indicator (PAPI) with a standard 3-degree glide path. Runway 15-33 can accommodate all weight Class A and B aircraft and up to 75 percent of weight Class C aircraft in dry conditions. In wet conditions, this reduces to approximately 12 percent of weight Class C aircraft.

1.3.3.1.1.2 Runway 6-24

Runway 6-24 serves as the current primary visual flight rule (VFR) runway; however, ILS is also present. It measures 5,425 feet long by 150 feet wide. It is generally aligned in a southwest to northeast direction. The runway is constructed of grooved asphalt and has HIRL. Runway 24 is equipped with a 1,400-foot medium intensity approach lighting system with sequenced flashers (MALSF). The runway is equipped with 4-box PAPI on both runway ends, and both have a standard 3-degree glide path. Runway 6-24 has precision instrument markings in good condition. An EMAS bed is located at the approach end of Runway 6. Similar to Runway 15-33, Runway 6-24 can accommodate all weight Class A and B aircraft and up to 75 percent of weight Class C aircraft in dry conditions. In wet conditions, it can accommodate approximately 12 percent of weight Class C aircraft.

1.3.3.1.2 Taxiways

The Airport has seven taxiways designated A, A1, B, C, C1, D, and E. **Table 1.3-4** lists existing taxiways and their respective lengths and widths. All the taxiways are of asphalt construction and are equipped with LED medium intensity taxiway lights (MITL) except for a portion of Taxiway B between Taxiway D and the hold position for Runway 24 lit with incandescent edge lights. The exception is Taxiway E, which is unlit. Reflective markers mark the pavement edge of the run-up area near Runway 24 on Taxiways B and the no-taxi island on the East Ramp beyond the intersection of Taxiways B and D. The taxiway system at the Airport, as illustrated on **Figure 1.1-2**, consists of parallel, connecting, access, and entrance/exit taxiways.

[2] Defined per FAA AC 150/5300-13B as "maximum distances available and suitable for meeting takeoff, rejected takeoff, and landing distances performance requirements for turbine powered aircraft."

Table 1.3-4 Existing Taxiways

Pavement	Length (ft)	Width (ft)
TWY A	5,800	50
TWY A1	400	65
TWY B	3,750	40
TWY C	5,800	50
TWY C1	400	55
TWY D	3,600	65
TWY E	990	50

The existing taxiways include:

- Taxiway A serves as a full-length parallel taxiway to Runway 15-33 adjacent to the Terminal Ramp;
- Taxiway A1 is a stub taxiway that connects Runway 15-33 to Taxiway A approximately 1,120 feet from the Runway 15 threshold;
- Taxiway B serves as a partial parallel taxiway to Runway 6-24 adjacent to the East Apron. It connects with Taxiway A near the threshold of Runway 33 and terminates at the intersection of Runway 6-24;
- Taxiway C serves as a full-length parallel taxiway to Runway 6-24. Taxiway C crosses Runway 15-33 approximately 1,200 feet from the Runway 33 threshold;
- Taxiway C1 located on the north side of Runway 6-24, is a stub taxiway that connects Taxiway C to Runway 6-24;
- Taxiway D, which measures approximately 65 feet wide at the hold bar west of Runway 15-33, 75 feet wide at the hold bar north of Runway 6-24, and 50 feet wide everywhere else. The majority of Taxiway D intersects both Runways 15-33 and 6-24 at an acute angle. Taxiway D extends from the North ramp, across Taxiway A and Runway 15-33 to Taxiway B, east of Runway 6-24; and
- Taxiway E connects to Runway 15-33 to a run-up pit located north of Runway 15-33.

1.3.3.1.3 Ramps

The Airport has three ramps; the Terminal Ramp, the East Ramp, and the North Ramp, that provide approximately 369,500 sf of based aircraft parking, itinerant aircraft parking (transient aircraft parking), aircraft fueling ramp, and staging and maneuvering areas. These ramps are defined as areas intended for use by aircraft for loading and unloading passengers and cargo, parking, refueling, or maintenance.

- The Terminal Ramp is located adjacent to the terminal on the west side of Runway 15-33 and spans approximately 24,000 square yards (SY). The Terminal Ramp is used for passengers boarding and deboarding aircraft. The northern section of the Terminal Ramp was rehabilitated in 2013. Other portions of the Terminal Ramp were rehabilitated in 2015 and a deicing pad and aircraft wash rack area were installed as environmental protection enhancements.
- The East Ramp is located east of Runway 6-24 and spans approximately 45,600 SY. The majority of hangars that provide storage for single engine aircraft are found on the East Ramp. There are 55 tie-downs on the East Ramp, with 18 located in front of the 110 Mary Dunn Way hangar and 37 in front of the Hyannis Hangar LLC T-hangars and the Hexagon hangar.
- The North Ramp is connected to the Terminal Ramp closest to the Runway 15 end and spans approximately 55,500 SY. The ramp has limited space available for aircraft tie-downs and is the busiest ramp in the summer months.

1.3.3.2 Landside Facilities

Landside facilities support the aircraft and pilot/passenger functions, as well as other non-aviation facilities typically providing a revenue stream to the Airport. These facilities include the terminal building, general aviation facilities, and support facilities, such as fuel storage, vehicle parking, roadway access, and ARFF. The primary landside facilities at the Airport are identified in **Figure 1.3- 1**.

1.3.3.2.1 Hangars

Hangar space at the Airport is provided for both based and itinerant aircraft. There are currently eight conventional hangars, approximately 24,850 sf in total, located on both the East and North Ramps. Six of the eight conventional hangars are located on the North Ramp: Atlantic Aviation, Airport-owned hangar leased by

Cape Air/Nantucket Airlines, Griffin Avionics, Airport-own Hangar II leased by Cape Air/Nantucket Airlines, and Gull Air (Hangars 1 and 2). The other two conventional hangars are located on the East Ramp: 110 Mary Dunn Way Hangar and Cottle Hangar.

There are currently 33 individual unit hangar buildings located on the East Ramp: Airport owned T-hangar, Aero Management Associates Hangar, Hyannis Hangar LLC, Hexagon Hangar, and Kingsbury (Hangars 1 and 2). There are currently 32 entities on a waitlist for Airport hangars.

Table 1.3-5 Airport Assets - Buildings

Asset	Size	Use
Ross Rectrix Aerodrome Center	35,000 sf	FBO, FAA and Cape Air office Space, and aircraft storage
HYA Fleet Hangar (Leased by Hyannis Air Service aka Cape Air and Nantucket Airlines)	39,500 sf	Aircraft storage, offices, and maintenance (Hyannis Air Service only)
Griffin Avionics	19,000 sf	FBO, aircraft storage, aircraft maintenance and offices
HYA Hangar II (Leased by Cape Air)	12,500 sf	Cape Air office and storage space, Airport SRE storage
Airline Realty Trust (Leased by Allies Aviation)	5,000 sf	Aircraft charters and aircraft storage
Hangar 51 LLC (Leased by Allies Aviation)	10,500 sf	Aircraft charters and aircraft storage
110 Mary Dunn Way Hangar	6,000 sf	FBO and aircraft storage
Cottle Hangar	7,500 sf	Aircraft storage
Airport T-hangar	8,900 sf (6-units)	Aircraft storage, maintenance and SRE storage
Aero Management Association (AMA), Inc	11,450 sf (3-units)	Aircraft maintenance and storage
Hyannis Hangar LLC	7,550 sf (8-units)	Aircraft storage
Hexagon Hangars (Privately Owned)	10,250 sf (6-units)	Aircraft storage
Kingsbury Aviation	10,000 sf (4-units)	Aircraft storage
Kingsbury Aviation	9,700 sf (6-units)	Aircraft storage

1.3.3.2.2 Airport Terminal Building

Constructed in 2011, the approximately 32,000 sf terminal building is located on the southwest side of the Airport property and serves as the point of transition for travelers between surface and air transportation utilizing commercial airlines. The Airport terminal also serves as the airport administration building and a community asset for artists to display their work, the Massachusetts Air and Space Museum to showcase historic aviation artifacts, and as a public gathering space for various community events. The current Airport terminal building was constructed in 2011 and has two floors. The first floor, approximately 26,600 sf, provides secure and non-secure areas for passengers (food and beverage, retail, and service-based concessions). The second floor, approximately 5,400 sf, is comprised entirely of office space, including Airport and TSA offices, and support and storage space.

1.3.3.2.3 Vehicle Parking

The Airport provides parking in five locations: main terminal lot, rental car parking, employee parking, overflow grass parking lot and a gravel lot leased to the Steamship Authority. The passenger parking lots contain a total of approximately 585 spaces, while the overflow parking lot accommodates approximately 400 parking spaces. Current demand for parking is approximately 313 cars. In addition, approximately 100 car rental spaces are provided.

1.4 Airport Activity

The FAA defines an aircraft operation as a takeoff or a landing and categorizes the operations by aircraft type and purpose. These categories include commercial/air taxi, General Aviation, and military. The forecasting of all these different types of operations, combined with the requirements of the design critical aircraft, is used in the planning and size criteria of terminal buildings, runways, taxiways, and other airport infrastructure. At Cape Cod Gateway Airport, the:

Air taxi and commuter operations are those commercial in nature with less than 60 seats. They include charter operator activities such as Cape Air, Gull Air, and similar type operators.

Air Carrier are all those operations on aircraft with greater than 60 seats.

Commercial operations are all those which are all airline operations at the passenger terminal.

General Aviation (GA) refers to all civil aviation non-commercial operations. This includes recreational, corporate, and medical evacuation operations. **Itinerant** GA refers to flights traveling to/from the Airport. **Local** operations include those operations on Airport-based aircraft.

Aircraft activity at the Airport is tracked via a third-party service which utilizes cameras and radar to identify each individual aircraft that takes off and lands at the Airport since 2015. This information is tracked online and reported annually to the FAA. Prior to 2015, the data was collected via air traffic records.

Table 1.4-1 presents data for historical aircraft operations at the Airport by type. Overall, operations began to decline in 2007 and were accelerated with the departure of air taxi operator Colgan Air in 2010, followed by Island Air in 2015. Collectively, these services conducted 188,000 operations annually; a capacity that could not be served by Cape Air. Additionally, high speed ferry service started serving the islands from Hyannis provided a less expensive alternative.

JetBlue commenced operations at the Airport in 2014 and is forecasted to have 240 operations in 2023 with the same schedule as 2022. Aircraft operations trends also illustrate an increase in general aviation operations from 2021 to 2022.

Table 1.4-1 2008-2023 Historical Aircraft Operations (Calendar Year)

Year	Air Carrier	Air Taxi	GA Itinerant	GA Local	Military	Total Ops
2008	0	118,418	35,603	5,546	292	159,859
2009	12	84,246	20,774	7,070	271	112,373
2010	1	77,929	20,325	5,543	202	104,000
2011	0	69,238	19,783	7,058	201	96,280
2012	0	70,956	23,693	9,167	333	104,149
2013	0	67,798	24,796	9,067	367	102,028
2014	149	64,419	26,513	8,220	222	99,523
2015	159	58,758	24,067	6,733	251	89,968
2016	255	58,001	29,316	9,381	212	97,165
2017	186	47,092	26,521	7,081	136	81,016
2018	183	35,595	22,340	9,009	223	67,350
2019	167	32,483	22,241	10,839	387	66,117
2020	60	25,939	18,021	9,049	330	53,399
2021	84	26,628	18,455	9,177	364	58,361
2022	240	23,254	19,369	10,245	248	53,569
2023	416	21,590	15,243	7,622	732	45,603

Source : 2023 https://adip.faa.gov/agis/public/#/airportData/HYA

1.4.1 Commercial Passenger Enplanements

Historical data for passenger enplanements is presented in **Table 1.4-2**. This commercial airline data includes both the larger air carriers as well as air taxi operators. Evidently, this shows that the Airport has experienced a decline in passenger growth over the past ten years. The overall decrease in enplanements is likely due to many factors, including competition with other modes of transportation such as the high-speed ferry service, the Great Recession (2008-2009), and the loss of two airlines (Colgan Air and the bankruptcy of Island Airlines). Collectively, those two airlines served over 150,000 passengers per year. Most recently, the COVID pandemic had a dramatic impact on commercial air travel overall and locally evident in the dip in enplanements in 2020. Air travel began to rebound in 2021.

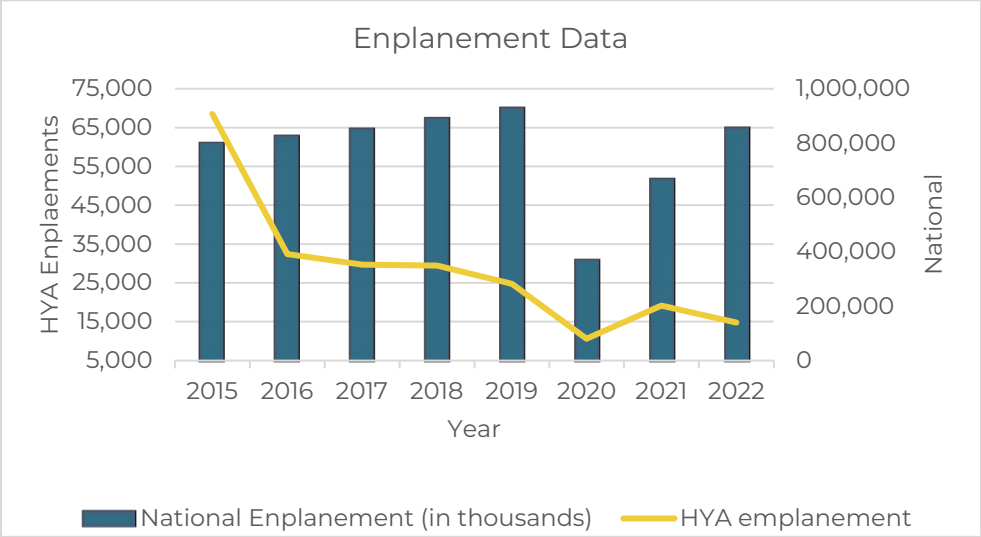
Table 1.4-2 HYA Passenger Enplanements Between 2008 and 2022

Year	Enplanements
2008	191,837
2009	138,451
2010	124,164
2011	100,450
2012	94,466
2013	86,745
2014	84,764
2015	68,519
2016	32,397
2017	29,719
2018	29,457
2019	24,799
2020	10,627
2021	19,175
2022	14,753

NOTE: July 2017 - Began to report revenue only activity

In 2022, total global flight volume was 18% below 2019 levels[3] and this trend is similar at Cape Cod Gateway Airport as reflected in the recovering operational trend discussed above and enplanement data graphed below. Industry-wide, a decline in the use of regional jets and an increase in narrow-bodied jets is trending. This is partially due to pilot shortages as regional airlines typically provide the training required for larger aircraft, an industry-wide factor. Locally, the ferries have played a role in the reduced aircraft operations and passenger volumes to Nantucket and Martha's Vineyard. However, there is a trend of increased private and charter flight operations post-COVID as more users have switched to private charter services. That data is not tracked in the enplanement data identified herein.

Graph 1.4-1 HYA and National Enplanement Data Trends



1.4.2 Operational Forecasts

The FAA requires that all airport planning efforts be based upon an approved forecast methodology as the resulting analysis assists in determining the facility requirements for meeting future demand. In the 2022 Master Plan, different operational forecasting methodologies utilizing key metrics were determined to be the most appropriate to use for each type. Operational forecasting is a key component of all airport master plan development. Air carrier and air taxi operations utilized the FAA National Aerospace Forecast methodology. GA jet operations utilized a blended forecast of the New England Region market share and the national growth rate. Light GA operations utilized a forecast that is a blend of the ten-year trend analysis and the National

[3] Oliver Wyman. Airline Economic Analysis 2022-2023. https://www.oliverwyman.com/our-expertise/insights/2023/may/airline-economic-analysis-2022-2023.html

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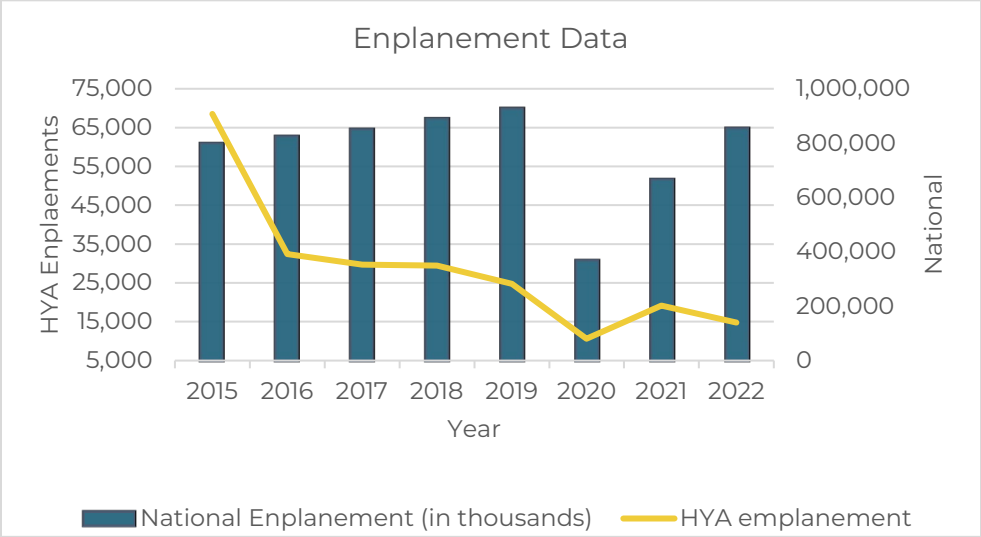

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[4] Oliver Wyman. Airline Economic Analysis 2022-2023. https://www.oliverwyman.com/our-expertise/insights/2023/may/airline-economic-analysis-2022-2023.html

Table 1.4-5 Forecasted Commercial Passenger Enplanements

Year	Master Plan Forecast
2020	26,104
2025	27,121
2030	28,193
2040	30,484

1.5 Environmental Review and Permitting

The Projects are subject to the following, federal, state, and regional environmental review processes.

1.5.1 Permit and Approval Requirements

The Projects are anticipated to require the following permits and approvals from local, state, and federal agencies listed in **Table 1.5-1.**

Table 1.5-1 Environmental Permits and Approvals Required for the Project

Permit/Review	Agency	Status and Relevant Project(s)	Measures to Comply with Applicable Performance Standards
Federal			
National Environmental Policy Act (NEPA)	Federal Aviation Administration (FAA)	Draft EA to be filed November 2023	An Environmental Assessment (EA) and issued federal Finding of No Significant Impact (FONSI) has been completed in accordance with FAA Order 1050.1F.
Section 404 General Permit (Pre-Construction Notification)	Army Corps of Engineers (Corps)	PCN to be filed (Date TBD) for Taxiway D only	Selection of the least environmentally damaging practicable alternative including measures designed to avoid, minimize, and mitigate impacts to wetlands and other waters of the U.S.
Coverage under National Pollutant Discharge Elimination System (NPDES) Construction Activities Permit	Environmental Protection Agency	Notice of Intent (NOI) to be filed one to two months prior to start of construction of all Projects over 1 acre of impact.	Stormwater Pollution Prevention Plan to be developed and implemented, involving series of construction BMPs to reduce potential for erosion and sedimentation.
Table 1-Section 7 Consultation under U.S. Endangered Species Act	Department of Interior, U.S. Fish and Wildlife Service (USFWS)	FAA lead agency to consult with USFWS when EA is filed	The Project will be reviewed by the USFWS through the Section 404 permitting process with the Corps as well as NEPA.
Review under Section 106 of the National Historic Preservation Act (36 CFR 800)	FAA, U.S. Army Corps of Engineers; Tribal Consultation; State Historic Preservation Officer (SHPO)	FAA lead agency to consult with SHPO when EA is filed	The Project will be designed to avoid or minimize impacts to historic resources. A determination of "no effect" has been made by FAA based on the MA SHPO consultation letter.
State			
Individual 401 Water Quality Certificate	Department of Environmental Protection (MassDEP)	WQC to be filed Date TBD for Taxiway D	Similar BMPs are to be employed as required by NPDES and the Corps and under the Massachusetts Wetlands Protection Act. Avoid, minimize, and mitigate impacts to wetlands and waterbodies.

Table 1.5-2 Permits and Approvals Required for the Project (Continued)

Permit/Review	Agency	Status and Relevant Project(s)	Measures to Comply with Applicable Performance Standards
State			
Wetlands Protection Act M.G.L. c. 131 § 40	MassDEP	Notice of Intent To be filed Date TBD for Taxiway D	Avoid, minimize, and mitigate impacts to wetlands and other waterbodies including a minimum of 1:1 replication for unavoidable fill placed in BVW
M.G.L. c. 90 § 35B, 780 CMR 111.7	Massachusetts Department of Transportation (MassDOT) – Aeronautics Division	Conceptual design complete. Final construction design to be completed in permitting phase.	Taxiway / runway surfaces will be designed to comply with MassDOT requirements.
Review under Massachusetts Endangered Species Act	Natural Heritage and Endangered Species Program	No impacts anticipated. MESA Checklist filed TBD if necessary.	Avoid and minimize impacts to state listed species habitats.
State Historic Register Review (Chapter 256)	Massachusetts Historical Commission (MHC)	FAA to consult with MHC upon submittal of the EA.	The Project will be designed to avoid or minimize impacts to historic resources. Consultation will be led by FAA and a determination of "no effect" is anticipated to be made by the MA SHPO based on consultation letter.
Regional			
Development of Regional Impact	Cape Cod Commission	DRI application to be submitted upon design completion, date TBD	The Project will be designed to meet standards and requirements of the Cape Cod Commission Regional Policy Plan Standards and Technical Bulletins
Local			
Wetlands Bylaw Order of Conditions	Barnstable Conservation Commission	Notice of Intent to be filed date TBD For Taxiway D	Avoid, minimize, and mitigate impacts to wetlands and other waterbodies including a minimum of 1:1 replication for fill placed in BVW and compensatory flood storage. Similar BMPs to be employed during construction as required by NPDES, the Corps, and MassDEP to prevent erosion and sedimentation that could result in discharges to wetlands.

Chapter 2.0

Purpose and Need

2.0 PURPOSE AND NEED

The FAA must approve certain proposed airport layout changes to the Cape Cod Gateway Airport; such an approval constitutes a federal action requiring NEPA review. The purpose and need for a project are key elements of the NEPA review. It explains the reasons for the action and what the project sponsor expects to achieve. Further, it provides the basis for evaluating the effectiveness of the alternatives (*i.e.*, how each alternative achieves the purpose of the project by addressing the documented needs).

The need for each Project discussed below addresses the Airport's operational and safety needs while minimizing environmental and community impacts and responding to community questions and comments. Airports receiving federal funding are obligated by grant conditions to comply with FAA planning and airfield design standards that are detailed in multiple FAA advisory circulars, orders, and other regulations. At the most basic level, these requirements are rooted in maximizing safety and efficiency for those in the air and those on the ground.

FAA's AC 150/5300-13B (revised 2022) contains the FAA standards and recommendations for the geometric layout and engineering design of runways, taxiways, aprons, and other facilities at civil airports. These airport design standards represent a concerted effort by the FAA to establish new taxiway design standards to improve overall airport operational safety by requiring airfield taxiway geometries be upgraded to meet the new standards. FAA AC 150/5325-4B Runway Length Requirements for Airport Design provides design standards and guidelines for determining appropriate runway lengths based on the critical design aircraft. The current runway lengths do not meet these criteria for the current design aircraft. The proposed runway extension is needed to meet the recommended runway length based on the operational needs and efficiency of the design aircraft. The proposed Projects are part of the overall FAA effort to improve airfield operational safety by modifying current taxiway geometries to conform with new or revised design standards and Airport operational needs. Often the need for geometric modifications is the result of the design of older airfields and the geometries that existed in the 1920s and 1940s when they were first constructed; as is the case with Cape Cod Gateway Airport. The current non-standard airfield geometries and design at the Airport are identified where applicable and summarized in **Table 2.2-5.**

Information is provided to demonstrate a balanced approach to achieving the purpose and need for the proposed Projects, along with data analysis, to address and respond to community feedback received at public meetings and during formal comment periods. The individual Projects are described further in Chapter 3.0. The evaluation of the alternatives and selection of alternatives to meet the purpose and need is described in Chapter 4.0.

2.1 Purpose

The proposed Projects from the 2022 Master Plan for the Cape Cod Gateway Airport have the following purposes:

- To improve airfield safety and compliance with FAA airport design standards by eliminating nonstandard taxiway designs and geometries including direct taxiway connections from apron areas to runways and non-standard taxiway intersections;
- To provide a reasonable and balanced approach in meeting runway length recommendations for safety and operational efficiency as identified in the Master Plan for the current and future families of aircraft using the Airport including general aviation, air carrier, air taxi, military, and private and corporate aircraft; and

  To enhance and maintain safe and efficient landside facilities that are compliant with FAA airport design standards and MassDOT Aeronautics Division regulations.

2.2 Need

As described in more detail below, the proposed Projects are needed to enhance overall operational safety and efficiency at the Cape Cod Gateway Airport. The Projects are based on the need to reasonably accommodate existing and anticipated aviation demand for the current families of aircraft, FAA and MassDOT safety and security requirements, and Airport financial self-sufficiency. The Airport operates as an enterprise fund and is financially self-sufficient from the town in meeting its operating obligations and future infrastructure needs. References to FAA airport design standards, unless otherwise noted, refer to FAA Advisory Circular (AC) 150/5300-13B, *Airport Design*. Descriptions of the need for the individual Projects are provided below. All proposed Projects are shown in **Figure 1.1-3**.

2.2.1 Airside Facilities

2.2.1.1 Construct Partial Parallel Taxiway D to Runway 15-33

Currently, the existing Taxiway D ranges in width from 50 to 75 feet wide and begins at the North Ramp apron area and crosses both Taxiway A and Runway 15-33 to existing Taxiway B east of Runway 6-24. It intersects both runways at an acute angle, a non-standard geometry per FAA AC 150/5300-13B, *Airport Design*. A non-right-angle taxiway approaching a runway can lead the taxiing aircraft to inadvertently enter the runway. In addition, the non-right-angle connection reduces the ability to see runway ends which may contribute to the loss of situational awareness. This is similar to if your car was parked at an intersection, and you had the inability to clearly see cars coming from either direction. The geometry of Taxiway D also currently provides direct access from the ramp to the runway, a nonstandard condition that can lead to a runway incursion[1].

This Proposed Action involves construction of a new partial parallel taxiway east of Runway 15-33 with a standard 400-foot runway centerline to taxiway centerline separation. It will extend from the existing Taxiway A1 across existing Taxiway D and Runway 6-24 to the proposed relocated Taxiway B (see Section 2.2.1.3 below). This taxiway would be approximately 3,200 feet in length, 50 feet wide, and tie in with the existing/remaining taxiway. Ultimately, this new partial parallel taxiway will be named Taxiway D. This Project also includes the removal of the portion of existing Taxiway D between existing Taxiway A across Runway 15-33 and up to the proposed new partial parallel taxiway. See **Figure 2.2-1**.

The proposed new partial parallel taxiway (future Taxiway D) would eliminate direct access from the North Ramp to Runway 15-33, the acute angle access points to Runway 15-33, as well as the high-energy crossing location. The future Taxiway D would also prevent existing operational concerns due to two-way taxiing occurring directly in front of the terminal building.

2.2.1.2 Remove Taxiway E and Existing Runup Area/Construct an Engine Run-up Area for Partial Parallel Taxiway D

The existing Taxiway E measures 50 feet wide and connects Runway 15-33 to an approximately ±42,000 square foot (sf) engine run-up area, which currently does not have a sound barrier. The existing engine run-up area is currently used by aircraft for pre-flight testing and maintenance operations and is used to buffer the noise for those types of operations. The current geometry of Taxiway E is non-standard per FAA AC 150/5300-13B, *Airport Design*.

This proposed Project will eliminate existing non-right-angle geometry to Runway 15-33 by removing the existing Taxiway E and the associated aircraft engine runup area (pit). Removal of the existing run-up area will require the construction of a new run-up area, immediately adjacent to the existing run-up area, designed to accommodate the existing aircraft fleet. The new run-up area, proposed for construction on the future Taxiway D, will be used for the same purposes.

A noise barrier is proposed to be constructed adjacent to the run-up area to provide additional noise mitigation for the surrounding areas. See **Figure 2.2-1**.

In conformance with the FAA's goals to correct nonstandard airfield geometries, enhance aircraft safety, and ensure compliance with regulatory guidance, this Project serves to correct deficiencies associated with existing Taxiway D (circa 1998) and Taxiway E (circa 1980) that will ultimately improve safety and operational efficiency.

2.2.1.3 Relocate and Reconstruct Taxiway B

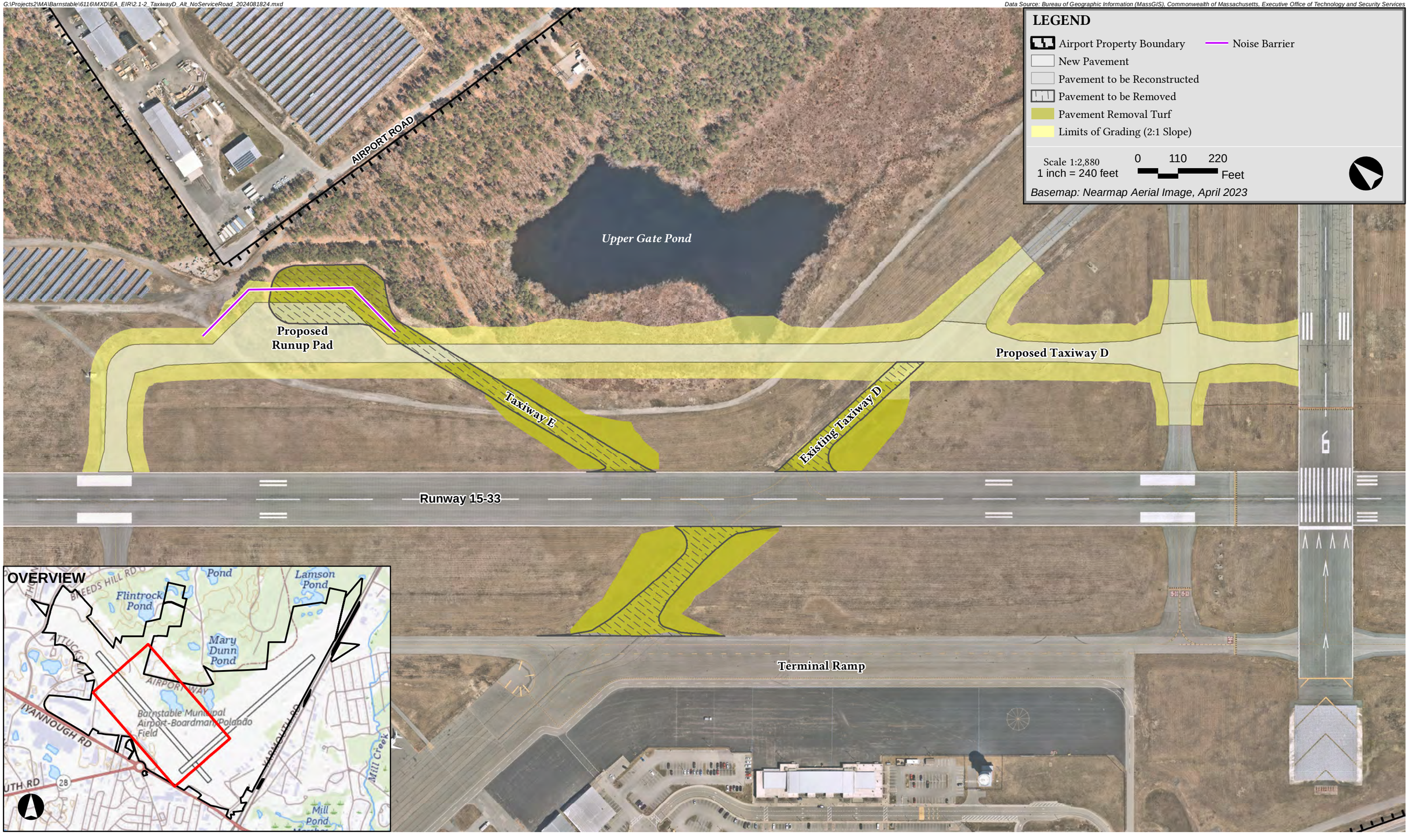
Adjacent to the East Apron, the existing Taxiway B is 40 feet wide and serves as a partial parallel taxiway to Runway 6-24. It connects with Taxiway A near the threshold of Runway 33 and terminates south of the Runway 24 approach end. It is also the oldest piece of pavement on the airfield and needs replacement due to failing conditions. Taxiway B's dual use pavement, high energy intersection, and intersection departure due to its physical connection with the East Apron make it a nonstandard geometry taxiway per FAA AC 150/5300-13B, Airport Design. Other deficiencies include its narrow width and pavement condition.

This proposed Project involves widening Taxiway B to a design standard 50 feet to meet FAA design requirements for the families of aircraft that use the Airport and relocation to an FAA design standard 400-foot runway centerline to taxiway centerline separation south of Runway 6-24; this would separate the taxiway from the East Apron and remove a direct connection from the apron to the taxiway. This new configuration would not only separate the taxiway pavement from the apron pavement, but it would also extend Taxiway B northward to just south of the existing glide slope antenna and allow for additional room for apron expansion.

[1] Any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and takeoff of aircraft.

G:\Projects2\MA\Barnstable\6116\MXD\EA_EIR\2.1-2_TaxiwayD_Alt_NoServiceRoad_2024081824.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 2.2-1

Taxiway D No Access Road Alternative

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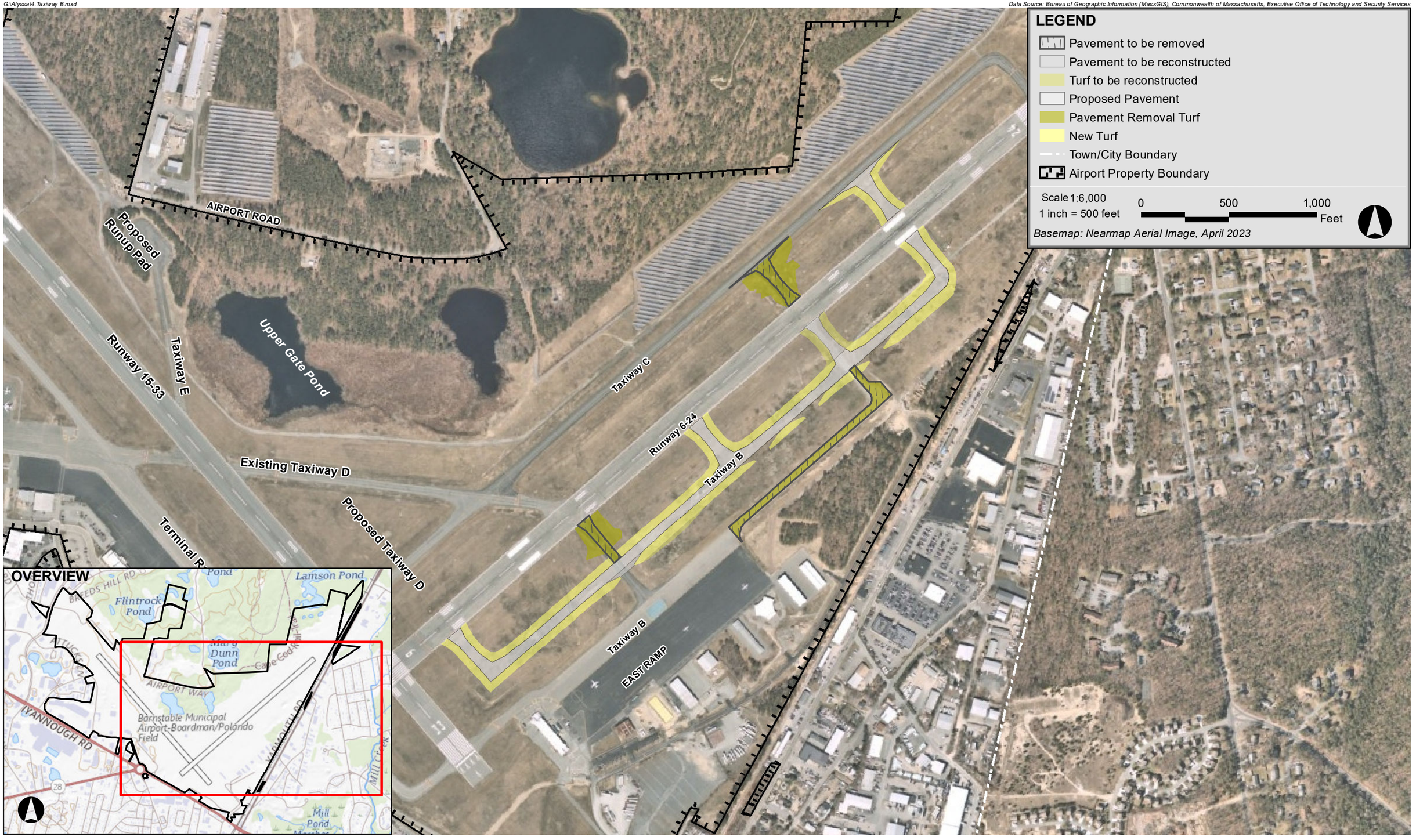
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 2.2-2
Proposed Taxiway B Relocation

The new taxiway configuration/length would provide for aircraft to taxi closer to the runway ends and reduce/eliminate the need for "back-taxiing" operations and enables runway crossings to occur at runway ends, the safest location to cross a runway. The associated taxiway object free area (TOFA) would remain clear of the glide slope used for navigational purposes. See **Figure 2.2-2**.

The Project would enhance safety by removing dual purpose pavements (i.e., combined apron and taxiway), lengthening the taxi distance, and relocating the taxiway crossing of Runway 6-24 to a lower energy location. A short distance between the apron and the runway requires flight crews to complete the same number of checklist items in a shorter timeframe and requires more heads-down time during taxi.

2.2.1.4 Extend Runway 15-33

This proposed Project will extend Runway 15-33 from 5,255 feet to a total length of 6,150 feet (see **Figure 2.2-3**). This length is based on the 2022 Airport Master Plan analysis conducted for the Airport's current family of aircraft using the Airport facility and those projected to use the Airport with typical stage lengths (i.e., distances of travel to/from the Cape Cod Gateway Airport). The length analysis is also based on additional screening that has taken place during the environmental review process, including input from surrounding communities. This analysis eliminates the 33-end extension, reducing the runway length recommendation identified in the Master Plan Preferred Alternative by approximately 400 feet. Even with this modification, the extension still meets demand and runway length recommendations. The Airport Master Plan Facility Requirements, which identified the recommended length of 6,550 feet based on FAA design formulas, has been included in **Appendix B** of this Final EA.

Currently, Runway 6-24 (5,425 feet long by 150 feet wide) serves as the primary visual flight rule (VFR) or "good weather" runway, while Runway 15-33 (5,255 feet long by 150 feet wide) serves as the current primary instrument flight rules (IFR) or "bad weather" runway. Extension of Runway 6-24 was eliminated from further study during the Master planning process due to the anticipated community impacts. The extension of the runway ends is constrained by the need to relocate Yarmouth Road, railroad tracks, existing EMAS, Iyannough Road Rotary, and residential property acquisition. See further discussion in Section 4.1.1.7.

Background

During normal operating procedures, the pilot of an aircraft must determine the runway takeoff distance required to fly to a specific destination based on current weather conditions (temperature, humidity, prevailing wind direction, and speed), mission requirements (destination/fuel load, passenger load, and cargo load), specific airport conditions (airport elevation, runway condition, obstructions, etc.), among other factors. Once that runway takeoff distance determination is made, the pilot will compare the existing runway length available with the requirement for that specific mission. If that existing runway length is deficient, the pilot will be forced to reduce the overall weight of the aircraft to lower the takeoff distance required to match the airport's existing runway length. This is done by reducing the amount of fuel (shortening flight distance) and/or payload (passengers or cargo) that the aircraft can take on that flight; this is also known as a weight penalty.

While this is the standard operating procedure for aircraft operators to adjust accordingly to ensure safe operations, it is also generally a goal of airports to optimize aircraft functional safety by reasonably and practicably providing appropriate runway length to accommodate the needs of the majority of their operators.

The planning challenge for airports is to strike an appropriate balance in providing runway length that will meet the requirements of the forecasted critical design aircraft while taking into consideration airport constraints and the surrounding community.

Airports receiving federal funding in the form of grants are required to comply with a wide variety of grant assurances which include the requirement to comply with FAA planning and design standards that are detailed in multiple FAA advisory circulars, orders, and other regulations. At the most basic level, these regulations are rooted in maximizing safety for those in the air and those on the ground. In general, airport infrastructure, including runway length, is designed to accommodate the most demanding aircraft type that will utilize the infrastructure on a regular basis. The FAA refers to this aircraft as the critical design aircraft, which it defines as "*the most demanding aircraft type, or grouping of aircraft [families of aircraft] with similar characteristics, that make regular use of the airport. Regular use is 500 annual operations, including both itinerant and local operations but excluding touch-and-go operations.*"[2] The primary purpose of identifying the critical aircraft is to ultimately translate the operational requirements of that aircraft into the design for airport facilities and infrastructure.

[2] FAA AC No: 150/5000-17, Critical Aircraft and Regular Use Determination, (June 20, 2017)

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

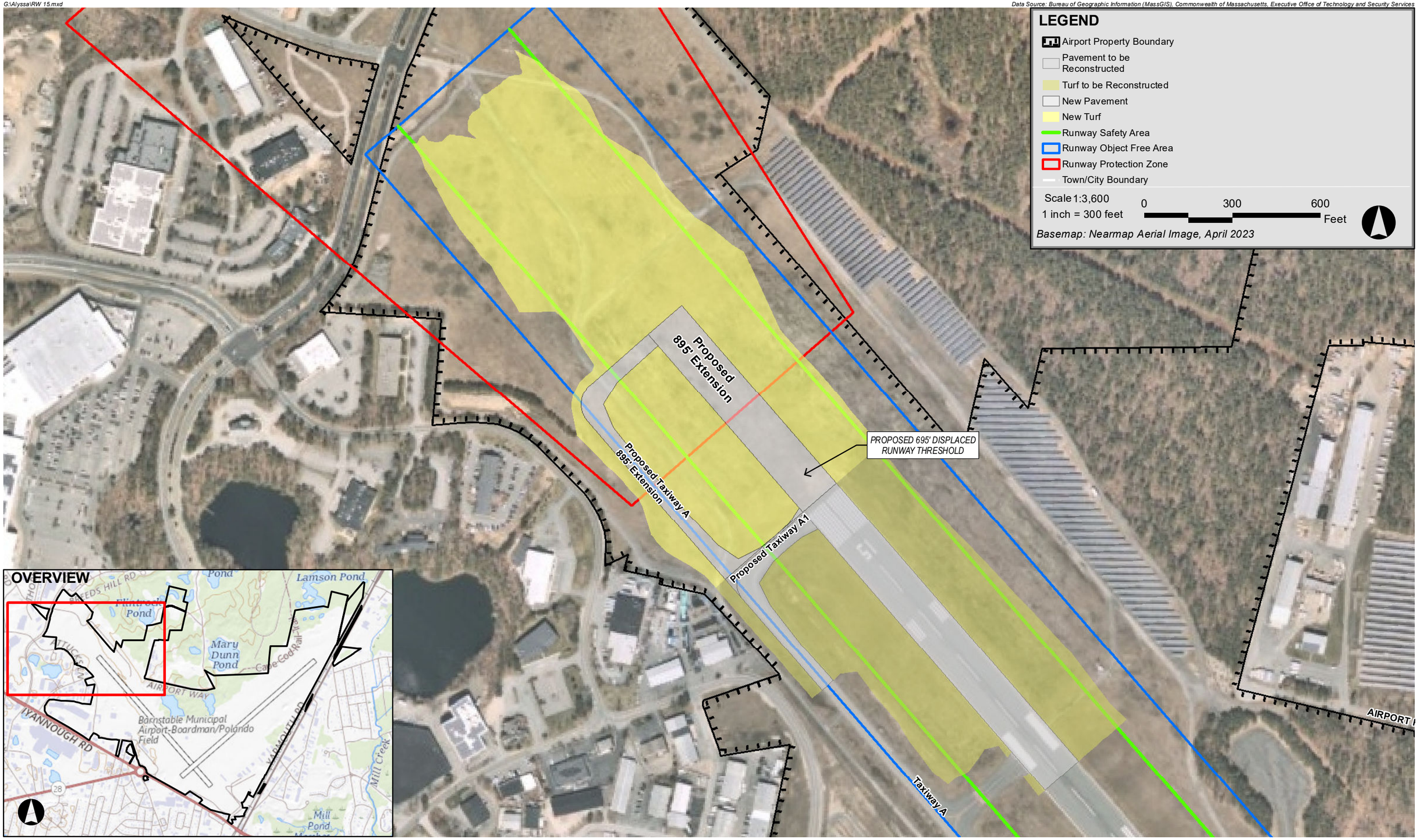


Figure 2.2-3
Proposed Runway 15 Extension

The FAA has developed a system to connect the physical characteristics of the critical aircraft to airport planning and design standards. This system detailed in FAA AC 150/5300-13B Airport Design includes the following codes used to develop the Runway Design Code (RDC).

- The first code, designated with a letter, is the Aircraft Approach Category (AAC) which is based on the approach speed (landing speed) of an aircraft.
- The second code, the Airplane Design Group (ADG), is determined by the wingspan and tail height of an aircraft and is represented by a Roman numeral.

Every aircraft, runway, and the airport as a whole is assigned a reference code. The RDC of a runway and airport is based on the aircraft or combination of aircraft with the highest approach speed and greatest wingspan that either use or are expected to make regular use of the airport. **Figure 2.2-4** lists the AACs/RDCs and illustrates example aircraft for each.

As documented in the 2022 Master Plan, the current and future critical design aircraft for Cape Cod Gateway Airport was established by conducting an aircraft operations analysis. As shown in **Table 2.2-1**, aircraft operations data from the FAA's Traffic Flow Management System Counts (TFMSC) database was used to evaluate historical operations at Cape Cod Gateway Airport to help identify the appropriate critical design aircraft. The TFMSC operations data for this report has been updated to include data through 2022 to confirm the validity of the Master Plan analysis, which was based on 2019 operational data.

It is important to recognize that TFMSC data represents actual flights recorded and validated by the FAA through means of flight plans, instrument flight operations, and/or other radar-based tracking applications. It is the most accurate FAA flight data currently publicly available and identifies aircraft type, flight dates, flight origins and destinations, etc. It must also be recognized that TFMSC data represents a subset of the total number of operations experienced at an airport; thus, there are many operations that occur at an airport that are not recorded in TFMSC.

Specific to the Airport, the total number of civilian operations that occurred in 2022 was 53,946[3], whereas TFMSC recorded details for only 15,681 of those operations or 29.1 percent of the overall total. Most of the operations not captured in the TFMSC can reasonably be assumed to be comprised of smaller general aviation aircraft as their users are typically the least likely to engage in flight recording activities that would register their operations in the TFMSC. Conversely, users of larger aircraft (e.g., multi-engine aircraft, turbine aircraft, business jet aircraft, etc.) tend to regularly utilize those services and therefore their activities are more likely to be captured in the TFMSC. Given this basis of understanding, the fidelity and detail of the TFMSC data provides excellent perspective and insights into the most demanding types of aircraft that regularly operate at an airport.

As documented in the 2022 Master Plan and reflected in **Table 2.2-1**, Cape Cod Gateway Airport's existing and future AAC/ADG is C/D-III. This is established not on the individual categories (i.e., C-III or D-III) meeting the 500 annual operations thresholds, but on a composite approach whereby AAC C and AAC D meet that annual threshold and likewise ADG III now currently meets that 500 operations threshold. This methodology and designation have been reviewed and formally approved by the FAA in May 2022.

The AAC/ADG C/D-III designation includes general aviation aircraft such as Gulfstream variants, the Bombardier Global Express, and other large business jets, as well as commercial service aircraft such as the Embraer E190 and the Airbus 220, all of which either currently operate at the Airport or are projected to in the future. Based on the range of the most demanding aircraft that operate at the Airport, two critical design aircraft were identified for Cape Cod Gateway Airport: one representing general aviation activities and one representing commercial service activities. Specifically, the existing general aviation design aircraft and commercial service design aircraft were determined to be the Gulfstream V/G500 and the Embraer E190, respectively. **Table 2.2-2** below provides supporting FAA TFMSC operational data for all those aircraft with an ADG of III that flew into and out of Airport in 2022, including the critical design aircraft.

[3] Aircraft operations data are collected via ATC tower counts, and by a third-party company (Vector) via airfield cameras that record activity.

Table 2.2-1 Cape Cod Gateway Airport TFMSC Annual Operations by AAC/ADG (2018-2022)

	2018	2019	2020	2021	2022
A-I	2,178	1,962	1,857	2,016	2,094
A-II	445	476	410	670	676
A-III	0	0	0	0	0
B-I	6,348	6,151	6,314	6,998	5,592
B-II	4,684	4,203	3,022	4,464	4,366
B-III	20	29	12	64	72
B-IV	0	0	0	0	0
C-I	596	499	506	710	615
C-II	964	972	982	1,439	1,257
C-III	274	265	134	369	423
C-IV	7	0	1	1	12
D-I	35	28	20	29	13
D-II	310	263	261	404	341
D-III	100	128	72	225	220
D-IV	0	0	0	0	0
Totals:	*15,961*	*14,976*	*13,591*	*17,389*	*15,681*
AAC A	2,623	2,438	2,267	2,686	2,770
AAC B	11,052	10,383	9,348	11,526	10,030
AAC C	1,841	1,736	1,623	2,519	2,307
AAC D	445	419	353	658	574
ADG I	9,157	8,640	8,697	9,753	8,314
ADG II	6,403	5,914	4,675	6,977	6,640
ADG III	394	422	218	658	715
ADG IV	7	-	1	1	12

Source: FAA TFMSC

Table 2.2-2 Total Annual Operations of ADG III Aircraft (2022)

Airplane Approach Category (AAC)	Airplane Design Group (ADG)	Aircraft Type	Total Annual Operations (2022)
B	III	GL7T - Bombardier Global 7500	30
B	III	FA7X - Dassault Falcon F7X	38
C	III	E190 - Embraer E190*	241
C	III	GL5T - Bombardier BD-700 Global 5000	40
C	III	GLEX - Bombardier BD-700 Global Express	142
D	III	GLF5 - Gulfstream V/G500*	165
D	III	GA6C - G-7 Gulfstream G600	22
D	III	GLF6 - Gulfstream	33

Source: FAA TFMSC Database

* Designated as a critical design aircraft for Cape Cod Gateway Airport

Airplane Design Group (ADG) (Wing Span) (Tail Height)	Aircraft Approach Category (AAC) (Approach Speed)			
	Category A (<91 kts)	Category B (91 - <121 kts)	Category C (121 - <141 kts)	Category D (141 - <166 kts)
Group I (<49') / (<20')	**A-I** Cessna 172, Beech Bonanza, Vans RV-6	**B-I** Piper Navajo, Cessna 421, Beech Baron 58	**C-I** Learjet 25, Israel Westwind Astra	**D-I** Learjet 35, F-16C Fighting Falcon
				
Group II (49' - <79') (20' - <30')	**A-II** Pilatus PC-12, Cessna 208, Aero Commander 500	**B-II** EMB Brasilia, Super King Air 350, Air Tractor 802-A	**C-II** Gulfstream III, Canadair Challenger 600, Citation X	**D-II** Gulfstream G200 and IV
				
Group III (79' - <118') (30' - <45')	**A-III** Fairchild F-27, Douglas DC-3	**B-III** Boeing B-17, Douglas DC-4, Dash 8	**C-III** Airbus A318, Gulfstream 550, Global 6000, PBY Catalina	**D-III** Boeing 737-800, Douglas DC-9
				
Group IV (118' - <171') (45' - <60')		**B-IV** Ilyushin Il-76, Boeing C97 Stratocruiser, Douglas DC-7	**C-IV** Boeing 757 and 767, Boeing KC-135	**D-IV** Boeing 767, Douglas DC-10, Douglas MD-11
				
Group V (171' - <214')(60' - < 66')			**C-V** Boeing 777-200 and 787-8 Dreamliner, Airbus A340-300	**D-V** Boeing 747-400 and 777-300, Airbus A340-500
				

Figure 2.2-4

FAA Airport Reference Code Designations

Runway Length Recommendations

The purpose of this section is to present a summary of the runway length analysis included in the 2022 Cape Cod Gateway Airport Master Plan. Runway length requirements are based on the greater of the takeoff or landing performance characteristics of the critical design aircraft. Note that the takeoff length requirement nearly always dictates runway length requirements since takeoffs are typically the most demanding operation on a runway.

It should be understood that in practical application, specific runway takeoff length requirements must be generated for each flight that originates at any airport. These requirements are dependent on a wide range of variables (e.g., temperature, humidity, winds, runway condition and gradient, obstructions, aircraft type, length of haul, payload, etc.), many of which can vary dramatically daily or even hourly. However, for airport planning purposes, the FAA endorses applying a generalized methodology for establishing a recommended runway length; this is either computed from FAA composite aircraft fleet operational performance curves (typically used for critical airplanes with maximum takeoff weights (MTOW) between 12,500 pound and 60,000 pounds), or are determined from specific aircraft manufacturer performance data (typically applied for airplanes with a MTOW of greater than 60,000 pounds), or a combination of both.

Since Cape Cod Gateway Airport realizes a significant volume of traffic of aircraft operating in either category (with MTOW below and above 60,000 pounds), both FAA-recommended methodologies were applied. This was done specifically to balance the various needs of the full range of aircraft currently and projected to operate at the Airport over the long term. For those aircraft with a MTOW between 12,500 pounds and 60,000 pounds, the standard FAA methodology was applied to establish a baseline recommended runway length. This approach reflected the steps and requirements dictated in FAA AC 150/5325-4B, Runway Length Requirements for Airport Design, and through application of the FAA Airport Design Software v4.d; the results of this analysis are shown in **Table 2.2-3**.

It should also be recognized that runway length requirements will differ for some aircraft depending on whether the runway is dry or wet/contaminated (i.e., due to rain, snow, or ice)[4] with the latter conditions typically resulting in aircraft requiring additional runway length to operate safely.

Table 2.2-3 FAA Runway Length Recommendation

Input		
Airport Elevation	54' MSL	
Mean Daily Maximum Temp. in Hottest Month	78.0° F	
Maximum Difference in Runway Centerline Elevation	12'	
Estimated Stage Length	1,000 mi	
Runway Lengths Recommended for Airport Design		
	Dry Runway	Wet Runway
Large airplanes of 60,000 pounds or less:		
75 percent of these large airplanes at 60 percent useful load:	4,700'	5,270'
75 percent of these large airplanes at 90 percent useful load:	6,030'	6,800'
100 percent of these large airplanes at 60 percent useful load:	5,120'	5,500'
100 percent of these large airplanes at 90 percent useful load:	7,450'	7,450'
Large airplanes of greater than 60,000 pounds	Individual Assessment Required	

Source: FAA Airport Design Software

In reviewing the results of this analysis for Cape Cod Gateway Airport over a span of various aircraft types and useful loads, the recommended runway lengths ranges between 4,700 feet and 7,450 feet based on dry runway conditions. However, when considering wet runway conditions, which is not atypical at Cape Cod Gateway Airport, the minimum runway length increases from 5,270 feet to 7,450 feet, which exceeds the existing Runway 15-33 length of 5,255 feet. (It should also be noted that when such inclement weather is experienced at the Airport, aircraft will tend to operate on Runway 15-33 since it is considered to be the bad weather runway).

In essence, this analysis results in drawing the reasonable conclusion that Runway 15-33 is currently at the absolute minimum length required to safely accommodate the majority of the families of aircraft with a MTOW

[4] AC No. 35-21, *Takeoff Performance Data for Operations on Contaminated Runways*, provides guidance and standardized methods for developing takeoff performance data for operations on contaminated runways.

between 12,500 pounds and 60,000 pounds, which encapsulates most general aviation turbine-engine aircraft. Any enhancement to the existing length would increase the level of safety and operational effectiveness for the aircraft operating on Runway 15-33.

The second runway length methodology applied within the 2022 Cape Cod Gateway Airport Master Plan was based on conducting individual operational assessments for the range of the largest aircraft (with a MTOW of greater than 60,000 pounds) anticipated to operate on Runway 15-33 in the near future. This included both critical design aircraft (Embraer E190 and Gulfstream V/G500) as well as other large aircraft including Bombardier Global 5000/Express, Airbus A220, and Airbus A320.

As suggested above, runway length recommendations for aircraft are a function of a wide variety of factors, and for aircraft with MTOW, of greater than 60,000 pounds, those variables and the resultant runway length recommendations are often amplified. Thus, to take a measured and balanced approach, the runway length analysis for each of these aircraft not only included a complete runway length recommendation assessment based on their individual MTOWs, but it also established a typical stage length for each aircraft that is normally experienced at Cape Cod Gateway Airport. The two-step runway length analysis was done to help ensure that the recommendations were moderated and scaled to the actual needs of Cape Cod Gateway Airport.

Table 2.2-4 provides a summary of the detailed analysis conducted within the Master Plan. For each aircraft type, the range of potential runway lengths were determined (variability of the lengths is based on temperatures and payloads), as well as the runway length required to execute a typical flight from Cape Cod Gateway Airport, assuming standard weather conditions. The latter analysis incorporated data relative to the takeoff weight of the typical aircraft based on reasonable payload assumptions (e.g., passengers, luggage, etc.) and fuel weights of a typical operation airport within a 1,500 nautical mile (approximately 1,726 miles) range (stage length). This results in a more conservative analysis with reduced runway length recommendations as part of this EA/EIR analysis.

This approach reflects what is typically experienced at Cape Cod Gateway Airport as opposed to a maximum capability analysis, which is typical of a master plan study. Using information on typical destinations aircraft flying from the Airport are traveling to balance typical operational requirements and optimal operational requirements. However, it must be recognized that while these length requirements reflect operations that might be most typically expected, it is important for an airport to also consider actively enhancing aircraft capabilities beyond just those normal operations.

Table 2.2-4 Runway Length Analysis

Aircraft Type	Runway Length Recommendation - Standard Analysis at MTOW (feet)	Runway Length Recommendation - HYA Adjusted Analysis (feet, assumptions)
Embraer E190* (Existing Commercial)	6,115 – 8,915	5,290 (HYA-JFK)
Gulfstream V/G500* (Existing GA)	6,585 – 6,585	6,054 (1,500 NM)
Bombardier Global Express (Existing GA)	5,540 – 6,540	5,958 (1,500 NM)
A220 (Future Commercial)	6,200 – 9,415	5,865 (HYA-JFK)
A320 (Future Commercial)	5,515 – 7,515	6,000 (HYA-JFK)

McFarland Johnson analysis, 2020.

* Cape Cod Gateway Airport (HYA) Critical Design Aircraft per 2022 Cape Cod Gateway Airport Master Plan

As shown in this table, the fleet mix operating at MTOW has a range of runway length recommendations that extends from a minimum of 5,515 feet to a maximum of 9,415 feet (existing Runway 15-33 is 5,255 feet). In terms of runway lengths based on typical operations at Cape Cod Gateway Airport, the range extends from 5,290 feet to 6,054 feet, which happens to reflect the requirements for the existing design aircraft.

The previous sections presented the three different runway length evaluation methodologies employed within the 2022 Master Plan, all of which resulted in consistent results. **Figure 2.2-5** below aggregates those results into a single graphic that presents a range of aircraft that typically operate at Cape Cod Gateway Airport and their general takeoff runway length requirements compared against Runway 15-33's existing length, the range of lengths identified by the two FAA methodologies (for aircraft with MTOWs below and above 60,000 pounds), and range of lengths identified by the modified methodology designed to reflect typical operations at Cape Cod Gateway Airport.

Also included in **Figure 2.2-6** is the Airport Master Plan recommended runway length of 6,550 feet, which was established through an internal coordination process that weighed the various runway requirements against the physical constraints of the Airport site. The runway length of 6,550 feet represented the maximum runway length that could reasonably be achieved for Runway 15-33 without experiencing excessive physical, operational, and community impacts.

Bombardier Global Express 700

Embraer E 190

Dassault Falcon F7X

Gulfstream G500

Figure 2.2-5

Current Family of Aircraft at the Airport

Additionally, the regional role of Cape Cod Gateway Airport must be acknowledged and evaluated. Per H.R.302 - FAA Reauthorization Act of 2018, Section 47106 of title 49 of the United States Code, *"When evaluating the master plan of an airport [...], the Secretary shall take into account (1) the role an airport plays with respect to medical emergencies and evacuations; and (2) the role the airport plays in emergency or disaster preparedness in the community served by the airport."*[5]

Cape Cod Gateway Airport is the only public-use airport on Cape Cod having runways that exceed 5,000 feet. In an emergency, the Airport would play an essential role for the region including providing access to first responders, landing, and storing supplies for the area, as well as potentially facilitating evacuations of large portions of the population. For these purposes, aircraft similar to Boeing 737(BBJ)/A320-type aircraft must be factored into the runway length determination. These aircraft have takeoff distance requirements of approximately 6,500 feet with a full payload (to operate at that length and at full payload, these aircraft would have to take severe weight penalties that would limit the distance they could travel).

Conclusion

Based on the Airport Master Plan length analysis of the existing general aviation fleet mix as well as each of the individual aircraft greater than 60,000 pounds that regularly use the Airport, the range for runway length of between 6,000 and 6,400 feet was identified to meet the existing and future demands of the family of aircraft using the Airport while minimizing community impacts. As Cape Cod Gateway Airport's primary bad weather runway and the runway with the greatest ability to be extended, Runway 15-33 is the preferred runway for an extension. The Proposed Action to extend the runway to a total length of 6,150 feet meets the need to enhance airport operational safety by largely meeting the runway length requirements of aircraft that regularly utilize the Airport and balances community impacts by maintaining the runway and safety areas on the Airport. A displaced threshold on Runway 15 increases the takeoff clearance. The Proposed Action also enhances overall regional safety and emergency response capabilities by providing needed runway length. This runway extension length is reduced from the Master Plan's recommended length by 400 feet through the elimination of the 33-end extension. The revised runway length reduction is based on community commentary and additional feasibility analyses.

2.2.1.5 Extend Taxiway A (including new Taxiway A1 and Taxiway A4)

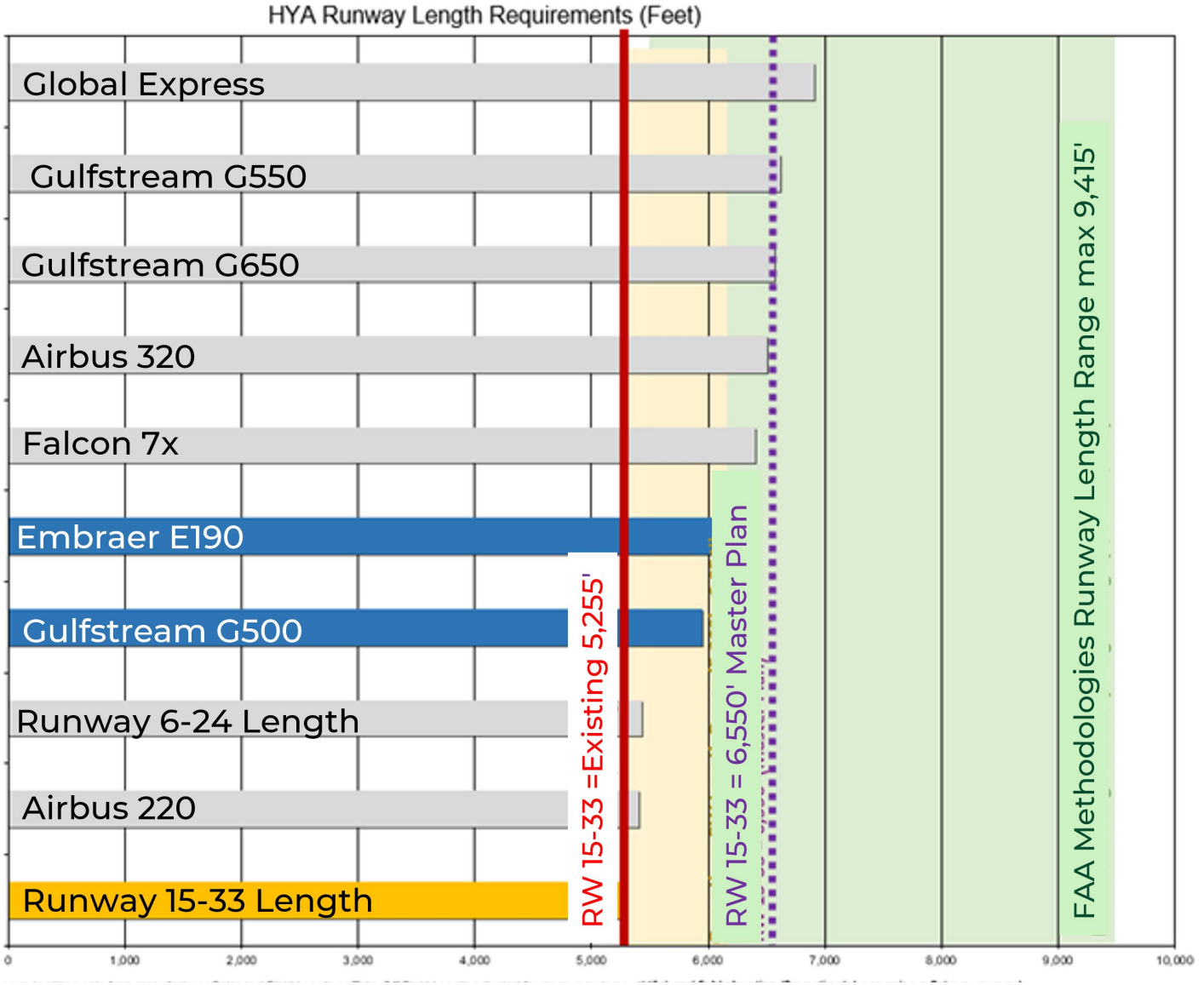
Existing Taxiway A measures 50 feet wide and serves as a full-length parallel taxiway to Runway 15-33 adjacent to the Terminal Ramp. The Proposed Action proposes to extend Taxiway A and construct new connectors (Taxiway A1 and Taxiway A4) to align with the new Runway 15 end as described in Section 2.2.1.4. Full parallel taxiways are recommended as a standard airport design element. To optimize operational safety and efficiency, taxiways must extend to the runway ends. This eliminates the need for "back-taxiing" operations and enables runway crossings to occur at runway ends, the safest location to cross a runway. This Project maintains this functionality as part of the proposed runway extension project. See **Figure 2.2-3**.

2.2.1.6 Aeronautical Development Areas

Based on the Airport Master Plan forecasted demand, between 40,000 sf and 67,000 sf of additional apron space will be required by 2040. There is an existing shortage of conventional hangar space per the Airport Master Plan and a waiting list for existing Airport hangars. During the preparation of this EA, the list has 25 aircraft owners actively waiting for a hangar. The Master Plan recommends planning for a mix of both new individual hangars and conventional hangars to account for growing demand and new businesses' needs. See **Figures 2.2-7** and **2.2-8**.

The Proposed Action allocates a combined 42 acres of Airport land divided into two areas (East and North Ramps) for additional aeronautical development. The relocation of Taxiway B described above would open up additional space to the areas that are currently in use for aeronautical activities at the East Ramp. These ramp development areas include future space for transient aircraft parking as well as additional hangars or other aeronautical businesses and will be developed as opportunities for growth arise. Future hangar development will accommodate longer wingspans to reflect the needs associated with newer aircraft types. For example, the typical existing T-hangar door width is 42 feet, while newer ADG I aircraft often have wingspans of 44 to 48 feet.

[5] https://www.congress.gov/115/plaws/publ254/PLAW-115publ254.pdf



Source: Airport Solutions Group 2023.

** HYA Critical Design Aircraft are shown in yellow*

Figure 2.2-6

Runway Length Analysis Summary

Table 2.2-5 Summary of Need and Purpose of Proposed Projects

Measure	Deficiency	Need and Purpose
Construction of Partial Parallel Taxiway D	♦ Non-Standard FAA airfield geometry ♦ Non-right-angle taxiway ♦ Provides direct access from the ramp to the runway	♦ Increases airfield safety and efficiency. ♦ Eliminates direct ramp to runway access. ♦ Eliminates high-energy crossing. ♦ Prevents two-way taxing.
Removal of Taxiway E and Runup Area and Construction of Engine runup Area	♦ Non-Standard FAA airfield geometry ♦ Non-standard taxiway to runway separation ♦ Non-right-angle taxiway	♦ Increases airfield safety and efficiency.
Reconstruction and Relocation of Taxiway B	♦ Does not meet taxiway width for TDG 3. ♦ Relocation to allow for future hangar development within East Apron ♦ Does not meet runway ends	♦ Increases safety of aircraft operating at the airport. ♦ Maximizes aeronautical development within existing developed / disturbed areas. Allows access via new roadway along Mary Dunn Way.
Runway 15-33 extension	♦ Current runway lengths do not meet operational and efficiency requirements of the critical design aircraft	♦ Increases safety of aircraft operating at the airport.

Figure 2.2-7

Conceptual Layout of East Ramp Development

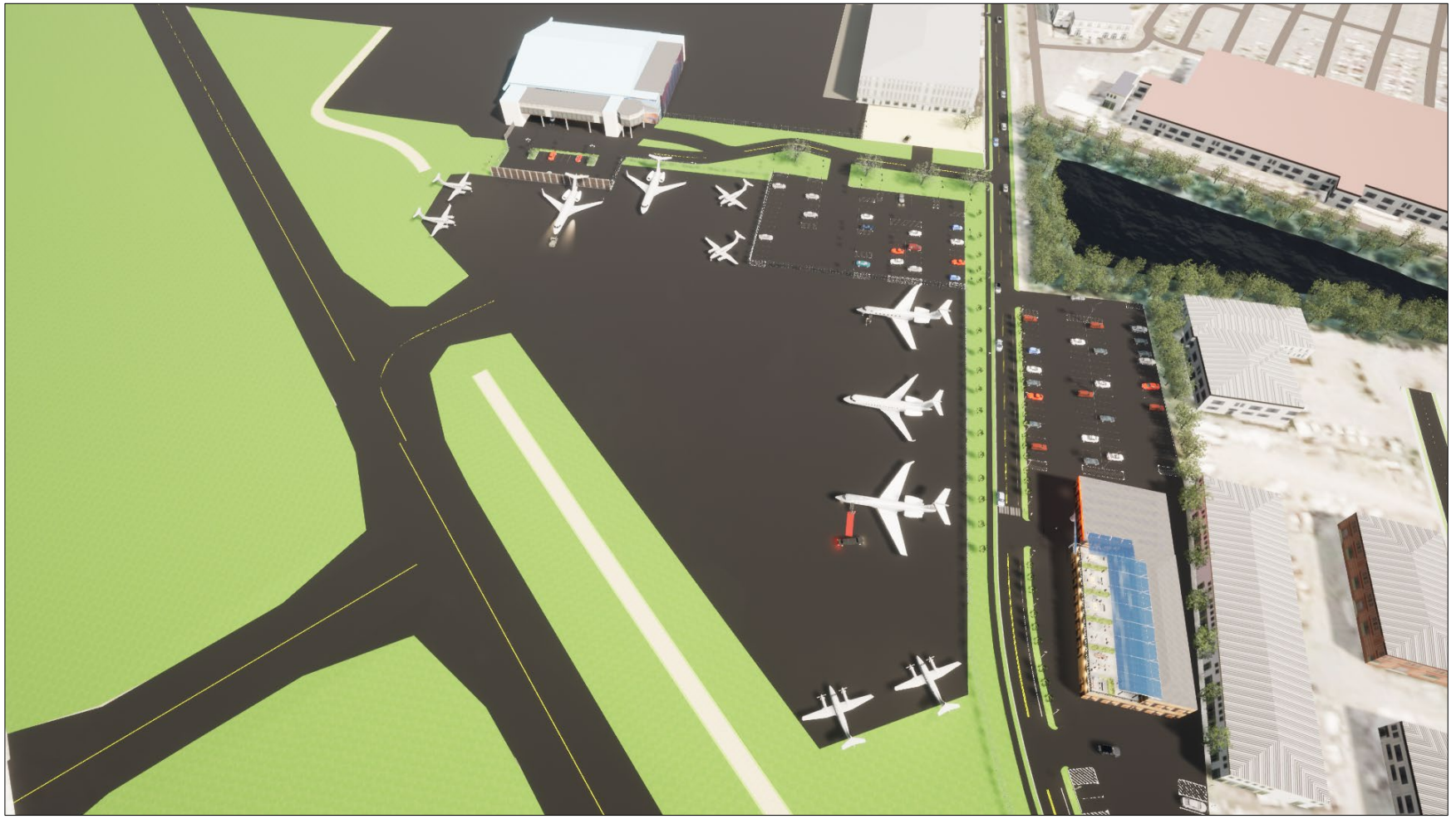


Figure 2.2-8

Conceptual Layout of North Ramp Aircraft Tie-Down and Parking

2.2.2 Landside Improvements

2.2.2.1 Construct Electric Aircraft Support Equipment

Aircraft manufacturers have begun investing in the development of all-electric aircraft. The development has focused predominantly on nine-seat and smaller aircraft. The key planning considerations associated with the development of electric aircraft include the provision of the airport facilities necessary for charging, maintenance, and storage.

To respond to industry developments, the Proposed Action includes ramp space for up to six electric aircraft parking for itinerant ADG II aircraft. The Airport has identified space on either side of the terminal ramp (see **Figure 1.1-1**) to plan for electric aircraft infrastructure for both GA and commercial aircraft. As electric aircraft technology continues to advance, the Airport is planning for access to charging and parking options for electrical aircraft.

MassDOT Aeronautics recently received a US$1.95 million grant award to be used in the planning of a smart microgrid at Cape Cod Gateway Airport. The microgrid will generate and distribute clean, reliable power, not only to the Airport, but for charging electric aircraft, and electric ground vehicles (including buses). In collaboration with the Cape Cod Regional Transit Authority (CCRTA), the initiative will increase access to clean energy independence while supporting communities near the Airport.

2.2.3 Airspace Control Improvements

2.2.3.1 Runway 15-33 RSA and Runway Object Free Area Avigation Easements

The FAA defines Runway Object Free Areas (ROFAs) as an area cleared of all objects except those that are related to navigational aids and aircraft ground maneuvering. ROFA is also centered around runways to enhance the safety of aircraft operations. The Proposed Action will acquire avigation easements from willing parties designed to enhance the Airport's control of the existing ROFAs. FAA design standards for ROFAs surrounding runways serving AAC-ADG C-III aircraft are a width of 800 feet, a length that extends 600 feet prior to the landing threshold, and a length that extends 1,000 feet beyond the runway end. ROFAs and objects within it should be at or below the nearest Runway Safety Area elevation. A total of four easements for 0.8 acres have been identified for future easement acquisition (on a seller willing basis) for existing airfield conditions.

2.2.3.2 Enhance Airport control over Runway Protection Zones

Runway Protection Zones (RPZs) are large trapezoidal areas on the ground off each runway end that are within aircraft approach and departure paths (see FAA AC 150/5300-13 Change 11, Appendix 14 for approach and departure RPZs). The RPZ is intended to enhance the protection of people and property on the ground. Many land uses including residential, churches, and fuel storage are prohibited by FAA standards within these areas. These limitations are only applicable if the RPZ is owned or controlled by the Airport sponsor.

Under existing conditions at the Airport, areas within RPZs that are not under Airport control via avigation easements or fee simple include all portions of the Runway 6 RPZs west of Iyannough Road (71 parcels), the north and southwest corners of the Runway 15 RPZ (15 parcels), the southern corner of the Runway 24 RPZ (12 parcels), and the eastern portion of the Runway 33 RPZ (36 parcels), for a total of 44 acres/134 parcels. Airport control of these areas could be obtained through direct property acquisition or easements or zoning to control development and land use activities.

Avigation easement acquisition off the 15-end, to prevent future obstructions, is required for the runway extension. A total of four additional full or partial easements will be pursued on a willing seller basis. These easements are primarily commercial properties located on Independence Drive, Thornton Drive and Kidd's Hill Road. Layout plans depicting these parcels identified for easement acquisition for existing or proposed RPZs are included in **Appendix D**.

The Proposed Action will acquire avigation easements from willing parties designed to bring both existing RPZs and the proposed Runway 15 RPZ into Airport control.

Chapter 3.0

Proposed Action Description

3.0 PROPOSED ACTION DESCRIPTION

This chapter describes the 2022 Master Plan projects, that have been identified as occurring in the reasonably foreseeable future, including those whose design and permitting will occur within the next 5-7 years. These include airside, airspace, and landside facility requirements, necessary to enhance safety and efficiency and meet requirements of existing aircraft families at Cape Cod Gateway Airport (the Airport) in accordance with Federal Aviation Administration (FAA) design criteria and safety standards. Additionally, projects are identified that enhance economic activity and revenue for the Airport, as well as projects to achieve green energy goals.

3.1 Airside Facilities

Airside facilities are those airport layout components that are directly related to the arrival and departure of aircraft, primarily runways and taxiways and their associated safety areas. This section addresses the projects determined to be necessary to bring the airside portion of the airport into compliance with FAA design criteria and standard geometry.

3.1.1 Construct Partial Parallel Taxiway D to Runway 15-33

This Proposed Action involves construction of a new partial parallel taxiway east of Runway 15-33 with a standard 400-foot runway centerline to taxiway centerline separation. It will extend from the existing Taxiway A1 across existing Taxiway D and Runway 6-24 to the proposed relocated Taxiway B (see Section 3.1.3 below). This taxiway would be approximately 3,700 feet in length, 50 feet wide, and tie in with the existing/remaining taxiway. Ultimately, this new partial parallel taxiway will be named Taxiway D. This Project also includes the removal of the portion of existing Taxiway D between existing Taxiway A across Runway 15-33 and up to the proposed new partial parallel taxiway. Unpaved Airport perimeter vehicular access would be provided on the north side of the new taxiway. Construction of Taxiway D will result in a net increase of 1.37 acres of pavement. Stormwater management infrastructure will be designed to comply with regulatory requirements for managing runoff associated with this impervious surface.

Due to the required runway to taxiway separation distance, the taxiway pavements and associated taxiway object free and safety area construction will impact wetland resource areas associated with Upper Gate Pond, requiring approximately 6,000 cubic yards (cy) of fill material. Approximately 10,900 sf of Land Under Water (LUW) and approximately 3,000 sf of Bordering Vegetated Wetlands (BVW) will be permanently filled. Grading associated with the taxiway and runup area will result in an excess of 17,500 cy of material that can be re-used on other projects on Airport property. Additionally, approximately 3.76 acres of forest/shrub-scrub upland areas will be impacted for the construction of this Project.

The proposed new partial parallel Taxiway D enhances safety by eliminating direct access from the North Ramp to Runway 15-33 that can lead to pilots missing hold lines and causing a runway incursion. The new taxiway also eliminates the y-shaped (non-right angle) runway crossing for Runway 15-33 and the high-energy crossing on Runway 15-33. A non-right angle taxiway approaching a runway can lead the taxiing aircraft to inadvertently enter the runway.

3.1.2 Remove Taxiway E and Existing Runup Area/Construct a Runup Area for Partial Parallel Taxiway D

The Proposed Action will remove existing Taxiway E and the aircraft runup area (pit), correcting non-right angle geometry at Runway 15-33 (taxiway Intersecting runway at non-right angle). The existing Taxiway E measures 50 feet wide and connects Runway 15-33 to an approximately ±42,000 sf engine run-up area, which currently does not have a sound barrier. Construction of a new run-up area along the north side of the proposed partial parallel Taxiway D (discussed above) will accommodate the existing fleet of aircraft using the current run-up pad (including the Cessna 402 and Tecnam P2012). A noise wall would be constructed adjacent to the run-up area to provide noise mitigation for surrounding areas.

3.1.3 Realign and Reconstruction Taxiway B

The Proposed Action would re-align Taxiway B to a standard 400-foot separation south of Runway 6-24 to separate the taxiway from the East Apron. The proposed Taxiway B would be widened to 50 feet to meet taxiway Design Group 3 standards to optimize existing and future aircraft movement. Taxiway B would be 4,000 feet long. The Proposed Action would also extend Taxiway B northward by 750 feet to the south of the existing glide slope while the TOFA would remain clear of the glide slope. Portions of the taxiway safety areas are not currently up to standard. All safety areas would be brought to the correct grades. Unpaved Airport perimeter vehicular access would be provided from the East Ramp / end of Mary Dunn Way along the south side of the new taxiway, meeting the existing access road near the end of the runway by the fence line.

The total area of disturbance including pavement removal, turf removal and grading is approximately 19.2 acres. The net gain in impervious surface is 5.2 acres. There will be no impacts on wetland resource areas as part of this realignment. Due to the grading required associated with the safety areas and taxiway construction, this

Project will require a net import of fill material of approximately 23,865 cy. Stormwater management infrastructure will be designed to comply with standards and provide an improvement over existing conditions.

3.1.4 Runway 15-33 and Taxiway A Extension

The Proposed Action would extend Runway 15-33 by 895 feet on the 15-end (western end) to a total length of 6,150 feet from 5,255 feet, based on the runway length analysis for the critical aircraft for the Airport identified in the Master Plan and updated analysis in Chapter 4.0 of this document. The extension would maintain the existing width of 150 feet. Grading of a new turf runway safety area would extend from the end of the runway by 1,000 feet. Taxiway A will be extended to the new end of the runway (see discussion below). Additionally, Runway 15 Precision Approach Path Indicators (PAPI) will be relocated for the new end of runway. These lights consist of four light boxes arranged perpendicular to the end of the runway and provide a red and white light projection pattern along the descent path to the touchdown point on the runway. There will be no impacts on wetland resource areas as part of this extension nor required tree removals.

The Proposed Action would also extend Taxiway A by 895 feet to meet the new runway end to allow aircraft to exit the runway efficiently. The current width of 50 feet would be maintained for this extension. A full-length parallel taxiway enhances safety by reducing "back-taxiing" and runway crossings. Currently, Taxiway A measures 50 feet wide and serves as a full-length parallel taxiway to Runway 15-33 adjacent to the Terminal Ramp. As part of the extension of Taxiway A, a new stub taxiway, Taxiway A4, would be constructed to connect Runway 15-33 to Taxiway A approximately 5,380 feet from the Runway 15 threshold.

Due to the grading required associated with the safety areas and runway construction, a portion of the existing runway will also be reconstructed. This includes elevating the grades of a portion of the existing runway to meet the new runway extension. Because of this change in grade, this Project will require a net import of fill material of 23,865 cy. Impacts to existing turf area will comprise 42.63 acres, inclusive of the new runway safety areas extending from the end of the runway and the edges of pavement along with taxiway safety areas. These areas will be restored to turf. There will be a net increase in pavement of approximately 3.25 acres. Approximately 5.7 acres of existing runway and taxiway pavement will be reconstructed. Stormwater management infrastructure will be designed to comply with Massachusetts Stormwater Management Standards and will seek to both provide an improvement over existing conditions and increased rainfall events.

3.1.5 Aeronautical Development Areas

The Proposed Action includes two areas for additional aeronautical development on the Airport for a combined 42 acres - East Ramp and North Ramp - as opportunities for growth arise. These ramp development areas would include space for transient aircraft parking as well as additional hangars or other aeronautical businesses. Future hangar development could consider longer wingspans, which are a feature of modern single- and multiengine- aircraft. The typical T-hangar door width is 42 feet and modern ADG I aircraft have wingspans of 44 to 48 feet. The North Ramp area is already paved.

Based on forecasted demand, between 40,000 sf and 67,000 sf of additional apron space will be required by 2040. There is also an existing shortage of conventional hangar space per the Master Plan and current waiting list for hangars maintained by the Airport. The additional space proposed at the East Ramp would require the clearing of ~6 acres of trees and the addition of ~9.1 acres of impervious surface, inclusive of potential hangar buildings. There are no wetland resource area impacts associated with this Project. Any development projects at the East Ramp would be required to avoid disturbance of the cap of the PFAS disposal area (see Section 6.12.6 for additional discussion), soils would not be reused onsite. Stormwater management infrastructure will be designed to comply with Massachusetts Stormwater Management Standards and will seek to provide an improvement over both existing conditions and increased rainfall events. Hangars at the East Ramp would have all water and sewer service provided by existing mains installed in 2022 along Mary Dunn Way. Connections to these mains would be required by the individual hangar developers. Conceptual layouts of these ramp development areas are shown in **Figure 2.2-7**.

3.2 Landside Improvements

Landside improvements are those projects which support the operations of the Airport.

3.2.1 Construct Electric Aircraft Support Equipment

To respond to industry developments, the Proposed Action includes space for up to six electric aircraft parking for itinerant Airplane Design Group (ADG) II aircraft. The Airport has identified space on either side of the terminal (see **Figure 1.1-3**) to plan for electric aircraft infrastructure for both GA and commercial aircraft. This equipment will support the charging of electric aircraft.

3.3 Airspace Control Improvements

3.3.1 Runway 33 RSA and Runway Object Free Area (ROFA) Avigation Easements

The Proposed Action will acquire avigation easements from willing parties designed to bring existing Runway Object Free Areas (ROFAs) into Airport control (see **Table 3.3-1**). Currently, not all the ROFAs are within airport control for existing conditions. A total of four (4) easements for 0.8 acres have been identified as out of airport control, associated with Runway 33 end. These are identified as Parcels 33-1 through 33-4 on the Town parcel map (see **Figure 3.3-1**). Roadways such as Iyannough Road and Yarmouth Road are not proposed for acquisition. Existing airport penetrations into ROFA are managed through modification to standards approved by the FAA every five years.

Table 3.3-1 ROFA Penetrations

Location	Penetration
Runway 33 End	Iyannough Road, Mary Dunn Way, four off-Airport buildings, Airport perimeter fence, ARFF/Maintenance/SRE Ramp;
Runway 24 End	Yarmouth Road, railroad tracks, Airport perimeter fence
Runway 15	Glideslope runway visual range (RVR), wind cone
Runway 15-33 along the side of the runway	Distance measuring equipment (DME), precision approach path indicator (PAPI) power and control units
Runway 6-24 along the side of the runway	Localizer, DME, PAPI power and control units, glideslope, ASOS

3.3.2 Enhance Airport control over off-Airport Property within Runway Protection Zones

The Proposed Action will acquire avigation easements from willing parties designed to bring existing Runway Protection Zones (RPZs) into Airport control. Under existing conditions at the Airport, areas within RPZs that are not under Airport control via either avigation easements or fee simple include all portions of the Runway 6 RPZs west of Iyannough Road (70 parcels), the north and southwest corners of the Runway 15 RPZ (15 parcels), the southern corner of the Runway 24 RPZ (12 parcels), and the eastern portion of the Runway 33 RPZ (36 parcels), for a total of 44 acres/133 parcels. Airport control of these areas could be obtained through direct property acquisition or easements or zoning to control development and land use activities.

Existing avigation easements are identified on Sheet 23 of the Airport Layout Plan in **Appendix D**. Avigation easement acquisition off the 15-end, to prevent future obstructions, is required for the runway extension within the Town of Barnstable. A total of 12 additional partial easements will be pursued on a willing seller basis (see **Figure 3.3-2** and **Table 3.3-2**). These easements are primarily commercial properties located on Independence Drive, Thornton Drive, and Kidd's Hill Road. Layout plans depicting these parcels identified for easement acquisition for existing or proposed RPZs are included in **Appendix D**.

Table 3.3-2 Avigation Easements Needed for Proposed Conditions associated with Runway 15 Extension

Parcel ID	Address	Acres	Full or Partial Easement
314-041-00S	270 Communication Way	0.017	Partial
296-005-001	11 Thornton Drive	1.11	Partial
296-009	53 Thornton Drive	0.2	Partial
296-025	400 Kidd's Hill Road	1.57	Partial
295-004-001	0 Wilkins Lane	0.77	Partial
295-011	75 Perseverance Way	0.72	Partial
296-008-0A	30 Thornton Drive	0.11	Partial
296-010	52 Thornton Drive	0.49	Partial
296-031	270 Communication Way	1.42	Partial
296-007	31 Thornton Drive	0.49	Partial
296-005-002	20 Merchants Way	0.01	Partial
296-012-00H	72 Thornton Drive	0.18	Partial
Total		7.11 ac	

Figure 3.3-1 Runway 33 ROFA Easements and Proposed RPZ Easements for Existing Conditions

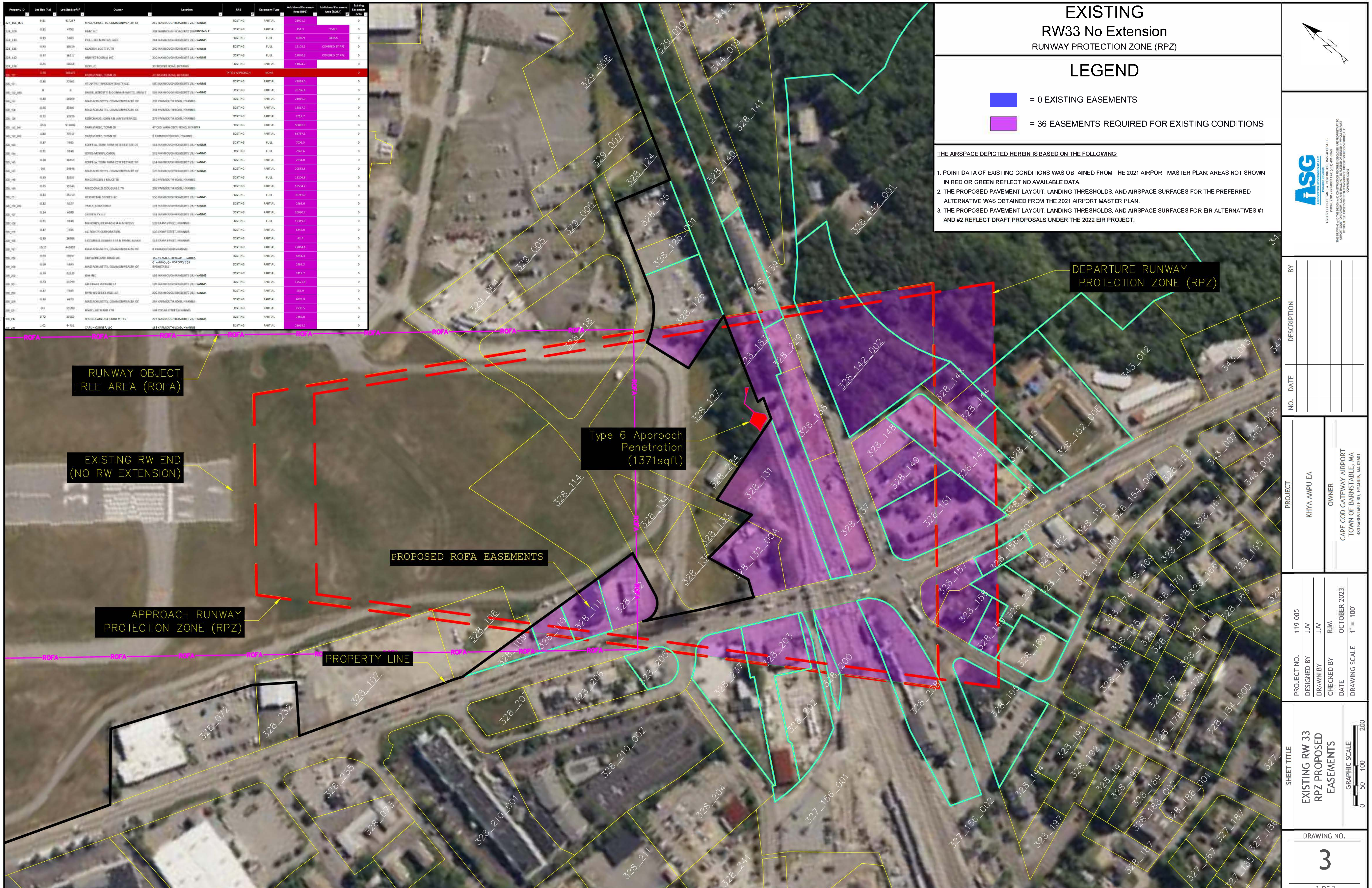
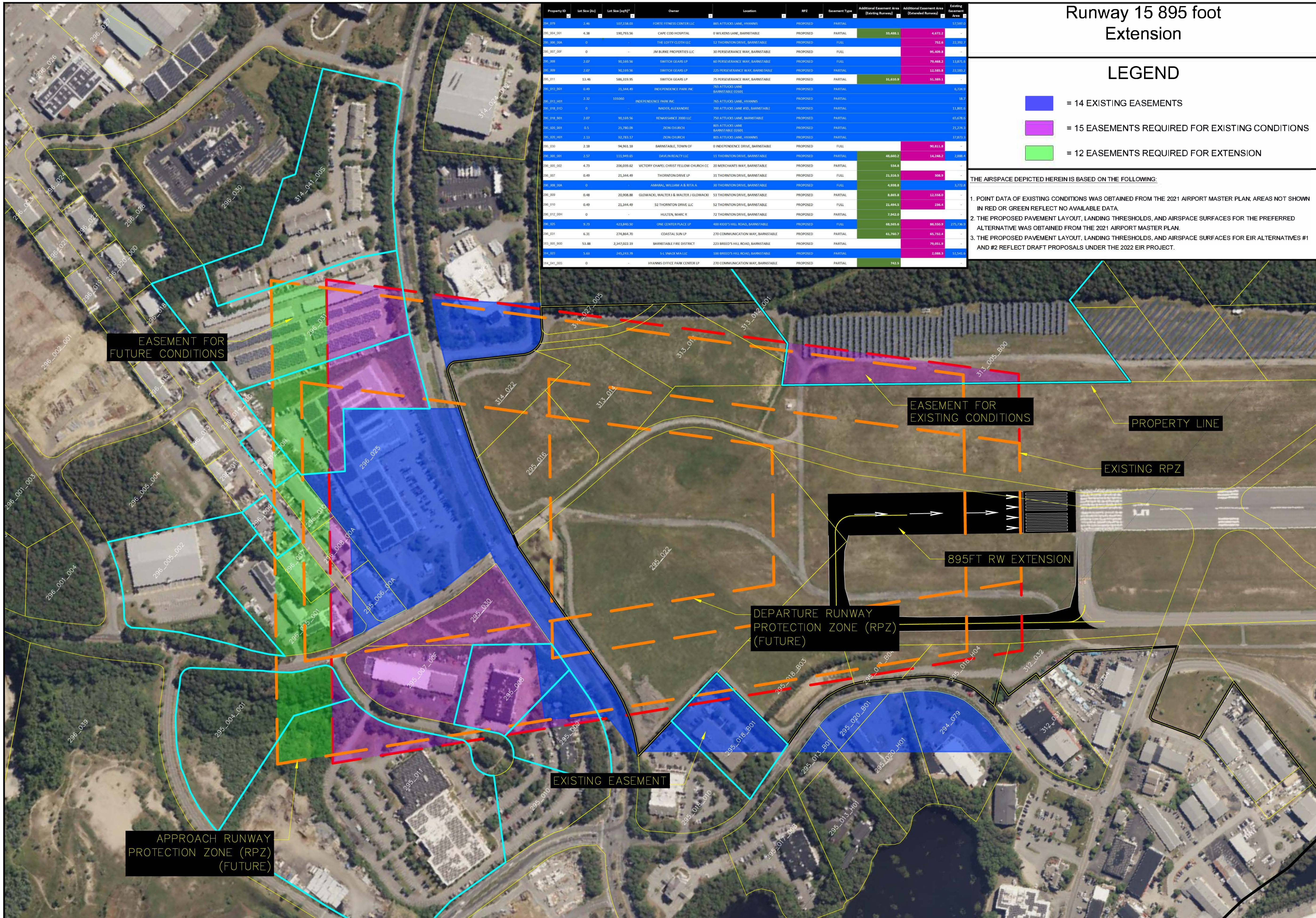


Figure 3.3-1: *Runway 33 ROFA Easements and Proposed RPZ Easements for Existing Conditions*



Property ID	Lot Size (Ac)	Lot Size (sqft)*	Owner	Location	RPZ	Easement Type	Additional Easement Area (Existing Runway)	Additional Easement Area (Extended Runway)	Existing Easement Area
294_079	2.46	107,158.03	FORTE FITNESS CENTER LLC	865 ATTUCKS LANE, HYANNIS	PROPOSED	PARTIAL			57,597.0
295_004_001	4.38	190,793.56	CAPE COD HOSPITAL	0 WILKENS LANE, BARNSTABLE	PROPOSED	PARTIAL	33,488.1	4,672.2	-
295_006_00A	0	-	THE LOFTY CLOTH LLC	12 THORNTON DRIVE, BARNSTABLE	PROPOSED	FULL		752.6	22,392.7
295_007_00F	0	-	JM BURKE PROPERTIES LLC	30 PERSEVERANCE WAY, BARNSTABLE	PROPOSED	FULL		95,409.8	-
295_008	2.07	90,169.56	SWITCH GEARS LP	60 PERSEVERANCE WAY, BARNSTABLE	PROPOSED	FULL		79,468.2	13,871.6
295_009	2.07	90,169.56	SWITCH GEARS LP	225 PERSEVERANCE WAY, BARNSTABLE	PROPOSED	PARTIAL		12,585.8	22,183.2
295_011	13.46	586,319.95	SWITCH GEARS LP	75 PERSEVERANCE WAY, BARNSTABLE	PROPOSED	PARTIAL	31,610.9	51,389.1	-
295_013_B01	0.49	21,344.49	INDEPENDENCE PARK INC	765 ATTUCKS LANE BARNSTABLE 02601	PROPOSED	PARTIAL			6,724.9
295_013_H01	2.32	101060	INDEPENDENCE PARK INC	765 ATTUCKS LANE, HYANNIS	PROPOSED	PARTIAL			18.7
295_018_01D	0	-	NADER, ALEXANDRE	700 ATTUCKS LANE #1D, BARNSTABLE	PROPOSED	PARTIAL			11,801.6
295_018_B01	2.07	90,169.56	RENAISSANCE 2000 LLC	750 ATTUCKS LANE, BARNSTABLE	PROPOSED	PARTIAL			65,678.6
295_020_B01	0.5	21,780.09	ZION CHURCH	805 ATTUCKS LANE BARNSTABLE 02601	PROPOSED	PARTIAL			21,274.3
295_020_H01	2.13	92,783.17	ZION CHURCH	805 ATTUCKS LANE, HYANNIS	PROPOSED	PARTIAL			37,873.3
295_030	2.18	94,961.18	BARNSTABLE, TOWN OF	0 INDEPENDENCE DRIVE, BARNSTABLE	PROPOSED	FULL		90,811.8	-
296_005_001	2.57	111,949.65	DAVLIN REALTY LLC	11 THORNTON DRIVE, BARNSTABLE	PROPOSED	PARTIAL	48,660.2	14,248.2	2,888.4
296_005_002	4.73	206,039.62	VICTORY CHAPEL CHRIST FELLOW CHURCH CC	20 MERCHANTS WAY, BARNSTABLE	PROPOSED	PARTIAL	534.8		-
296_007	0.49	21,344.49	THORNTON DRIVE LP	31 THORNTON DRIVE, BARNSTABLE	PROPOSED	FULL	21,316.5	308.9	-
296_008_00A	0	-	AMARAL, WILLIAM A & RITA A	30 THORNTON DRIVE, BARNSTABLE	PROPOSED	FULL	4,938.8		3,772.8
296_009	0.48	20,908.88	GLOWACKI, WALTER J & WALTER J GLOWACKI	53 THORNTON DRIVE, BARNSTABLE	PROPOSED	PARTIAL	8,865.8	12,558.0	-
296_010	0.49	21,344.49	52 THORNTON DRIVE LLC	52 THORNTON DRIVE, BARNSTABLE	PROPOSED	FULL	21,494.5	236.4	-
296_012_00H	0	-	HULTEN, MARC R	72 THORNTON DRIVE, BARNSTABLE	PROPOSED	PARTIAL	7,942.0		-
296_025	9.73	423,840.50	ONE CENTER PLACE LP	400 KIDD'S HILL ROAD, BARNSTABLE	PROPOSED	FULL	68,565.6	88,550.9	275,736.9
296_031	6.31	274,864.70	COASTAL SUN LP	270 COMMUNICATION WAY, BARNSTABLE	PROPOSED	PARTIAL	61,760.7	65,732.4	-
313_005_B00	53.88	2,347,022.19	BARNSTABLE FIRE DISTRICT	223 BREED'S HILL ROAD, BARNSTABLE	PROPOSED	PARTIAL		79,051.9	-
314_023	5.63	245,243.78	S-L SNACK MA LLC	100 BREED'S HILL ROAD, BARNSTABLE	PROPOSED	PARTIAL		2,088.3	51,541.6
314_041_00S	0	-	HYANNIS OFFICE PARK CENTER LP	270 COMMUNICATION WAY, BARNSTABLE	PROPOSED	PARTIAL	742.5		-

Runway 15 895 foot Extension

LEGEND

- = 14 EXISTING EASEMENTS
- = 15 EASEMENTS REQUIRED FOR EXISTING CONDITIONS
- = 12 EASEMENTS REQUIRED FOR EXTENSION

THE AIRSPACE DEPICTED HEREIN IS BASED ON THE FOLLOWING:

1. POINT DATA OF EXISTING CONDITIONS WAS OBTAINED FROM THE 2021 AIRPORT MASTER PLAN; AREAS NOT SHOWN IN RED OR GREEN REFLECT NO AVAILABLE DATA.
2. THE PROPOSED PAVEMENT LAYOUT, LANDING THRESHOLDS, AND AIRSPACE SURFACES FOR THE PREFERRED ALTERNATIVE WAS OBTAINED FROM THE 2021 AIRPORT MASTER PLAN.
3. THE PROPOSED PAVEMENT LAYOUT, LANDING THRESHOLDS, AND AIRSPACE SURFACES FOR EIR ALTERNATIVES #1 AND #2 REFLECT DRAFT PROPOSALS UNDER THE 2022 EIR PROJECT.

ASG AIRPORT SOLUTIONS GROUP, LLC
Innovation By Design
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NO.	DATE	DESCRIPTION	BY

PROJECT: KHYA AMPU EA

OWNER: CAPE COD GATEWAY AIRPORT, TOWN OF BARNSTABLE, MA, 480 BARNSTABLE RD, HYANNIS, MA 02601

PROJECT NO.	119-005
DESIGNED BY	JJV
DRAWN BY	JJV
CHECKED BY	RJM
DATE	OCTOBER 2023
DRAWING SCALE	1" = 150'

SHEET TITLE: EIR ALTERNATIVE #1 RW 15 RPZ PROPOSED EASEMENTS

GRAPHIC SCALE 0 75 150 300

DRAWING NO. 2

2 OF 3

10/2/2023 2:47:45 PM P:\ASG Data\Projects\PVT - Epsilon Associates\119-005 - HYA AMPU EA\CADD\Drawings\119-005 RW15-33 Extension Alternatives.dwg (JJV)

Figure 3.3-2: *Runway 15 Proposed RPZ Easements Acquisition for Runway Extension*

3.4 Project Schedule

Projects are anticipated to be constructed are identified in **Table 3.4-1** along with the estimated timeline for projects described in this EA.

Table 3.4-1 Proposed Project Schedule (Calendar Year)

Project	2025	2026	2027	2028	2029	2030
Airside						
Relocate and Extend Taxiway B	--	--	--	--	--	--
Reconstruct and Realign Taxiways D/E, new run up ramp	--	--	--	Permit	Permit	Design/Construct
Extend Runway 15-33	--	--	--	Permit	Permit	Design/Construct
Extend Taxiway A (including new Taxiway A and A4)	--	---	--	Permit	-	Design/Construct
East Ramp Development	On-going pending leasing					
North Ramp Development	On-going pending leasing					
Landside						
Construct electric aircraft support equipment	--	--	--	--	--	--
Airspace Enhancements						
Proposed RPZ Easements	On-going pending funding					
Runway 33 RSA and ROFA Easements	On-going pending funding					

3.5 Summary of Impacts of Proposed Action

Table 3.5-1 Land Impacts of Proposed Actions

Project	Temporary Disturbance to grassed areas	Existing Vegetated to Impervious	Removal of Existing Impervious	Net Increase in Impervious	Impacts to Wetland Resource Areas
Reconstruct and Realign Taxiways D and E / Remove Taxiway D/E and the existing runup pit, new run up ramp	12.56 ac	3.76 ac	3.45 ac	1.37 ac	10,900 sf LUW 3,000 sf BVW 300 lf Bank
Extend Runway 15-33	42.63 ac	3.25 ac	0	3.25 ac	0
Relocate and Extend Taxiway B	12.22 ac	7.58 ac	2.39 ac	5.2 ac	0
Extend Taxiway A (including new Taxiway A and A4)	included in RW extension #s	1.69 ac	0	1.69 ac	0
Construct electric aircraft support equipment	0	0	0	0	0
East Ramp Development	Included in TWY B #'s	17.3 ac	0	17.3 ac	0
North Ramp Development	0	9.1 ac	0.81 ac	8.25 ac	0
Runway Extension RPZ Easements	0	0	0	0	0
Total	**67.41 ac**	**42.68 ac**	**6.65 ac**	**37.06 ac**	**10,900 sf LUW 3,000 sf BVW 300 lf Bank**

Chapter 4.0

Alternatives Analysis

4.0 ALTERNATIVES ANALYSIS

This chapter provides information on alternatives identified for evaluation in this EA consistent with the purpose and need for the proposed Projects. As required by the Council on Environmental Quality (CEQ) regulations (Title 40 Code of Federal Regulations [C.F.R.] section 1502.14). During the Master Plan development, the alternatives were initially screened based on the ability of the proposed Projects (and alternatives) to meet the following purpose and need screening criteria:

- Accommodate forecasted aviation demand and satisfy the corresponding facility requirements,
- Meet applicable FAA design and airfield geometry standards, and
- Provide methods to meet local constraints and address community concerns.

The Master Plan analyzed alternatives against Level 1 screening criteria (infrastructure constraints) and Level 2 screening criteria (FAA standards and facility requirements). In addition to the Master Plan screening criteria described above, this EA evaluates additional alternatives based on preliminary design concepts used to identify environmental impacts community impacts, and estimated cost.

The following alternatives analysis presents considered alternatives in comparative form based on the information and analysis presented in Chapter 5.0, Affected Environment and Chapter 6.0, Environmental Consequences. Consistent with this goal, the following analysis on alternatives considers what effect changing the parameters of a project, or components, will have on the environment. The following information is provided within this alternatives analysis:

- The Proposed Action,
- Reasonable alternatives to the Proposed Action, including alternatives that the agency eliminated from detailed study and reasons for their elimination,
- Information on the No- Action (i.e., No-Build) Alternative, and
- Preferred alternative or alternatives, if one or more exists.

FAA Order 5050.4B, paragraph 706 (d)(7), notes that when an alternative is considered but judged "not reasonable," the EA should concisely explain why the sponsor or FAA eliminated the alternative from further consideration. Environmental impacts, avoidance, minimization, and mitigation measures for the proposed Projects are briefly described in this chapter and expounded upon in Chapter 5.0 – Affected Environment and Chapter 6.0 – Environmental Consequences.

As part of the alternatives analysis, a "No-Build Alternative" is considered for each proposed Project. The No-Build Alternative leaves existing conditions unchanged. No improvements would be made. The No Build Alternative serves as the baseline to which the other alternatives are compared. A No-Build scenario assumes preventive or routine maintenance activities on existing infrastructure and considers other ongoing Airport-sponsored projects. Project locations are shown in **Figure 1.1-3** and the alternatives are individually shown in **Figures 4.1-1 through 4.1-12**.

4.1 Airside Alternatives

Airside alternatives include projects directly related to the arrival and departure of aircraft, primarily runways and taxiways and associated safety areas. Airside alternatives are provided to identify potential solutions to non-standard FAA geometry or design conditions as identified in the Airport Master Plan.

As noted in the Master Plan, a variety of aircraft types, both large and small, using the Airport have different runway requirements. The Master Plan's Airfield Capacity analysis provides factors relative to runway length that are used to determine aircraft performance and the runway requirements that must be met for an aircraft to use a particular runway. Additional review of alternatives has been conducted as part of environmental review, and as appropriate, alternatives that reduce and minimize impacts, primarily community and environmental impacts, over the Master Plan recommendation are discussed below.

FAA Advisory Circular 150/5300-13B, Airport Design contains Airport design standards that provide guidelines for a safe, efficient, and economic airport system. The Master Plan undertook a review of the design standards to ensure safety and efficiency of current and future Airport users, and to identify the basic aircraft characteristics which the Airport design will need to meet. Airport design parameters that are based only on the existing aircraft can limit the Airport's ability to expand and meet future safety requirements for aircraft anticipated to use the airport in the future due to factors such as fleet changes over time. As discussed in Section 2.2.1.4, determination of the design critical aircraft is an important aspect of airport planning and design as it sets dimensional requirements on an airport, such as the separation distance between taxiways and runways, and the size of certain areas protecting the safety of aircraft operations and passengers. The critical aircraft determination, identified in the Master Plan, ensures proper development of airport facilities. It also matches aircraft operational area dimensions to the most demanding aircraft that regularly use the runways, taxiways, and apron areas.

The critical aircraft is defined as "the most demanding aircraft type or grouping of aircraft (family of aircraft) with similar characteristics, which make regular use of the airport." Regular use is 500 annual operations, including both itinerant and local operations but excluding touch-and-go operations. An operation is either a takeoff or landing. The existing and proposed design aircraft should be reviewed on an individual basis per **FAA AC 150/5325-4B *Runway Length Requirements for Airport Design***. The existing commercial and GA design aircraft are the Embraer 190 (E190) and Gulfstream V/Gulfstream G500 (G500), respectively; The future commercial design aircraft for the Airport is the Airbus 220 (A220). However, the runway length analysis looked at the family of aircraft using the facility now and proposed to use the facility in the future.

The Master Plan utilized a screening process to analyze alternatives created to address aircraft operational requirements and FAA design and geometry standards (as identified in FAA Advisory Circular (AC) 150/5300-13B).

4.1.1 Runway 15-33 Extension

Runway 15-33 is currently 5,255 feet long and 150 feet wide and is the primary Instrument Flight Rules (IFR) runway at the Airport. The existing critical design aircraft for Runway 15-33 are the Airbus A220-300 and Gulfstream V/G500. Alternatives to meet the Master Plan's requirements relative to runway length are identified below. These alternatives are limited by the need for the Runway 15 Runway Safety Area (RSA) to remain on Airport property as well as to keep Runway 33 RSA in its existing location.

As discussed above, and in *Chapter 2.0, Purpose and Need*, additional runway length is needed at the Airport to meet the requirements of the critical aircraft to enhance safety and efficiency of operations. Airport design and safety guidelines to meet runway length recommendation are detailed in FAA **AC 150/5325-4B**, ***Runway Length Requirements for Airport Design***, and are discussed for each runway alternative. Because Runway 15-33 is the IFR runway at the Airport, it was selected for extension. However, an evaluation of the extension alternatives of Runway 6-24 was completed as part of the Master Plan (see **Appendix B**) and is also discussed summarized in Alternative 5 below. This alternative was eliminated from further evaluation during Master Plan alternatives screening.

Additionally, an evaluation of the use of Joint Base Cape Cod (JBCC) as a public-use airport was considered as Runway 15-33 Alternative 6 (see Section 4.1.1.8). Prior MEPA analysis provided a rational decision on this alternative, concluding that the use of JBCC as a public-use airport is not a feasible alternative for several reasons (see EEA 12267, ENF Certificate, September 2000). Most importantly, the use of JBCC would merely shift environmental impacts of this project to another community and that the property itself is owned by the Commonwealth of Massachusetts and leased by the Federal Government, and hosts five different military commands, compounding jurisdictional issues. **Table 4.1-1** summarizes the alternatives for the Runway 15-33 Extension.

4.1.1.1 Runway 15-33 Alternative 1 – No-Build Alternative

The No-Build Alternative (see **Figure 1.1-1**) keeps the runway length of Runway 15-33 at its current length of 5,255 feet. The No-Build Alternative was dismissed because it does not meet the existing and future requirements and purpose and needs related to runway length for the identified families of aircraft.

4.1.1.2 Runway 15-33 Alternative 2 – 1,295-foot extension to Runway 15 end and 400-foot extension to Runway 33 end

This alternative proposes extending Runway 15-33 to meet the runway length recommendation presented in the Master Plan (see **Figure 4.1-1**). This alternative includes a 1,295-foot extension to the Runway 15 end and a 400-foot extension to the Runway 33 end for a total length of 7,281 feet.

The Runway 33 extension would include a displaced threshold with the Runway 33 landing threshold remaining in its current location. Taxiway A would be extended, and new connectors (Taxiway A1 and Taxiway A4) constructed to align with the new Runway 15 end at 90-degree angles. All areas within the taxiway object free areas (TOFAs) and the relocated perimeter road located off Airport property would be acquired when the land becomes available on a willing seller basis.

Alternative 2 meets the requirement for a runway length of 6,000 feet for both accelerated stop distance available (ASDA) and landing distance available (LDA) in both directions of Runway 15 and 33. Moving the Runway 15 landing threshold (i.e., removing the displacement to the threshold) would require additional obstruction removal and would result in incompatible land uses since the runway extension moves the RPZs further out and over Victory Chapel. A house of worship within an RPZ is an incompatible land use. Obstruction removal that would be required for this alternative would result in difficulties and high costs for construction. The obstructions include above utilities poles that would require re-location along Independence Drive as well as other man-made structures and natural obstructions.

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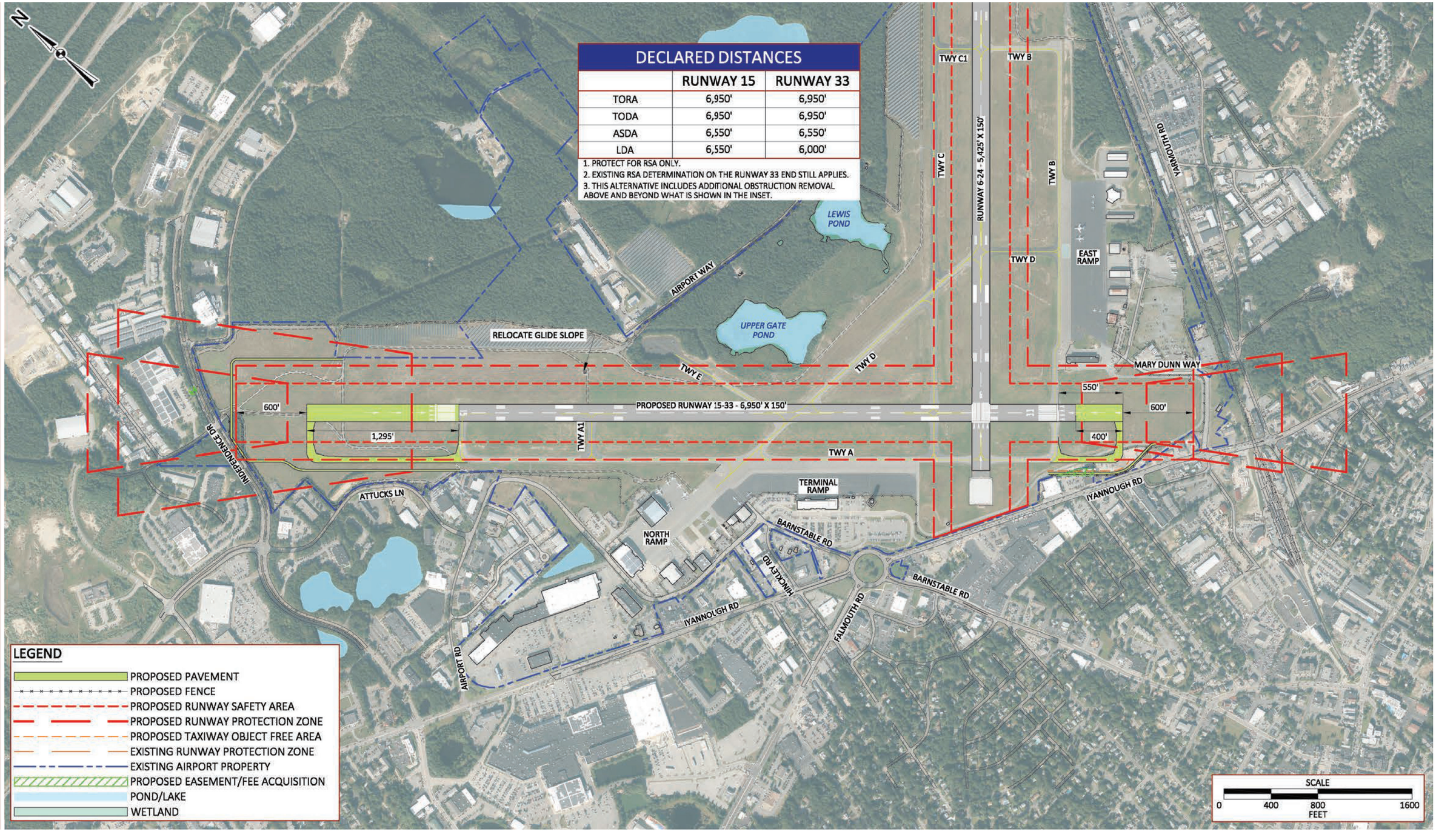

Figure 4.1-1

Runway 15-33 *Alternative 2: 1,295-foot Extension to RW 15 End and 400-foot Extension to RW 33 End (Master Plan Preferred Alternative)*

4.1.1.3 Runway 15-33 Alternative 3 – 1,258-foot extension to the Runway 15 end and a 400-foot extension to the Runway 33 end (with increased displaced thresholds)

Alternative 3 (see **Figure 4.1-2**) proposes a 1,258-foot extension to the Runway 15 end and a 400-foot extension to the Runway 33 end for a total length of 7,181 feet. This alternative includes a 1,058-foot displaced landing threshold on the Runway 15 end and a 550-foot displaced threshold on the Runway 33 end. In this alternative, Taxiway A would extend to the new runway ends and connect to the runway at a 90-degree angle at each end. All areas within the TOFAs and the relocated perimeter road located off Airport property would be acquired when the land becomes available on a willing seller basis.

Runway 15-33 Alternative 3 results in reduced obstruction impacts and provides greater land use compatibility compared to Runway 15-33 Alternative 2. This alternative does not meet the Runway 15 recommended LDA of 6,000 feet; however, it improves the Runway 15 LDA by 200 feet compared to existing conditions. It also requires the acquisition of additional off Airport property.

4.1.1.4 Runway 15-33 Alternative 4 – 895-foot extension to the Runway 15 end and a 400-foot extension to the Runway 33 end (6,550 feet)

Alternative 4 (see **Figure 4.1-3**) proposes an 895-foot extension to the Runway 15 end and a 400-foot extension to the Runway 33 end for a total length of 6,550 feet. This alternative includes a 695-foot displaced threshold on the Runway 15 end and a 550-foot displaced threshold on the Runway 33 end. Taxiway A would be extended to the new runway ends and connect to the Runway 15 and 33 ends at 90-degree angles. All areas within the TOFAs and relocated perimeter road located off Airport property would be acquired when the land becomes available on a willing seller basis. Compared to Alternatives 2 and 3, Alternative 4 results in fewer obstruction impacts to Runway 15-33. This alternative improves Runway 15 LDA by 200 feet compared to existing conditions to 5,855 feet.

Runway 15-33 Alternative 4 provides a runway length balanced in terms of enhancing safety and operations and minimizing impacts to the community. The additional runway length that is proposed in Runway 15-33 Alternative 3 only aids take-offs and does not help bring the Airport closer to meeting the facility requirements for LDA due to the presence of obstructions on the Runway 15 approach. Runway 15-33 Alternative 4 removes excess pavement and focuses on the key pavement necessary to meet the facility requirements, where possible.

4.1.1.5 Runway 15-33 Alternative 4A – 801-foot extension to the Runway 15 end only (total runway length of 6,054 feet)

Alternative 4A (see **Figure 4.1-4**) proposes an 801-foot extension only to the Runway 15 end for a total runway length of 6,055 feet. This alternative includes a 695-foot displaced threshold on the Runway 15 end. Taxiway A would be extended to the new runway end and connect to Runway 15 at a 90-degree angle.

This alternative meets the runway length needs of the critical aircraft for takeoff on both runways, while also providing a balanced approach to limiting and avoiding off Airport impacts to surrounding communities. This alternative results in the following:

- Additional reduced obstruction impacts over Runway 15-33 Alternatives 2, 3, 4, and 5.
- Less impervious surfaces compared to other alternatives.
- Minimizes costs and off Airport property needed to be acquired to extend Taxiway A to the ends of the extended Runway 33 end compared to other alternatives that include an extension to the Runway 33 end.
- As with other alternatives, Runway 15-33 Alternative 4A provides a runway length balanced in terms of enhancing safety and operations and minimizing impacts.
- The additional runway length that is proposed in Runway 15-33 Alternative 4A meets TORA recommendations for critical aircraft but does not meet the facility requirements for landing needs for Runway 15/33.
- Minimizes increases in new pavement and focuses on the key pavement necessary to meet the runway length needs of the critical aircraft identified in the facility requirements.

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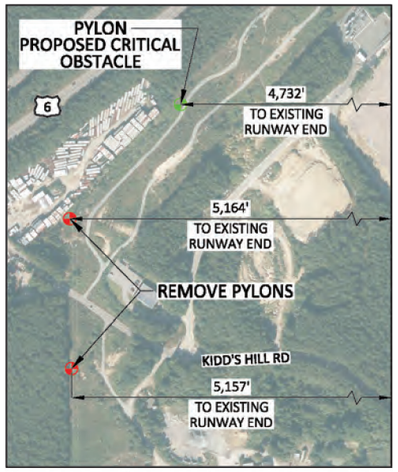
SCALE : 1" = 600'



DECLARED DISTANCES		
	RUNWAY 15	RUNWAY 33
TORA	6,913'	6,913'
TODA	6,913'	6,913'
ASDA	6,513'	6,550'
LDA	5,455'	6,000'

1. PROTECT FOR RSA ONLY.
2. EXISTING RSA DETERMINATION ON THE RUNWAY 33 END STILL APPLIES.
3. THIS ALTERNATIVE INCLUDES ADDITIONAL OBSTRUCTION REMOVAL ABOVE AND BEYOND WHAT IS SHOWN IN THE INSET.

POLE
PROPOSED CRITICAL
OBSTACLE

RELOCATE GLIDE SLOPE

PROPOSED RUNWAY 15-33 - 6,913' X 150'

1,258'
637'
1,058'
550'
600'
400'

RUNWAY 6-24 - 5,425' X 150'

TWY A
TWY A1
TWY B
TWY C
TWY C1
TWY D
TWY E

AIRPORT WAY
LEWIS POND
UPPER GATE POND
EAST RAMP
NORTH RAMP
TERMINAL RAMP
MARY DUNN WAY
YARMOUTH RD
IYANNOUGH RD
BARNSTABLE RD
HINCKLEY RD
FALMOUTH RD
AIRPORT RD
ATTUCKS LN
INDEPENDENCE DR
VICTORY CHAPEL

LEGEND
- PROPOSED PAVEMENT
- PROPOSED RUNWAY SAFETY AREA
- PROPOSED RUNWAY PROTECTION ZONE
- PROPOSED TAXIWAY OBJECT FREE AREA
- EXISTING RUNWAY PROTECTION ZONE
- EXISTING AIRPORT PROPERTY
- PROPOSED EASEMENT/FEE ACQUISITION
- POND/LAKE
- WETLAND

SCALE
0 400 800 1600
FEET

Figure 4.1-2
Alternative 3: 1,258-foot Extension to RW 15 end and 400-foot Extension to RW 33 end

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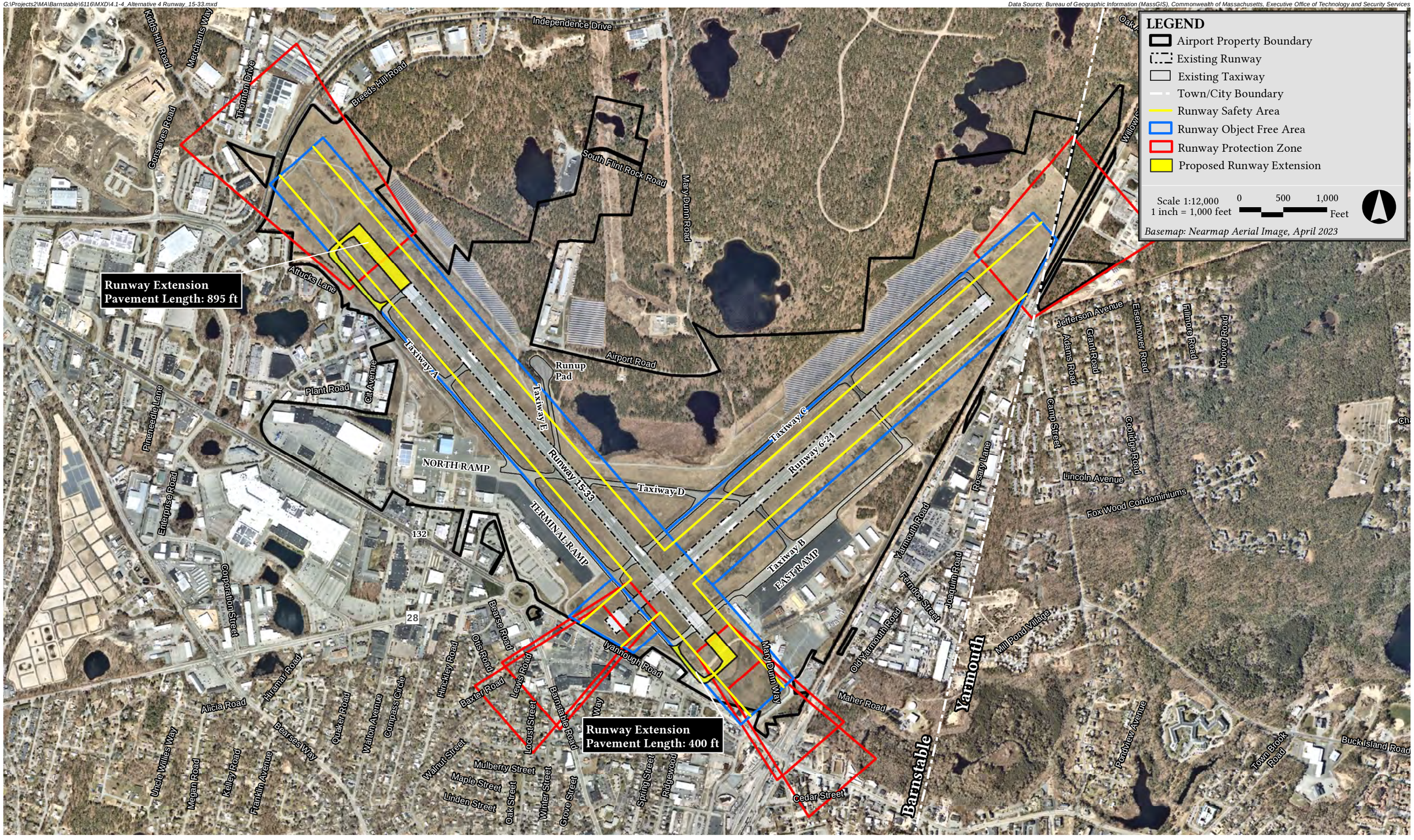
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 4.1-3

Runway 15-33 Alternative 4: 895-foot Extension to RW 15 End and 400-foot Extension to RW 33 End

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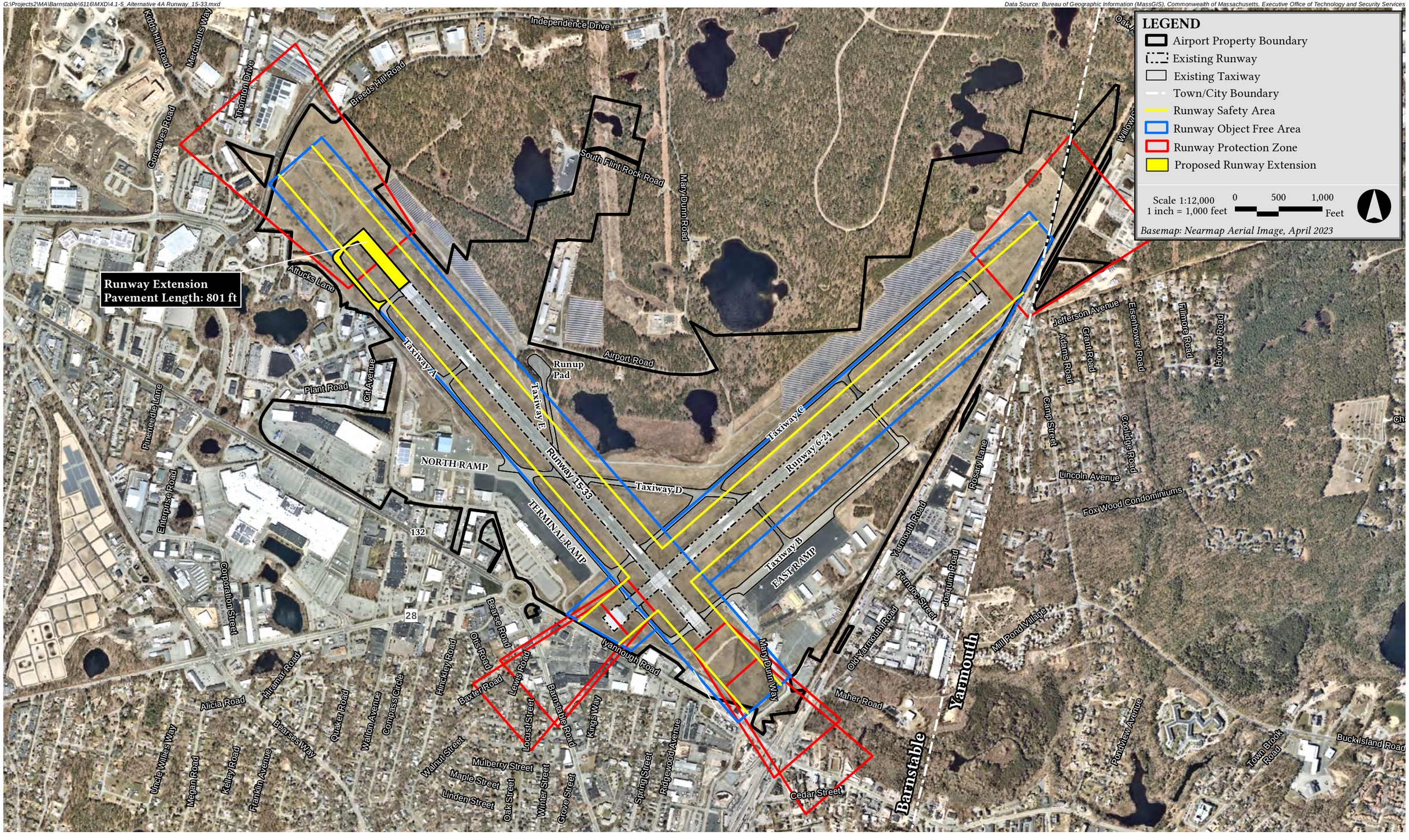
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport **Barnstable, Massachusetts**

Figure 4.1-4
Alternative 4A Runway 15-33: 801-Foot Extension to RW 15 End

4.1.1.6 Runway 15-33 Alternative 4B – 895-foot extension to the Runway 15 end only (total runway length of 6,148 feet) – Preferred Alternative

After the additional analysis described in Section 2.2.1 was completed, Alternative 4B was selected as the Preferred Alternative as it meets the purpose and need of the runway length recommendation. Alternative 4B (see **Figure 4.1-5**) proposes an 895-foot extension only to the Runway 15 end for a total runway length of 6,150 feet. This alternative includes a 695-foot displaced threshold on the Runway 15 end resulting in a TORA of 6,150 feet and an LDA of 5,455 feet. Runway 33 TORA would increase to 6,150 feet also, and more importantly, LDA increases to 6,000 feet. This provides the Airport with a runway that meets the LDA for the critical aircraft. Taxiway A would be extended to the new runway end and connect to Runway 15 at a 90-degree angle.

- Runway 15-33 Alternative 4B results in reduced airspace obstruction impacts over Runway 15-33 Alternatives 2, 3, and 5.
- This alternative also reduces the amount of impervious surface compared to other alternatives.
- Compared to alternatives that include extension to the Runway 33 end, this alternative minimizes costs and impacts associated with off Airport property needed to be acquired for the construction of the Taxiway A extension to the ends of the extended Runway 33 end.
- As with other alternatives, Runway 15-33 Alternative 4B provides a runway length balanced in terms of enhancing safety and operations, meeting the runway length recommendation identified in the 2022 Master Plan, while minimizing community impacts.
- Runway 15-33 Alternative 4B minimizes an increase in new pavement and land disturbance and focuses on adding the minimum pavement necessary to meet the facility requirements for both take-offs and landings on at least one runway (Runway 33).

4.1.1.7 Runway 15-33 Alternative 5 – Extend Runway 6-24

This alternative would extend both ends of Runway 6-24 to meet the desired Master Plan runway length of 6,550 feet. Both ends of Runway 6-24 are constrained by the Airport property limits and adjacent land uses. An extension to the Runway 24-end would require the relocation of Yarmouth Road, railroad tracks, existing EMAS, and Iyannough Road Rotary. An extension to the Runway 6-end would also require the acquisition of residential properties. This alternative was dismissed due to the immediate vicinity community impacts.

4.1.1.8 Runway 15-33 Alternative 6 – Closure of Cape Gateway Airport and Operational Shift to Joint Base Cape Cod

This alternative proposes the closure of the Airport in its entirety and operational shifts to JBCC (see **Figure 4.1-6**). JBCC is a joint-use base home to five military commands, a 22,000-acre tract of land in Bourne, Sandwich, Falmouth, and Mashpee between Route 28 and Route 6. The Otis Air National Guard base controls approximately 3,830 acres in the southeast corner of JBCC. The rest of the property is divided between the Army National Guard (14,500 acres), the Coast Guard (1,407 acres), other federal agencies (1,100 acres), and the Veteran's Administration (750 acres).

The Massachusetts General Court created the military installation in 1935 authorizing the acquisition of 12,600 acres in Bourne, Sandwich, Falmouth, and Mashpee, establishing a campsite for the use and training of military forces of the Commonwealth. Since then, the reservation was enlarged by converting part of the Shawme-Crowell State Forest to military use. Currently, the Army, Air Force, and Coast Guard all lease land on the JBCC. The land, owned by the Commonwealth, is leased to the Federal government, and licensed back to the Commonwealth for National Guard purposes.

The JBCC airfield is located in the southeast corner of the base. Aviation facilities include two runways and numerous aprons and taxiways around the airfield. The main runway runs NW/SE and is approximately 9,500 feet long. The second runway runs NE/SW and is approximately 8,000 feet long. The Air National Guard and US Coast Guard operate workshops and maintenance facilities around the airfield. Army National Guard helicopter/ aviation facilities, fire station and the existing air traffic control tower and FAA building are also in this area.. Runway conditions are such that reconstruction would be required for conversion to a public use airport as well as review and approval by FAA for Part 150 Certification as a commercial-use airport.

The native grassland surrounding the runways at JBCC is habitat for several rare bird species monitored by the Army National Guard, Environmental Protection Office, and the NHESP. Other terrain at JBCC includes mixed hardwood and conifer woods on the northern edge, immature pine forests scattered throughout the base, and pitch pine scrub oak forest on the south and western edges of the base. JBCC is located over the Sagamore groundwater lens, a portion of the Cape Cod sole source aquifer. There is one water supply well (Well J), and there are two CCC Identified Wellhead Protection Areas in the northern and southern portions of the base. Also present on the base are identified freshwater recharge areas to Ashumet Pond and Johns Pond, extending across the southeast corner. Past activities by various military organizations utilizing JBCC property have resulted in the contamination of soil and groundwater in several locations.

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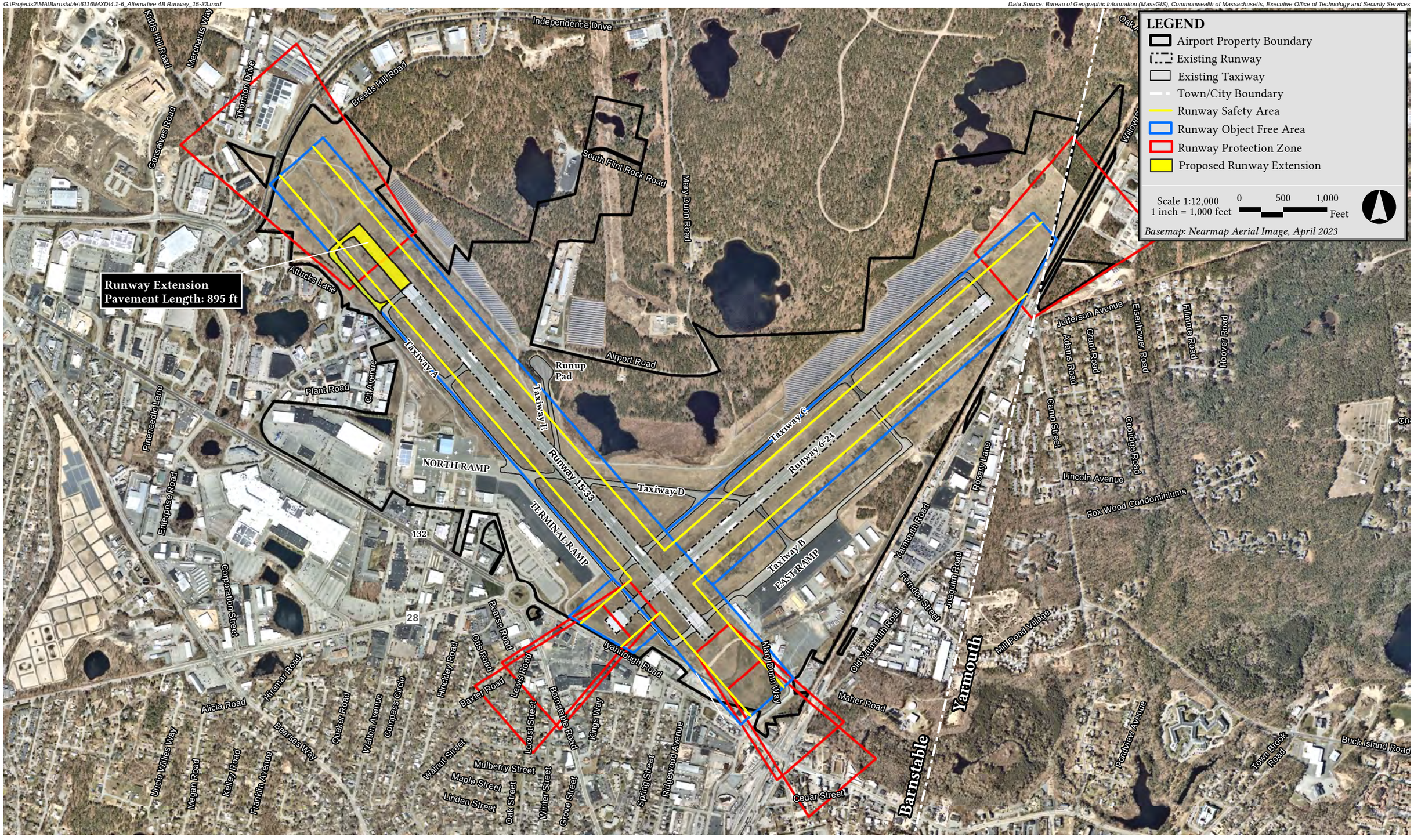
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 4.1-5

Alternative 4B Runway 15-33: 895-Foot Extension to RW 15 End

The relocation of Cape Cod Gateway Airport functions to JBCC is not a viable alternative. The Cape Cod Gateway Airport Commission is an agency of the Town of Barnstable, entrusted with the management of the Airport, a public facility of the Town of Barnstable. M.G.L Chapter 90 creates the legal framework to empower the Airport Commission as the responsible entity for the "custody, care and management of the municipal airport of said city or town." The statues within M.G.L Chapter 90 are instrumental in creating a governance structure for municipal airports to ensure their control is secure from influence that would detract from their mission as a public-use transportation asset to the flying public, and to guide its operation and future development.

For the Commission to address an alternative outside municipal borders is inconsistent with both its powers and its obligations. The Commission has no current rights to operate outside Barnstable Municipal limits. The alternatives under consideration are limited to Airport property, or, in the case of improved access, to changes to be made within Barnstable with the cooperation and consent of the Barnstable Town Council.

JBCC is the property of the Commonwealth of Massachusetts and is leased by the Federal Government under the Department of the Air Force. In Massachusetts, the only state entity which is constituted to own and operate airports is the Massachusetts Port Authority (Massport). Massport has no statutory authorization to develop or operate an airport at JBCC. Such an undertaking would necessitate significant state commitments of funds, a programmatic expansion of Massport powers and responsibilities, and a major change in state transportation structures and policies and could only be undertaken as directed by Massachusetts legislature. Any suggestion that a public airport be established at JBCC can only be addressed by the legislature, and only if a majority of the legislature so directs such an alternative be able to be considered.

For Airport functions to be relocated to JBCC, a major change in land use for Falmouth would be required. Activities at JBCC have in the past been a subject of considerable controversy (the PAVE PAWS radar system in the 1970s, open burning in the 1980s, and groundwater contamination in the 1990s), and it seems reasonable to anticipate that the proposal of the Town of Barnstable to shift Airport operations might not be positively received. Should the Commonwealth, led by the legislative delegation, undertake a significant campaign to create a major public-use regional airport at JBCC, then (and only then) should further investigation of this alternative be required.

The CCGA is the only full-service airport with a precision runway most proximate to Nantucket. Air travel from the Airport to Nantucket is closer, hence less costly, than from other airports, including JBCC. Nantucket residents rely heavily on access to the Airport for their access to mainland Massachusetts. Hundreds of residents of Barnstable and other mid-Cape communities use the Airport to commute to Nantucket for work, and thus their livelihoods depend on a functioning Airport (the ferry is not an alternative, owing to the duration of the trip and weather dependency). Conversely, Nantucket businesses and services rely on a mainland workforce that is simply not available in the employment market on Nantucket proper.

CCGA also supports emergency response. For individuals on Cape Cod and the islands of Nantucket and Martha's Vineyard seeking emergency medical assistance, the Airport provides efficient access to the Cape Cod Hospital. The Airport also hosts Boston Med Flights and supports military operations, such as the U.S. Coast Guard's sea search and rescue missions, which are part of its role in providing emergency response and ensuring public safety on Cape Cod and the islands. These benefits are not transferable to JBCC due to the less central location and longer distance from Cape Cod Hospital. JBCC is over 20 miles away from Cape Cod Hospital and over 40 minutes away whereas Cape Cod Gateway Airport is approximately one mile, less than 10 minutes, from Cape Cod Hospital.[1]

Moreover, according to the 2019 MassDOT Aeronautics study titled "The Economic Impact of Public-use Airports in Massachusetts," the Airport has the second largest economic output of all Massachusetts airports (exclusive of Massport facilities) and provides economic benefits of approximately $157.2 million annually to the local economy. Businesses dependent on the Airport employ approximately 1,725 workers and commit approximately $73.8 million dollars to payroll annually. To shut down the Airport entirely, or to channel all future growth to a JBCC alternative, is anticipated to adversely impact the entire economy of the mid-Cape. Furthermore, significant financial impacts would be experienced by the CCGA's numerous tenants (leaseholders), their facilities and infrastructure, and the taxes they pay to the town. Not all tenants would be willing to relocate their businesses and if they did, a substantial investment in new structures would be required. These significant adverse economic impacts deem this alternative infeasible.

As one of nine Enterprise Funds of the Town of Barnstable, the Airport makes an annual profit and requires no financial support from the Town of Barnstable. The Airport has received approximately $87 million in state and federal funding for airport purposes since 1982. Grant conditions require that the improvements thus funded be used for aviation purposes. A closure of the Airport could require the Town of Barnstable to reimburse the United States and the Commonwealth for these past expenditures of airport grant funding received, which could have significant negative economic impacts to the Town of Barnstable and its residents. For all the above reasons, this alternative was dismissed for further consideration in this environmental assessment.

[1] *Boston MedFlight provides a critical airborne Island lifeline* https://www.mvtimes.com/2016/08/03/boston-medflight-provides-critical-airborne-island-lifeline/

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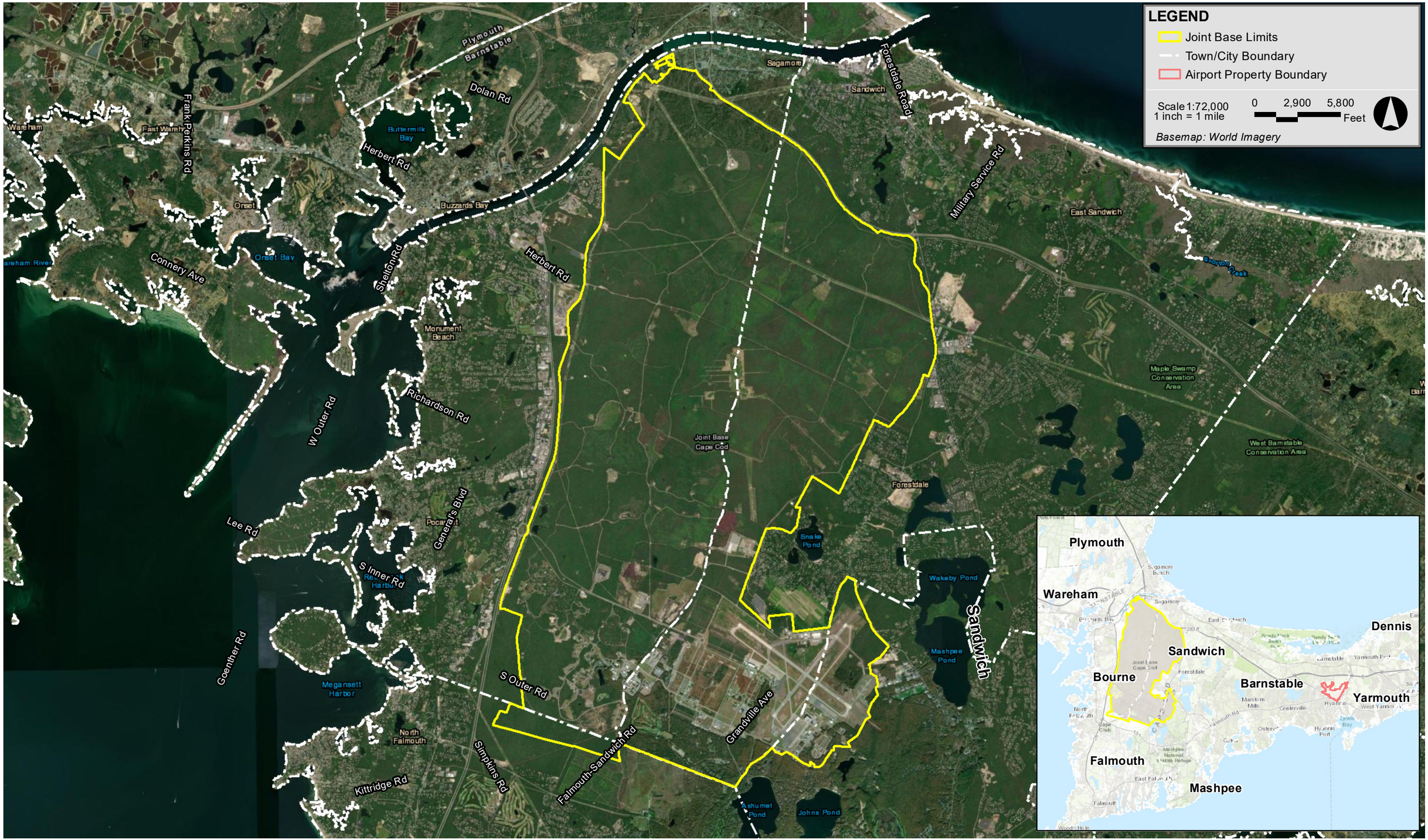
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 4.1-6
Alternative 6 Joint Base Cape Cod

Table 4.1-1 Runway 15-33 Extension Alternatives (FAA AC 150/5325-4B, Runway Length Requirements for Airport Design)

	Meets FAA Recommendations for LDA and TODA of 6,000 feet	Community Impacts	Env. Impacts (Land Alteration, Stormwater)	Easement Acquisition	Cost	Carried forward for further analysis	Notes
Alterative 1 (No Build Alternative) Maintain current length of 5,255 ft	No	None	None	Yes.	★★☆	Yes	Does not meet existing and future facility requirements.
Alternative 2 Extend Runway 15 end by 1,295 ft, Extend Runway 33 end by 400 ft. Total Length 6,950 ft	Yes. the LDA is 6,500' for the Runway 15 and 6,000' for Runway 33. TODA is 6,950' for both RW15 and RW33	★★★	★★★	Yes.	★★★	No	**Extensive obstruction removal required. Incompatible land uses within RPZ. Requires relocation of roadways. Cost and offsite impacts resulted in the dismissal of this alternative.**
Alternative 3 Extend Runway 15 end by 1,258 ft, Extend Runway 33 end by 400 ft. Total Length 6,913 ft	Yes, but not for LDA of RW 15. The LDA is 5,455' for the Runway 15 and 6,000' for Runway 33. TODA is 6,913' for both RW15 and RW33	★★★	★★★	Yes.	★★★	No	**Moderate obstruction removal. Requires relocation of roadways. Cost and offsite impacts resulted in the dismissal of this alternative.**
Alternative 4 Extend Runway 15 end by 895 ft. Extend Runway 33 end by 400 ft. Total Length 6,550 ft	Yes, but not for LDA of RW 15. The LDA is 5,455' for the Runway 15 and 6,000' for Runway 33. TODA is 6,550' for both RW15 and RW33	★★☆	★★☆	Yes.	★★☆	No	Land acquisition needed for TW A extension. Balances community impacts with longer extension on 15 end
Alternative 4A Extend Runway 15 end by 801 ft. Total Length 6,056 ft	No. The LDA is 5,361' for RW 15 and 5,906 for RW 33. The TODA is 6,056' for RW 15 and RW 33.	★☆☆	★☆☆	Yes.	★☆☆	No	Meets takeoff requirements. Reduces community impacts further by only extending one runway end.
Alternative 4B (Preferred Alternative) Extend Runway 15 end by 895 ft. Total Length 6,148 ft	Yes, but not for LDA of RW 15. LDA is 5,455 for RW 15 and 6,000' for RW33. The TODA is 6,150' for RW 15 and RW 33.	★☆☆	★☆☆	Yes.	★☆☆	Yes	Runway 33 meets LDA requirements for critical aircraft. Meets takeoff requirements. Reduces community impacts further by only extending one runway end.

Table 4.1-1 Runway 15-33 Extension Alternatives (FAA AC 150/5325-4B, Runway Length Requirements for Airport Design) (Continued)

	Meets FAA Recommendations for LDA and TODA of 6,000 feet	Community Impacts	Env. Impacts (Land Alteration, Stormwater)	Easement Acquisition	Cost	Carried forward for further analysis	Notes
Alternative 5 Extend Runway 6-24 to meet runway length of 6,550 feet	Yes.	★★★	★★★	Yes.	★★★	No	Requires relocation of infrastructure, acquisition of residential and commercial properties
Alternative 6 Close the Airport / shift to Joint Base Cape Cod (JBCC).	Presumed to be yes.	★★★	TBD	No.	★★★	No	Requires major change in land use Falmouth/Mashpee/Sandwich. Shifts impacts, does not reduce impacts., owned by state, leased by federal entities.

★★★ Large impact

★★☆ Moderate impact

★☆☆ Minimal impact

4.1.2 Taxiway Alternatives

FAA **AC 150/5300-13B, *Airport Design*** (2022-03-31) contains FAA standards and recommendations for the geometric layout and engineering design of runways, taxiways, aprons, and other facilities at civil airports. The Master Plan update reviewed the Airport's existing taxiway system with the design standards in AC 150/5300-13B to evaluate compliance with current standards for taxiway width, taxiway safety areas, TOFAs, taxiway shoulders, taxiway gradient, and for parallel taxiways, the distance between the runway and taxiway centerlines.

The term "taxiway standards" describes FAA standards and recommended practices for both taxiways and taxilanes. Some of the design standards for taxiways and taxilanes vary given the different aircraft speeds and uses of taxiways versus taxilanes. Taxiways typically reside in movement areas, while taxilanes are more common in non-movement areas such as terminal apron areas.

The dimensions for taxiways vary based on the identified Airplane Design Group (ADG) and taxiway design group (TDG) for each taxiway. The ADG is based on the wingspan and tail height of an aircraft, while the TDG is based on the distance between an aircraft's cockpit to main gear, as well as the width of the main gear. There are six ADG groups and seven TDG groups.

FAA provides airport design standards, recommended practices, and design considerations for taxiways and taxilanes. Specifically, these design standards provide guidance to enhance safety and efficiency for 1) Taxiway and taxilane dimensions, configuration, and separation standards, 2) Taxiway turns and intersection design, and 3) Surface gradients.

The following standards from FAA AC 150/5300-13B, *Airport Design*, are listed below and their applicability to the proposed Projects discussed.

Taxiway / Apron Geometry Taxiways connecting an apron directly to a runway ("direct connection") can lead to confusion by creating a false expectation of a parallel taxiway prior to a runway. This loss of situational awareness can result in a pilot entering a runway unknowingly, thus, resulting in a runway incursion.

- Taxiways leading from an apron to a runway should make at least one turn between 75 and 90 degrees prior to reaching the runway hold line.
- For existing conditions with direct access from an apron to a runway: Develop a plan (e.g., ALP) to meet the standard when it becomes practical to make such improvements, and reconfigure existing direct-access taxiways, including those not designated as hot spots, when the associated taxiway is subject to reconstruction.
- To the extent practicable, design taxi routes between the apron and runway ends to include a turn onto a parallel taxiway and a second turn onto a connecting taxiway leading to the runway.
- During taxiway rehabilitation projects, evaluate the feasibility of reconfiguring existing direct-access taxiways (even those not designated as hot spots).
- Evaluate whether an increase to the standard runway to taxiway separation is necessary to allow the critical aircraft to hold 90 degrees, plus or minus 15 degrees, to the runway centerline. Airport should consider providing a partial parallel taxiway if the existing runway does not have a parallel taxiway.

Taxiway Clearance Pilots need ample wingtip clearance due to the pilots' limited ability to see their aircraft's wingtips from the cockpit. Wingtip clearance values ensure an acceptable level of safety when one airplane on a parallel taxiway wanders off the taxiway centerline toward an airplane on the adjacent taxiways. The ADG of the critical aircraft determines the minimum separation distance between a taxiway/taxilane centerline and fixed or moveable objects.

Taxiway Safety Area (TSA) The TSA is a defined surface prepared to support the occasional passage of aircraft and ARFF equipment. The TSA width equals the maximum wingspan of the ADG. The TSA is free of objects, except for objects that need to be located in the TSA because of their function. The TSA is designed to be capable, under dry conditions, of supporting SRE, ARFF equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.

The dimensions of the taxiway safety areas vary based on the identified ADG and TDG for each taxiway. The ADG is based on the wingspan and tail height of an aircraft, while the TDG is based on the distance between an aircraft's cockpit to main gear, as well as the width of the main gear. These ADG and TDG groups are utilized to determine applicable design standards for taxiways, see **Table 4.1-2.**

Table 4.1-2 Taxiway Design Standards for Safety Areas, Object Free Area, and Separation Areas

Design Standard[2]	ADG I	ADG II	ADG III	ADG IV	ADG V	ADG VI
Taxiway Safety Area (feet)	49	79	118	171	214	262
Taxiway Object Free Area (feet)	89	124	171	243	285	335
Runway/Taxiway Separation (feet)	225-400[1]	240-400[1]	400	400	400	500[1]

Source: FAA AC 150/5300-13B
1: Runway/Taxiway separation vary based on approach visibility minimums
2: Existing and future design aircraft are in the AAC-ADG C-III family of aircraft for airfield dimensional standards.

Taxiway Object Free Area (TOFA) The TOFA/TLOFA is an area adjacent to the TSA that is clear of objects not fixed-by function to provide vertical and horizontal wingtip clearance. Applying the taxiway/taxilane centerline to object separation values in **Table 4.1-3** to both sides of the centerline establishes the TOFA/TLOFA.

The FAA Airport Design Advisory Circular states the side safety areas, which extend 200 feet off each side edge of pavement into the grass should be: clear and graded and have no hazardous ruts, humps, depressions, or other surface variations; drained by grading or storm sewers to prevent water accumulation; capable under dry conditions of supporting snow removal equipment, aircraft rescue firefighting equipment, and the occasional passage of aircraft without causing damage to the aircraft; and free of objects, except those required because of their function, greater than 3 inches above grade.

Table 4.1-3 Taxiway Design Group – Design Width Standards

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

Source: FAA AC 150/5300-13B
1: The future design aircraft (A220) for both runways is a TDG 3 aircraft

Parallel Taxiways A parallel taxiway eliminates using the runway for taxiing, thus increasing runway capacity, and protecting the runway under low visibility conditions. A dual parallel taxiway provides ATCs flexibility in staging aircraft for takeoff and in routing inbound and outbound (opposite direction) traffic.

Runway/Taxiway Intersections Right-angle taxiways provide the best visual perspective to a pilot approaching an intersection with the runway to observe aircraft in both the left and right directions. They also provide the optimum orientation of the runway holding position signs to maximize visibility for the pilot.

- Design right-angle intersections for runway/taxiway intersections, except where there is a need for acute angled exit taxiways, such as a high-speed exit.
- If a true 90-degree angle with the runway is not practicable, it is acceptable to adjust the angle such that the critical aircraft is ±15 degrees from a 90-degree angle when at the hold line.
- Limit runway crossings to the outer thirds of the runway, keeping the middle third (high-energy area) of the runway clear so a pilot can maneuver to avoid a potential collision.

4.1.2.1 Taxiway D

Airport design standards are established by the Federal Aviation Administration (FAA) through the issuance of various guidance documents including, but not limited to, FAA Advisory Circulars (AC). FAA AC 150/5300-13B contains FAA standards for airport design for runways, taxiways, aircraft parking aprons, and other airfield systems and facilities. FAA design standards are based on the type of aircraft using a particular airfield facility. Based on the Cape Cod Gateway Airport's latest approved Airport Master Plan study (2022), the minimum runway taxiway separation distance is 400 feet, measured from the centerline of the runway to the centerline of the taxiway.

Taxiway D Alternatives include the No Build and two build alternatives to improve multiple existing non-standard geometry conditions (see **Table 4.1-4**). This section provides further details on the constructability, cost, and environmental impacts for each alternative identified.

Table 4.1-4 Taxiway D – Non-Standard Geometry/Design Conditions

Airfield Geometry / Design Standard	Description of Taxiway D Non-Standard Conditions
Taxiway Intersection Angle	Taxiway D crosses Runway 6-24 and Runway 15-33 at non- 90 degree angles. Taxiway design standards specify right-angle intersections for runway/taxiway intersections, except where there is a need for acute angled exit taxiways, such as a high-speed exit. Right angle intersections, both between taxiways and runways, allow pilots the best visibility to the left and right. A right angle at the end of a parallel taxiway is a clear indication of approaching a runway.
High Energy Intersections	Runway 15-33 at Taxiway D crosses at a high-energy segment of the runway. Runway crossings should be limited to the outer thirds of the runway, keeping the middle third (high-energy area) of the runway clear so a pilot can maneuver to avoid a potential collision.
Direct Access	Taxiway D provides direct access from the Airport's North Ramp to Runway 15-33. This airfield geometry is problematic because taxiways leading directly from an apron to a runway without requiring a turn can cause confusion when a pilot expects to encounter a parallel taxiway but instead accidentally enters a runway. Also, when exiting a ramp area, hold lines may approach quickly. Pilots may not observe them and cause a runway incursion.
Multiple Taxiways Crossing	Taxiway D crosses RWY 15-33 at the vicinity of Taxiway E crossing. Multiple taxiways crossing each other between the hold line and the runway could cause confusion, additional time on the runway, and wrong turns/loss of pilot situational awareness.

Alternatives identified below seek to resolve existing non-standard geometry outlined in **Table 4.1-4** above as much as practicable. Design options for relocation and extension of Taxiway D are provided below.

4.1.2.1.1 Taxiway D Alternative 1 – No-Build

The No-Build Alternative leaves the current taxiway configuration serving Runway 15-33. In the No-Build Alternative, Taxiway D remains in its current location and does not address existing non-standard conditions with potential safety concerns, including a non-90 degree taxiway angle, high energy crossing, direct access, and multiple crossings. The No-Build Alternative does not meet the existing and future facility requirements related to taxiway geometry and safety enhancements and therefore was dismissed from further consideration.

4.1.2.1.2 Taxiway D Alternative 2

Taxiway D Alternative 2 **(Figure 2.2-1)** would construct a partial parallel taxiway east of Runway 15-33 with a 400-foot standard runway centerline to taxiway centerline separation. Alternative 2 would extend from the existing Taxiway A1 across existing Taxiway D and Runway 6-24 to the proposed relocated Taxiway B. The Preferred Alternative would also construct an engine run-up area along the north side of the proposed partial parallel taxiway D and adjacent to the existing Taxiway E run-up pit, which would be removed. A fence/wall would be constructed next to the proposed run-up pit both for blast and noise protection.

This alternative removes Taxiway D between existing Taxiway A across Runway 15-33 and up to the new partial parallel taxiway, consistent with the Project's purpose and need. The Preferred Alternative implements geometry changes to meet FAA taxiway design standards thereby enhancing safety for aircraft using the Airport.

This alternative proposes a partial parallel taxiway to Runway 15-33, preventing safety concerns of two-way taxiing (conflicts between arriving and departing aircraft) occurring in front of the terminal building. This alternative also addresses the following FAA airfield geometry and design standards:

- Direct access from apron areas to the runway.
- Taxiway and Runway at acute angles, and
- High energy crossing.

The proposed location for Taxiway D would result in impacts on wetland resources (Bordering Vegetated Wetlands (BVW), Bank, and Land Under Water (LUW)) associated with Upper Gate Pond. Design options for reducing wetland resource area impacts include conventional fill on the north side of the taxiway with steep side slopes to limit the extent of impacts and a concrete retaining wall to further limit the extent of impacts.

Design alternatives relative to slide slope grading/construction investigation to limit the extent of impacts (see **Figures 4.1-7 to 4.1-9**) were considered and are discussed below.

Build Alternatives 2A, 2B, 2C, 2D – Construct Partial Parallel Taxiway D and Runup Pad

These alternatives **(Figures 2.2-1 and 4.1-7 through 4.1-9)** would construct a partial parallel taxiway east of Runway 15-33 with a 400-foot standard runway centerline to taxiway centerline separation, from the existing Taxiway A1 across existing Taxiway D and Runway 6-24 to the proposed relocated Taxiway B. Within design options for Alternative 2, the requisite dimensions for safety areas and object free areas, as required by FAA standards, are proposed. Impact to resource areas associated with Upper Gate Pond are summarized in **Table 4.1-5** below.

Table 4.1-5 Wetland Resource Area Impacts for Alternative 2 Options

Alternative	Resource Area Impacts		
	BVW (sf)	Bank (lf)	LUW (sf)
Alternative 2A – 4:1 Slope	11,790	540	27,980
Alternative 2B – 2:1 Slope	4,600	300	12,700
Alternative 2C – Retaining Wall	3,500	230	7,100
Alternative 2D - Bridge	0	100 (shadow)	10,000 (shadow)

- **Alternative 2A - Standard side slope**

Taxiway D Alternative 2A proposes a parallel taxiway along the north side of Runway 15-33. This design alternative contains standard side slope aeras, Safety Areas, and TOFA for TDG 3/ADC III aircraft. This alternative for Taxiway D results in the largest impacts on BVW, Bank, and LUW associated with Upper Gate Pond due to fill on the north side of the taxiway (see **Figure 4.1-8**).

- **Alternative 2B/Preferred Alternative - Steeper side slope (higher slope within TOFA)**

Alternative 2B, similar to Alternative 2A, would construct a partial parallel taxiway with a 400-foot standard separation east of Runway 15-33 from Taxiway B to the existing Taxiway A1 (see **Figure 2.2- 1**). This alternative also prevents safety concerns of two-way taxiing (conflicts between arriving and departing aircraft) occurring in front of the terminal building and addresses the following FAA airfield geometry and design standards: Direct access from apron areas to the runway, taxiway and runway acute angles, and high energy crossing.

Impacts on Upper Gates Pond (BVW, Bank, and LUW) from this alternative will be lower due to the increased sides slopes to the north of Taxiway D and wider area of Taxiway Safety Area and TOFA.

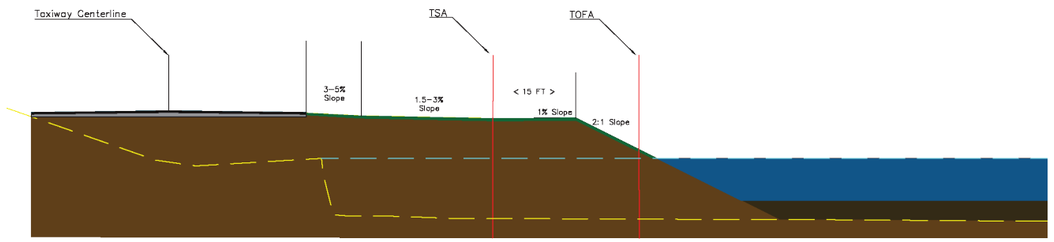
- **Alternative 2C - Retaining Wall**

Alternative 2C is similar to both Alternative 2A and 2B as it would construct a partial parallel taxiway with a 400-foot standard separation east of Runway 15-33 from Taxiway B to the existing Taxiway A1. This alternative, as with the others, meets the Project's purpose and need by preventing safety concerns of two-way taxiing (conflicts between arriving and departing aircraft) occurring in front of the terminal building, and addresses the following FAA airfield geometry and design standards: Direct access from apron areas to the runway, Taxiway and Runway acute angles, and High energy crossing.

Alternative 2C includes the construction of a retaining wall at the bottom of the taxiway side slopes. The construction of a retaining wall would result in reduced impacts on Upper Gates Pond (BVW, Bank, and LUW) over the impacts from 2A and 2B, due to the ability to create steeper side slopes to the north of Taxiway D and wider area of Taxiway Safety Area and TOFA.

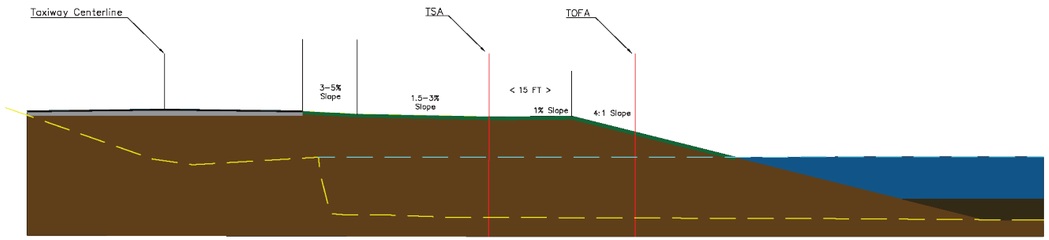
Higher side slopes do not meet the TSA and TOFA standards. Also, this alternative still results in impacts on Upper Gate Pond, and a high cost due to anticipated subsurface work associated with constructing a retaining wall. Therefore, this alternative has been eliminated.

2:1 Slope



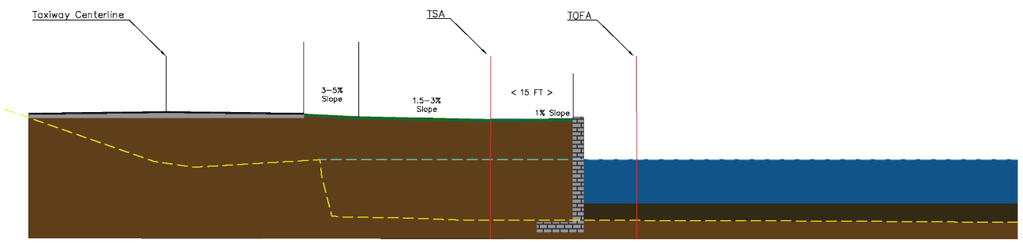
2:1 is increased slope grading within Taxiway OFA. To minimize impacts associated with Upper Gate Pond

4:1 Slope



4:1 is standard grading within Taxiway OFA

Retaining Wall



Alternative with the smallest impacts to Pond ($$$)

Figure 4.1-7
Side Slope Alternatives for Taxiway D

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

Impact to 200-ft Buffer Zone
3.48 acres total
1.13 acres pavement

Impact to 100-ft Buffer Zone
1.75 acres total
0.52 acres pavement

AIRPORT ROAD

Upper Gate Pond

Proposed Runup Pad

Taxiway E

Existing Taxiway D

Proposed Taxiway D

Runway 15-33

Terminal Ramp

LEGEND

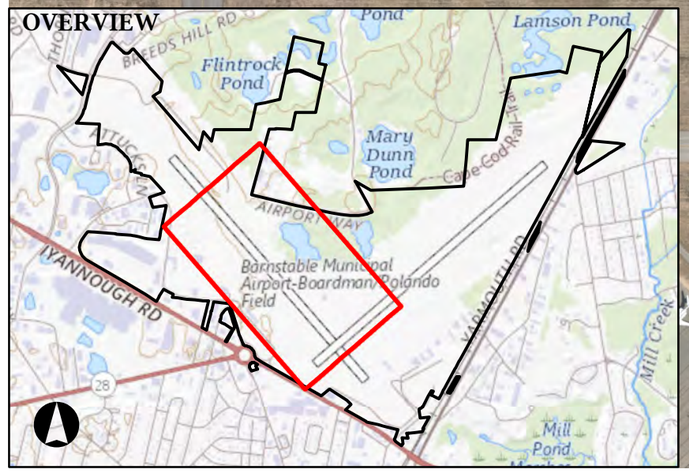
- Airport Property Boundary
- New Pavement
- Pavement to be Reconstructed
- Pavement to be Removed
- New Turf
- Turf to be Reconstructed
- Pavement Removal Turf
- Bordering Vegetated Wetland
- Land Under Water
- Bank
- 200-ft Buffer Zone
- 200-ft Buffer Zone

Scale 1:2,880
1 inch = 240 feet

0 120 240 Feet

Basemap: Nearmap Aerial Image, April 2023

OVERVIEW



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 4.1-8

Taxiway D Alternative 2A - Standard side slope (4:1)

- **Alternative 2D Bridge /Elevated Taxiway Surface**

Alternative 2D includes the construction of a structural bridge component to Taxiway D at the segment crossing Upper Gate Pond, spanning the bottom of the taxiway side slopes. The construction of a bridge/elevated taxiway structure would result in the lowest direct impacts on Upper Gate Pond (BVW, Bank, and LUW) over the impacts from Alternatives 2A, 2B, and 2C. This alternative requires extensive structural design, significant amounts of new construction, as well as high costs. Therefore, it has been eliminated from consideration.

4.1.2.1.3 Taxiway D Alternative 3 – Reduced Length Partial Taxiway

Taxiway D Alternative 3 is similar to the Taxiway D Alternative 2B (Preferred Alternative) but would maintain the run-up pad in its existing location and include the removal of Taxiway D between Taxiway A and the proposed partial parallel Taxiway D (see **Figure 4.1-9**). The partial parallel taxiway in this alternative is shorter than other alternatives, extending less toward Runway 15 end.

This alternative resolves safety concerns of two-way taxiing occurring in front of the terminal building and eliminates direct access from two points but results in a high-energy crossing on Runway 15-33. While this alternative improves safety compared to the No-Build Alternative by providing a standard 400-foot runway-taxiway centerline separation and improves non-standard FAA geometry conditions (eliminates non-standard runway taxiway intersection angles, the y-shaped runway crossing, and direct access), it does not meet FAA geometry standards due to the high-energy runway crossing.

4.1.2.1.4 Taxiway D Alternative 4 – 300' Separation Distance

This Taxiway D Alternative ("Shifted Alt") a runway/taxiway centerline separation distance of 300 feet would not impact BVW, LUW and Bank (**Figure 4.1-10**) for a graphical representation of this alternative taxiway layout.) This proposed alternative would circumnavigate Upper Gate Pond without impacting BVW, LUW and Bank. The "shifted" alternative layout was designed at a conceptual phase level (e.g., 25% conceptual design stage). In this alternative, the taxiway shifts closer to the runway by approximately 100 feet thereby providing a Runway to Centerline to Taxiway to Centerline separation distance of 300 feet, versus the required FAA centerline separation distance of 400 feet. **This alternative is not feasible because it does not meet FAA safety standards.**. The analysis demonstrates the distance between Runway 15-33 and TWY D that would result in no impact to BVW, LUW and Bank. This alternative would avoid all impacts to wetland resource areas.

This alternative is rejected as an infeasible alternative and does not meet the Purpose and Need of improving safety and meeting design standards. Recent FAA decisions including funds allocated to Taunton Municipal Airport to shift the taxiway further away from Runway 12-30 by 39 feet to meet the airport's runway/taxiway centerline separation distance indicate that meeting safety standards is paramount to airport design. Accordingly, FAA will not fund the construction of a new parallel taxiway that does not meet standard runway/taxiway centerline separation distance of 400 feet.

4.1.2.1.5 Taxiway D Alternative 5 - No Service Road (Preferred Alternative)

In this alternative, the same alignment and runway to taxiway separation distance of 400 feet is maintained, along with a 2:1 side slope in the vicinity of Upper Gate Pond. The area to the north of the taxiway which consists of the 37.5-foot-wide Taxiway Safety Area (TSA) and the 12 foot-wide perimeter vehicular service road has been narrowed to just include the TSA (see **Figure 4.1-11**). The service road will terminate east of Upper Gate Pond and vehicular access to this portion of the airfield will be either via Airport Road to the north of the project area or via Taxiway D. This enables a taxiway that still meets standards including TOFA and TSA but reduces wetland impacts. Airport operations will be minimally impacted, and vehicular access will be restricted in this section of taxiway unless coordinated with the Air Traffic Control Tower.

This Alternative would result in permanent fill of 3,000 sf of BVW, Land Under Water (LUW) impacts 10,900 sf and 300 linear feet of Inland Bank. These impacts have been avoided and minimized to the maximum extent practicable through utilization of 2:1 side slope design with an engineered slope option. As discussed above, to meet FAA safety standard designs for taxiway to runway separation, impacts to wetlands cannot be completely avoided.

The appropriate mitigation measures include proposed wetland replication, construction means and methods such as steel sheet piling coffer dams and turbidity curtains can isolate the work area in water and avoid impacts to the remainder of the pond. Material handling and disposal of dredged sediments are discussed further in Chapter 5.0.

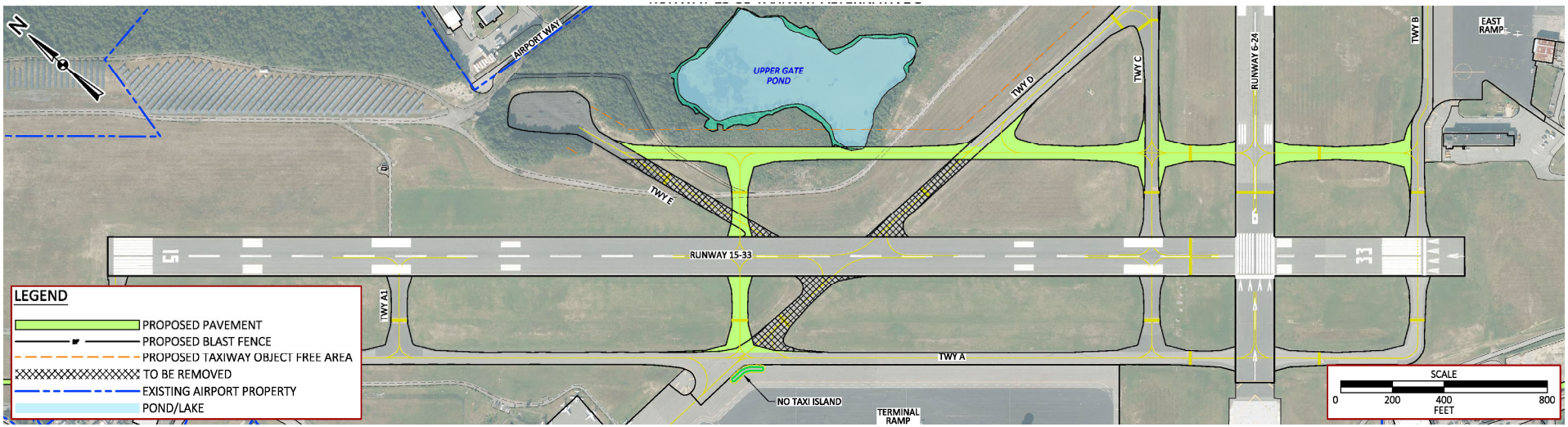


Figure 4.1-9

Taxiway D Alternative 3 – Reduced Taxiway Length

4.1.2.2 Taxiway B

The existing taxiway system to Runway 6-24 has multiple non-standards geometry conditions. One build alternative was created to resolve these existing deficiencies.

4.1.2.2.1 Alternative 1 – No-Build Alternative

Alternative 1, the No-Build alternative, leaves Taxiway B in its current location and does not address existing non-standard conditions with potential safety concerns, including non 90-degree taxiway angle, high energy crossing, direct access, and multiple crossings. The No-Build Alternative does not meet the existing and future facility requirements related to taxiway geometry and safety enhancements and was dismissed from further consideration.

4.1.2.2.2 Alternative 2 – Preferred Alternative

Alternative 2 would include the reconstruction of Taxiway B (parallel to Runway 6-24), shown in **Figure 2.2-2**.

Taxiway B would be relocated to a standard 400-foot separation distance (runway centerline to taxiway centerline) from Runway 6-24. By configuring Taxiway B in a standard separation distance, aircraft taxi time is reduced. Also, this alternative would achieve compliant TOFAs and provide an opportunity for the Airport to pursue additional planned aeronautical development on the East Ramp as discussed in Section 3.1.5.

- This alternative enhances safety by constructing a perpendicular crossover taxiway south of the existing glide slope allowing the new taxiway's TOFA to remain clear of the glide slope critical area (no obstructions are allowed within this area).
- Taxiway B Alternative 2, removes Taxiway C1 and keeps the existing portion of the stub taxiway connecting to Runway 6-24.
- Construct a midfield taxiway to Taxiway B to enhance efficiency of taxiway turnoff options for aircraft exiting the runway. This alternative also keeps the existing Taxiway D exit to Taxiway C as an acute-angled exit only taxiway.

The taxiway configuration in Alternative 2 allows heavy/large aircraft landing on Runway 6 the full-length available and could use Taxiway C to taxi back to the terminal or North Ramp area of the Airport. Additionally, single- and twin-engine (small) aircraft landing via Runway 24 would be able to exit prior to the Runway 15-33 intersection, and large aircraft would have the opportunity to exit prior to the Runway 15-33 intersection. These taxiway enhancements would allow aircraft to efficiently exit the runway after landing and increase safety for Airport users.

Alternative 2 limits runway crossings of aircraft using Runway 6-24, which limits the number or time with which potential incursions or accidents can take place. This alternative enhances safety by removing the crossing within the high-energy portion of the runway and achieves compliance with FAA standards.

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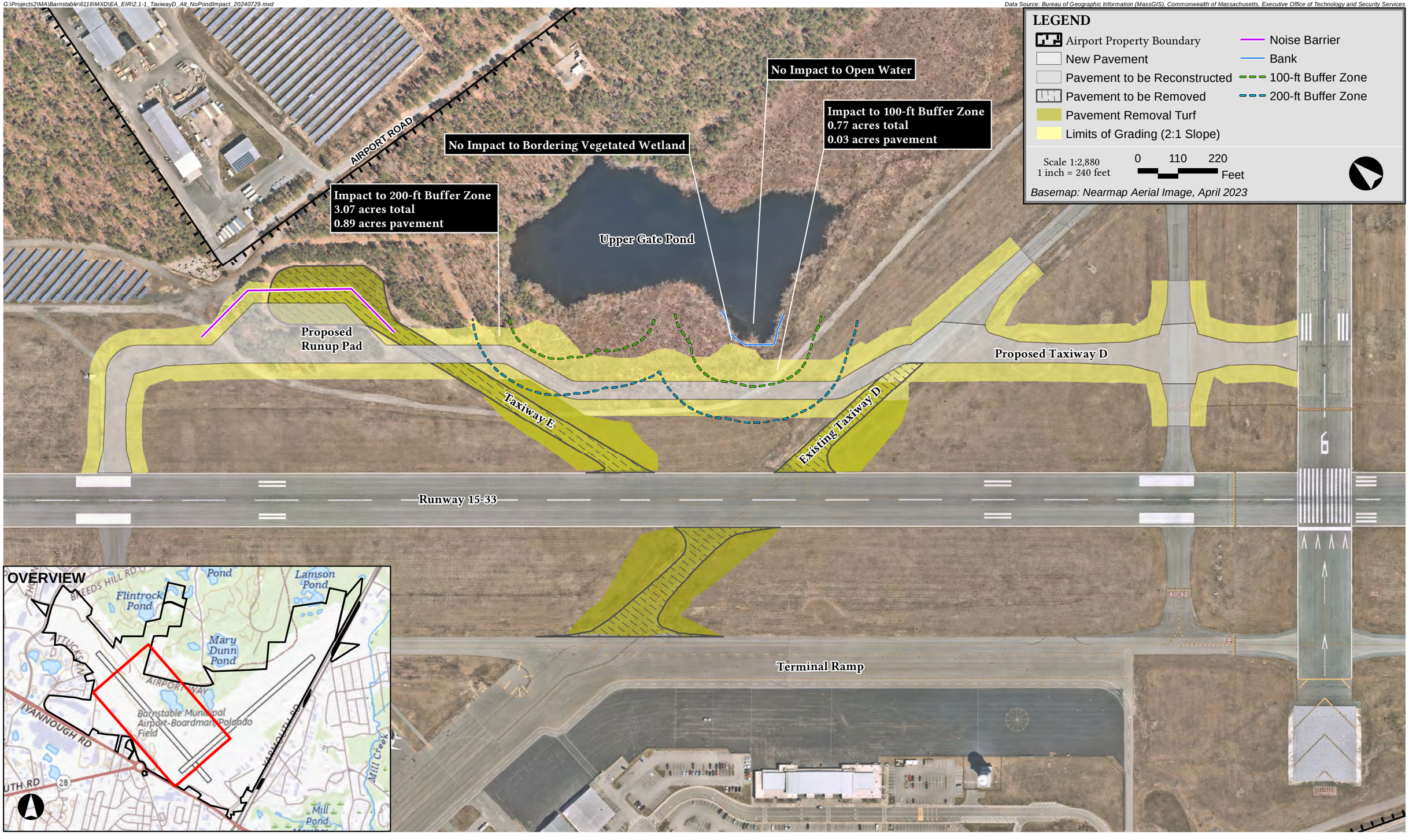
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 4.1-10
Taxiway D 300-Foot Separation Alternative

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

Impact to 200-ft Buffer Zone
3.78 acres total
1.13 acres pavement

Impact to Bordering Vegetated Wetland
0.1 acres total
0.01 acres pavement

Impact to Open Water
0.29 acres total
0.0 acres pavement

Impact to 100-ft Buffer Zone
1.85 acres total
0.52 acres pavement

AIRPORT ROAD

Upper Gate Pond

Proposed Runup Pad

Taxiway E

Existing Taxiway D

Proposed Taxiway D

Runway 15-33

Terminal Ramp

LEGEND

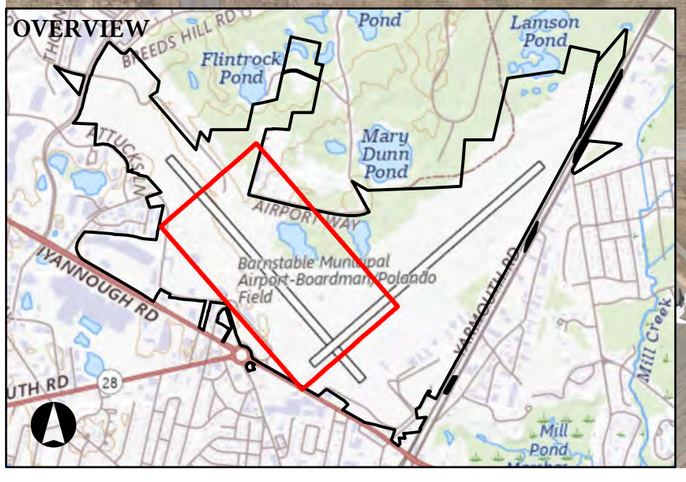
- Airport Property Boundary
- New Pavement
- Pavement to be Reconstructed
- Pavement to be Removed
- Pavement Removal Turf
- Limits of Grading (2:1 Slope)
- Noise Barrier
- Bordering Vegetated Wetland
- Land Under Water
- Bank
- 100-ft Buffer Zone
- 200-ft Buffer Zone

Scale 1:2,880
1 inch = 240 feet

0 120 240 Feet

Basemap: Nearmap Aerial Image, April 2023

OVERVIEW



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 4.1-11
Taxiway D No Access Road Alternative

Table 4.1-6 Summary of Taxiway B and D Alternatives

Alternative	Proposed	Compliance	Env. Impacts	Cost	Carried forward for further analysis	Notes
Taxiway B						
Alternative 1 (No Build Alternative)	Leave Taxiway B in its current location	Does not physically separate taxiway from apron	★☆☆	★☆☆	Yes	
Alternative 2 (Preferred Alternative)	Reconstruct Taxiway B parallel to Runway 16-24 with standard 400-foot separation distance (centerline to center line) from Runway 6-24	Achieve compliant TOFA. Remove high-energy crossing	★☆☆	★★☆	Yes	Approximately 226,200 sf (5.193 acres) net increase in pavement area
Taxiway D						
Alternative 1 (No Build Alternative)	Leave Taxiway D in its current configuration	Does not address existing non-standard conditions with potential safety concerns. Does not meet the existing and future facility requirements related to taxiway geometry and safety enhancements.	★☆☆	★☆☆	Yes	
Alternative 2A	Construct a partial parallel taxiway with a 400-foot standard separation east of Runway 15-33 from Taxiway B to existing Taxiway A1 Standard side slope of 4:1, Safety Areas and TOFA for TDG 3/ADC III aircraft	Prevents safety concerns of two-way taxiing (conflicts between arriving and departing aircraft) occurring in front of the terminal building. Addresses FAA airfield geometry and design standards	★★☆	★★☆	No	Largest impacts associated with Upper Gate Pond 11,800 sf BVW, 28,000 sf LUW and 540 lf of Bank
Alternative 2B (Preferred Alternative)	Construct a partial parallel taxiway with a 400-foot standard separation east of Runway 15-33 from Taxiway B to existing Taxiway A1 Steeper side slope 2:1 (higher slope within TOFA)	Prevents safety concerns of two-way taxiing (conflicts between arriving and departing aircraft) occurring in front of the terminal building. Addresses FAA airfield geometry and design standards	★★☆	★★☆	Yes	Reduced impacts associated with Upper Gate Pond 4,600 sf BVW 12,700 sf LUW 300 lf Bank

Table 4.1-6 Summary of Taxiway Alternatives (Continued)

Alternative	Proposed	Compliance	Env. Impacts	Cost	Carried forward for further analysis	Notes
Alternative 2C	Construct a partial parallel taxiway with a 400-foot standard separation east of Runway 15-33 from Taxiway B to existing Taxiway A1. Construct a retaining wall at the bottom of the taxiway side slopes	Does not meet Taxiway Safety Area requirements	★☆☆	★★☆	No	Reduced permanent impacts to Upper Gates Pond. Wall over 16 feet tall required 3,500 sf BVW 7,100 sf LUW 230 lf Bank
Alternative 2D	Construct a structural bridge component to Taxiway D at the segment crossing Upper Gate spanning the bottom of the taxiway side slopes.	Does not meet Taxiway Safety Area requirements	★☆☆	★★★	No	Extensive amounts of new construction High cost
Alternative 3	Construct a partial parallel taxiway with a 400-foot standard separation east of Runway 15-33 from Taxiway B to existing Taxiway A1 Maintain the run-up pad in its existing location. Remove Taxiway D between Taxiway A	Resolves safety concerns of two-way taxiing occurring in front of the terminal building	★★☆	★★☆	No	Does not meet FAA geometry standards - results in a high-energy crossing on Runway 15-33
Alternative 4	Locate a parallel Taxiway D south of Upper Gate Pond closer to Runway 15-33, approximately 300ft from the runway center line. Compared to prior alternatives, will avoid impacts associated with BVW, Bank and LUW. located.	Does not meet Taxiway Safety Area requirements	★☆☆	★★☆	No	Does not meet FAA defined separation standards. Results in a non-standard geometry on the airfield, that results in unsafe conditions
Alternative 5	Construct a partial parallel taxiway with a 400-foot standard separation east of Runway 15-33 from Taxiway B to existing Taxiway A1. Construct a retaining wall at the bottom of the taxiway side slopes. The area to the north of the taxiway which consists of the 37.5-foot-wide Taxiway Safety Area (TSA) and the 12 foot-wide perimeter vehicular service road has been narrowed to just include the TSA	Meets Taxiway Safety Area requirements	★★☆	★★☆	No	This Alternative would result permanent fill of 3,000 sf of BVW 10,900 sf Land Under Water (LUW) and 300 linear feet of Inland Bank

★★☆ Large impact
★☆☆ Moderate impact
★★★ Minimal impact

4.2 Airspace Control Improvements

4.2.1 Runway 33 RSA and Runway Object Free Area (ROFA) Avigation Easements

The FAA defines ROFAs as an area cleared of all objects except those that are related to navigational aids and aircraft ground maneuvering. ROFA is also centered around runways to enhance the safety of aircraft operations. FAA design standards for ROFAs surrounding runways serving AAC-ADG C-III aircraft are a width of 800 feet, a length that extends 600 feet prior to the landing threshold, and a length that extends 1,000 feet beyond the runway end. ROFAs and objects within it should be at or below the nearest Runway Safety Area elevation. Any penetration to the ROFA requires a modification to standards (MOS) under **FAA Order 5300.1G *Modifications to Agency Airport Design, Construction, and Equipment Standards***.

4.2.1.1 Alternative 1 – No-Action Alternative

The No-Action Alternative would not seek to acquire, on a willing seller basis, the approximately 1.3 acres of land within Runway 33 needed for use as object free areas. This Alternative does not address the multiple penetrations to the ROFA including Iyannough Road, Mary Dunn Way, off-Airport buildings, Airport perimeter fence, and ARFF / SRE Ramp. The penetrations to the ROFA would continue to exist, and under FAA Order 5300.1G *Modifications to Agency Airport Design, Construction, and Equipment Standards*, a Modification to Standards (MOS) would need to be updated every five years.

4.2.1.2 Alternative 2 – Acquire Easements

The Proposed Action will acquire avigation easements from willing parties designed to bring existing ROFAs into Airport control. Currently, not all ROFAs are within Airport control for existing conditions. A total of four (4) easements for 0.8 acres have been identified as out of airport control, associated with Runway 33 end. These are identified as Parcels 33-1 through 33-4 on the Town parcel map (see **Figure 3.3-1**). Roadways such as Iyannough Road and Yarmouth Road are not proposed for acquisition.

4.2.2 Enhance Airport Control Over RPZ Properties

RPZs are large trapezoidal areas on the ground off each runway end that are within aircraft approach and departure paths. The RPZ is intended to enhance the protection of people and property on the ground. Many land uses including residential, churches, and fuel storage are prohibited by FAA standards within these areas. These limitations are only applicable if the RPZ is owned or controlled by the Airport sponsor.

4.2.2.1 Alternative 1 – No-Action Alternative

The No-Action Alternative would not provide incremental enhancements to safety by increasing the Airport's control of the land area in the RPZs, on a willing seller basis.

Areas within RPZs that are not currently under Airport control in avigation easement or fee simple include all portions of the Runway 6 RPZs west of Iyannough Road, the north and southwest corners of the Runway 15 RPZ, the southern corner of the Runway 24 RPZ, the eastern portion of the Runway 33 RPZ, which total 44 acres/134 parcels. Airport control of these areas could be obtained through direct property acquisition or easements or zoning to control development and land use activities.

The No-Action Alternative would not seek to enhance control of approximately 44 acres within current RPZs off Airport property. Enhancing control of these areas allows the Airport to meet FAA standards for controlling obstructions, preventing future obstruction, and protecting airspace surfaces. However, the current RPZ conditions are grandfathered into the standards, and as a result, are considered standard by the FAA. The no Action Alternative would not acquire an additional 9.95 acres of easements for the proposed runway extension.

4.2.2.2 Alternative 2 – Preferred Alternative

The Proposed Action will acquire avigation easements from willing parties designed to bring existing RPZs and the proposed Runway 15 RPZ into Airport control. A total of four (4) easements for 9.95 acres have been identified as out of Airport control.

4.2.3 Alternative Analysis for North and East Ramp Hangar Development

The following alternatives analysis reviews the need for hangar development, based on the current forecasted demand for the Airport. This component to the airport infrastructure is needed to meet an anticipated industry trend for aircraft storage and is not a an "increase in capacity" to induce more demand for airplane and vehicular travel. The 2010 Environmental Notification Form and 2011 Draft EIR for the 2008 Airport Master Plan evaluated alternatives for hangar development in detail. As the preferred alternative in the 2011 assessment remains the same the 2020 Master Plan, that analysis remains valid as those areas have not yet been built out. Additionally,

this analysis takes into consideration the evolution of aircraft and future hangar development should consider longer wingspans, which are a feature of modern single and multiengine- aircraft. The typical T-hangar door width is 42 feet and modern ADG I aircraft have wingspans of 44 to 48 feet (e.g., Piper M350 and Piper Malibu).

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

- 1,200 SF for Single Engine and Rotor Aircraft
- 1,600 SF for Multi-Engine Aircraft
- 3,200 SF for Jet Aircraft

When calculating hangar demand, it is assumed that 70 percent of single engine and 35 percent multi-engine aircraft will be stored in individual hangars. It is also assumed that 25 percent of single engine aircraft, 60 percent of multi-engine aircraft, and 100 percent of jet aircraft will be stored in conventional hangars.

The forecast for based aircraft reflects a 0.4 percent decline in total based aircraft based on the historical trends of the Airport. These trends represent a small increase in small jet growth but the consolidation of light GA aircraft because of flying clubs and fractional ownership. More people will use based aircraft, which is why based aircraft numbers may decline, but aircraft operations increase. Based on the forecasting detailed below in **Table 4.2-1**, there is an existing shortage of conventional hangar space, which needs to be accommodated. Should demand exceed what is forecast, it is recommended to plan for six individual hangars and up to eight new conventional hangars to account for unplanned demand for new hangars and new businesses.

Table 4.2-1 Aircraft Hangar Demand

Year	Facility Demand	Current Provision	Additional Need
Baseline			
Individual Hangars	28	33	0
Conventional Hangars	27,860 sf	24,850 sf	3,010 sf
2025			
Individual Hangars	27	33	0
Conventional Hangars	28,220 sf	24,850 sf	3,750 sf
2030			
Individual Hangars	25	33	0
Conventional Hangars	27,620 sf	24,850 sf	2,770 sf
2040			
Individual Hangars	24	33	0
Conventional Hangars	30,220 sf	24,850 sf	5,370 sf

Source: McFarland Johnson 2020

In the analysis below, a No Build Alternative, Alternative 1: Northfield Development and Alternative 2: North and East Ramp Development are identified for proposed hangars and other development, considering impacts to land alteration and impervious area.

4.2.3.1 Hangar and Ramp Development – No-Build Alternative

The No-Build Alternative for hangar and ramp development would not add additional aircraft parking and hangar space to the Airport. The No-Build Alternative would not meet the current need of the airport users identified above.

4.2.3.2 Alternative 1: Northfield Development

This alternative considers the Northfield development area to the north of the proposed Taxiway D alignment in the vicinity of Upper Gate Pond and Lewis Pond (see **Figure 4.2-1**). Given runway and taxiway safety area operational setbacks, property available to be developed outside of the East Ramp or North Ramp is limited to undisturbed areas on the northern side of the airfield. Development of this portion of the Airport could allow for the construction of 178,200 sf of corporate and general aviation hangars. Alternative 1 would result in a net increase of disturbance of 10.5 acres over the Preferred for just the hangars and ramp areas alone. Development may also impact wetland resource areas of Upper Gate and Lewis Ponds. Additionally, this area is proximate to several active municipal supply wells used periodically. It would require additional infrastructure through the creation of a suitable access road via Mary Dunn Road or along the northern airfield perimeter road. It would also require the construction of a separate secure entrance, security fencing and automated gates, security lighting, and other associated appurtenances. These security concerns would add substantial increased costs. Alternative 1 would also represent a large change in aircraft travel patterns throughout the Airport that would

need to be evaluated by the FAA. Impacts to natural resources were deemed sufficient to eliminate Alternative 1 from further consideration.

4.2.3.3 Alternative 2: East and North Ramp Development – Preferred Alternative

The relocation of Taxiway B would open additional space to the areas of the airport that are currently in use for aeronautical activities at the East Ramp. Hangars at the East Ramp would have all water and sewer service provided by existing mains installed in 2022 along Mary Dunn Way. Connections to these mains would be required by the individual hangar developers.

The majority of the North Ramp is already paved and has taxi lane access, making it an ideal location for airside development in close proximity to the terminal building. No wetland impacts are associated with this alternative.

These ramp development areas include future space for transient aircraft parking as well as additional hangars or other aeronautical businesses and will be developed as opportunities for growth arise. The alternatives analysis, and summary **Table 4.2-2** below, supports the selection of the Preferred Alternative and includes all feasible measures to avoid Damage to the Environment, or to the extent Damage to the Environment cannot be avoided, to minimize and mitigate Damage to the Environment to the maximum extent practicable.

Table 4.2-2 Hangar Development Summary

	Alt. 1 Hangars within North Field Area Upper Gate and Lewis Pond	Alt. 2 Hangars within East and North Ramp Area of Airport (Pref. Alt)	Difference in Impact
Total Area	15 acres	15 acres	-
New Pavement[1]	15 acres	14.5 acres	-0.5 acres
Existing Disturbed Areas[2]	0 acres	4.5 acres	-10.5 acres
Existing Pavement	0 acres	0.5 acres	+0.5 acres
Tree / Vegetation Removal	15 acres1	6 acres	-9 acres
Impacts to Wetland Resource Areas (e.g., BVW)	Yes	No	No wetland impacts associated with the Alt.2

[1] Hangar buildings would need to be located beyond the Building Restriction Line (BRL) for the RVZ within this area.

[2] Areas categorized as previously disturbed include service roadways, disturbed grass, and existing pavement.

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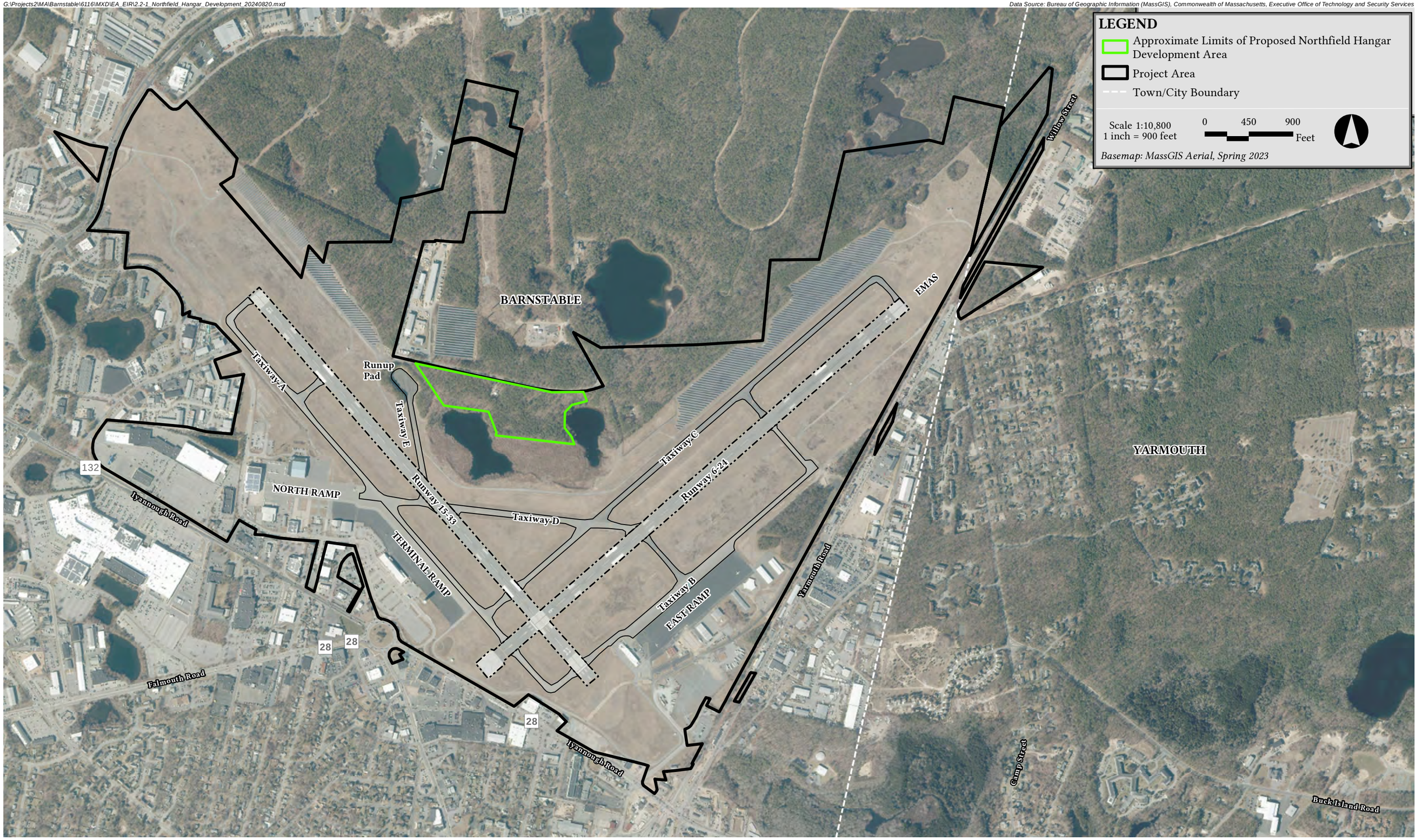
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport **Barnstable, Massachusetts**

Figure 4.2-1
Alternative 1 - Northfield Hangar Development

Chapter 5.0

Affected Environment

5.0 AFFECTED ENVIRONMENT

5.1 Introduction

This chapter describes the environmental conditions of the potentially affected geographic areas of the Proposed Actions at the Airport. The following discussion, designed to meet the requirements of NEPA, is based on analyses conducted to understand potential impacts of the Proposed Actions. Resource categories identified for analysis are in accordance with FAA Orders 1050.1F, *Environmental Impacts: Policies and Procedures* (Order 1050.1F) and 5050.4B*, NEPA Implementing Instructions for Airport Actions* (Order 5050.4B) and MEPA 301 CMR 11.07 (6)(g) "Existing Environment".[1]

5.2 Project Area

For the purposes of discussing existing conditions, the Airport refers to the entirety of the Airport's property limits, and the Project Area(s) or Project Site refers to the portion of the property on which improvements are proposed. The locations of each identified Project vary on the Airport property. **Figure 1.1-3** identifies all proposed Projects at the Airport.

All the proposed airside and landside improvement projects are located on Airport property and are consistent with existing aviation uses. The "study area" for each of the resource categories varies according to area of potential impact. Potential off-Airport property avigation easement acquisition areas are briefly discussed below and in more detail in Chapter 6.0.

The Airport is situated at elevations ranging from 30 feet to 60 feet above mean sea level (MSL). The topography at the Airport is generally flat with a general downward slope from the center of the Airport to the Runway 24 end. The Airport also has a rising gradient from the center of the Airport (approximately 40 feet) towards the northwest end of the Airport near Runway 15 end (approximately 60 feet). According to Massachusetts GIS contour data, the central portion of the Airport is at an elevation of approximately 40 feet, while the northeastern portion of the Airport is approximately 30 feet (Runway 24 end), and the northwestern portion elevation is at approximately 50-65 feet. The runways are elevated at 54.1 feet (15-end), 42.6 feet (33-end), 44.4 feet (6-end), and 39.2 feet (24-end).

The lower elevations of the Project Sites are associated with Upper Gate Pond. For example, the Upper Gate Pond's embankment is at an elevation of around 45 feet and the pond's water elevation is around 25 feet above MSL, resulting in a relatively steep drop of 20 feet down to the pond itself.

5.3 Soils/Farmland

Natural Resource Conservation Service (NRCS) soil survey data, accessed via the Web Soil Survey (WSS) shows two primary soil units mapped at the Airport. The airfield soils surrounding Runway 15 are mapped Hinckley loamy sand, 0 to 3 percent slopes, which accounts for approximately 80 acres. The area around Runway 24 end is mapped as Carver loamy coarse sand, 0 to 3 percent slopes, which accounts for approximately 127 acres of the Airport. Additionally, areas of soil mapped as Urban Land account for approximately 264 acres of the Airport.

Soils that exhibit good drainage are typically considered by the U.S. Department of Agriculture Soil Conservation Service to be prime farmland. The Farmland Protection Policy Act (FPPA) requires coordination with the local office of the NRCS if the proposed project entails irreversible conversion of prime farmland to nonagricultural uses. Farmland subject to this requirement does not have to be currently used for cropland; it may also be forestland or pastureland, but not urban or built-up land. This requirement is intended to monitor the impact that federal programs or federally funded projects have on the conversion of this resource. The Farmland Protection Policy Act (7 U.S.C. 4201-4209) (PL 97-98 amended by Section 1255 of the Food Security Act of 1985, PL 99-198) addresses the conversion of farmland to non-agricultural uses.

In Massachusetts, Executive Order 193 (March 19, 1981) is likewise intended to avoid or minimize the conversion of farmland to non-agricultural uses. According to the NRCS WSS, approximately 99 acres, which is approximately 19 percent of the airfield, is classified as prime farmland soil (Hinckley loamy sand, 0 to 3 percent slopes and Hinckley loamy sand, 3 to 8 percent slopes). Mapped farmland soils are shown on **Figure 5.3-1**. These two locations at the Airport are classified as prime farmland; however, none of those areas are in, or have been in, agricultural production since the Airport started operating.

[1] Massachusetts is a state with a NEPA-like statute, the MEPA, which has similar but not identical requirements to NEPA. This document is prepared to satisfy the requirements of NEPA. To the extent that this document, its appendices and other attachments contain content specific to the MEPA process and that is not relevant or required for NEPA compliance, the FAA does not adopt such text, analysis, or information as part of the Federal EA, nor will the FAA rely on such text, analysis, or information in reaching significance conclusions or decisions regarding the approval of the proposed project.

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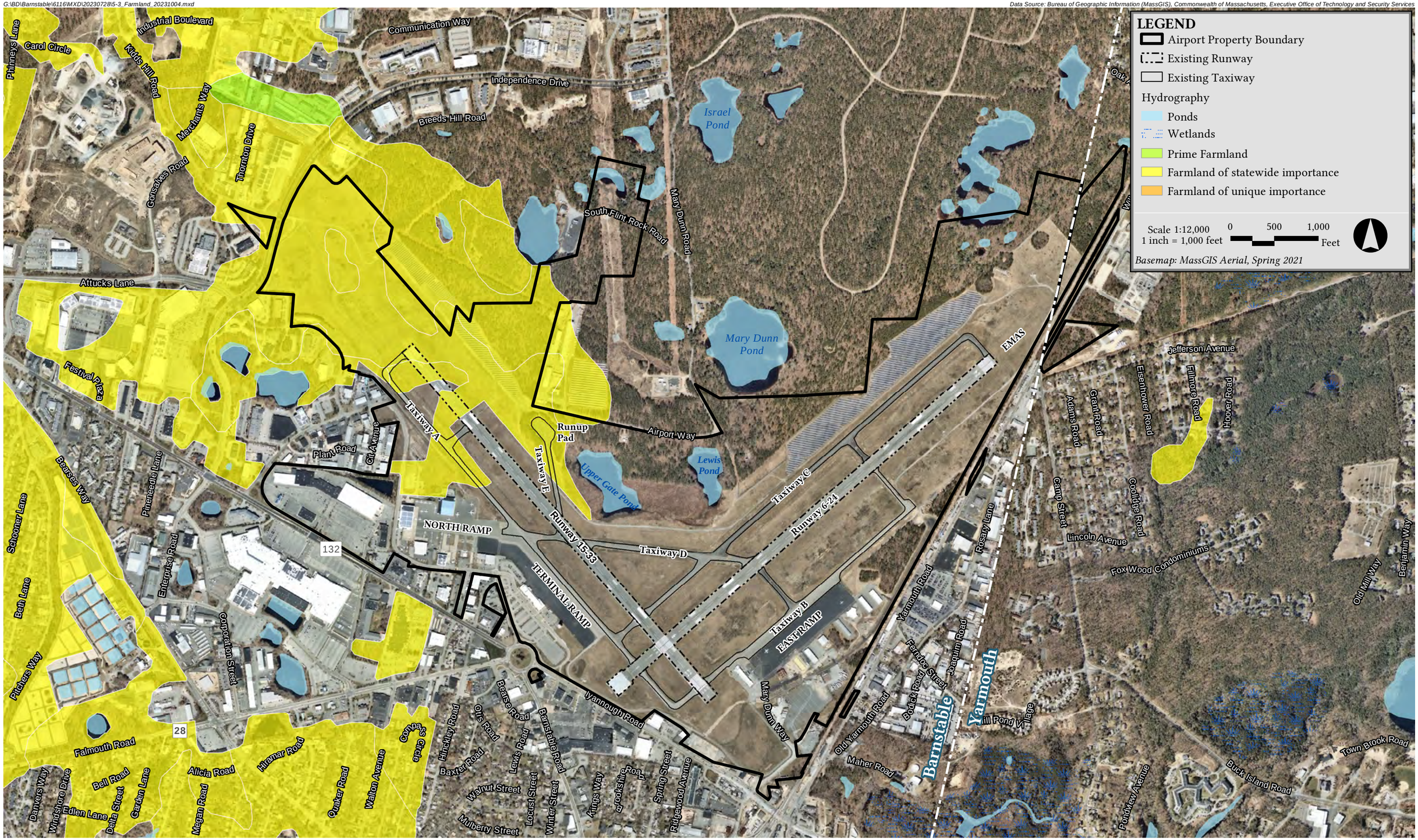
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 5.3-1
Mapped Farmland Soils

Since the No Action and Proposed Action Alternatives would not affect soils or farmlands in the primary study areas, this resource was dismissed from further consideration.

5.4 Water Resources

Water resources are surface waters and groundwater that are important in providing drinking water and in supporting recreation, transportation and commerce, industry, agriculture, and aquatic ecosystems. Surface water, groundwater, floodplains, and wetlands do not function as separate and isolated components of the watershed, but rather as a single, integrated natural system. Disruption of any one part of this system can cause impacts to the functioning of the entire system.

5.4.1 Surface Waters

Ponds proximate to and within the Project Sites include Upper Gate Pond and Lewis Pond located in between Runway 15-33 and Runway 6-24 (see **Figure 5.4-1**). The surface area of Upper Gate Pond is approximately 5.7 acres and that of Lewis Pond is approximately 4.4 acres. Upper Gate Pond is one of two small ponds located within the most northerly part of the Airport parcel; the second being Lewis Pond which is approximately 700 feet to the east. A third pond, Mary Dunn Pond, has a surface area of approximately 19.2 acres and extends only slightly into the property along the Airport's northern boundary, outside the Project Sites. Each of these waterbodies are located within distinct topographic depressions that are typical features of the pitted outwash plain upon which the Airport is located.

Upper Gate Pond has a perimeter measuring approximately 2,500 feet. It has a complex shape that is elongated along the north-south axis and somewhat resembles a goldfish. Its meandering shoreline presents itself as a series of small coves, two of which are occupied by culverts and spillways associated with the Airport's stormwater management system along the southeastern edge. A bathymetric survey of the pond's western portion was completed by CR Environmental in the Fall of 2022. During surveying, the water depth was measured and recorded at 182 locations on a 25 by 25-foot grid and recorded depths ranged between 0.9 and 6.8 feet. The complete results of the bathymetric survey are provided in **Appendix E**.

The terrain surrounding Upper Gate and Lewis Pond contains steep embankments and bordering vegetated wetlands associated with the ponds. Vegetation surrounding the southern segments of the ponds is disturbed frequently due to maintenance mowing by the Airport operations staff. Additional historical disturbance within buffers around the ponds is due to debris from historically placed materials near the outfall at Lewis Pond, surrounding Lewis Pond, and along the southern and eastern shores of Upper Gate Pond creating irregular embankments. These ponds have historically served as outfalls for stormwater discharge from the Airport property (as required by past permits).

The Runway Visibility Zone (RVZ) between the two runways is maintained free of tall/dense vegetation to allow aircraft to verify the location and actions of other aircraft and vehicles on the ground. The northern portions of the pond (outside of the RVZ) contain densely forested embankments, extending into the Hyannis Ponds Wildlife Management Area (WMA). The ponds are separated by an area of forested upland and are not hydrologically connected through any surface water features.

In addition to Upper Gate and Lewis Ponds, Mary Dunn Pond and Lamson Pond and associated bordering vegetated wetlands extend onto Airport property, outside the limits of the Project Site. Mary Dunn Pond, the largest of the four ponds, located to the north of Taxiway C, supports a classic Coastal Plain Ponds Community consisting of narrow concentric bands of vegetation that can provide habitat for some of Massachusetts' rare plant species. Lamson Pond, located to the northeast quadrant of the Airport, also supports Coastal Plain Pond communities.

These ponds and their associated wetlands may be subject to regulation under the federal Clean Water Act, the Massachusetts Wetlands Protection Act, the CCC RPP, and the Town Wetlands Ordinance. Like other ponds on Cape Cod, both ponds are classified as a Class B water body, meaning that they have been designated as habitat for fish, other aquatic life, and wildlife, and for primary or secondary contact recreation, according to the Massachusetts Surface Water Standards (314 CMR 4.00). The ponds are listed on the Massachusetts Division of Watershed Managements' integrated list of impaired waters, Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act, 2018-20.

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

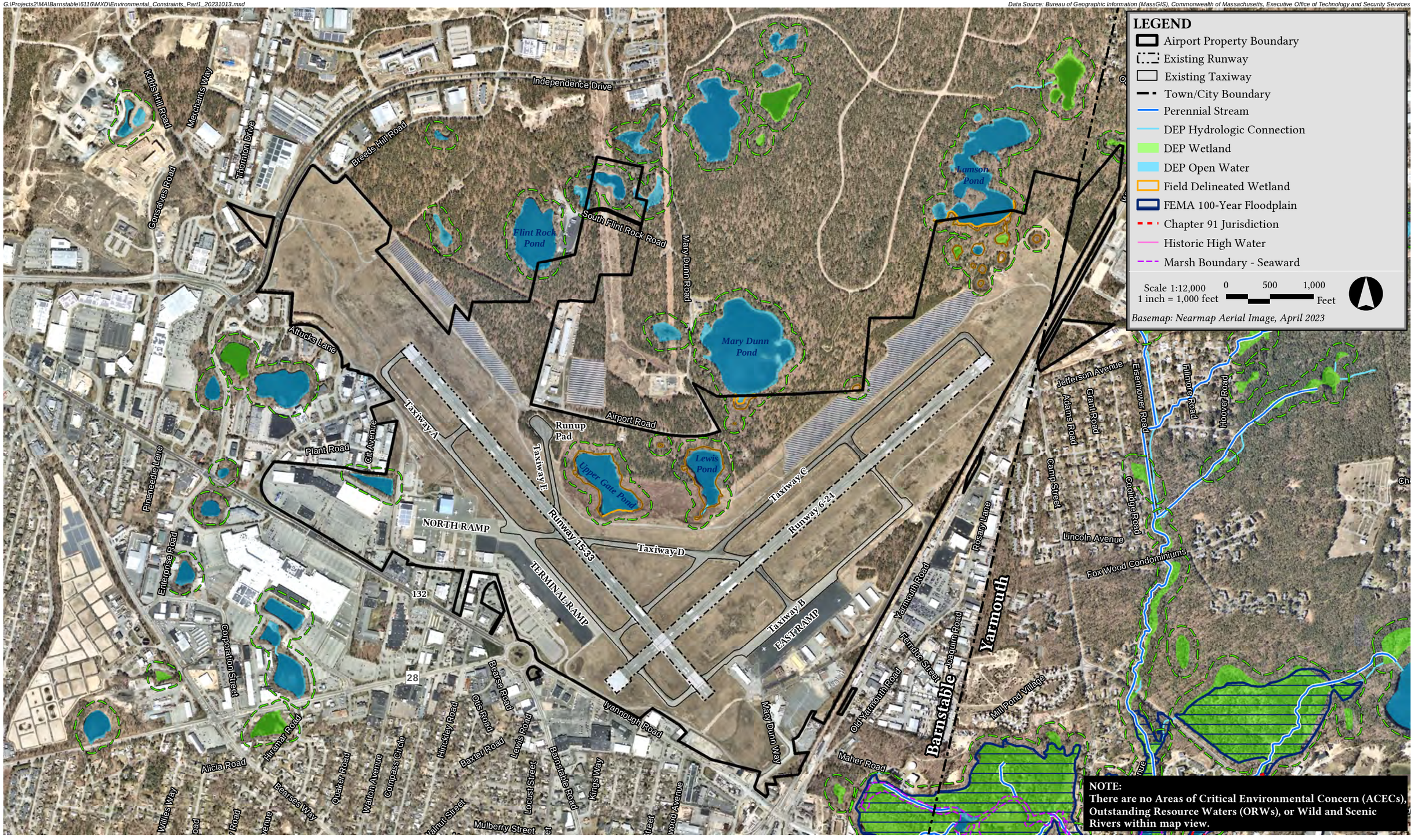

Figure 5.4-1

Wetlands Resource Areas, FEMA Flood Hazard Areas, and Chapter 91 Tidelands Jurisdiction

5.4.2 Wetlands

The Airport contains several areas of freshwater ponds (see Section 5.4.1 above), wetlands bordering these ponds, and isolated vegetated wetlands, see **Figure 5.4-1**. The majority of these wetlands are located on the northern and northeastern portions of the airfield. Adjacent to the Airport's northern boundary is the Hyannis Ponds WMA. Wetlands areas have been identified during past field surveys as well as recent targeted wetland delineations of resource areas within limits of disturbance of the Projects in the Airport's Master Plan. Wetland and aquatic resources within the Airport's boundary are protected by state, local, and federal statutes including the Massachusetts Clean Water Act, administered by MassDEP under the M.G.L. Ch 21 § 26-53, the Massachusetts Wetlands Protection Act (M.G.L. Ch. 131 § 40), the Town of Barnstable Wetlands Protection Bylaw (Chapter 237), and the Cape Cod Commission Regional Policy Plan, approved as Barnstable County Ordinance 19-01 and amended in 2021. A description of wetland resources areas in or near the Project limits is provided below.

Upper Gate Pond and Lewis Pond experience large growths of submerged aquatic vegetation and emergent species that cover the surface of the ponds during the growing season. Bordering Vegetated Wetlands (BVW)/Freshwater Wetlands surround the two ponds. Various tree species are found along the banks such as willow (*Salix spp.*) and red maple (*Acer rubrum*) with occasional tupelo (*Nyssa sylvatica*). Dominant shrub species include fetterbush (*Leucothoe racemosa*), sweet pepperbush (*Clethra alnifolia*), northern arrowwood (*Viburnum dentatum*), winterberry (*Ilex verticillata*), maleberry (*Lyonia ligustrina*) highbush blueberry, inkberry, nannyberry (*Viburnum lentago*), and European buckthorn (*Frangula alnus*). Poison Ivy (*Toxicodendron radicans*) is also located throughout the wetland areas. Portion of the pond edges contain common greenbrier in densely grown thickets. Groundcover species include sheep laurel (*Kalmia angustifolia*), and sensitive fern *(Onoclea sensibilis*).

Upper Gate Pond north of Taxiway D hosts a subaquatic community dominated by white water lily *(Nymphaea adorata).* Palustrine wetland vegetation observed along the shoreline includes highbush blueberry, sweet pepperbush, and Bebb's willow *(Salix bebbiana).*

Within the northeast quadrant of the Airport, eleven isolated freshwater depressions, ranging in size, are located within a forested area adjacent to the Runway 24 end. One larger isolated wetland is located in the far northeastern corner of the Airport property and is greater than 0.5 acres. These isolated freshwater wetlands are situated in a kettle hole-like depression supported by standing water as observed in the fall/winter of 2019-2020 by Horsley Witten Group (HWG). Vegetation within these freshwater wetlands is similar to that observed within the BVW/Freshwater wetlands around Upper Gate Pond and Lewis Pond, including a stand of red maple, eastern white pine (*Pinus strobus*), and gray birch (*Betula populifolia*). Open areas in the central portions of these wetlands also commonly support sphagnum moss (*Sphagnum spp.*). Approximately one third of these isolated wetland areas are identified as potential vernal pools by the Massachusetts NHESP (see **Figure 5.10-1**). These isolated wetlands are outside of the proposed Project Areas.

5.4.3 Groundwater

Groundwater is subsurface water that occupies the space between sand, clay, and rock formations. The term aquifer is used to describe the geologic layers that store or transmit groundwater to wells, springs, and other water sources. Nearly the entire Airport and most of the land area between Route 132, Route 6, and Yarmouth Road, is situated within a zone of groundwater contribution to public water supplies. These areas are protected at the federal, state, and local level as discussed below.

The Airport is located above a Sole Source Aquifer (SSA) as designated by the U.S. Environmental Protection Agency (EPA) under Section 1424(e) of the Federal Safe Drinking Water Act. A SSA is one that supplies at least 50 percent of the drinking water consumed by the human population in the area overlying the aquifer where there is no other alternative to this water supply. This designation gives EPA authority to review all proposed federal financially assisted projects which have the potential to contaminate the area of the Sole Source Aquifer. Under the SDWA, EPA has the authority to withhold use of federal funding for construction of any proposed project within a designated SSA which it believes poses a significant threat of contamination to an aquifer.

The Cape Cod Aquifer provides 100% of the Cape's drinking water, and its highly permeable aquifer deposits make it one of the most productive groundwater systems in New England. These water supplies are susceptible to contamination from development and land uses within their watersheds. Based on previous groundwater investigations, groundwater flows in a southeasterly direction from the Airport towards Lewis Bay, see **Figure 5.4-2A**. The Cape Cod Aquifer is recharged solely by precipitation, with approximately 60% of rainfall and snowmelt contributing to recharge annually. All developed impervious areas and most developed open space areas within the Airport property are classified as medium yield non-potential drinking water source areas. There are public drinking water supply wells near the Airport and the Airport is located within their wellhead protection areas, or Zone II as defined by MassDEP. Wellhead protection areas represent the land area where rain soaks into the ground, enters groundwater, and flows to one of the wells. See **Figure 5.4-2B** for a map of wells and protection areas within the Airport. See **Figure 5.4.-2C** for locations of water supplies within a 5-mile radius of the Project Site and **Figure 5.4-2D** for the Barnstable Wellhead Overlay protection areas.

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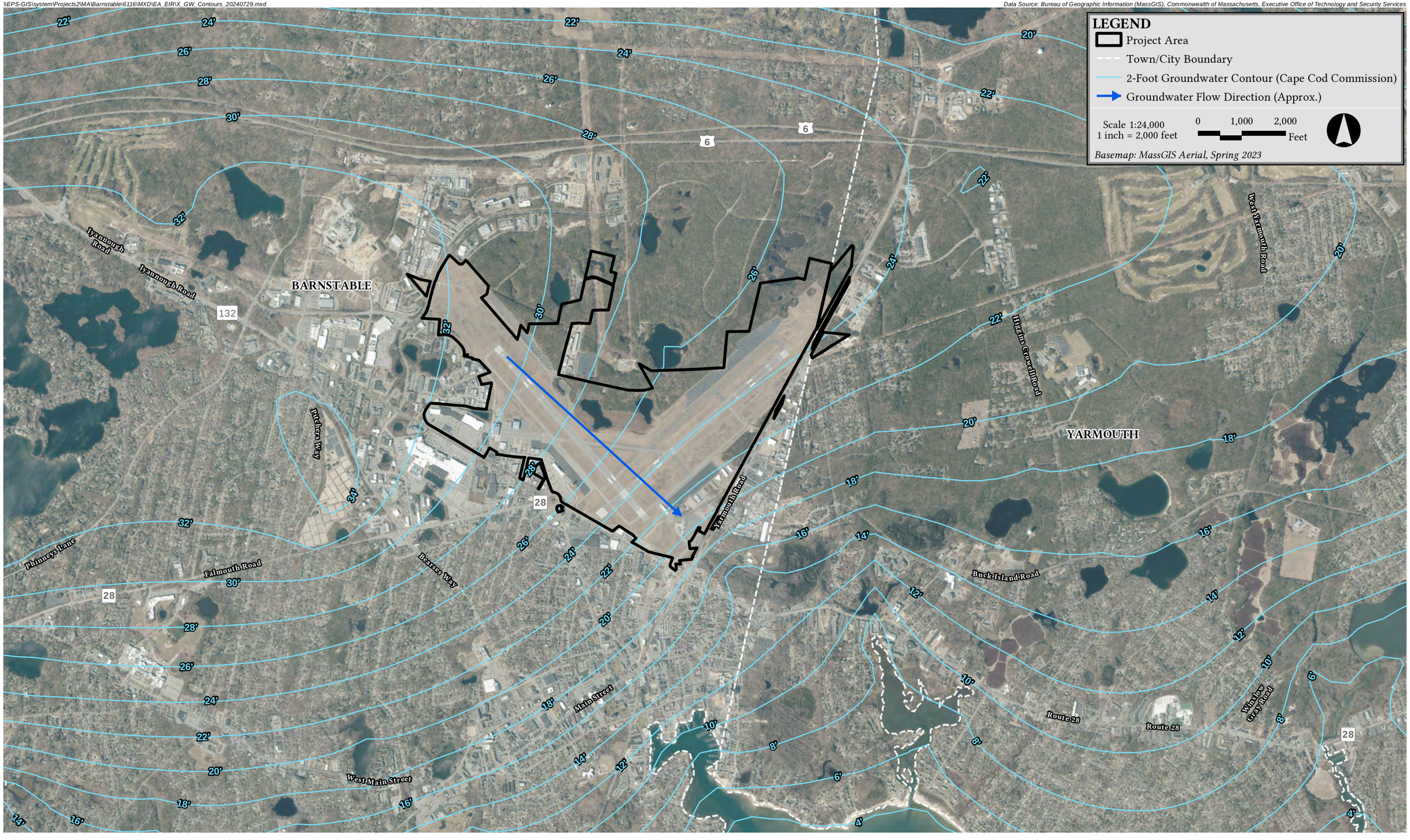
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 5.4-2A
Groundwater Contours

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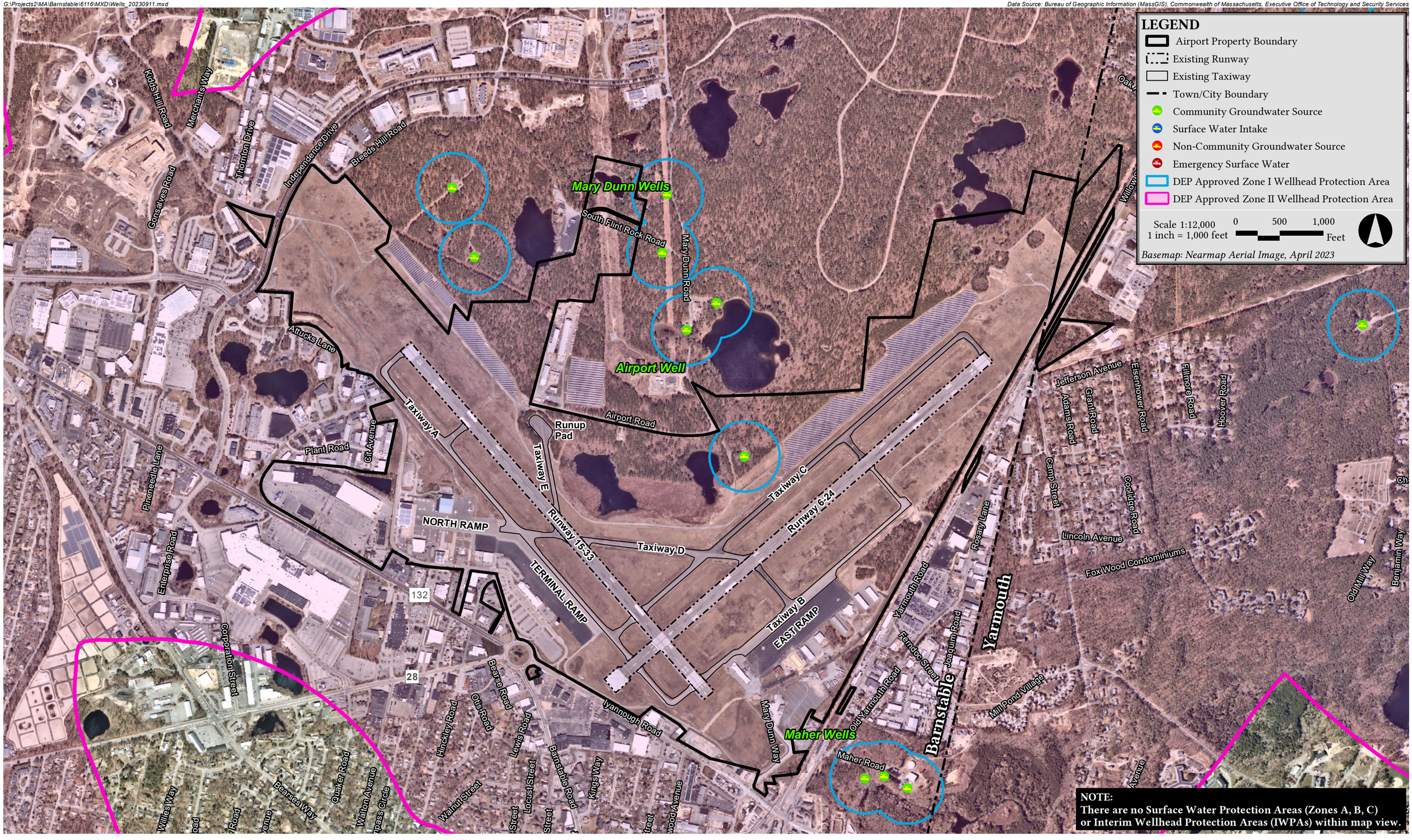
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



NOTE:
There are no Surface Water Protection Areas (Zones A, B, C) or Interim Wellhead Protection Areas (IWPAs) within map view.

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

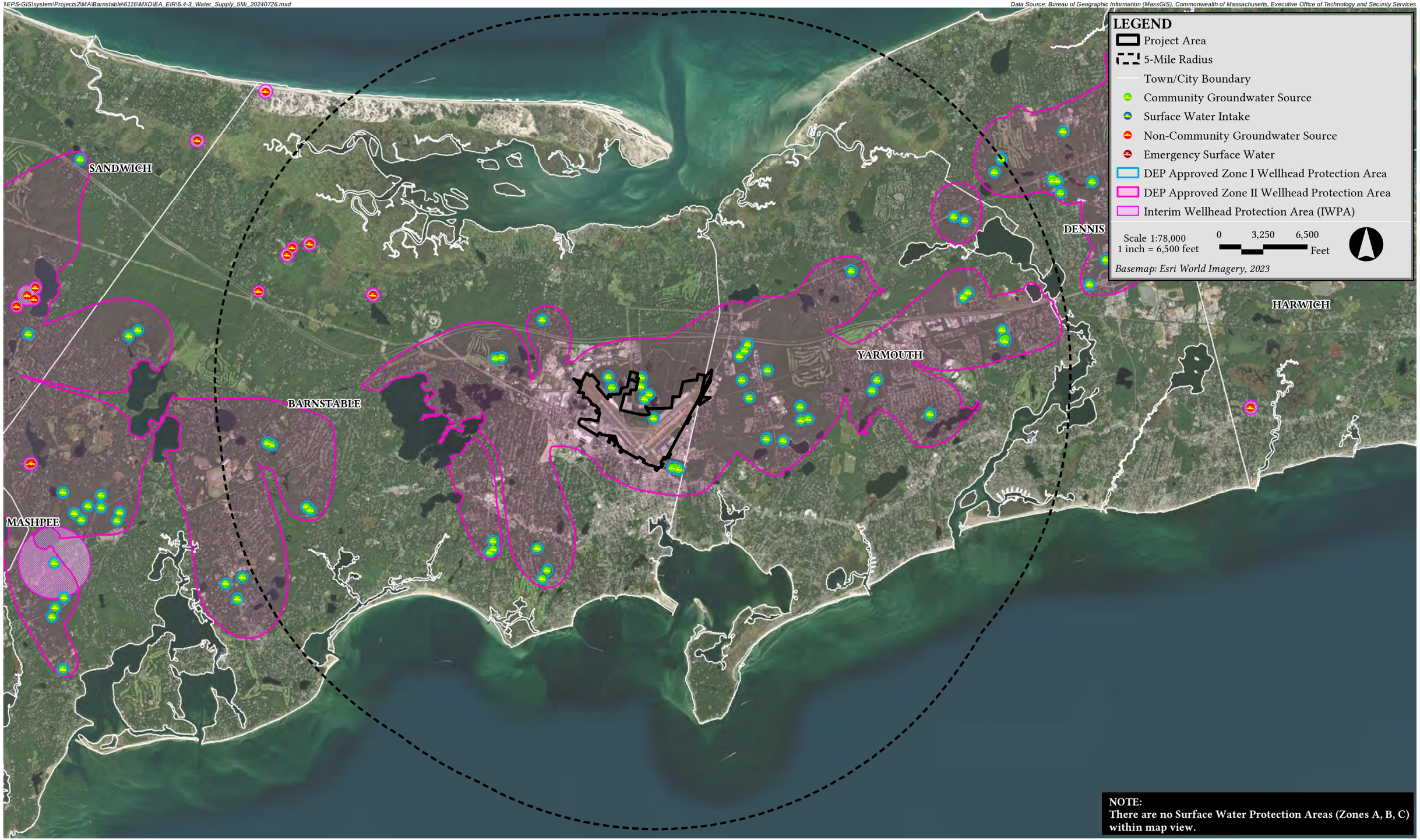


Figure 5.4-2C
Protected Water Supply Areas

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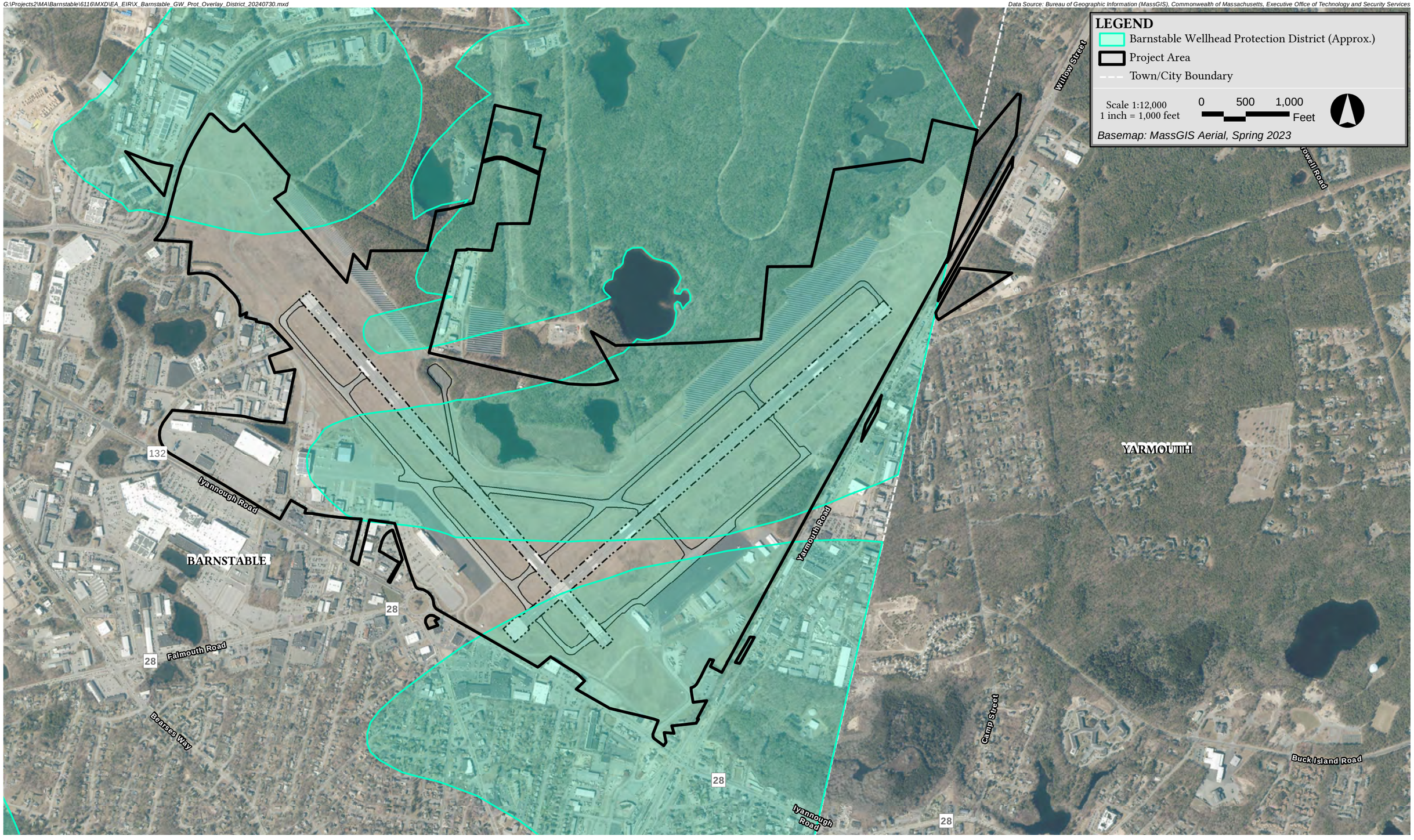
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport **Barnstable, Massachusetts**

Figure 5.4-2D
Barnstable Wellhead Protection Overlay District

5.4.3.1 Existing and Potential Public Drinking Water Wells

Public drinking water wells have been developed to the north and east of the Airport. The Maher Wellfield is located approximately 0.1 miles southeast from the Airport and consists of three production wells that supply approximately 30 to 35 percent of the Town of Barnstable's Water Supply Division service connections in Hyannis and Hyannis Port.

Existing wells proximate to the Airport are operated by the Barnstable Water Company (BWC) and the Barnstable Fire District. Additional wells operated by the Yarmouth Water Department are located east of Willow Street in Yarmouth. While these wells are further away from the Airport than the Maher Wells, the groundwater resources associated with them occupy a larger area of the Airport Property than those linked to the Maher Wellfield. **Figure 5.4-2B** also shows potential future well locations, including two locations leased by the Airport to the Barnstable Water Company, and two locations on Airport property that are identified as future well sites on the Town of Barnstable's zoning map.

MassDEP regulations protect both Zone I and Zone II of public water supplies. The Zone I area is a protective area – usually a 400-foot radius - which must be owned or controlled by the public water supplier, and within which current and future land uses must be limited to those land uses directly related to the provision of the public water system or to other land uses which the public water system has demonstrated have no significant impact on water quality. Zone II is a larger area, denoting the area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at approved yield, with no recharge from precipitation). MassDEP has strict Zone I protective requirements. Zone II protection is provided through local wellhead protection zoning, passed by cities and towns under impetus from MassDEP.

The Airport is located within wellhead protection areas (land area where rain soaks into the ground, enters groundwater, and flows to one of the wells), or Zone II areas as defined by MassDEP. As shown on **Figure 5.4-2B**, Zone II areas protecting wells located proximate to the Airport underlies the entire Airport property. Areas within Zone II defined by the five-year time of travel as described below reflect areas of highest sensitivity due to their direct connection to existing drinking water supplies. This area represents the portion of the larger Zone II that is most closely connected to the source well. The Barnstable Groundwater Protection Overlay District and associated regulations impose stronger restrictions on the five-year time of travel area, which is known under local zoning as the Wellhead Protection (WP) Overlay District. Additionally, several of the Cape Cod Commission policies and procedures are designed to protect groundwater resources. Project compliance with these above protection policies is discussed further in Chapter 8.0.

5.4.4 Wild and Scenic Rivers

Wild and Scenic Rivers are identified as rivers having remarkable scenic, recreational, geologic, fish, wildlife, historic, or cultural values as defined by the Wild and Scenic Rivers Act. If the FAA is taking an action that would physically impact resources covered by the Wild and Scenic Rivers Act, there may be consultation requirements under the Act. The Proposed Action is not located within 5 miles of a designated Wild and Scenic River as determined by the NWSR System or of a river segment identified in the NRI (see **Figure 5.4-1**). The only currently designated Wild and Scenic Rivers in Massachusetts are Nashua, Squannacook and Nissitissit Rivers; Sudbury, Assabet and Concord Rivers; Taunton River; and Westfield River.

Since the No Action and Proposed Action Alternatives would not affect Wild and Scenic Rivers in the primary study areas, this resource is dismissed from further consideration.

5.4.5 Floodplains

Floodplains are lowland areas adjoining inland and coastal waters which are periodically inundated by flood waters, including flood-prone areas of offshore islands. Floodplains are often discussed in terms of the 100-year flood. The 100-year flood is a flood having a 1 percent chance of occurring in any given year. The 100-year flood is also known as the base flood. Floodplains are valued for their natural flood and erosion control, enhancement of biological productivity, and socioeconomic benefits and functions. Airport development actions must avoid impacting floodplains if a practicable alternative exists to comply with Executive Order 11988 (1977) *Floodplain Management* and the US Department of Transportation (USDOT) Order 5650.2 *Floodplain Management and Protection*. In addition, the FAA has provided guidance for floodplain analysis that needs to be incorporated in NEPA evaluations to adhere to EO 14030 *Climate-Related Financial Risk* (May 20, 2021) and the earlier EO 13690 (January 30, 2015) *Establishing a Federal Flood Risk Management Standard [FFRMS] and a Process for Further Soliciting and Considering Stakeholder Input*.

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (25001C0566J, effective on 07/16/2014 and 25001C0567J, effective on 07/16/2014) show the Airport is not within the 100-year floodplain (**Figure 5.4-3**). The Airport property is not at a high risk of flooding. A small amount of forested area near Mary Dunn Pond, within the Airport property boundary but outside the Project Area, is within an area with a 0.2 percent annual chance of flood hazard.

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

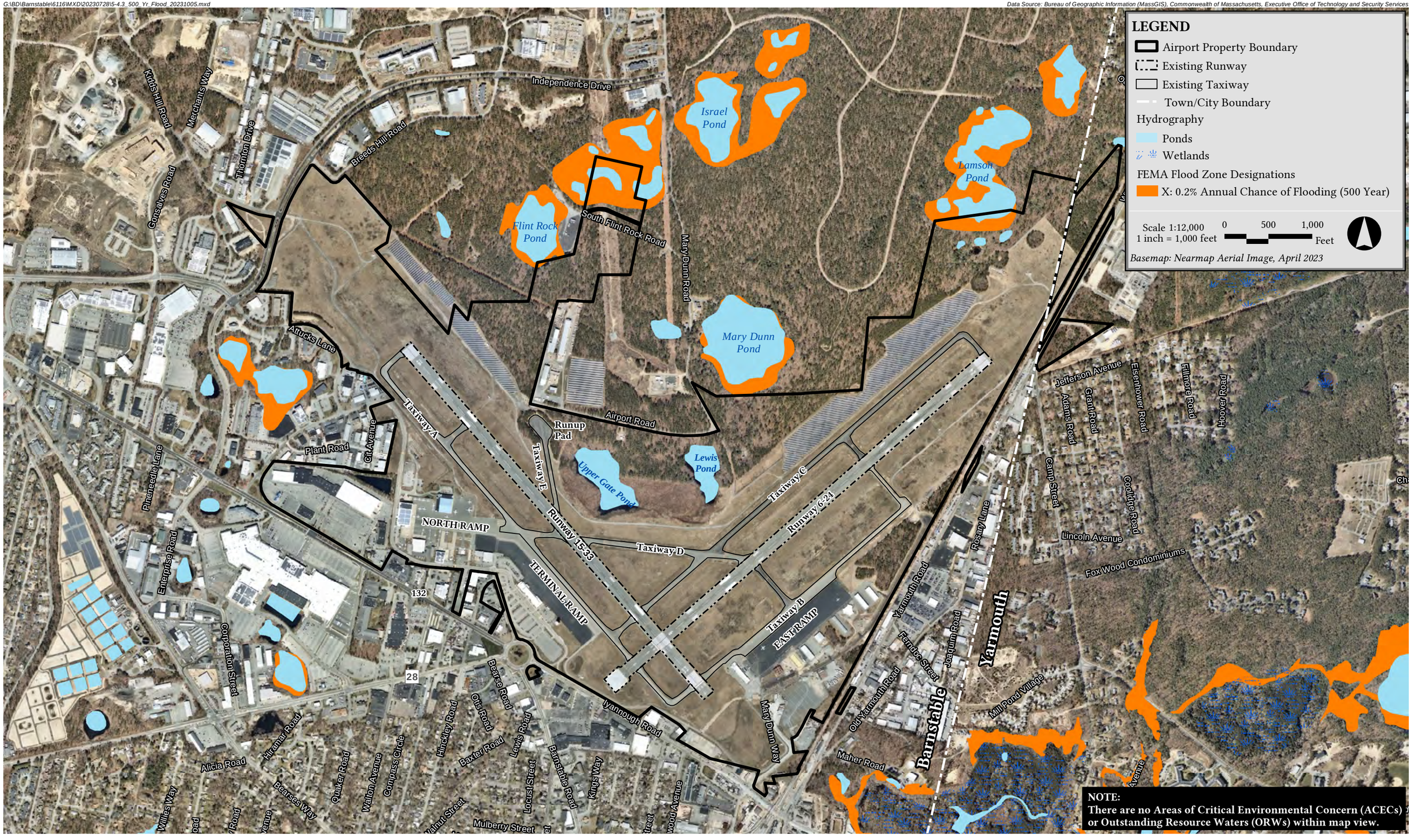

Figure 5.4-3
Environmental Constraints: FEMA Flood Hazard Areas

There will be no impact to mapped floodplains as part of this project. The nearest mapped floodplain to the Airport is located approximately 1,000 feet to the southeast. The identified flood elevation for this Zone AE is elevation 9 feet NAVD 88. The Airport's runway elevation is 52 feet NAVD 88.

5.5 Coastal Resources

Coastal resources include all natural resources occurring within coastal waters and their adjacent shorelands. Coastal resources include islands, transitional and intertidal areas, salt marshes, wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as fish and wildlife and their respective habitats within these areas. The Coastal Zone Management Act (CZMA) provides for the management of U.S. coastal resources. Requirements of the CZMA ensure that activities conducted or authorized by federal agencies are consistent with approved state coastal zone management programs. Consistency requirements, as listed in the National Oceanic and Atmospheric Administration's (NOAA) implementing regulations (15 CFR part 930), apply to activities that would have reasonably foreseeable effects on land or water uses or natural resources in a coastal zone.

Cape Cod and the islands of Nantucket and Martha's Vineyard are included in the Massachusetts Coastal Zone Boundary, as identified in the Massachusetts Office of Coastal Zone Management (CZM) Policy Guide. The Airport is located within the Massachusetts Coastal Zone (see **Figure 5.5-1**); therefore, the Project is required to undergo CZM consistency review under Section 307 of the Federal Coastal Zone Management Act of 1972. Projects requiring review under NEPA, such as those funded by the FAA would also require CZM consistency review.

5.6 Air Quality

Air quality impacts are evaluated based on requirements outlined in FAA Orders 1050.1F and 5050.4B. Specifically FAA Order 1050.1F and accompanying 1050.1F Desk Reference establishes guidelines for compliance with NEPA. The FAA establishes thresholds for determining significant impacts for the various impact categories. For air quality, the significance level is: "The action would cause pollutant concentrations to exceed one or more of the National Ambient Air Quality Standards (NAAQS), as established by the EPA under the Clean Air Act, for any of the time periods analyzed, or to increase the frequency or severity of any such existing violations (FAA Order 1050.1F, Exhibit 4-1)."

This section presents an overview of the regulatory process, a determination of the need for an air quality assessment, and description of the existing air quality conditions at the Airport.

5.6.1 Regulatory Framework

In 1970, the CAA was enacted by the U.S. Congress to protect the health and welfare of the public from the adverse effects of air pollution. As required by the CAA, the EPA promulgated NAAQS for the following criteria pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM) (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), ozone (O_3), and lead (Pb). US EPA reports air pollution concentrations with respect to how the health-based NAAQS are defined. These are called design values. For example, some standards are not to be exceeded such as the annual NO_2 standard, and some standards are compared to the 98th percentile of 24-hr averages or a 1-hr daily maximum, averaged over 3 years, such as the short-term $PM_{2.5}$ and the NO_2 standards, respectively. The NAAQS are listed in **Table 5.6-1**. Massachusetts recently revised their codified standards to be identical to NAAQS.

NAAQS specify concentration levels for various averaging times and include both "primary" and "secondary" standards. Primary standards are intended to protect human health, whereas secondary standards are intended to protect public welfare from any known or anticipated adverse effects associated with the presence of air pollutants, such as damage to vegetation. The NAAQS also reflect various durations of exposure. The short-term periods (24 hours or less) refer to exposure levels not to be exceeded more than once a year. Long-term periods refer to limits that cannot be exceeded for exposure averaged over three months or longer.

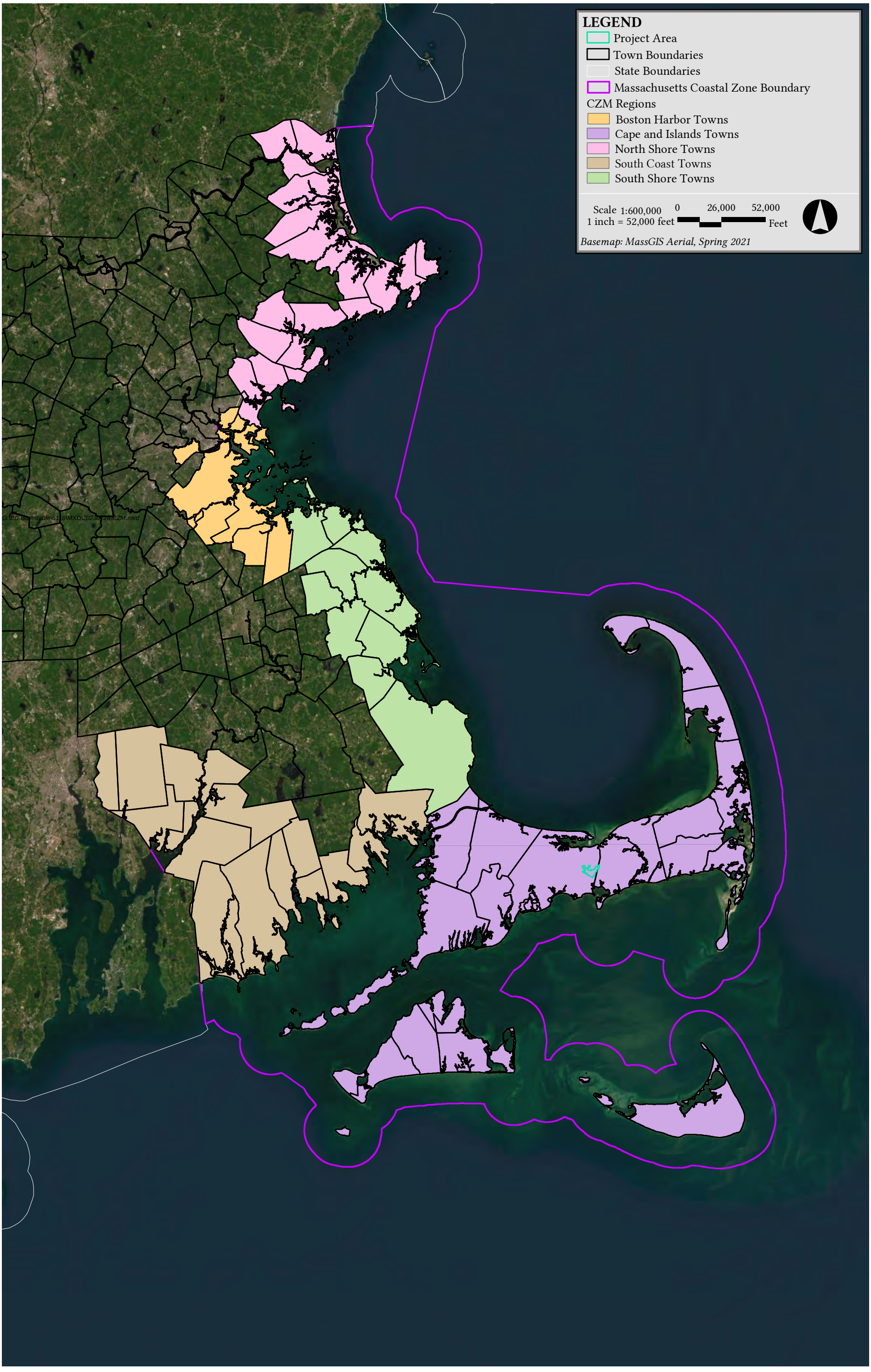

Figure 5.5-1
Coastal Zone Management Resources

The NAAQS are applicable to all of the US and territories. An area that is not in compliance with the NAAQS is deemed in nonattainment. If there is insufficient data to determine compliance, then an area is deemed unclassified and is treated as if in compliance.

Table 5.6-1 National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Period	NAAQS (µg/m³) *Primary*	NAAQS (µg/m³) *Secondary*
NO_2	Annual [1]	100	Same
	1-hour [2]	188	None
SO_2	3-hour [3]	None	1300
	1-hour [4]	196	None
$PM_{2.5}$	Annual [1]	12	15
	24-hour [5]	35	Same
PM_{10}	24-hour [3]	150	Same
CO	8-hour [3]	10,000	Same
	1-hour [3]	40,000	Same
Ozone	8-hour [6]	147	Same
Pb	3-month [1]	0.15	Same

Source: http://www.epa.gov/ttn/naaqs/criteria.html and 310 CMR 6.04
[1] Not to be exceeded.
[2] 98th percentile of one-hour daily maximum concentrations, averaged over three years.
[3] Not to be exceeded more than once per year.
[4] 99th percentile of one-hour daily maximum concentrations, averaged over three years.
[5] 98th percentile, averaged over three years.
[6] Annual fourth-highest daily maximum eight-hour concentration, averaged over three years.

Attainment with the NAAQS is based on data that is collected from a network of air monitoring sites across the country. The primary responsibility to ensure compliance with the NAAQS is assigned in the CAA to the individual states and any nonattainment areas require states to establish a State Implementation Plan (SIP) to reach compliance. The FAA is responsible for ensuring that airports' actions conform with SIPs, which is also known as General Conformity (Title 40 CRF Part 93). The general conformity rules only apply to areas that have been deemed to be in nonattainment or in maintenance (i.e., areas that were formally in nonattainment but have been in attainment for a period of 10 to 20 years). Although not considered a criteria air pollutant in terms of having an air quality standard protective of human or welfare effects, carbon dioxide (CO_2) is considered a greenhouse gas and analysis of CO_2 emissions is required. This assessment is presented in Section 5.7 Climate and Greenhouse Gas Emissions.

5.6.2 Attainment Status and Conformity

The EPA is required to publish a list of the geographic areas that are either not in compliance or in compliance with the NAAQS (Section 107 of the 1977 CAA Amendments). The attainment status for Barnstable County is shown in **Table 5.6-2**. As the Table shows, all of Massachusetts is in attainment of all the NAAQS; therefore, the General Conformity regulations do not apply to Barnstable County.

Table 5.6-2 Attainment Status for Barnstable County

Pollutant	Attainment Status
NO_2 (1-hour and annual)	Unclassifiable/Attainment
SO_2 (1-hr)	Unclassifiable/Attainment
PM-2.5	Unclassifiable/Attainment (2012)
PM-10 (24-hour)	Unclassifiable/Attainment
CO (1 and 8-hour)	Unclassifiable/Attainment
Ozone (8-hour)	Unclassifiable/Attainment (2015)
Pb (rolling 3-month)	Unclassifiable/Attainment

Source: 40 CFR 81.322, EPA's Green Book, and Massachusetts 2021 Air Quality Report

5.6.3 Background Air Quality

To estimate background pollutant levels representative of the area, the most recent US EPA design values[2] were obtained for 2019 to 2021 for the criteria pollutants. The closest and most representative monitoring station for which data are available for all air pollutants is generally selected. The monitoring station at Harrison Avenue in Boston was selected for this Project. This station is located in an urban area near major roads so would be considered a conservative estimate of background air concentrations.

Table 5.6-3 presents the background air quality concentrations for all the criteria air pollutants.

Table 5.6-3 Observed Ambient Air Quality Concentrations and Background Levels

Pollutant	Averaging Time	Background Concentration (µg/m³)	NAAQS	Percent of NAAQS
NO_2 (1)	1-Hour	84.6	188	45%
	Annual	18.8	100	19%
SO_2 (2)	1-Hour	5.2	196	3%
$PM_{2.5}$	24-Hour (3)	15	35	43%
	Annual (3)	6.2	12	52%
PM_{10}	Max 24-hr	28	150	19%
CO (4)	1-Hour	1833.6	40000	5%
	8-Hour	1260.6	10000	13%
Ozone (5)	8-Hour	119.7	147.0	81%
Pb	Max 24-hr	0.003	0.15	2%

Notes:
From Air Quality Design Values | US EPA. or EPA's AirData Website
NO_2 concentrations are reported in ppb. Converted to µg/m³ using factor of 1 ppb = 1.88 µg/m³.
SO_2 reported ppb. Converted to µg/m³ using factor of 1 ppb = 2.62 µg/m³.
Background level is the average concentration of the three years.
CO is reported in ppm. 1 ppm = 1150 µg/m³.
O_3 reported in ppm. Converted to µg/m³ using factor of 1 ppm = 1963 µg/m³.

As shown in **Table 5.6-3**, the air quality at background air quality is generally very good even in urban areas with high traffic volumes, with air concentrations that are well below the current NAAQS. Emission sources from airport operations include aircraft, auxiliary power units, ground support equipment, stationary/area sources, ground access vehicles, and construction. Criteria air pollutants and GHGs are primarily emitted from the burning of fossil fuels. As noted above, the FAA has established significance thresholds to serve as indicators of what constitutes a significant impact.[3] For air quality, the significance threshold is any action that would result in criteria air pollutant concentrations that would lead to an exceedance of the NAAQS or increase the severity of any existing exceedance.

5.7 Greenhouse Gas Emissions

A variety of GHG emission sources are associated with the operations at the Airport. GHG emissions are linked to equipment and energy use owned by the Airport and with equipment that is operated by its tenants and the general public. Airport-owned sources of emissions include ground service equipment, fleet vehicles, parking lots, buildings, and stationary sources such as emergency generators. Tenant emissions are associated with the operation of the aircraft, ground service equipment, and fleet vehicles. Emissions associated with the general public include vehicle travel to and from the Airport.

Emissions from Airport buildings are associated with electricity consumption and fuel consumption. Lighting, plug loads, fans, and pumps are all examples of building equipment that consume electricity. Kitchen equipment and boilers for space heating and water heating are sources of fuel combustion. In 2017, the Cape Cod Commission estimated that aviation activity to and from Barnstable County (inclusive of Cape Cod Gateway, Chatham, and Provincetown municipal airports as well as Joint Base Cape Cod) results in 19,614

[2] Air Quality Design Values | US EPA. A design value is reported by US EPA in the correct format for comparison with the NAAQS.

[3] FAA Order 1050.1F

MTCO2E annually.[4] Of this, the Airport accounted for 11,700 MTCO2E in 2019, or 59.7%. Overall, within the transportation sector, aviation accounts for only 0.1% of air emissions on Cape Cod.

The Airport is committed to energy conservation and over the years has invested in several improvements to promote energy conservation and efficiency at the Airport:

- Maintains two solar fields (24,640 solar panels in total) on the northern side of the Airport property, occupying approximately 25 acres of Airport property and the adjacent Fire District property. The solar fields generate approximately 6.7 megawatts (direct current or DC) of energy and are estimated to offset more than 5,000 metric tons of CO2 emissions annually;
- Upgraded Airport street and parking lot lights to LED using Cape Light Compact's lighting program;
- Has installed electric vehicle charging stations in three parking lot locations;
- Worked with Cape Air to install roof mounted solar arrays on two leased hangars; and
- Has purchased electric, solar and propane mowing equipment.

Additionally, the Airport has initiated the development of a smart microgrid in conjunction with the Cape Cod Transit Authority (CCTA) and MassDOT Aeronautics Division to provide an instantaneous and dependable supplementary source of power. Microgrids are a purpose-built local electrical system that can operate either in parallel with or separate from the utility, providing their own generation and load balancing to achieve stable operations. They integrate several different local generation resources as well as some type of energy storage to allow for flexibility in peak conditions. The development of this microgrid will enhance the Airport's ability to set new airport standards for resiliency and sustainable energy.

Project Related Climate Benefits[5]

Aspects of the Project may reduce climate risks, these include measures such as improvements to stormwater management systems, use of onsite energy generation/storage via a microgrid, and use "green" construction standards for airport tenants. Additionally, the proposed Project is consistent with, and responds to future climate scenarios (e.g., heat impacts) by adding runway length to maintain safe aircraft operations.

As described above, within the SHMCAP (2018) "high temperatures may also impact airplane operations. If the length of existing runways is not sufficient under higher temperature conditions, planes may not be able to take off when there is less lift available [and] high temperatures and dense air conditions could lead to increased runway length requirements for aircraft due to diminished performance in such conditions."

Mitigation and minimization measures to Project impacts are discussed in Chapter 7.0 and are anticipated to adequately address potential future climate conditions.

5.7 Natural Resources and Energy Supply

Under FAA Order 1050.1F, the natural resources and energy section provides information relative to the Project's consumption of natural resources (such as water) and use of energy supplies (such electricity). Consumption of natural resources and use of energy supplies may result from construction, operation, and/or maintenance of the Proposed Action or Alternative(s).

To adequately describe the existing conditions for natural resources and energy supply within the Project area, this EA/EIR provides the following information:

- The suppliers of energy resources found in the area such as power plants, water utilities, sewage disposal utilities, and suppliers of natural gas and petroleum; and
- The resources a project would use in the construction, operation, and maintenance of a project and identify where the suppliers are located.

Barnstable Water Company serves the Airport. Effluent from each building's sanitary system flows into the Town of Barnstable's sanitary sewer system via a four-inch or eight-inch pipe connected to the Airport. The effluent from the kitchen area of the café flows through one of the laterals and into a 1,000-gallon grease trap before flowing into the sanitary system. At the time of document preparation, there was no active use of the kitchen within the terminal building.

The Airport's electricity needs are provided by Eversource. The Airport also has backup generators for the terminal building as well as for the airfield should power ever go out. The closest power plant is Canal Station, located on the Cape Cod Canal in Sandwich. Canal Station operates a 350 megawatt (MW) dual-fueled (natural gas and diesel) generation station which provides power during peak need. Vineyard Wind 1, the nation's first

[4] Cape Cod Regional Greenhouse Gas Inventory, 2017 Baseline. February 2021. Cape Cod Commission.

[5] Considered consistent with the Massachusetts Environmental Policy Act.

utility-scale offshore wind energy project is currently under construction offshore of Martha's Vineyard and will produce 800 MW of power to be brought onshore in Barnstable at Covell's Cove. Once this project is brought online, it will be transmitted via ISO New England.

Energy consumption at the Airport consists predominantly of electricity and fuel for aircraft and ground vehicles and lighting along runways and taxiways, approach lighting systems, ramp lighting, terminal facilities, hangar buildings, air traffic control tower, roadway, and parking lot lighting. The Airport's current energy conservation commitments are discussed above in Section 5.7. The Airport continues to seek projects that encourage energy conservation and the use of renewable sources such as the smart microgrid project discussed in Section 5.7.

5.8 Noise

This sound level assessment includes computer modeling to predict future sound levels from the Project as well as a comparison to existing sound levels and FAA land use compatibility. Potential noise receptors include residential developments in all directions of the Airport – including the towns of Barnstable, Cummaquid, Yarmouth, West Yarmouth, Hyannis, and Centerville; commercial facilities directly adjacent to the Airport – including shopping centers, auto dealerships, restaurants, corporate buildings; and the Hyannis Ponds Wildlife Management Area, a state forest with associated trails to the north.

A Federal Aviation Regulations (FAR) Part 150 Noise Study was prepared for the Airport in 1987 and approved by FAA in 1989. The study was updated in 1998-99, resulting in additional practices being adopted. These studies presented an analysis of existing and future noise levels both at the Airport and in the vicinity thereof resulting from aircraft operations. It also provided suggestions that, when implemented, would help to reduce noise impacts. These suggestions are currently in effect as voluntary noise abatement flight procedures. These procedures are for use in visual flight rule (VFR) weather conditions. These procedures (1) indicate priority runway use for noise abatement; (2) identify known noise sensitive areas in the vicinity of the Airport; and (3) provide optimum noise abatement arrival and departure paths for each runway. These are to be followed unless otherwise directed by ATC, or unless, in the pilot's judgment, safety of the flight will be compromised.

At the Airport, pilots are educated in these procedures via a handout and via airfield signage. These procedures are also available on the Airport's website at https://flyhya.com/pilot-info/noise-abatement/. The Airport has established voluntary quiet hours between 10 p.m. and 6 a.m. During these times, airlines and general aviation operators are encouraged to limit their flights so that citizens in neighboring communities are not disturbed during normal sleeping hours. Also, training, touch-and-go and certification flights are prohibited without approval of the airport management.

5.9.1 FAA Land Use Compatibility

The Project is subject to the guidelines for land use compatibility adopted by the FAA. Code of Federal Regulations, Title 14, Part 150 provides the FAA's recommended guidelines for determining noise/land use compatibility. Airport-compatible land uses are defined as those uses 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 potential negative environmental or safety impacts. According to these FAA guidelines, all identified land uses, including residential areas, are compatible with aircraft noise at DNL levels below 65 dB. Commercial land use areas are compatible with DNL levels below 70 dB.

5.9.2 Existing Noise Conditions

The existing noise environment surrounding the Airport has been documented through noise exposure maps. The noise exposure maps (NEMs) include annual day-night average (DNL) sound level contours computed used the FAA's Aviation Environment Design Tool (AEDT) for aircraft flights using operations data from 2019 to establish existing conditions DNL contours. The results of this noise assessment for the 2019 existing conditions are described below. Utilizing 2019 data for the baseline noise analysis is a conservative approach as the operations numbers were approximately 50% more than the number of operations in 2022 (34,190).

The FAA's AEDT was used to generate the DNL noise contours for the 2019 Existing Condition. Input data required for the AEDT noise model includes the following: aircraft fleet mix, runway geometry, runway utilization, the number and type of aircraft operations (departures and arrivals) by aircraft type, and the number of daytime (7 am to 10 pm) and nighttime (10 pm to 7 am) aircraft operations for a typical average annual day at the Airport.

5.9.2.1 Noise Model Inputs

Total operations for 2019 for all aircraft categories were 67,350. Of these, 6,203 were Touch and Go, accounting for 9.2% of Aircraft operations. Aircraft operations were broken down into the following categories: Single Engine (Piston), Jet, Turbo prop, Helicopter, and General Aviation Touch & Go aircraft. All the touch & go operations occur during the daytime period. **Table 5.9-1** summarizes the Airport's average annual daytime and nighttime operations by aircraft type for the 2019 Existing Condition. Also included in **Table 5.9-1** is the AEDT aircraft code used for each aircraft type in the AEDT model. The noise model input also includes a breakdown

by arrival and departure by runway (not shown here for brevity). See **Appendix H** for all operations data included in the noise model.

Table 5.9-1 2019 Existing Conditions Operations Data

Aircraft	AEDT Code	Aircraft Type	Ann Ops	Daily op	Day Op	Night Op
Generic Single	C172	Piston	5,712	15.65	14.62	1.03
Piper Cherokee (PA28)	P28A	Piston	1,433	3.93	3.67	0.26
Cirrus SR22	SR22	Piston	1,270	3.48	3.25	0.23
Piper Navajo	PA31	Piston	9,136	25.03	23.38	1.65
Pilatus PC-12	PC12	Turboprop	1,119	3.07	2.86	0.20
Cessna 402 Businessliner	C402	Piston	26,274	71.98	67.23	4.75
Cessna 414 Chancellor	C414	Piston	889	2.44	2.27	0.16
Beechcraft Super King Air	BE30	Piston	9,021	24.72	23.08	1.63
Cessna Citation Excel	C56X	Jet	1,270	3.48	3.25	0.23
Cessna Citation Sovereign	C680	Jet	1,105	3.03	2.83	0.20
Technam P2012 Traveller	P212	Piston	268	0.73	0.69	0.05
Hawker 800	H25B	Jet	319	0.87	0.82	0.06
Learjet 45	LJ45	Jet	607	1.66	1.55	0.11
Bombardier Challenger 300	CL30	Jet	1,135	3.11	2.90	0.21
Bombardier Challenger 600	CL60	Jet	390	1.07	1.00	0.07
Embraer 190	E190	Jet	184	0.50	0.47	0.03
Gulfstream 4	GLF4	Jet	271	0.74	0.69	0.05
Gulfstream 5	GLF5	Jet	120	0.33	0.31	0.02
Bombardier Global Express	GLEX	Jet	156	0.43	0.40	0.03
Eurocopter EC 145	EC45	Helicopter	234	0.64	0.60	0.04
Sikorsky S-76	S76	Helicopter	234	0.64	0.60	0.04
Total			**61,147**			
Touch and Go			**6,203**			
Total Operations			**67,350**			

Runway utilization is a major part of AEDT modeling. At Cape Cod Gateway Airport, aircraft operations are proportionally distributed to each of the four runways. Approximately 55.4% of aircraft departure and arrival operations occur from Runways 6 and 24 and 44.6% from Runways 15 and 33. Nighttime operations total 6.6% of total operations. Touch & Go aircraft operations are similarly distributed on runways **Table 5.9-2** summarizes runway utilization for the 2019 Existing Condition used in the noise modeling analysis.

Table 5.9-2 2019 Runway Utilization

Runway 15	Runway 33	Runway 6	Runway 24
19.9%	24.7%	18.0%	37.4%

5.9.2.2 Day Night Average Sound Level Results

Using the aircraft data shown in **Table 5.9-1**, DNL noise contours were generated using the AEDT noise model for the 2019 Existing Condition at the Airport. These numbers are reflective of current post-COVID conditions, if not more conservative as operations numbers remain lower post-COVID. The 70, 65, and 60 DNL noise contours are shown in **Figure 5.9-1**. Overlaying the DNL noise contours onto a base map of the area surrounding the Airport, a determination of overall noise exposure was made based on aircraft operations. FAA guidelines indicate that all land uses are normally compatible with DNL noise levels less than 65 dBA.

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

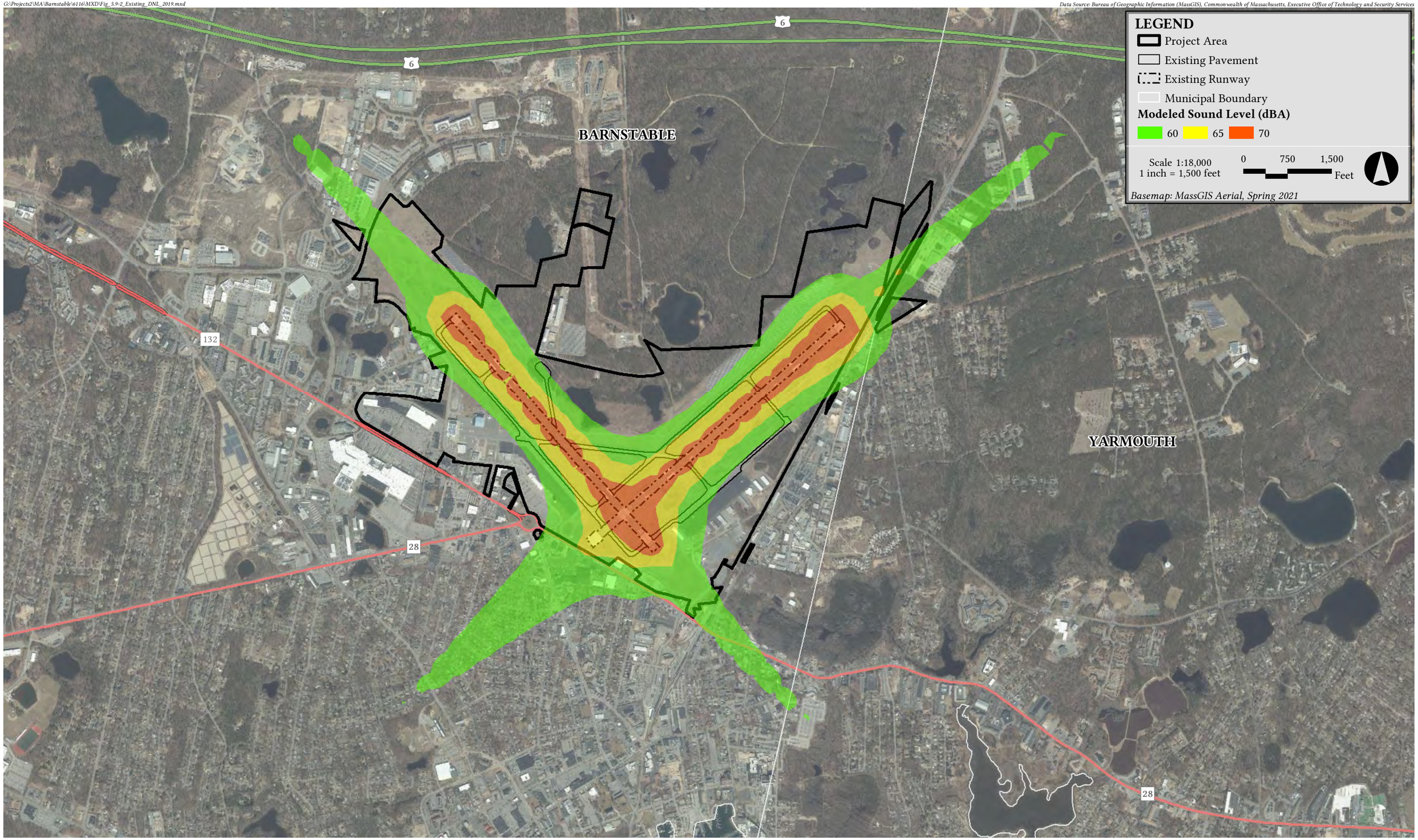

Figure 5.9-1
Existing Aircraft Only Annual Day Night Level (2019)

Based on the 2019 noise contours, the 70 and 75 dBA DNL contours are entirely within the Airport property. The 65 dBA contour slightly extends into commercial land use east of Yarmouth Road. **Figure 5.9-1** shows that the 65 dBA DNL sound contour generally falls within the airport property, extending just beyond the property to the east near Yarmouth Road. These commercial facilities are all below a DNL of 70 dBA, which is the noise compatibility threshold of commercial land uses. These results indicate that the existing condition of land use surrounding the Airport is noise compatible. All residences are exposed to noise levels below a DNL of 65 dBA and all commercial facilities are below a DNL of 70 dBA as described by the FAA's Order 1050.1F.

5.10 Biological Resources (Fish, Wildlife, and Plants)

Biological resources include terrestrial and aquatic plant and animal species; game and non-game species; special status species (state or federally listed threatened or endangered species, marine mammals, or species of concern, such as species proposed for listing or migratory birds); and environmentally sensitive or critical habitats. Wildlife species have specific habitat requirements, such that the distribution and abundance of each species are limited by the quality and quantity of available habitat in a given area.

The study area for biological resources affected by the Project focuses on the individual Project Sites and the entire Airport. Where relevant, areas outside of the Airport's property boundaries are discussed. Certain undeveloped portions of the Airport provide suitable habitat for a number of plant and wildlife species common to Massachusetts.

5.10.1 Threatened and endangered species

5.10.1.1 Federally protected species and critical habitat

Federally listed species identified near the Project area via IPaC include one animal, Northern Long Eared Bat (*Myoptis septentrionalis,* NLEB) and two plants, American chaffseed (*Schwalbea americana)* and sandplain gerardia (*Agalinis acuta*). The U.S. Fish and Wildlife Service (USFWS) has not identified critical habitat for these species. Neither of these species is listed by the Massachusetts Natural Heritage and Endangered Species Program (NHESP) as within the Project area. Additionally, the USFWS identifies bald eagles, protected by the Bald and Golden Eagle Protection Act as present in the Project area.

According to NHESP mapped data (June 12, 2019), two known maternity roost trees for NLEB are located in Sandwich and several in Eastham. No known hibernacula are documented on Cape Cod. American chaffseed is found in sandplain grasslands in open sunny plant communities. There is only one known population in one location in Barnstable County. A review of the USFWS Critical Habitat for Threatened & Endangered Species Map revealed no critical habitats within the Project area. A species list via USFWS IPac is provided in **Appendix I**.

The NLEB range includes much of the eastern and north central United States and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. NLEB spend winter hibernating in caves and mines called hibernacula. They use areas in various sized caves or mines with constant temperatures, high humidity, and no air currents. During the summer, NLEB roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and dead trees (snags). Northern long-eared bats seem to be flexible in selecting roosts, choosing roost trees based on suitability to retain bark or provide cavities or crevices. The majority of active airfields are generally free of forest stands and thus lacks summer tree roosting habitat. However, portions of the project area proposed for development (East Ramp), or obstruction removal (north of Taxiway D) may have trees suitable for roosting and surveys would need to be implemented during the permitting phase of these projects to ascertain if bats are present.

5.10.1.2 State protected species and priority habitat

According to the Massachusetts Natural Heritage Atlas (15th Edition, August 1, 2021), areas north and northwest of the Airport contain mapped Estimated Habitat of Rare Wildlife (EH) and Priority Habitats of Rare Species (PH) including Mary Dunn Pond (EH 276 and PH 278), Lewis Pond (PH273), Lamson Pond (PH294), and northwest of Taxiway A off Airport Road (PH 274). Several Potential Vernal Pools (PVPs) are located south of Lamson Pond, south of Mary Dunn Pond, and one Certified Vernal Pool is located just west of Mary Dunn Pond (CVP 4695). Mary Dunn Pond is also identified as a state-imperiled Coastal Plain Pond Shore community. Both the stated-mapped Habitat and vernal pool areas are outside the proposed Projects' limits of disturbance. Refer **Figure 5.10-1** for NHESP mapped areas.

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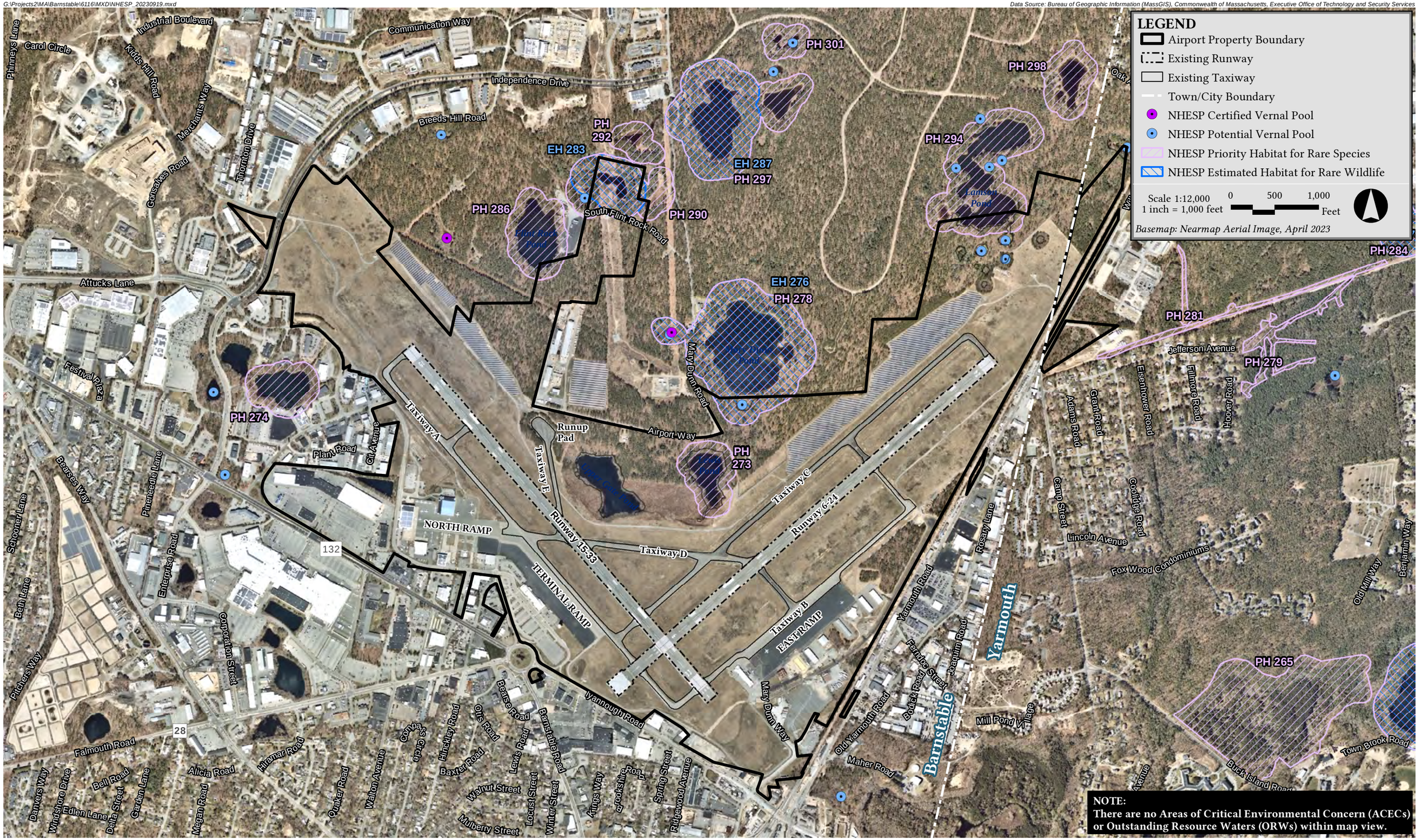
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 5.10-1
NHESP Habitat

5.10.2 Wildlife

Airport property supports habitat for many common mammal species found throughout southeastern Massachusetts as shown in **Table 5.10-1**.

Table 5.10-1 Common Mammal Species found at Cape Cod Gateway Airport

Common Name	Scientific Name.
coyote	*Canis latrans*
gray fox	*Urocyon cinreoargenteus*
red fox	*Vulpes vulpes*
white-tailed deer	*Odocoileus virginianus*
Virginia opossum	*Didelphis virginiana*
eastern gray squirrel	*Sciurus carolinensis*
woodchuck	*Marmota monax*
eastern chipmunk	*Tamias striatus*
meadow vole,	*Microtus pennsylvanicus*
common muskrat,	*Ondatra zibethicus*
white-footed deermouse	*Peromyscus leucopus*
cottontail	*Sylvilagus spp.*
shrew	*Sorex spp,*
fisher	*Martes pennanti*
American mink	*Neovison vison*
striped skunk	*Mephitis mephitis*
racoon	*Procyon lotor*
bat	*Eptesicus sp*

The Airport supports habitat for many bird species, both resident and migratory. The IPaC report (**Appendix I**) identifies several birds that are protected under the Migratory Birds Treaty Act of 1918 and/or the Bald Eagle and Golden Eagle Protection Act of 1940. The USFWS has identified migratory bird species at the Airport that are of particular concern either because they are on the USFWS Birds of Conservation Concern (USFWS 2021) or otherwise warrant special attention in the region (New England/Mid-Atlantic Coast) and at the Airport. These include several shoreline or coastal bird species, as well as woodland species listed in **Table 5.10-2**.

Table 5.10-2 Migratory Bird Species at Cape Cod Gateway Airport

Common Name	Scientific Name
American Oystercatcher	Haematopus palliatus palliates
Bald Eagle	Haliaeetus leucocephalus*
Black Skimmer	Rynchops niger
Black-Billed Cuckoo	Coccyzus erythropthalmus
Blue-winged warbler	Vermivora pinus
Bobolink	Dolichonyx oryzivorus
Canada Warbler	Wilsonia canadensis
Chimney Swift	Chaetura pelagica
Hudsonian godwit	Limosa haemastica
King rail	Rallus elegans
Lesser Yellowlegs	Tringa flavipes
Long-eared Owl	Asio otus*
Prairie Warbler	Dendroica discolor
Purple Sandpiper	Calidris maritima aritima/belcheri
Ruddy Turnstone	Arenaria interpres
Rusty Blackbird	Euphagus carolinus
Short-billed Dowitcher	Limnodromus griseus
Willet	Tringa semipalmata
Wood thrush	Hylocichla mustelina

While not on the IPaC report, the Osprey (*Pandion haliaetus*), a regular resident at the Airport, as well as mallard duck (*Anas platyrhynchos*) and Canada goose (*Branta canadensis*) are regularly observed at the Airport and in the ponds. Conversely, the IPaC report includes other avian species that are rare or may be only casual migrants to the region, that rarely nest on Cape Cod, such as the Black Skimmer.

5.10.3 Vegetation

Vegetated communities at the Airport primarily consist of open grassy areas and forested areas, predominantly upland communities, with wetland communities associated with the various ponds. The grassy areas are maintained and consist largely of grasses and other herbaceous and low growing woody species. The community supports a relatively dense understory of black huckleberry (*Gaylussacia baccata*) and dangleberry (*Gaylussacia frondosa*). Species observed at the Airport during surveys conducted by Airport consultants are identified in **Table 5.10-3** below.

Forested communities are located to the north of the intersection of the two runways along the north side of the airfield, east of the 24-end, and along the eastern limits of Mary Dunn Way, east of the North Ramp. The forest community is a pitch pine-oak community, 60 % canopy with tallest trees (pitch pine - *Pinus rigidus*) approximately 35-40 feet high. A forested fringe is located along the southeast Airport boundary, in between the roadway and the train tracks. Often dense entanglements of common greenbrier (*Smilax rotundifolia*) and/or cat greenbrier (*Smilax glauca*) are located throughout the upland plant communities.

Table 5.10-3 Common Plant Species found at the Airport

Habitat	Common Name	Scientific Name
Grassland	Little bluestem	Schizachyrium scoparius
	Broom sedge	Andropogon virginicus
	Creeping juniper	Juniperus horizontalis
	Common dewberry	Rubus flaggellaris
	Pearly everlasting	Anaphalis margaritacea
	Pitch pine (seedlings)	Pinus rigida
	Lichens	Cladonia spp.
	Common hawkweed	Hieracium vulgatum
	Purple headed sneezeweed	Hieracium nudiflorum
	Asters	Aster spp.
	Bearberry	Arctostaphylos uva-ursi
	Wild indigo	Baptista tinctoria
	Rabbit's foot clover	Trifolium arvense
	Bush clover	Lespedeza capitata
	Rockrose	Crocanthemum sp.
	Pineweed	Hypericum gentianoides
	Pennsylvania sedge	Carex pensylvanica
	Little ladies' tresses	Spiranthes tuberosa
	Tick trefoil	Desmodium nudiflorum
	Spreading dogbane	Apocynum androsaemifoliuim
Forested Areas	Pitch pine	Pinus rigida
	White oak	Quercus alba
	Scarlet oak	Quercus coccinea
	Black oak	Quercus velutina
	Eastern white pine	Pinus strobus
Forested Areas Shrub Areas	Sassafras	Sassafras albidum
	Eastern red cedar	Juniperus virginiana
	Black cherry	Prunus serotina
	Arrowwood	Viburnum dentatum
	Highbush blueberry	Vaccinium corymbosum
	Inkberry	Ilex glabra
	Sweet pepperbush	Clethra alnifolia
	Nannyberry	Viburnum lentago
	Northern bayberry	Morella pensylvanica
	Black chokeberry	Aronia melanocarpa
	Scrub oak	Quercus ilicifolia
Groundcover	Wild sarsaparilla	Aralia nudicaulis
	Bracken fern	Pteridium aquilinum
	Wintergreen	Gaultheria procumbens
	Pennsylvania sedge	Carex pensylanica

5.11 Transportation[6]

Because the improvements to the airside, taxiway, and runway are primarily intended to provide stronger compliance with FAA airport safety standards and rehabilitation of existing infrastructure, they would not directly affect the Airport's level of airside or landside activity. Operational forecasts (see Section 1.4.2) indicate a modest increase in enplanements of commercial traffic (~4,000 enplanements increase over baseline by 2040) and general aviation passengers (~13,000 increase in passengers over baseline by 2040).

The baseline condition at the Airport, as presented in the Master Plan, indicates that the existing terminal, with approximately 30,000 sf, has a design capacity of approximately 100 passengers per peak hour. This section examines the transportation network serving the Airport and presents an evaluation of transportation impacts associated with the terminal expansion based on the estimated changes in landside vehicle trip activity at the Airport.

5.11.1 Existing Condition

This section presents the Airport's existing (2023) access, vehicle circulation, the condition of area roadways and key intersections, available traffic data, and public transit services.

5.11.1.1 Airport Vehicle Access and Circulation

The Airport and surrounding roadway network are shown in **Figure 5.11-1**.

Automobiles related to airline passenger activity arrive at the Airport terminal primarily via the three roadway routes described below:

- From points northwest: Attucks Lane to Airport Road to Barnstable Road.
- From points east and northeast: Iyannough Road to Airport off-ramp southeast of the Rotary.
- From points west and south: Falmouth Road or Barnstable Road, through the Airport Rotary, to Hinckley Road.
- Automobiles exiting the Airport generally use the above routes in reverse. Most automobiles arriving at the terminal are dropping off passengers, parking, or returning rental cars.
- Access to and egress from the General Aviation facilities is provided on Mary Dunn Way, which is located approximately 500 feet northeast of the Iyannough Road (Route 28)/Yarmouth Road intersection. The Airport site also contains more than 40 local airport-related business tenants, generally located along Barnstable Road.

Three automobile parking areas are adjacent to the terminal building including the lot for passengers/public (585 spaces), the rental car lot (100 spaces), and the employee lot (50 usable spaces, 15 currently used for equipment storage). During periods of peak seasonal activity, an overflow parking area, with capacity for 400 vehicles, is available for use on Airport Road. Additionally, the Airport owns the parking lot currently leased to the Steamship Authority. Current (2023) parking fees at the passenger lot are $0 for less than 30 minutes, $5 for over 30 minutes, and $1 for each additional hour. The daily and weekly rates are $11 and $70, respectively.

The one-way airport driveway in front of the terminal building has a right-side passenger drop-off lane adjacent to the building, one through travel lane, and a left side passenger pick-up lane, which also serves as a waiting area for taxis and transportation network company (TNC) vehicles, such as Lyft and Uber. Vehicles dropping off passengers can circulate back to the parking lot area or to the Airport exit. The estimated passenger breakdown by landside mode is as follows:

- Parking lots: 40 percent
- Pick-up/drop-off: 25 percent
- Taxis and transportation network companies (TNCs): 25 percent
- Rental cars: 10 percent

Table 5.11-1 illustrates the assumed breakdown of existing peak vehicle demand at the curb, dwell time assumptions, and passenger per vehicle assumptions. It is assumed that 50 percent of the peak hour demand will occur during the peak 20-minutes, representative of the peak conditions that occur before or after a flight. Curb front and landside elements should be planned for the peak 20-minute period.

[6] This is included as a separate category due to differences in requirements of MEPA and NEPA, which this document was initially prepared to satisfy. This Final EA, now representing the FAA's NEPA compliance document, considers "transportation" impacts to be an element of the Socioeconomic analysis, which is presented later in this chapter at 5.16. For ease of documentation and efficiency, this transportation discussion appears separately but should be considered as part of 5.16's socioeconomics discussion.

Table 5.11-1 Peak Hour Vehicle Assumptions

	Existing Conditions Cars	Curb (LF)
Parking Lot		
Parking Lot	16	N/a
Parking Lot Peak 20 min	8	N/a
Curb Length		
Pick-up/ Drop-off Peak Hour	32	128
Curb Length		
Pick-up/ Drop-off Peak 20 min.	16	64
Taxis/TNC's Peak Hour	20	80
Taxis/TNC's Peak 20 min	10	40
Total Curb Peak Hour	52	208
Total Curb Peak 20 min	26	104
Exit Traffic	Vehicles Only, includes Parking and Rental Cars	
Total Exit Peak Hour	88	
Total Exit Peak 20 min	44	

Source: McFarland Johnson Analysis, 2020

5.11.1.2 Existing Traffic Volumes

An Automatic traffic recorder (ATR) is a device that continuously records the passage of vehicles, vehicle speed and classification, and direction of traffic flow. The MassDOT publishes traffic count data, including ATR data, on a Traffic Count Database System (TCDS) module. Year 2022 traffic data available for key locations near the Airport are summarized in **Table 5.11-2** and include Annual Average Daily Traffic (AADT) and the proportion of daily traffic occurring during the peak hour (K-factor, %).

Table 5.11-2 Average Daily Traffic Summary

Location/Direction	AADT	K Factor %
To/from points northwest		
Iyannough Road west of Phinneys Lane[1]		
Eastbound	13,404	10%
Westbound	14,001	9%
Total	27,405	8%
Attucks Lane west of Phinneys Lane[2]		
Eastbound	2,984	n/a
Westbound	2,767	n/a
Total	5,751	n/a

AADT Annual Average Daily Traffic; K Factor = Peak-hour Percentage

1. MassDOT Spot Location ID: S17-024-020-12 , 2. MassDOT Spot Location ID: RPA11-020-21019, 3. MassDOT Spot Location ID: S17-024-351-20 , 4.MassDOT Spot Location ID:7136, 5. MassDOT Spot Location ID: S17-021-020-15

5.11.1.5 Existing Public Transit

The Cape Cod Regional Transit Authority (CCRTA) operates 10 fixed routes within Barnstable County, covering all 15 Cape Cod towns. In the vicinity of the Airport, the CCRTA operates five fixed routes, including the Barnstable Villager which serves Hyannis, West Barnstable, and Barnstable with stops at the Cape Cod Gateway Airport. The Airport is also within a mile of the Hyannis Transportation Center (HTC), which provides access to CCRTA buses, intercity buses, and access to the CapeFLYER, a weekend train service that operates during the summer from South Boston to Hyannis. **Table 5.11-3** provides a summary of the routes and a map of the public transit services within the study area is shown in **Figure 5.11-2**.

Table 5.11-3 Existing Public Transit Services

Transit Service	Description	Peak Headway[1]
Train Service		
CapeFLYER	South Station – Hyannis (weekend only)	-
Bus Routes		
Sealine	HTC – Woods Hole (Steamship Authority) docks via Route 28	60
H20 Hyannis – Orleans	Downtown Hyannis – Orleans Center via Route 28 and Route 39	60
Barnstable Villager	Downtown Hyannis – Barnstable Courthouse via Route 132 and Route 6A	60
Hyannis Crosstown	Downtown Hyannis – Local/Popular Hyannis Locations	60
FLEX	Route 28 in Harwich – Provincetown	60
Bourne Run	Buzzards Bay Train Station – Mashpee Commons via Scenic Highway, County Road, Route 38A, and Route 151	60
Sandwich Line	Downtown Hyannis – Buzzards Bay Train Station	120
Provincetown Shuttle	Beach Shuttle between MacMillian Pier – North Truro	60
Hyannis Trolley	HTC – Ocean Street Docks and Waterfront attractions	45
Woosh Trolley	Falmouth – Woods Hole	60

1. Headway is the average time between trains/buses, shown in minutes. Source: Capecodrta.org and Capeflyer.com; July 2023.

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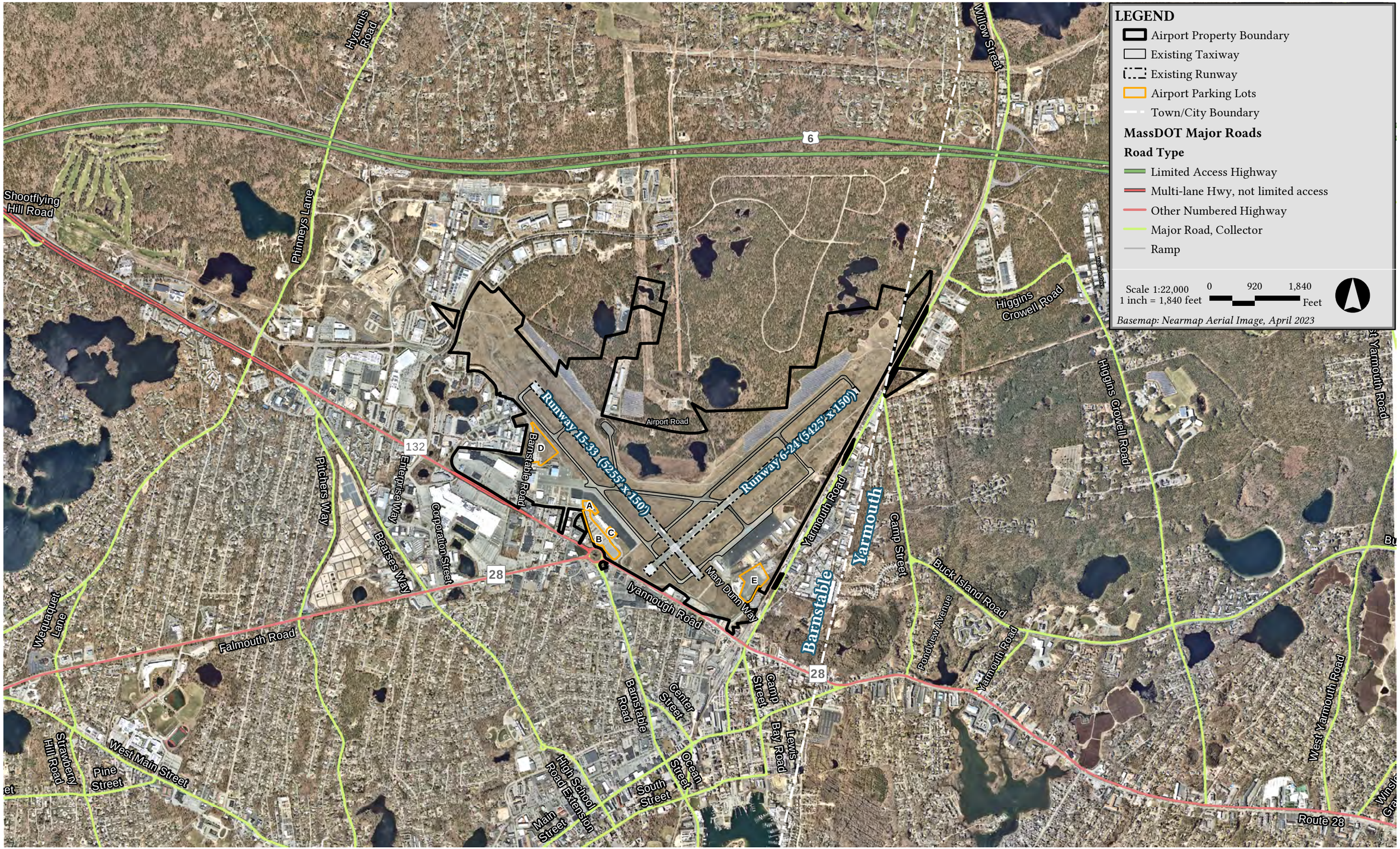
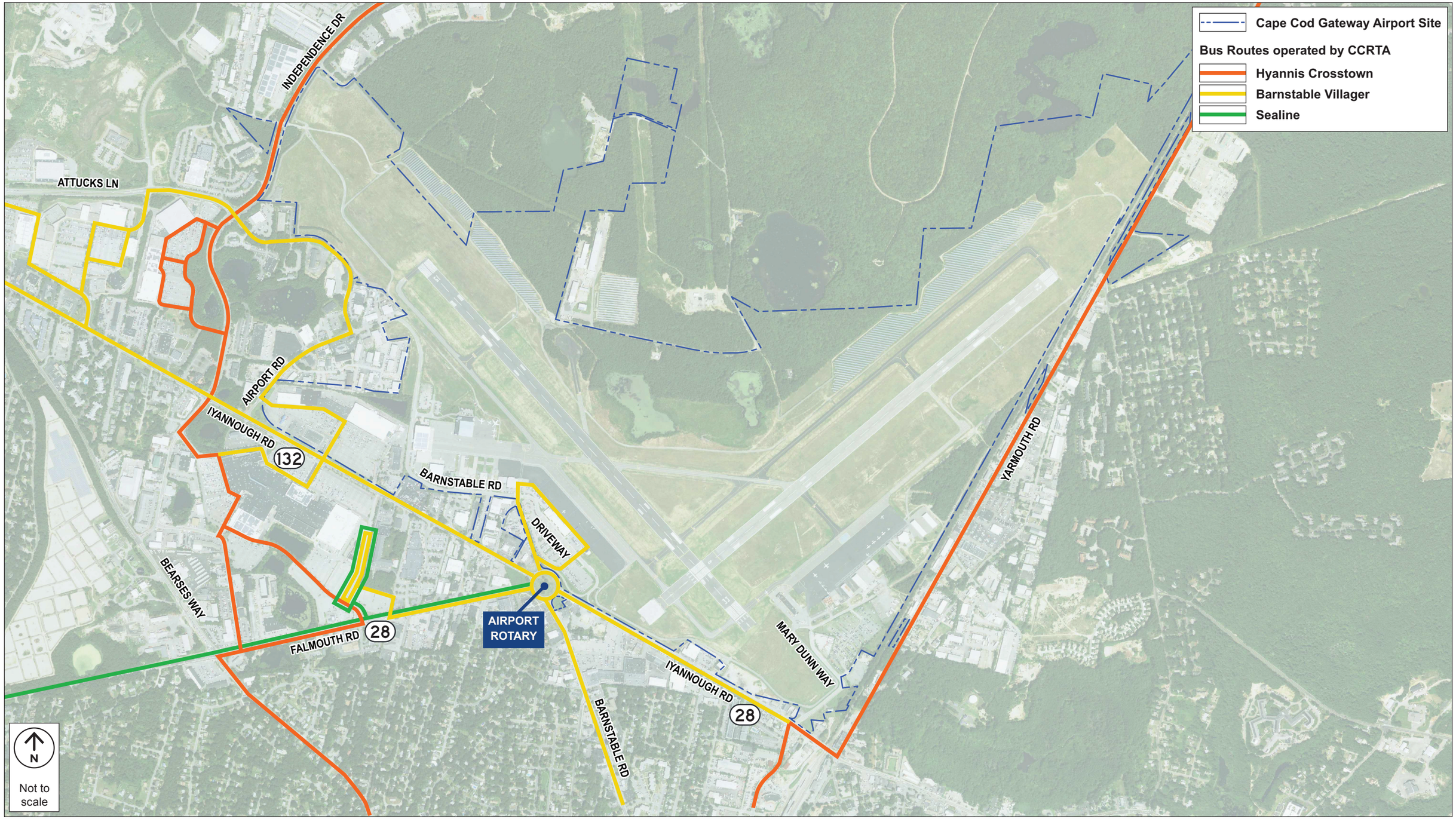
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 5.11-1
Roadway Network



Cape Cod Gateway Airport Barnstable, Massachusetts

HOWARD STEIN HUDSON
Engineers + Planners

Figure 5.11-2
Existing Public Transportation Services

5.12 Visual Environment (Including Light Emissions)

The visual environment of the Airport consists of the underlying landform and the land cover (both natural and manmade development). The existing visual environment of the Airport consists of a combination of natural and manmade features. Since 1928, the Airport has been a component of the manmade visual environment of the Outer Cape. The manmade elements within the Airport include many buildings of various sizes such as the Terminal Building, air traffic control tower, hangars, maintenance equipment shared with aircraft rescue and firefighting building (ARFF), lighting vault, and various commercial buildings on land leases outside of the airfield. Additional vertical elements at the Airport include the FAA instrumentation tower and light poles. The Airport area also has flat horizontal elements including the runways, the system of taxiways, and aircraft parking areas, as well as automobile parking areas along with stormwater basins.

Light emissions at the Airport are associated with runway and taxiway edge lighting, rotating beacons, Precision Approach Path Indicators (PAPI), approach lighting systems, and other visual navigational aids that help pilots locate the Airport and execute safe landings. Additionally, apron ramp lighting, parking lot lighting, and street lighting on access roadways create light emissions from the Airport.

5.13 Historical, Architectural, Archaeological, and Cultural Resources

The Proposed Action is subject to Section 106 of the National Historic Preservation Act (NHPA), 54 U.S.C. § 306108 et seq. and its implementing regulations (36 CFR 800) and Massachusetts General Laws, Chapter 9, Sections 26-27C as amended by the Acts of 1988 (950 CMR 71). Section 106 of the National Historic Preservation Act of 1966 requires Federal agencies to consider the effects of their projects on properties that are listed in, or are eligible for listing in, the National Register of Historic Places. See **Figure 5.13-1**. The lead Federal agency for a project must determine whether any property located within the project's Area of Potential Effect (APE) is listed in, or may be eligible for listing in, the National Register. The APE for archaeological resources is defined as locations where the proposed project may alter or disturb surface and/or subsurface soils that contain, or have the potential to contain, archaeological sites. For the purposes of Section 106, FAA is the lead Federal Agency, and the process will be administered on the state level by the State Historic Preservation Officer (Massachusetts Historical Commission).

In addition to the State Historic Preservation Officer (SHPO), projects that may cause potential impacts to historic properties must consult other involved parties including local historic commissions and Native American tribes. The FAA is required to engage in government-to-government consultation consistent with FAA Order 1210.20, American Indian and Alaska Native Tribal Consultation Policy and Procedures, if an Indian Tribe is a consulting party.

MHC comments on the ENF note that the Airport contains two sites which are considered significant ancient Native American sites. No work is proposed at these archaeological site locations and as such, no impacts to these sites are anticipated. A third site, an Indian Trail, crosses north-south through the Airport property. Project sites within vicinity of this former Indian Trail have previously been disturbed during previous airfield construction activities.

5.14 Section 4(f) Resources

Section 4(f) of the federal Department of Transportation Act of 1966 provides that the "Secretary shall not approve any program or project which requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance; or land of a historical site of national, state, or local significance as determined by the officials having jurisdiction thereof unless there is no feasible and prudent alternative to the use of such land, and such program or project includes all possible planning to minimize harm from the land use.

As described in Sections 5.4 and 5.15, the Hyannis Ponds Wildlife Management Area is located north of the Airport property, between Runways 15-33 and 6-24 and outside of the Proposed Projects limits. Further to the east of the Airport lies Yarmouth Water Supply land, part of the Zone II protection area for the Town of Yarmouth public water supply wells. Additionally, multiple golf courses are just east of this Yarmouth property. To the west of Phinneas Lane, west of the Airport, are additional Barnstable Water Supply Land parcels. See **Figure 5.12-1**, Public Owned Open Spaces. There are no known historic structures or archaeological sites within the Project areas proposed for improvements under the Preferred Alternatives.

5.15 Land Use

The Airport falls under the land use designations of both the Town of Barnstable and the Town of Yarmouth. Within the Airport, land uses include tax exempt, commercial, and open land. Surrounding land uses include commercial, industrial, mixed use-other, residential multi-family, and residential single-family to the east, west, and south; agriculture, tax exempt, unknown, and water. See **Figure 5.15-1** for land uses within and surrounding the Airport.

The Airport is generally bordered by a Massachusetts Fish and Wildlife designated conservation area (Hyannis Ponds Wildlife Management Area), Barnstable County Training Facility, and Route 6 to the north, Barnstable

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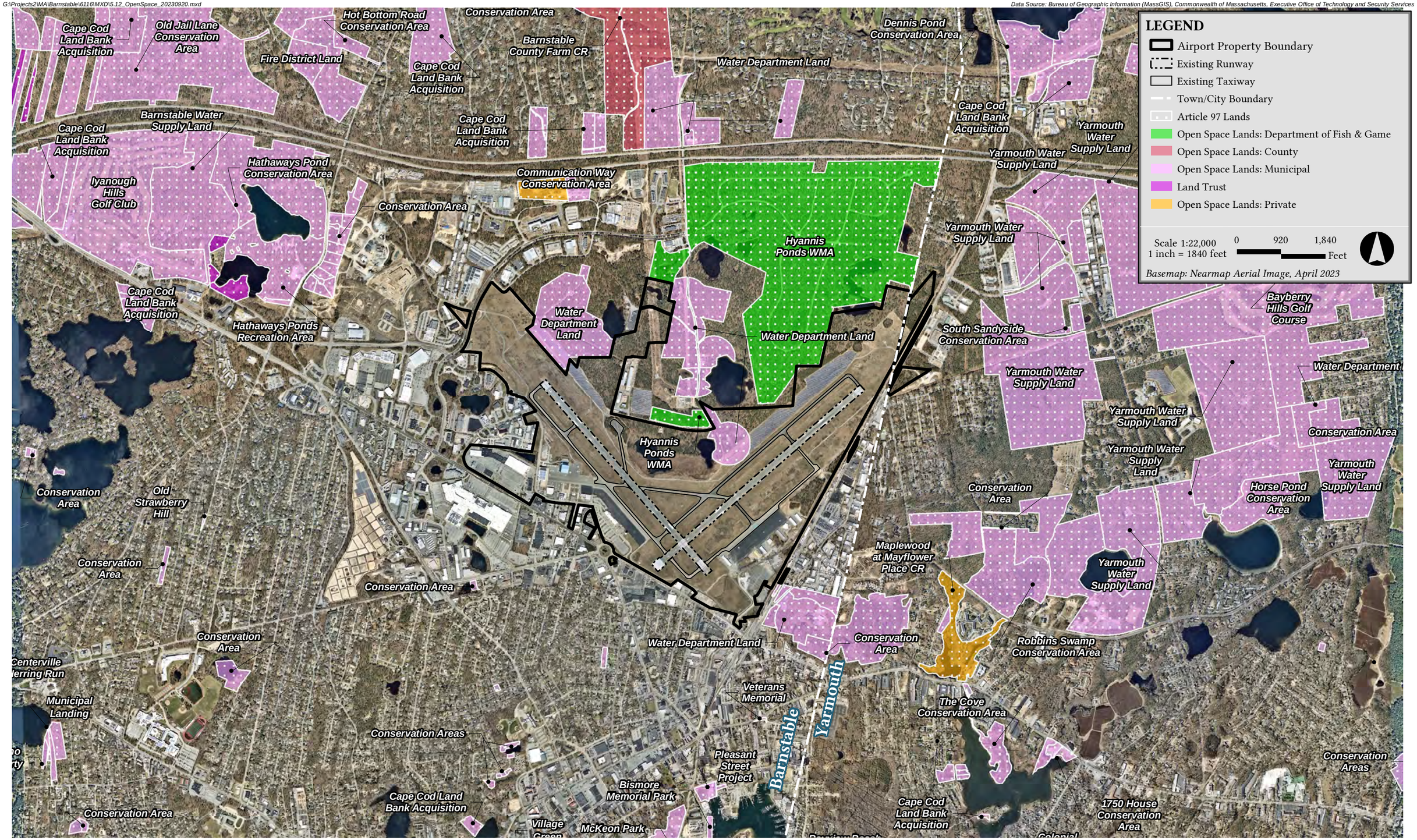
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport **Barnstable, Massachusetts**

Figure 5.12-1
Open Space

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

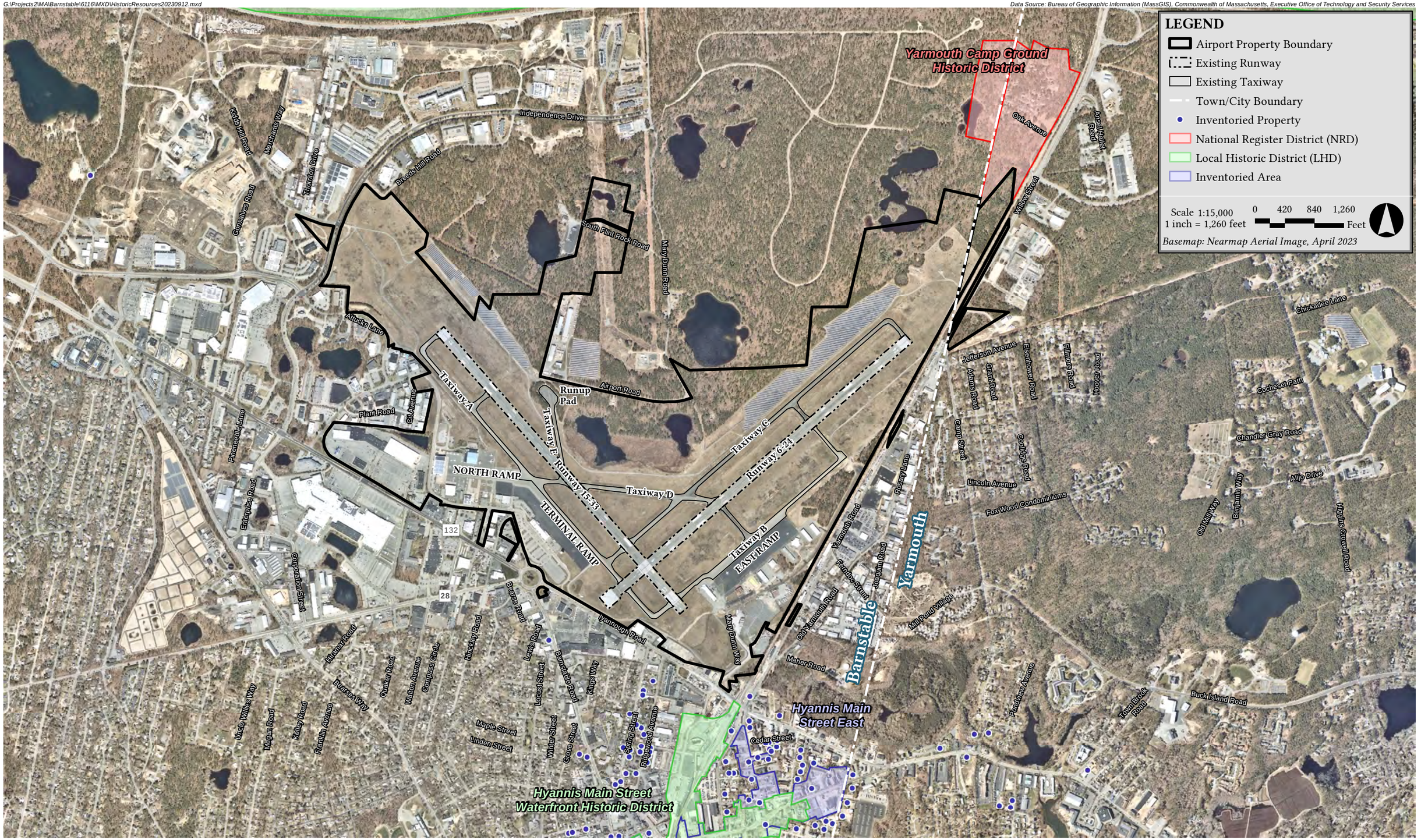

Figure 5.13-1
Historic Resources

Road (Route 132) to the south, Yarmouth Road to the east along with Barnstable Water Supply owned land, and an industrial park (Independence Park) to the west. Iyannough Road (State Route 132) is a major arterial road connecting Hyannis Village Center with both the Airport and the Mid-Cape Highway (Route 6). Several planned unit commercial developments are located in the vicinity of the Airport, which house multiple tenants with large parking areas to accommodate the businesses. Abutting the east side of the Airport is Yarmouth Road, densely populated with low-density commercial and industrial uses such as automobile dealerships, metal recycling shops, marine repair shops, residential properties, and home improvement supply warehouses. Yarmouth Road also connects the Hyannis Village Center with the Mid-Cape Highway at Exit 7.

The land uses north of the Airport are generally undeveloped areas of wooded land, wetlands, and ponds. In addition to the area's environmental value, the area is deemed critical to the public health, safety, and welfare as it is designated as a Wellhead Protection District for the municipal drinking water supply. Very few land uses are present aside from municipal utility infrastructure and public infrastructure for water and power distribution.

The closest public school buildings are located greater than one-half mile from the Airport. Barnstable Community Innovation School (elementary, public) is located at 156 Bearses Way in Hyannis within the approach to Runway 24. The Academy of Early Learning (preschool, private) is located at 465 Falmouth Road in Hyannis, southwest of the Airport. Sturgis Charter Public School at 427 Main Street (high school, public) is located south of the Airport. Faith Christian Academy (elementary, private) at 270 Communication Way is directly adjacent to the Airport and in the Runway 15 approach. Trinity Christian Academy (k-12, private) is located to the north of the Airport at 979 Mary Dunn Road in Barnstable.

With a few exceptions, the Project sites are under active aviation or aviation-related use. All proposed Projects with the exception of easement acquisitions are on existing Airport property and are within Business and Industrial Zoning Districts.

5.15.1 Existing Zoning

The Airport property is currently zoned as nine different zoning codes, five in Barnstable and four in Yarmouth along with seven others in proximity to the Airport, as can be seen in **Figure 5.15-2**. The Airport property is also subject to six overlay districts in the Town of Barnstable. Zoning districts of Airport locations within Barnstable include Business District (B), Industrial (IND), Industrial Limited (IND LTD), Highway Business (HB), and Hyannis Gateway (HG). Airport zoning within Yarmouth includes the Adult Entertainment District (AED). Updated in July 2003, the Town of Barnstable implements local regulations[7] to restrict the use of land adjacent and proximate to the Airport to activities and purposes compatible with standard Airport operations.

5.15.2 Runway Approaches and Protection Zones

Runway Protection Zones (RPZs) are large trapezoidal areas on the ground off each runway end that are within aircraft approach and departure paths as shown in **Figures 3.3-1 and 3.3-2**. The RPZs are intended to enhance the protection of people and property on the ground. Many land uses (i.e., residential, places of public assembly, fuel storage) are prohibited by FAA standards within these areas. However, these limitations are only enforceable if the RPZ is owned or controlled by the Airport. The dimensions of the RPZ for each runway end are a function of the type of aircraft and the approach visibility minimums associated with operations on that runway. The RPZ begins 200 feet beyond the end of the area useable for takeoff and landing for all runways. The existing approach visibility minimums are shown in **Table 5.16-1**. The Airport currently owns land in fee or easement off Runway 15 and 24 ends to control portions of the Airport's RPZs as well as to prevent the construction of obstructions or to maintain vegetative heights to avoid impact to the 14 CFR Part 77 approach surfaces.

Areas within RPZs that are not currently under Airport control in avigation easement or fee simple include all portions of the Runway 6 RPZs west of Iyannough Road, the north and southwest corners of the Runway 15 RPZ, the southern corner of the Runway 24 RPZ, the eastern portion of the Runway 33 RPZ. There are several public roads, residences, commercial/industrial buildings, rail facilities, and parking lots located within the RPZs. These roads include, but are not limited to, Iyannough Road, Yarmouth Road, Mary Dunn Way, and Barnstable Road. According to recently published guidance by the FAA, public roads are not considered compatible land uses within RPZs and are not recommended. The current FAA guidance does not require relocation of existing roadways within RPZs unless one of the following triggers occurs:

- An airfield project (i.e., runway extension, runway shift);
- A change in the critical design aircraft that increases the RPZ dimensions;
- A new or revised instrument approach procedure that increases the RPZ dimensions; or
- A local development proposal in the RPZ (either new or reconfigured).

[7] See Town of Barnstable Code Chapter 13: Airport, effective March 4, 1958.

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

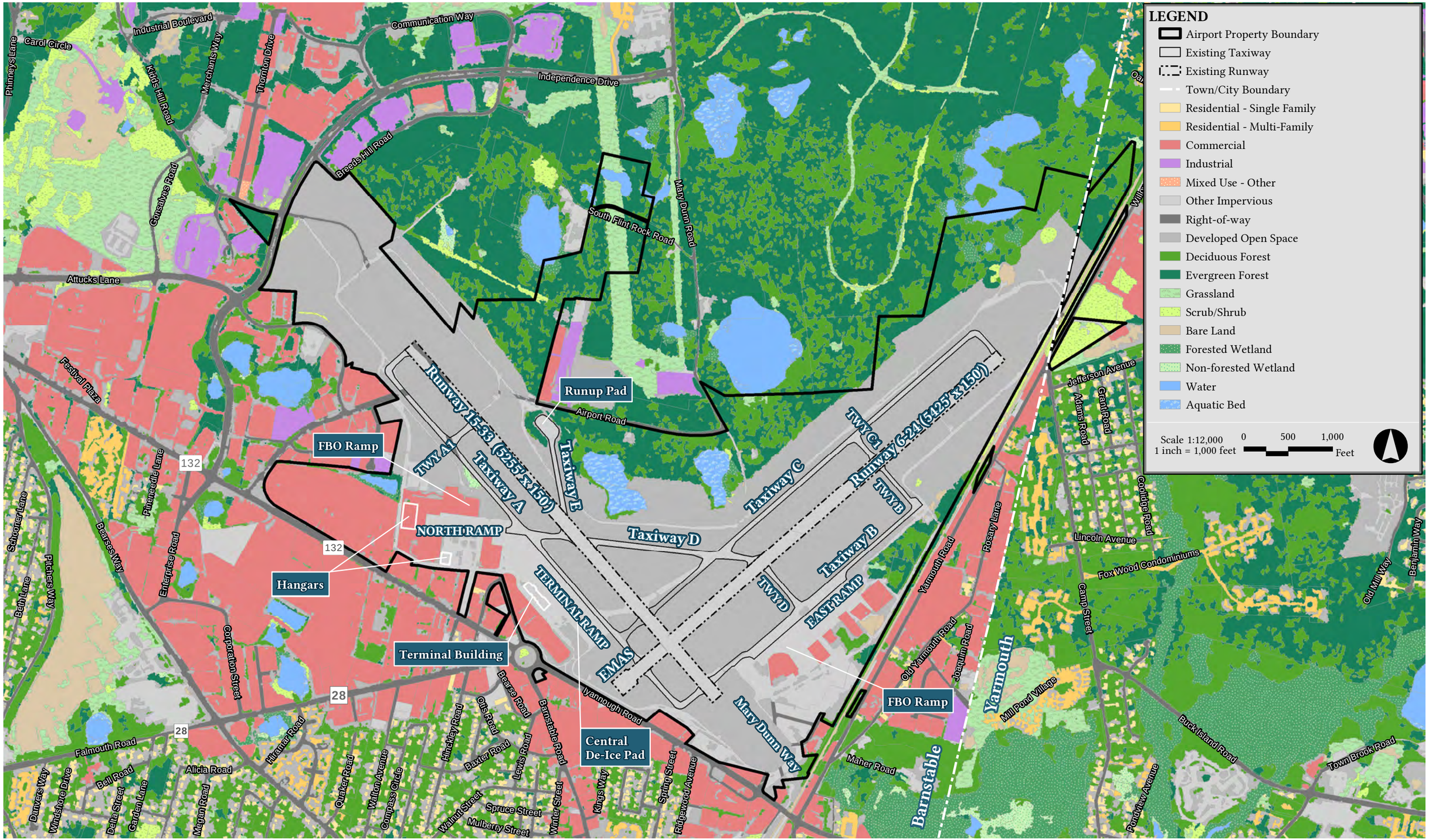


Figure 5.15-1
Land Use

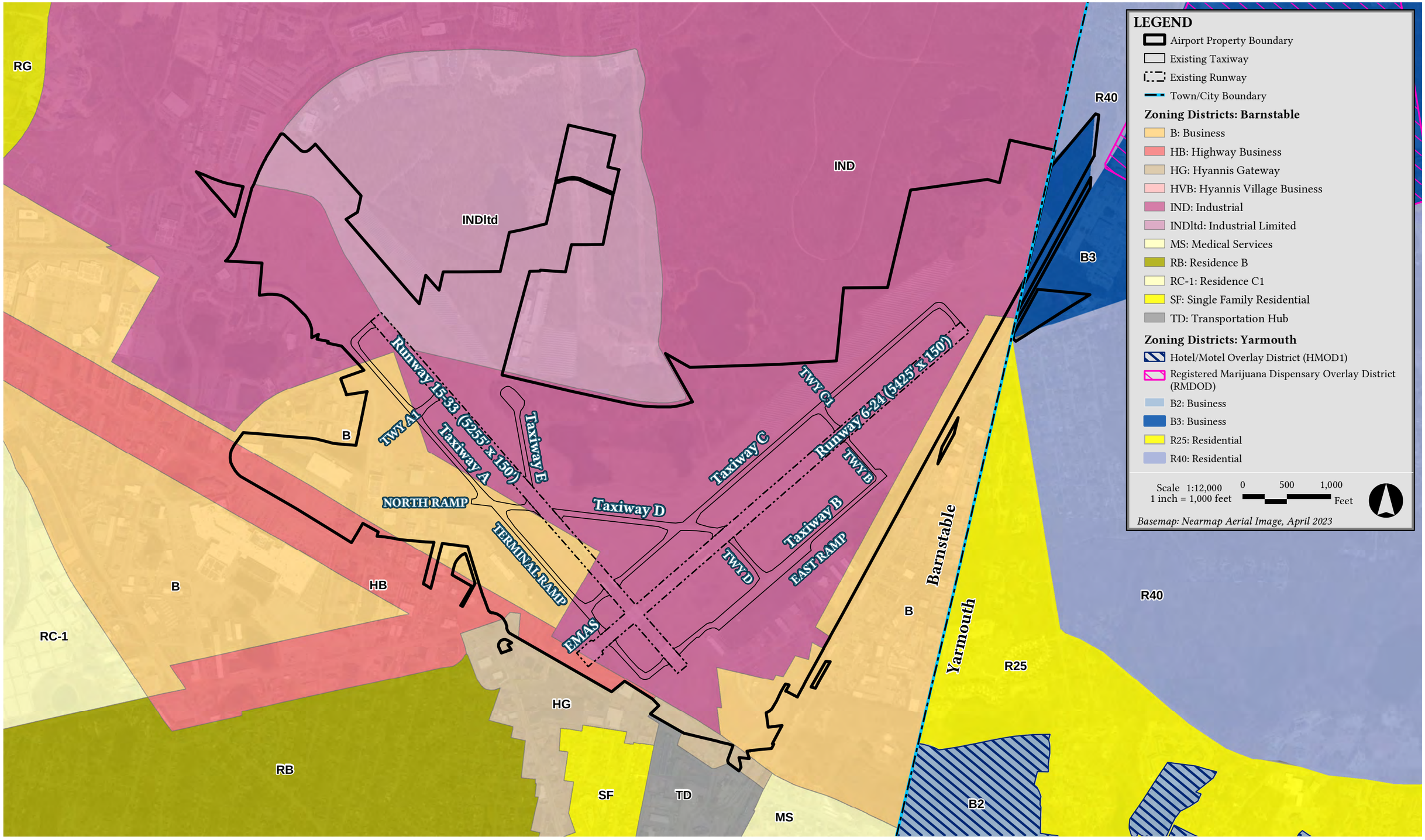


Figure 5.15-2
Zoning

Table 5.16-1 RPZ Dimensions Per Runway End

Runway	Minimums (feet)	Length (feet)	Inner Width (feet)	Outer Width (feet)	Acreage
Runway 6	1 mile	1,700	500	1,010	29.465
Runway 24	4,000 feet	1,700	1,000	1,510	48.978
Runway 15	2,400 feet	2,500	1,000	1,750	78.914
Runway 33	1 mile	1,700	500	1,010	29.465

Sources: FAA AC 150/5300-13B; FAA HYA Terminal Procedures, effective date: March 31, 2022.

5.16 Socioeconomics, Children's Environmental Health and Safety Risks[8]

MEPA regulations (301 CMR 11.00) require that a project consider the "social conditions" of its site. In addition, the Environmental Justice Policy of the Massachusetts Executive Office of Energy and Environmental Affairs directs all agencies, offices, boards, and other entities under the Executive Office of EEA to consider environmental justice in all its programs, to the extent applicable and legally allowable.

At the federal level, FAA Order 1050.1F requires the analysis of potential impacts of alternatives on "economic activity, employment, income, population, housing, public services, and social conditions." In compliance with these regulatory frameworks, the following sections characterize the existing socioeconomic, environmental justice, and children's health and safety conditions within and proximate to the improvement Projects.

5.16.1 Socioeconomics

This section provides the socioeconomic characteristics of areas surrounding the Airport. Socioeconomics is the term used to describe aspects of a project that are either social or economic in nature, or a combination of the two. This socioeconomic information identifies how factors of the human environment such as population, employment, housing, and public services might be affected by the proposed action and alternative(s).

Section 1508.14 of the Council on Environmental Quality (CEQ) Regulations states that "economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment." Therefore, the requirement to prepare socioeconomic analysis in an Environmental Assessment (EA) or Environmental Impact Statement (EIS) is project specific and is dependent upon the existence of a relationship between natural or physical environmental effects and socioeconomic effects.

The study area for socioeconomic factors is generally larger than the study area for other impact categories, as a proposed action could have an effect on the social fabric of the surrounding community. Accordingly, this environmental assessment considers the impacts to the surrounding communities on the following broad indicators: economic activity, employment, income, population, housing, and services.

U.S. Census Bureau, state, and local government data is utilized in the tables below to describe baseline socioeconomic characteristics of communities surrounding the Airport. The following sections provide information to understand the demographics within the Town of Barnstable and surrounding communities, including incomes data, race, housing, and employment to provide a comparison between current conditions and projected impacts associated with the Project.

Economic Activity and Income

The Airport is a significant economic engine to the economy of the Town of Barnstable, surrounding communities, and The Cape Region. The Airport is a critical commercial transportation hub and has attracted over 40 businesses located on the Airport, with several more businesses seeking to operate from the Airport in

[8] On January 21, 2025, President Trump issued EO 14173, Ending Illegal Discrimination and Restoring Merit-Based Opportunity. At that time, the NEPA process for this project was already underway, including the expiration of the comment period for the Draft EA. As a result of the timing of the Draft EA's release, the EA reflected the expected scope and content of analysis in this NEPA process to include analysis of environmental justice. However, as a result of the rescission of prior executive orders regarding environmental justice, and the recent action by the CEQ to rescind the NEPA implementing regulations, it is no longer the policy of the federal government to conduct environmental justice analysis and it is no longer a legal requirement to do so. Any prior data gathering, analysis, or discussion regarding environmental justice is not relevant for purposes of evaluating the NEPA significance of this project, nor will it play any role in agency decision-making. As a result, this EA has removed the prior discussion of, and data/analysis related to, environmental justice. Such analysis may remain relevant for the environmental review under MEPA.

the future**.** These businesses are important employers, and generators of economic activity, to residents of the Town of Barnstable, and surrounding Cape Cod communities.

The income of individuals, and households, within the study area communities are above the national average according to the Census Bureau QuickFacts for 2022 data. The median household income for the United States, 2017-2021 (in 2021 dollars) was $69,021 and $89,026 for the Commonwealth of Massachusetts. For Barnstable County, the median household income was $82,619, lower than the statewide median, but higher than the national median. In the Town of Barnstable, the median household income was $82,816, and within the surrounding towns of Yarmouth, Sandwich, and Mashpee, median household incomes were $72,124, $111,610, and $83,563, respectively.

Per capita income, defined as the total personal income in a geographic region divided by the total population in the region, shows similar trends to median income for the communities surrounding the Airport, with generally higher than national per capita income ($37,638) and comparable to Barnstable County's per capita income of $49,973, see **Table 5.16-2**.

Consistent with the above national household income data, poverty statistics show that Barnstable County has a lower poverty rate (8%) compared to the national (11.60%) and statewide (10.40%) rates. In the Town of Barnstable, the poverty rate is 7.90%. Surrounding towns also have below state and county poverty rates.

Table 5.16-2 Economic Activity and Income

	National	State	Barnstable County	Barnstable	Yarmouth	Sandwich	Mashpee
Median household income (in 2021 dollars), 2017-2021	$69,021	$89,026	$82,619	$82,816	$72,124	$111,610	$83,563
Per capita income in past 12 months (in 2021 dollars), 2017-2021	$37,638	$48,617	$49,973	$46,996	$45,471	$54,994	$48,569
Persons in poverty, percent	11.60%	10.40%	8.00%	7.90%	6.50%	5.20%	5.90%

Population and Housing

The overall population in Barnstable County is 232,457. In the Town of Barnstable, the population is 49,532. Communities surrounding the Airport include Yarmouth (population 25,244), Sandwich (population 20,611) and Mashpee (population 15,468). The number of residents who are age 65 and over is approximately 33% of the population in Barnstable County. Within the Town of Barnstable, 23% of the residents are 65 and in Yarmouth, Sandwich, and Mashpee 33%, 25% and 29% of the residents are 65+ respectively. These populations in the 65+ age group are above the state amount of 18% and national amount of 17%. **Table 5.16-2** provides population demographics data.

Table 5.16-3 Population Demographics for the Town of Barnstable, Town of Yarmouth, Town of Mashpee, and Sandwich

	National	State	Barnstable County	Barnstable	Yarmouth	Sandwich	Mashpee
Population	333,287,557	6,981,974	232,457	49,532	25,244	20,611	15,468
Population change (%) 2020 to 2022	0.60%	-0.70%	1.50%	1.30%	0.90%	1.70%	2.70%
Households, 2017-2021	124,010,992	2,714,448	98,163	19,748	10,704	7,918	6,603
Persons under 5 years, percent	5.60%	4.90%	3.30%	4.30%	3.90%	3.20%	4.50%
Persons under 18 years, percent	21.70%	19.20%	13.80%	17.90%	14.10%	17.30%	15.80%
Persons 65 years and over, percent	17.30%	18.10%	33.20%	23.30%	33.00%	25.40%	28.70%

Table 5.16-4 provides information on the labor force and various labor force characteristics including the current number of employed and unemployed persons within an area, consumer price indexes, productivity, and demographic characteristics of the labor force.

Table 5.16-4 Employment and Home Ownership Statistics

	National	State	Barnstable County	Barnstable	Yarmouth	Sandwich	Mashpee
In civilian labor force, total, percent of population age 16 years+, 2017-2021	63.10%	67.10%	59.50%	67.00%	57.60%	64.90%	60.10%
Owner-occupied housing unit rate, 2017-2021	64.60%	62.40%	80.80%	75.60%	80.70%	89.60%	83.70%
Median value of owner-occupied housing units, 2017-2021	$244,900	$424,700	$445,500	$430,100	$382,700	$422,300	$389,400

Construction Related Positive Socioeconomic Impacts

Project benefits include the estimated $100+ million in construction spending to the region along with the creation of construction related jobs and spending benefits to local communities. Research indicates that higher incomes and health outcomes are positively related. A 2011 report from the National Center for Health Statistics notes that the "association between [socioeconomic] measures, such as education and income, and health is well established."[9]

As noted above, the Project will provide economic benefits due to the anticipated positive impact of construction spending and employment. The Project will provide an estimated $74 million of infrastructure construction in Phase I and $24 million[10] in construction related spending in Phase II, providing spending in the region, along with multiplier effects of this spending throughout the surrounding communities.

The EJScreen analysis results presented in **Appendix K** show that none of the environmental and socioeconomic indicators within one mile of the Project Site are elevated (> 80th percentile) in the block groups within one mile of the Project Site. Overall, the EJ Screen analysis suggests that there are no potential environmental vulnerabilities in communities within one mile of the Project.

5.16.3 Children's Environmental Health and Safety Risks

As specified in the FAA's 1050.1F Desk Reference, and in accordance with Executive Order 13405, Protection of Children from Environmental Health Risks and Safety Risks, the FAA requires the identification and assessment of the potential health and safety risks that could disproportionately affect children. Such risks relate to other environmental resource categories such as air quality and noise. Project risks to children are discussed in Section 6.12.

According to the US Census Bureau, the population of Barnstable County was about 232, 411 in 2021 and about 14% of the population is under 18 years of age, which is lower than the rate for all of Massachusetts (~20%). Approximately 10% of these children are below the poverty line in the County, compared to about 13% in Massachusetts.

There are several schools and seasonal camps near the Airport, including two schools about two miles southwest of the Airport (Hyannis West Elementary School and Barnstable intermediate School), two schools about one mile south of the Airport (Barnstable Community Innovation and Sturgis Charter Public School), and two schools about three miles northeast and two miles east of the Airport (Marguerite E Small Elementary and Barnstable West Elementary School, respectively). The Cape Cod Volleyball camp is two miles to the southwest of the Airport and Camp Greenough and Camp Wingate Kirkland are three and four miles to the northeast, respectively.

[9] National Center for Health Statistics. 2012. Health, United States, 2011: With Special Feature on Socioeconomic Status and Health. Hyattsville, MD: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. http://www.cdc.gov/nchs/data/hus/hus11.pdf

5.17 Hazardous Materials, Solid Waste, and Pollution Prevention

Precautions against hazardous material releases at the Airport are of high importance due to the necessity of such materials for the operation and maintenance of aircraft, and the location of the Airport in drinking water recharge zones. This section provides information regarding storage and use of oil and/or hazardous materials (OHM) at the Airport.

In accordance with Code of Federal Regulations 40, Subpart 112 (40 CFR 112), a Spill Prevention, Control, and Countermeasure Plan (SPCCP) is maintained by the Airport to minimize the risk associated with bulk storage and transfer of Oil and Hazardous Materials (OHM). The Airport also maintains a Stormwater Pollution Prevention Plan (SWPPP) in accordance with the U.S. EPA National Pollutant Discharge Elimination System (NPDES) Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity. Copies of the SWPPP and SPCC plans are attached in **Appendices K and L,** respectively.

5.17.1 Fuel Storage

During typical operations, the Airport accepts, stores, handles, and transfers a variety of OHM. The Airport has implemented several programs to minimize the environmental impact associated with Airport operations, including the implementation of a SWPPP, in accordance with the U.S. EPA NPDES, a SPCC Plan, and several Best Management Practices (BMPs), to reduce the potential for a release of OHM to the Environment.

5.17.1.1 OHM Storage

OHM is staged within containers consisting of drums, ASTs, and USTs, which range in sizes from 55 gallons to 10,000 gallons. A summary of the OHM stored at the Airport is presented in **Tables 5.17-1 to 5.17-3**. Current storage locations are also shown on the Oil and Hazardous Materials Storage Map prepared by Horsley Whitten Group in **Appendix L, Figure 2**.

5.17.1.1 OHM Storage during Aircraft Refueling

During aircraft refueling activities, the petroleum products are transferred from the fuel farm or other sources by the Airport as well as tenant mobile refuelers. Further information regarding the procedures is described in the SPCC Plan (see **Appendix M**). Specific characteristics of each mobile refueler are described in **Tables 5.17-2 and 5.17-3**. All mobile refueler trucks are equipped with absorbents, drip pans, magnetic catch basin covers, and oil booms and can respond to a petroleum spill of less than 10 gallons during refueling activities. Spills greater than 10 gallons or those that trigger a reporting obligation to MassDEP under the Massachusetts Contingency Plan (MCP, 310 CMR 40,.0000) are completed under the direction of the on-call Licensed Site Professional (LSP).

Table 5.17-1 Airport Virgin Petroleum Storage

Operator	Location	Product	Tank Type	Spill Protection	Volume (Gallons)
Rectrix / Air Cape Cod	Gate P fuel farm	Avgas / Jet A	AST	Overfill protection, steel secondary containment	10,000 /10,000
Griffin Avionics	Griffin fuel island	Avgas	UST	Overfill protection, cathodic protected steel, interstitial monitoring	10,000
Cape Air	Inside Cape Air Hangar	Avgas	Portable AST	Spill containment pallet	100
Hertz Car Rental	Barnstable Road – Service Lot	Unleaded gasoline	UST	In tank monitor	10,000
Barnstable Municipal Airport	Gate F fuel farm	Unleaded gasoline	AST	Overfill protection, steel secondary containment, interstitial monitoring	4,000
		Diesel	AST		4,000
		Jet A	AST		20,000

Notes:
AST - aboveground storage tank
UST - underground storage tank
Source: Barnstable Municipal Airport Spill Prevention, Control, and Countermeasure Plan, 2020.

Table 5.17-2 Airport and Tenant Mobile Refuelers

Operator	Product	Number of Refueler Trucks	Truck Designation	Storage Capacity (Gallons)
Barnstable Municipal Airport	Jet A	3	55931 / 55932 / 5251	5,000 / 5,000 / 3,000
Rectrix / Air Cape Cod	Avgas	1	44219	1,500
Rectrix Aerodrome	Jet A	1	5693	3,000
Cape Air	Avgas	1	4298	1,500
Griffin Avionics	Avgas	2	612 / 4134	620 / 1,200

Notes:
AST – aboveground storage tank
UST – underground storage tank
Source: Barnstable Municipal Airport Spill Prevention, Control, and Countermeasure Plan, 2020.

Table 5.17-3 Other Airport OHM Storage Locations

Operator	Location	Product	Storage Vessel Type	Spill Protection	Volume (Gallons)
Barnstable Municipal Airport	Outside Airport ARFF/SRE Building	Waste Oil / Anti-freeze	AST	Leak detection, double walled with reinforced concrete	350 / 150
	Inside Airport ARFF/SRE Building	Antifreeze / 15W-40 / Grease / Hydraulic Oil / ATF / 5W-30 Synthetic / Waste Oil	Drums	Spill Containment Pallet	55
Rectrix / Air Cape Cod	Gate P Fuel Farm	Waste absorbent material / waste Jet A / Avgas	Drums	Spill Containment Pallet with overhead cover	55 / 55
Rectrix Aerodrome	Inside Rectrix Hangar	Jet A / Reclaimable Jet A Fuel / Waste Oil / Waste Absorbent	AST /Drums	Double walled / Spill Containment Workstation with Lid	55 / 55
Griffin Avionics	Inside Griffin Hangar	Used Oil filters	Drums	Spill Containment Pallet	55
Cape Air	Inside Cape Air Hangar	Waste oil	AST	Overflow Detection, Double Walled	500
		Waste oil / Hydraulic Oil / Used Oil filters /Antifreeze	Drums	Spill Containment Pallet	55
Allies Air	Inside Allies Air Hangar	Waste Oil	Drums	Spill Containment Pallet	55
AMA Nantucket Inc.	Inside Nantucket Inc. Hangar	Waste Oil / Mineral Spirits	Drums / Drums	Spill Containment Pallet / Spill Containment Pallet	55 / 55
Cape Flight Instruction	Inside Hangar	Waste oil / Antifreeze / used oil filters	Drums	Spill Containment Pallet	55
Avis Car Wash	Barnstable Road – Service Lot	Car Washer Fluid	AST	OWS	250
Hertz Car Wash	Barnstable Road – Service Lot	Car Washer Fluid	AST	OWS	250

Notes:
AST - aboveground storage tank
OWS – oil water separator
SRE – snow removal equipment
ARFF – airport rescue and fire fighting
Source: Barnstable Municipal Airport Spill Prevention, Control, and Countermeasure Plan, 2020.

5.17.2 Database Reviews

An Environmental Data Resources (EDR) report was acquired to obtain information on documented releases of OHM that could potentially result in environmental impacts at the Airport. Information related to releases of OHM at and up to approximately 1,000 feet of the Airport property was reviewed. The EDR report included information from state/federal databases, historical maps, and MassDEP records of Disposal Sites (Sites) located within one mile of the Airport property. Based on the information reviewed, a total of 64 Sites were identified that were located at or adjacent to the Airport property (**Figure 5.17-1**). As applicable, the MassDEP Waste Site & Reportable Releases Data Portal was also reviewed to obtain additional information. A summary of findings from the database reviews is presented in **Appendix N**. A copy of the EDR report is attached in **Appendix O**.

Based on the EDR report, two Sites (see **Figure 5.17-2**) are located on Airport property and are currently undergoing response actions:

- **Release Tracking Number (RTN) 4-26347:** This RTN is associated with historical releases of per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane to soil and groundwater. The release was reported to MassDEP on November 10, 2016. Response actions are ongoing and include assessment and remediation, including soil capping at two areas on Airport property where Aqueous Film Forming Foam (AFFF) containing PFAS was used. More information is discussed in Section 5.17.3.
- **RTN: 4-28577:** This RTN is associated with the presence of Polycyclic Aromatic Hydrocarbons (PAHs) and lead in surficial sediments above the MassDEP Sediment Screening Criteria at Upper Gate and Lewis Ponds. The sediments in the ponds were sampled as part of the North Ramp Phase II Comprehensive Site Assessment (CSA) required for the investigation and remediation of a hydrocarbon and chlorinated solvent plume at the Airport's North Ramp. Because it was unclear if the source of contamination was from the release at the North Ramp or from typical compounds found in stormwater runoff on the Property, MassDEP assigned RTN 4-28577 on October 29, 2020 to the sediment investigation. According to the November 2021 Phase I Initial Site Investigation (ISI) report, a proposed Phase II Scope of Work was drafted and includes researching historical documents to determine a potential source, sampling additional ponds to evaluate anthropogenic background conditions, sampling runoff water from floor drains, and performing an ecological risk assessment. Results of this work have been documented in a Permanent Solution Statement.

5.17.2.1 Airport Property: Closed Sites

Based on the information reviewed, none of the closed sites required conditions or deed restrictions, such as an Activity and Use Limitation (AUL), to achieve closure. The EDR report identified 15 Sites that have achieved regulatory closure under the Massachusetts Contingency Plan (MCP at 310 CMR 40.0000):

- 3 achieved a Class A-1 Response Action Outcome (RAO)
- 5 achieved a Class A-2 RAO
- 7 achieved a Permanent Solution with no Conditions (PSNC)
- 1 submitted a Downgradient Property Status (DPS)

5.17.2.2 Adjacent to the Airport Property: Open Sites

Based on the EDR report, six Sites with addresses within approximately 1,000 feet of the Airport are currently undergoing response actions:

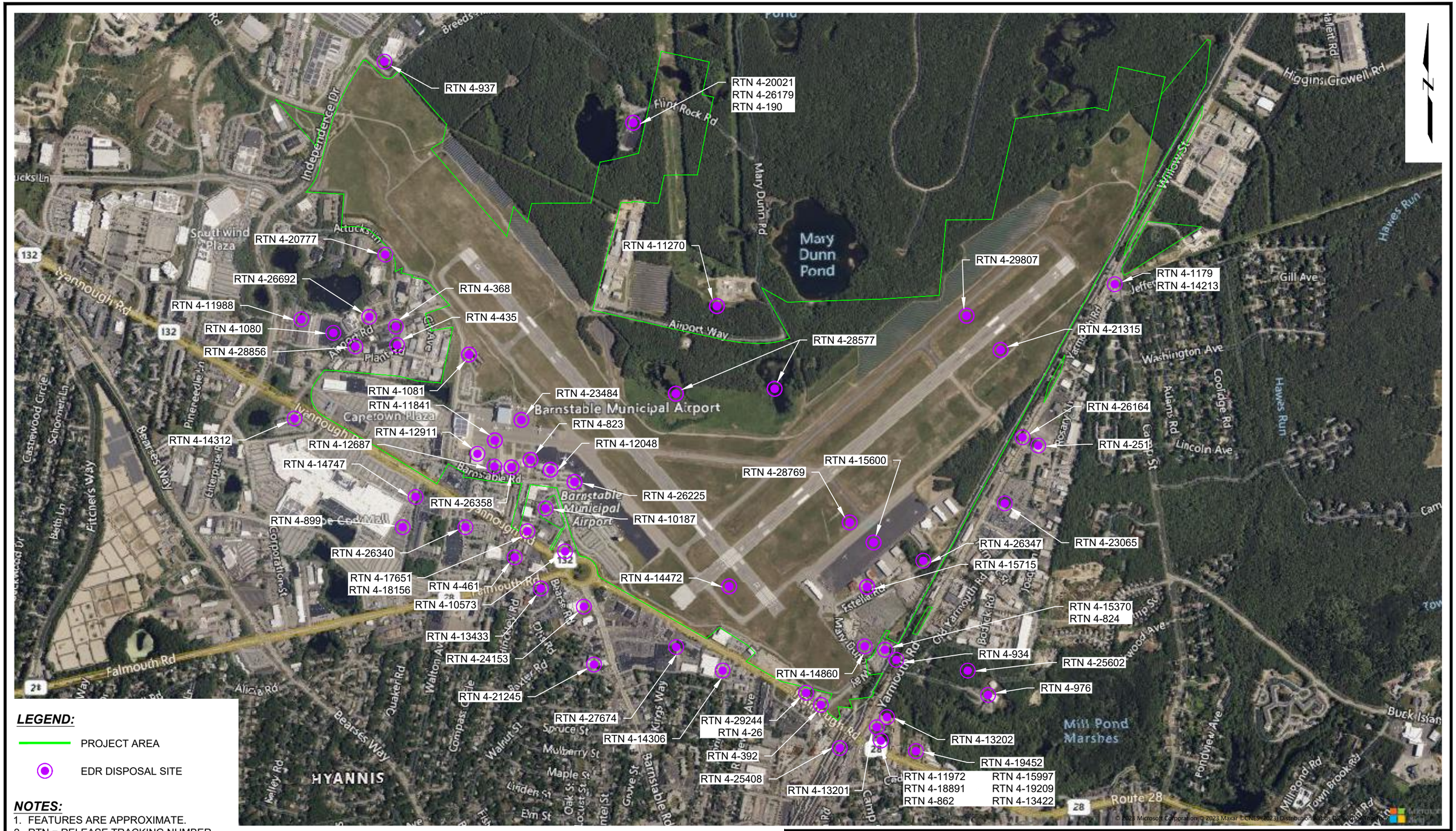
- Former Charter Station No. 6843, 258 Iyannough Road, Hyannis, MA
- Atwood Oil, 33 Brooks Road, Barnstable, MA
- Former Shell-Branded Service Station #137771, 381 Camp Street, Hyannis, MA
- Barnstable County Fire Training Academy, Mary Dunn Road, South Flint Rock Road, and Airport Way, Barnstable, MA

More information is discussed in Section 5.17.3.

5.17.2.3 Adjacent to the Airport Property: Closed Sites

EDR also identified 31 Sites that achieved regulatory closure under the MCP:

- 9 achieved a Class A-1 RAO
- 9 achieved a Class A-2 RAO
- 1 achieved a Class B-1 RAO



LEGEND:

- PROJECT AREA
- EDR DISPOSAL SITE

NOTES:

1. FEATURES ARE APPROXIMATE.
2. RTN = RELEASE TRACKING NUMBER.
3. EDR = ENVIRONMENTAL DATA RESOURCES, LLC.

SOURCE:

1. PROJECT AREA DIGITIZED FROM ENVIRONMENTAL NOTIFICATION FORM, CAPE COD GATEWAY AIRPORT, EPSILON ASSOCIATES, INC., NOVEMBER 30, 2022.

0 1000 2000

SCALE, FEET

Draft Environmental Impact Report
Cape Cod Gateway Airport
Hyannis, Massachusetts

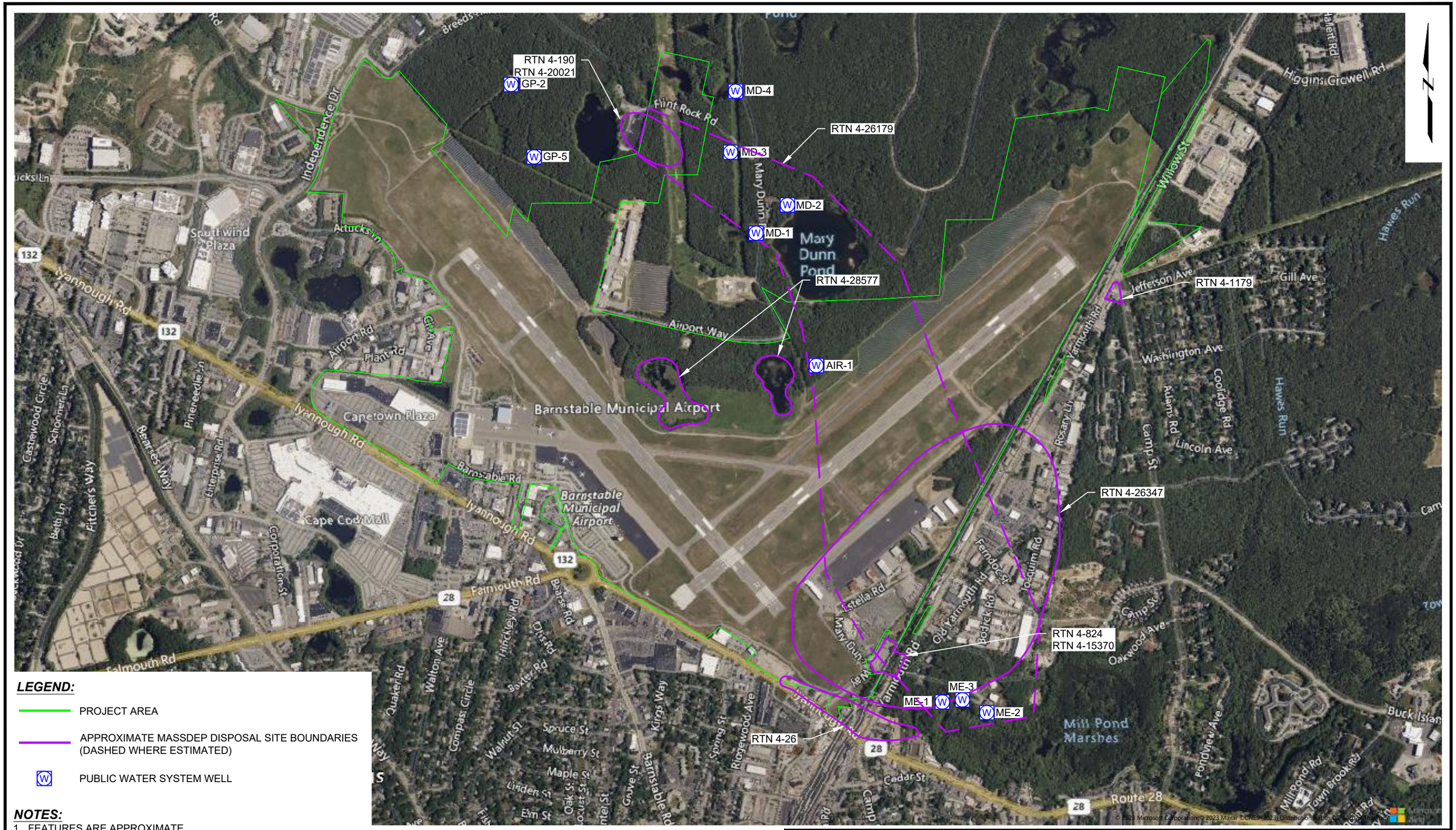
Epsilon Associates, Inc.
Manyard, Massachusetts

GEI Consultants

Project 2203788

SUMMARY OF MASSDEP DISPOSAL SITES

September 2023 **Figure 5.17-1**



LEGEND:

- PROJECT AREA
- APPROXIMATE MASSDEP DISPOSAL SITE BOUNDARIES (DASHED WHERE ESTIMATED)
- (W) PUBLIC WATER SYSTEM WELL

NOTES:

1. FEATURES ARE APPROXIMATE.
2. RTN = RELEASE TRACKING NUMBER.

SOURCE:

1. PROJECT AREA DIGITIZED FROM ENVIRONMENTAL NOTIFICATION FORM, CAPE COD GATEWAY AIRPORT, EPSILON ASSOCIATES, INC., NOVEMBER 30, 2022.
2. PUBLIC WATER SYSTEM WELL DATA FROM MASSGIS (BUREAU OF GEOGRAPHIC INFORMATION), COMMONWEALTH OF MASSACHUSETTS EOTSS. FEBRUARY 13, 2023

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Cape Cod Gateway Airport
Hyannis, Massachusetts

Epsilon Associates, Inc.
Manyard, Massachusetts

GEI Consultants

Project 2203788

ACTIVE MASSDEP DISPOSAL SITE BOUNDARIES WITHIN AND ADJACENT TO THE AIRPORT PROPERTY

September 2023 **Figure 5.17-2**

- 6 achieved a PSNC
- 1 achieved a DEP No Further Action (NFA)
- 2 achieved a DEP Not a Disposal Site (NDS)
- 2 achieved a LSP No Further Action (NFA)
- 1 achieved closure via a Utility Release Abatement Measure (URAM)
- 1 site (**RTN 4-25408**) achieved closure via a Permanent Solution with Conditions (PSC) related to the presence of lead associated with historic fill. No information was available regarding the extent of historic fill outside the disposal site boundary, which is not located on Airport property.

The following RTNs were filed with a DPS and listed the Airport property as a potential upgradient source:

- 210 Yarmouth Road, Hyannis, Massachusetts
- 202 Yarmouth Road, Hyannis, Massachusetts
- 95 Airport Road, Hyannis, Massachusetts

The following sites adjacent to the Airport filed a DPS, but did not list the Airport as a potential upgradient source:

- **RTN 4-19452**: Lot 147, 114 Iyannough Road, Hyannis, Massachusetts
- **RTN 4-392**: Airport Exxon (Former BP Service Station), 230 Iyannough Road, Hyannis, Massachusetts.

Information regarding these 30 Sites is summarized in **Appendix N** along with the EDR report.

5.17.3 Per- and Polyfluoroalkyl Substances

PFAS are part of a large family of organofluorine synthetic chemicals used in industry and consumer products since the 1940s. Due to their unique properties, including resistance to oil and water, and ability to withstand high temperatures, they have been used in a variety of applications such as food packaging, nonstick cookware, waterproof clothing, textiles, firefighting foam, and in certain manufacturing processes.

The substances of greatest concern are the longer-chain perfluoroalkyl acids (C6 to C10), such as perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), and products that can form these long-chain perfluoroalkyl acids. These compounds can be resistant to breakdown, migrate quickly in groundwater, and can bioaccumulate in the food chain. Although health risks posed by PFAS are still not completely understood, studies on laboratory animals and in people have shown that exposures to these compounds (particularly PFOA and PFOS) have been associated with a wide range of adverse health effects including reproductive, birth, developmental, behavioral, neurologic, endocrine, immunologic, metabolic, cardiovascular, and cancer outcomes.

Historic reports for the Airport indicate that a fluorotelomer-based AFFF (Chem-Guard 3% mil spec) containing PFAS was purchased and used by the Airport since the 1980s. AFFF was used by the Airport to respond to fires during aircraft accidents and during tri-annual drills and annual testing requirements to comply with FAA requirements. In 2016, the Airport purchased a foam testing system from ECOLOGIC™ to allow the FAA to verify the AFFF mixture without the need to spray the foam.

The Airport is currently assessing PFAS impacts to soil, groundwater, and sediment on and off Airport property from the historical use of AFFF for training and emergency response. The Airport is also assessing PFAS-impacted groundwater migrating onto the Airport and originating from plumes associated with upgradient sources.

5.17.3.1 Standards and Guidelines

EPA finalized national drinking water standards for six per- and polyfluoroalkyl substances (PFAS) on April 10, 2024. PFOA and PFOS: The Maximum Contaminant Level (MCL) is 4 parts per trillion (ppt); for PFNA, PFHxS, and HFPO-DA (GenX) The MCL is 10 pptUnder current state regulations (M.G.L. c.21E and the MCP [3104 CMR 40.0000]), MassDEP currently regulates six PFAS compounds in soil and groundwater: PFOA, PFOS, Perfluorodecanoic Acid (PFDA), Perfluoroheptanoic Acid (PFHpA), Perfluorohexanesulfonic Acid (PFHxS), and Perfluorononanoic Acid (PFNA). The RQs and RCs for PFAS are listed in Table 2 of the Massachusetts Oil and Hazardous Material List (MOHML), which can be found in Section 310 CMR 40.1600 of the MCP. For soils, each compound is regulated separately. For groundwater, because the Airport is located within a DEP-Approved Zone II public water supply area (Barnstable Water Company Maher Wellfield), category RCGW-1 applies. The RCGW-1 standard is 20 ppt for the sum of 6 PFAS listed above.

In October 2020, the MassDEP set a drinking water Maximum Contaminant Level (MCL) of 20 ppt for the sum of six PFAS compounds (PFAS6), including: PFDA, PFHpA, PFHxS, PFOA, PFOS, and PFNA. This drinking water standard is set to be protective against adverse health effects for all people consuming the water.

5.17.3.2 Airport Regulatory History

Investigations for PFAS began in July 2016, when the Airport conducted an initial round of groundwater sampling at the request of MassDEP to assess impacts to soil and groundwater resulting from the Airport's historic use of AFFF. Six monitoring wells were installed at suspected PFAS and/or PFOA release areas, based on an understanding of the Airport's past use of AFFF or potential release locations. Concentrations of PFAS and PFOA were detected above laboratory detection limits in all six monitoring wells. At two of the six monitoring wells, the sum of PFOS and PFOA were detected above the EPA health advisory limit of 70 ppt. PFOS and PFOA were also detected above the EPA health advisory limit in an upgradient monitoring well on the western boundary of the Airport.

On November 10, 2016, MassDEP issued a Notice of Responsibility (NOR) to the Airport. The NOR requested that the Airport perform additional field investigations to:

- Evaluate source(s) of PFAS including PFOS and PFOA detected in groundwater at the Airport;
- Evaluate Source(s) of 1,4-dioxane detected in one monitoring well downgradient of the Airport on the Maher wellfield property; and
- Identify potential impacts to public water supply wells operated by the Hyannis Water District at the Mary Dunn and Maher wellfields (**Figure 5.4-4**).

MassDEP subsequently issued RTN 4-26347 to the release on November 10, 2016.

In response to the NOR, the Airport submitted an IRA plan in accordance with the MCP on December 16, 2016, and a Release Notification Form (RNF) on February 28, 2017. The IRA plan included a plan for additional soil and groundwater testing.

In June 2019, the MassDEP requested that the Airport modify the IRA plan to propose response actions to "reduce infiltration of precipitation through PFAS-impacted soil, such as temporarily capping the source areas; excavating and properly disposing of the PFAS-impacted soil; or some equivalent approach." In response, the Airport submitted an IRA Modification report to MassDEP in December 2019 that included details for installing caps in the Deployment Area and the Airport Rescue and Fire Fighting/Snow Removal Equipment (ARFF/SRE) Building Area, as shown in **Figure 5.17-3**.

The two caps were installed in September 2020 and cover an area of approximately 94,100 sf. These two capped areas cover a majority of the known source areas for PFAS in soils resulting from the historic application of AFFF by the Airport. The Airport continues to monitor PFAS concentrations in groundwater at and downgradient of the capped areas to measure their effectiveness. These results are presented every 6 months in status reports submitted to MassDEP.

5.17.3.3 PFAS Source(s)

The primary source of PFAS impacts to environmental media at the Airport is the historical use of PFAS-containing AFFF in various areas, including:

- **Deployment Area**: Historical training exercises using AFFF at the unpaved Deployment Area between 1991 and 2012;
- **ARFF/SRE Building**: Incidental spillage at the AARFF/SRE Building since 1996;
- **Incident Response**: AFFF use at aircraft incident responses in 1981 and 2016;
- **Barnstable Fire Training Academy**: PFAS-impacted groundwater from upgradient sources, including the Barnstable Fire Training Academy PFAS Release

Further information on these areas is provided below. The locations of these areas are shown in **Figure 5.17-3**.

Deployment Area

The Deployment Area is an unpaved area adjacent to the East Ramp at the Airport (**Figure 5.17-3**). AFFF was used during tri-annual drills and annual compliance testing performed by the Airport between 1991 and 2015. The combination of tri-annual drills and annual compliance testing have contributed to the AFFF related PFAS impacts to soil and groundwater in this area. The Airport ceased use of AFFF in the tri-annual training drills in 2016 with the purchase of the foam testing system by ECOLOGIC™.

Concentrations of PFAS in soil and groundwater within the Deployment Area were reported above their applicable Method 1 Soil and Groundwater Standards.

A geomembrane cap was installed at this area in September 2020 to reduce infiltration of precipitation through PFAS-impacted soil (**Figure 5.17-3**). The cap area covers the majority of known PFAS in soil source areas relating to the historic use of AFFF; however, concentrations of PFAS above Method 1 Soil standards are still present in

soil outside the capped area. Inspections of the cap are performed by the Airport every six months. Results of the most recent inspection performed in March 2023 Indicated that the sand and loam protective layer overlying the geomembrane cap were intact and no signs of significant erosion were observed.

The Airport continues to investigate PFAS concentrations in soil outside the capped area. Additionally, the Airport performs bi-annual groundwater sampling to monitor the plume originating from the Deployment Area.

1991 Drill Area

All tri-annual drills occurred at the Deployment Area, with the exception of the 1991 drill, which occurred in an area adjacent to the northwest portion of Runway 15/33. Laboratory analytical results from shallow soil samples collected from this area in December 2018 did not indicate the presence of PFAS above background levels. No further assessment has been conducted in this area since 2018.

ARFF/SRE Building

The ARFF/SRE Building was constructed in 1996 for storage of emergency response vehicles, AFFF, and firefighting apparatus. This building was investigated and determined to be a source of PFAS and assumed to have been released in the building as a result of accidental spillage, equipment cleaning, or other means. Interior floor drains inside the building had historically discharged to grassy area adjacent to the building, which leached into the underlying soil and groundwater. Concentrations of PFAS in soil and groundwater were reported above their applicable Method 1 Soil and Groundwater Standards in this area.

An asphalt cap was installed over the former grassy area adjacent to the building in September 2020 to reduce infiltration of precipitation through PFAS-impacted soil (**Figure 5.17-3**). In addition, the interior floor drains were closed and connected to a permitted discharge to the Barnstable Wastewater Treatment Plant. The cap area covers the majority of known source area of PFAS- impacted soil relating to the historic use of AFFF outside the ARFF/SRE Building; however, concentrations of PFAS above Method 1 Soil standards are still present in soil outside the capped area. Inspections of the cap are being performed by the Airport every six months.

Airport Crashes

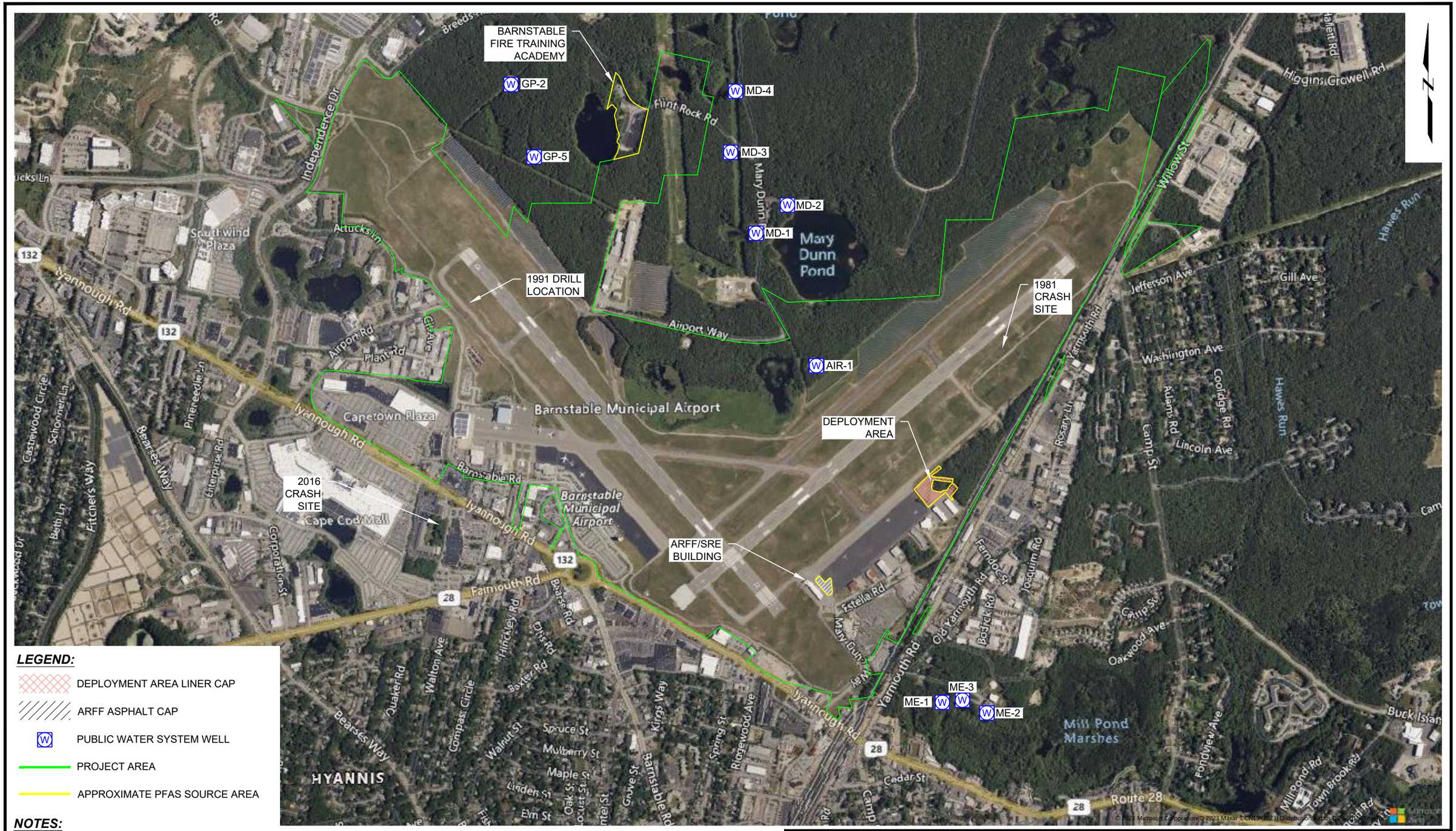
The following two instances of AFFF use during aircraft accidents were noted by personnel working at the Airport since 1980:

- **Runway 24**: A 1981 crash of a Beech 18 aircraft east of runway 24 between Willow Street and the Airport; and
- **Rental Car Area**: A 2016 crash of a Cirrus aircraft in the parking lot of the rental car facility west of the terminal building. Approximately 335 gallons of AFFF (10 gallons of 3% AFFF concentrate and 325 gallons of water) was used during the crash response. The information reviewed indicated that the AFFF was contained within a solid bottom manhole, and subsequently disposed of.

No further information regarding additional response actions in these areas was available in the information reviewed.

Upgradient Sources

The information reviewed indicated that a groundwater plume from the upgradient Barnstable Fire Training Academy PFAS Release Site (RTN 4-26179) and other unknown upgradient locations extend onto the Airport property. These upgradient releases are unrelated to the Airport's AFFF PFAS plume. Results of groundwater analytical testing at several wells located hydraulically upgradient of the Airport have detected concentrations of PFAS exceeding the MassDEP's MCL of 20 ppt. These upgradient releases also appear to be contributing to PFAS impacts detected at the Maher Well field. Based on the information reviewed, response actions are being performed by the Barnstable County Commissioners to address these releases. More information is discussed in Section 5.17.3.4.



LEGEND:

- DEPLOYMENT AREA LINER CAP
- ARFF ASPHALT CAP
- PUBLIC WATER SYSTEM WELL
- PROJECT AREA
- APPROXIMATE PFAS SOURCE AREA

NOTES:

1. FEATURES ARE APPROXIMATE.

SOURCE:

1. PROJECT AREA DIGITIZED FROM ENVIRONMENTAL NOTIFICATION FORM, CAPE COD GATEWAY AIRPORT, EPSILON ASSOCIATES, INC., NOVEMBER 30, 2022.
2. PUBLIC WATER SYSTEM WELL DATA FROM MASSGIS (BUREAU OF GEOGRAPHIC INFORMATION), COMMONWEALTH OF MASSACHUSETTS EOTSS. FEBRUARY 13, 2023

0 1000 2000

SCALE, FEET

Draft Environmental Impact Report
Cape Cod Gateway Airport
Hyannis, Massachusetts

Epsilon Associates, Inc.
Manyard, Massachusetts

GEI Consultants

Project 2203788

PFAS SOURCE AREAS

September 2023 **Figure 5.17-3**

5.17.3.4 Soil and Groundwater Investigations

Information from Airport resources, including when AFFF use occurred for training purposes or during an aircraft accident was used to develop a sampling plan to assess the nature and extent of PFAS at the Airport. Since 2016, the Airport has conducted many investigations to delineate the extent of PFAS impacts to soil and groundwater both on and off Airport property. As part of this effort, a review of AFFF use was performed to determine if AFFF use occurred for training purposes or during an actual aircraft accident.

The Airport currently routinely tests for 20 to 24 PFAS compounds which include the six PFAS compounds currently regulated by MassDEP. Investigations are ongoing and status reports documenting response actions at the Airport are submitted to MassDEP Bureau of Waste Site Cleanup (BWSC) every 6 months.

PFAS Impacts to Soil

As discussed in Section 5.17.3.4, historical use of AFFF has resulted in concentrations of PFAS in soil above their applicable MCP Method 1 S-1 Soil Standards at two areas of the Airport: the Deployment Area and the ARFF/SRE Building.

At these two areas, soil with PFAS concentrations above applicable MCP Method 1 S-1 Soil Standards was detected up to 16 feet below grade. These areas were capped in September 2020 to reduce infiltration of stormwater into the PFAS-impacted soil.

Concentrations of PFAS above Method 1 Soil standards are also present in soil outside of the two capped areas. The Airport intends to perform further evaluation of these areas as part of future response actions.

The Airport also performed an investigation to evaluate the background concentrations of PFAS in soil. Based on the information reviewed, 20 samples were collected from areas on and off the Airport property. The result of the sampling indicated that PFAS from multiple on and offsite sources, including from atmospheric deposition, are contributing to the presence of PFAS in soil at the Airport and throughout the Town of Barnstable. One background sample collected at the Airport, and eight collected off Airport property exceeded the applicable Method 1 Soil Standards for various PFAS compounds. PFAS was detected in 19 of the 20 samples collected.

The Airport and other Responsible Parties continue to investigate the contribution of upgradient, off-Airport PFAS sources to soil and groundwater at the Airport. Based on current data, the vertical extent of PFAS impacted media (soil and groundwater) from contribution of upgradient sources is estimated to be from the ground surface to approximately 56 feet below grade.

PFAS Impacts to Groundwater

Contributions of PFAS in groundwater are resulting from both on-Airport and off-Airport sources. Currently known on-Airport sources include the ARFF/SRE Building and Deployment Area. PFAS concentrations in groundwater at these two areas have been reported above the Method 1 GW-1 standard of 20 ppt. As discussed above, these areas were capped in September 2020 to reduce infiltration of stormwater through the PFAS-impacted soil. Installation of the two caps has resulted in a 75-82 percent decrease in the concentration of total PFAS in groundwater that is migrating from beneath the capped area. These results indicate that the cap is achieving the goal of reducing PFAS leaching from the soil into the underlying groundwater that was resulting from stormwater infiltration. Based on a measured southeasterly groundwater flow direction, the PFAS plume from these areas is presumed to be migrating toward the Maher Wellfield.

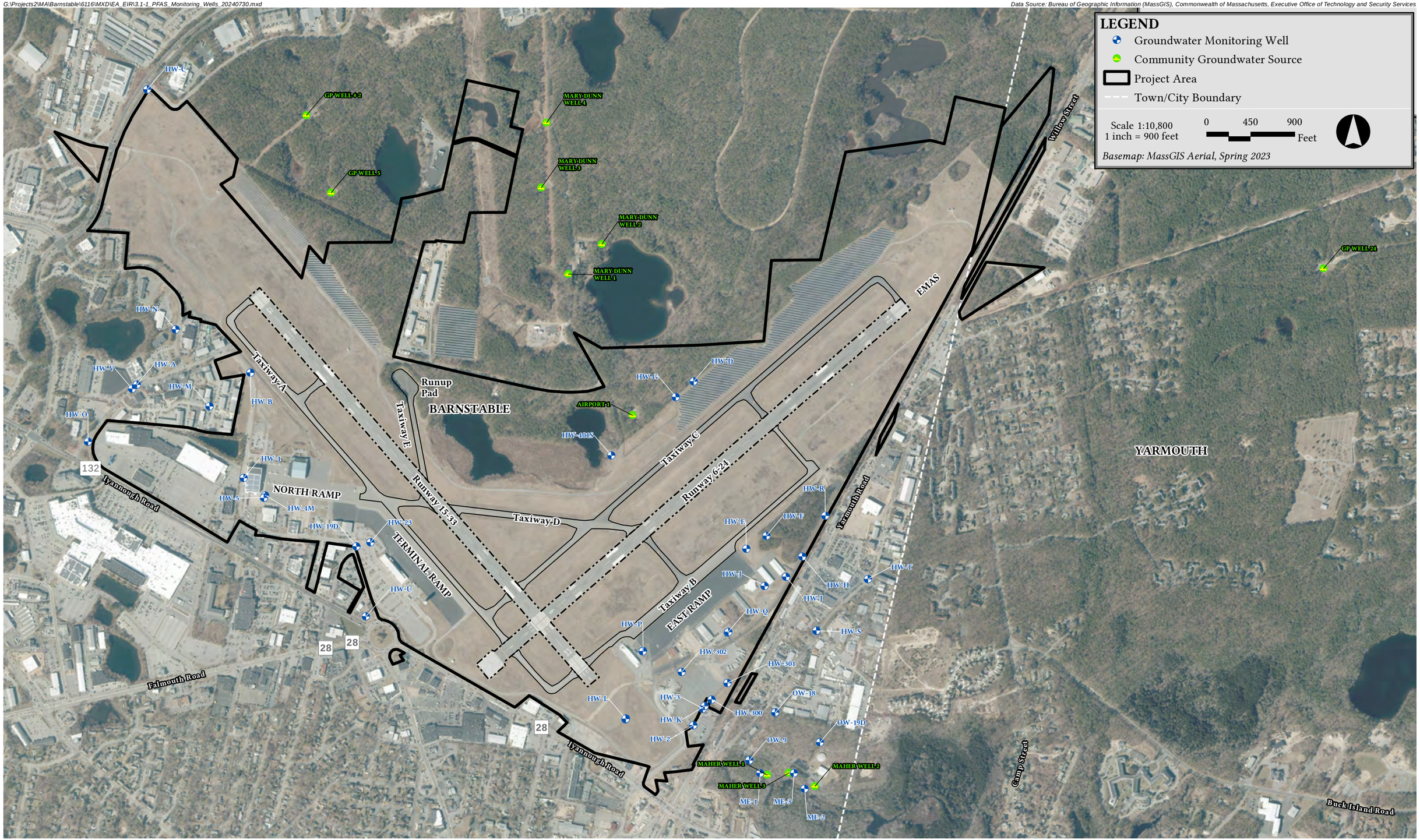
Off-Airport sources of PFAS in groundwater include the Barnstable Fire Training Academy and other unknown sources. The Airport is using forensic techniques to determine if PFAS in the groundwater on the Airport Property is from the Airport or from off-site sources. In September 2020, the Airport submitted groundwater samples to Batelle Memorial Institute of Columbus, Ohio (Batelle) from six monitoring wells screened at various depths at the Maher Wellfield for forensic PFAS analysis. Concentrations of PFAS were reported above the Method 1 GW-1 standard in all six monitoring wells. According to the Batelle report, groundwater samples collected from monitoring wells screened shallow (from approximately 17 feet to 27 feet) were representative of the Airports PFAS Plume. Samples collected from monitoring wells screened deeper (from approximately 32 feet to 70 feet) were representative of upgradient non-Airport related sources (i.e., the Barnstable Fire Training Academy and others). In summary, it appears that the Maher Wellfield has PFAS contributions from on-Airport and off-Airport sources. Response Actions to assess PFAS contamination from both on-Airport and off-Airport sources are currently ongoing. The Airport's PFAS Monitoring wells are identified in **Figure 5.17-4**.

5.17.4 Solid Waste

Solid waste is generated through various airport operations and is managed in accordance with local, state, and federal regulations. Solid waste at the Airport is routinely collected by Nauset Disposal and transported to the Barnstable Transfer Station, located approximately 5.5 miles southwest of the Airport.

G:\Projects2\MA\Barnstable\6116\MXD\EA_EIR\3.1-1_PFAS_Monitoring_Wells_20240730.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cape Cod Gateway Airport **Barnstable, Massachusetts**

Figure 5.17-4
Groundwater Monitoring Wells

5.17.5 Asbestos

Due to the age and material at the Airport, it is suspected that asbestos may be present in materials if installed before 1981. Asbestos is a naturally occurring natural fiber that is used in numerous building materials and vehicles products for its strength and its ability to resist heat and corrosion. If asbestos is inhaled and becomes airborne, it can be harmful to individuals. It is not known if an asbestos survey was performed at the Airport to identify the presence of potential asbestos containing materials (ACM).

Chapter 6.0

Environmental Consequences

6.0 ENVIRONMENTAL CONSEQUENCES

This Chapter discusses the reasonably foreseeable environmental impacts of the proposed action, the no action alternative, and other alternatives being considered in detail. The discussion of environmental impacts focuses on substantive issues and provides sufficient evidence and analysis for determining whether to prepare an EIS or a FONSI (see 87 FR 23453, CEQ Regulations). Additionally, this Chapter includes information demonstrating compliance with applicable requirements and identifies permits, licenses, other approvals, or reviews that apply.

Federal Aviation Administration (FAA) Order 1050.1F, Environmental Impacts: Policies and Procedures (Order 1050.1F) and Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions (Order 5050.4B) define the form and content of Environmental Assessments.

Environmental consequences for this EA have been determined by comparing anticipated environmental conditions in the Project area after development and to the environmental conditions if no project were to be developed (i.e., the "No-Action Alternative").

The environmental consequences identified within each impact category for the above alternatives include the consideration of the following:

- **Direct Impacts** – Direct impacts are those which are caused by the proposed action and occur at the same time and place (40 CFR 1508.8[a]).
- **Indirect Impacts** – Indirect impacts are defined as those which are caused by the proposed action and are later in time or farther removed in distance but are still reasonably foreseeable (40 CFR 1508.8[b]).
- **Cumulative Impacts** – Cumulative impacts are defined as the incremental effect on the environment which is the result from the impacts of the proposed action along with other past, present, and foreseeable future actions, regardless of what agency or person undertakes the other actions (40 CFR 1508.7). [1]

The FAA uses thresholds, found in Order 1050.1F Exhibit 4-1, that serve as specific indicators of significant impact for some environmental impact categories. FAA proposed actions that would result in impacts at or above these thresholds require the preparation of an EIS, unless impacts can be reduced below threshold levels. Quantitative significance thresholds do not exist for all impact categories; however, consistent with the CEQ Regulations, the FAA has identified factors that should be considered in evaluating the context and intensity of potential environmental impacts.

If these factors exist, there is not necessarily a significant impact. Some impact categories may have both a significance threshold and significance factors to consider. In these instances, a conclusion of significance can be determined based on the factors to consider even if the impacts do not meet the significance threshold criteria. As necessary, and appropriate, mitigation/avoidance measures and considerations are identified to reduce or eliminate anticipated environmental impacts for each of the alternatives.

Consistent with 706.f of FAA Order 5050.4, the following resources are not located in the Project area and would not be impacted by the Project alternatives: wild and scenic rivers, floodplains, and farmland. Accordingly, these environmental categories are not analyzed further in this section.

6.1 Water Resources

Construction of new, or reconstruction of, airport facilities may temporarily or permanently affect surface waters, groundwater, or drinking water supplies. As a result, this document evaluates the proposed project's potential water quality impacts. Development projects have the potential to cause water quality impacts, including new buildings or expanding the terminal or hangars, building new aprons or ramps, new or extended runways and taxiways, and installing navigational aids (NAVAIDS).

6.1.1 No-Build Alternative

There would be no effects on water resources, including stormwater, under the No-Build Alternative. The Project areas would remain in active airport use, there would be no new construction, the amount of impervious

[1] This document presents information on cumulative and indirect effects, required under the Massachusetts Environmental Policy Act and FAA Order 1050.1F, under which this EA was prepared. After the issuance of the Draft EA, the U.S. Supreme Court issued a decision in *Seven County Infrastructure Coalition, et. al v. Eagle County, CO*, which concluded that NEPA rarely requires disclosure of impacts that are distant in time and location from a project and that are not directly related to the proposal that triggers the NEPA review. This ruling generally supports a narrow discussion of impacts that can be directly tied to projects such as the one at issue in this EA; impacts previously disclosed as "cumulative" in nature are no longer relevant to the agency's findings on the significance of effects. The FAA has retained the discussion of cumulative impacts in this Final EA for continuity of information from the Draft EA to the Final EA and for MEPA requirements. The FAA will only consider effects that are a result of the project at issue in making its decision on the proposed action.

area would not increase, and the airport's existing stormwater collection and treatment systems would not be improved. Therefore, no direct or indirect impacts are anticipated under the No-Build Alternative. The No-Build Alternative would not provide the added benefit resulting from upgrades to stormwater treatment proposed with the Preferred Alternative.

6.1.2 Preferred Alternative

6.1.2.1 Groundwater

Portions of the proposed work will take place within the Town of Barnstable wellhead protection district. Proposed infiltration within the Wellhead Protection Zone will require pretreatment of runoff entering any infiltration device such as vegetative strips or leaching basins. The existing infiltration devices (chamber systems and leaching catch basins) may require the addition of pretreatment devices to satisfy the wellhead overlay district drainage requirements. These would be designed under the permitting phase for this project and installed at the time of construction.

The new taxiway will impact two existing storm drains that run perpendicular to the new taxiway and approximately seven (7) existing catch basins located between Taxiway B and Runway 6-24. It is anticipated that these catch basins will be removed and/or relocated. Runoff from the new pavement can be collected in drainage swales located outside the taxiway safety area (59 feet either side of centerline) and infiltrated into the ground via leaching basins. Each infiltration device will have pretreatment to remove a minimum 44% TSS prior to discharge into each infiltration device, which will provide additional TSS removal.

6.1.2.2 Surface Waters and Wetlands

The environmental consequences of the Preferred Alternative include unavoidable wetland resource area impacts associated with the permanent fill from the relocation of Taxiway D and associated grading on Upper Gate Pond. No other projects will impact wetland resource areas. As identified in Section 5.4, these resource areas are likely only jurisdictional under local, and statutes and implementing regulations due to the recent revised definitions of Waters of the US.

Due to site constraints, and FAA design requirements for airport geometry, this Project activity cannot be designed to fully avoid impacts to Bordering Vegetated Wetlands (BVW). Permanent fill of approximately 3,000 sf of BVW, 10,900 sf Land Under Water (LUW), 300 linear feet of Inland Bank will occur as a result of the realignment of Taxiway D. These impacts have been avoided and minimized to the maximum extent practicable through utilization of 2:1 side slope design with an engineered slope option and removal of fill/grading associated with a service road..

Additionally, approximately 3.76 acres of vegetated upland areas within 200 feet of Upper Gate Pond, a buffer zone protected by the CCC Regional Policy Plan Objective[2] and prior Minor Modifications to DRI Decisions[3] will be impacted.

Although final design and means and methods of construction have not yet been determined, there is also the potential for up to 5,200 cubic yards of excavation (dredge) of unconsolidated organic materials (i.e., "muck") along the pond bottom in order to provide suitable base material for the taxiway slope. As part of the next phase of design, geotechnical engineers will further investigate this area to ascertain if excavation is recommended or if there are other options to adequately support the slope and meet FAA design criteria.

These permanent impacts are summarized in **Table 6.1-1** below and depicted in **Figure 6.1-1**. In addition to the proposed permanent impacts to BVW, temporary impacts of approximately 1,500 sf to BVW generally involve a 5-foot horizontal area necessary for construction access and work associated with the Taxiway D. The proposed construction would temporarily alter these areas by a variety of construction activities including temporary excavation and backfilling, support of excavation and water control, staging and operating construction equipment, grading, and installing erosion controls. Once construction is complete, the resource areas not permanently impacted by filling would be restored to pre-existing grades and seeded with a native wetland seed mix.

[2] Objective WET 1: Protect wetlands and their buffers from vegetation and grade changes.

[3] See Minor Modification to Decision CCC Project No. TR95006 issued on March 25, 2015.

Table 6.1-1 Taxiway D Impacts to Upper Gate Pond

	BVW Impact		Bank Impact	Land Under Water Impact		200-foot Buffer Zone
	Area (sf)	Area (Acres)	Linear Feet (LF)	Area (Acres)	Area (sf)	Area (Acres)
Permanent	3,000	0.07	300	0.25	10,900	3.76

Compliance with specific performance standards of the applicable regulations identified below is addressed in Chapter 8.0 for each of the applicable resource areas. Permits under local and state regulations will be required for these impacts: Massachusetts General Laws c. 21, §§ 26-53, and MassDEP's Water Quality Certification Regulations at 314 CMR 9.00 (Water Quality Certification Regulations).

6.1.3 Indirect Impacts

The proposed Project is not anticipated to result in indirect or secondary impacts that would adversely affect water resources. Indirect or secondary impacts from stormwater runoff to water resources are prevented through the Airport's Spill Prevention, Control, and Countermeasure (SPCC) Plan and regular maintenance of management facilities. Potential indirect impacts from historical use of PFAS containing firefighting foam includes the following measures: the Town of Barnstable through the Hyannis Water System will continue to operate the Maher Wells treatment plant and will continue to provide drinking water that meets the regulatory drinking water standards. The MassDEP periodically inspects the Maher Treatment plant under the water supply/drinking water program.

Groundwater monitoring by the Airport will continue to track the PFAS plume migration and document the reduction in concentration over time until regulatory closure is achievable (estimated to be completed by 2029). A majority of the PFAS impacted soil within the two effected areas have been capped to reduce infiltration and groundwater impacts. The caps are inspected bi-annually to verify their effectiveness.

The actual time for treatment will be based on the collection of analytical samples for laboratory analysis. Groundwater monitoring beyond 2029 may be conducted at the Airport as part of an annual activity and use limitation (AUL) inspection or if plume concentrations have not dropped below the applicable GW-1. Bi-annual reports will continue to be uploaded to MassDEP until a permanent solution can be obtained.

6.1.4 Construction Impacts

6.1.4.1 Stormwater

For Projects identified herein with land disturbance of greater than 1 acre, the Airport and selected contractor will need to seek coverage under the 2022 (or its replacement) EPA NPDES Construction General Permit (CGP), including developing a stormwater pollution prevention plan (SWPPP), that reduces pollution from erosion and sedimentation from construction activities. The Airport or its designee will regularly inspect the active construction sites for compliance with the SWPPP and make sure that appropriate erosion control measures are in place and working properly.

In addition, construction will be phased out so that disturbed areas are minimized to the extent feasible. The SWPPP and selected BMPs will be finalized as construction methods and schedule are determined by the selected contractor. The SWPPP will be finalized prior to construction, updated as necessary during construction, and maintained throughout the period of construction. In addition, construction activities will comply with the FAA Advisory Circular 150/5370-10H (Latest Version), Airport Construction Standards. Site plans included in the SWPPP will depict sedimentation and erosion control measures and EPA and MassDEP BMPs to control and reduce sediments and dust in stormwater discharges to the extent feasible, in accordance with NPDES requirements.

A project specific operation and maintenance plan will be prepared for the final design of this project and incorporated into the SWPPP.

G:\Projects2\MA\Barnstable\6116\MXD\6.2-1_TaxiwayD_2-1_Slope_Wetland_Resource_Impacts_20231012.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

Impact to Bordering Vegetated Wetland
0.1 acres total
0.01 acres pavement

Impact to Open Water
0.29 acres total
0.0 acres pavement

Impact to 200-ft Buffer Zone
3.78 acres total
1.13 acres pavement

Impact to 100-ft Buffer Zone
1.85 acres total
0.52 acres pavement

Upper Gate Pond

LEGEND

- Airport Property Boundary
- New Pavement
- Pavement to be Reconstructed
- Pavement to be Removed
- Pavement Removal Turf
- Limits of Grading (2:1 Slope)
- Bordering Vegetated Wetland
- Land Under Water
- Bank
- 100-ft Buffer Zone
- 200-ft Buffer Zone

Scale 1:1,200
1 inch = 100 feet

0 50 100 Feet

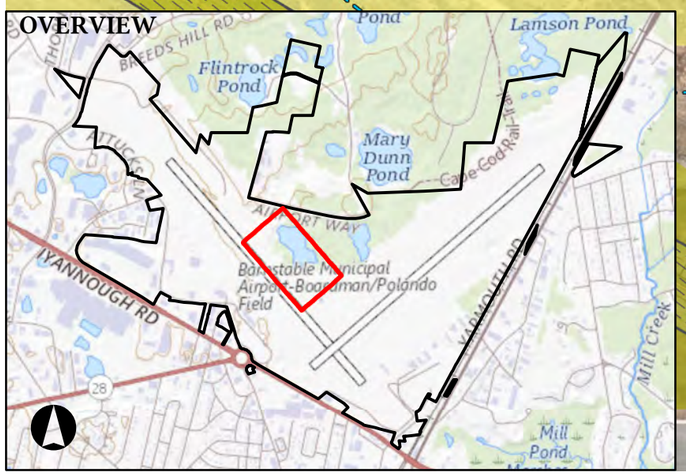
Basemap: Nearmap Aerial Image, April 2023

Proposed Taxiway D

Existing Taxiway D

Taxiway E

OVERVIEW



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 6.1-1
Wetland Resource Area Impacts

6.1.4.2 Wastewater Management

With the recent addition of a sewer line along Mary Dunn Way, any new proposed facilities will be able to connect to the Town wastewater system. Existing facilities are required to connect to the new sewer line. Typically, general aviation hangars are not anticipated to result in additional wastewater discharges as these hangars are used for aircraft storage only.

6.1.4.3 Soils Management

Although final design and means and methods of construction have not yet been determined, there is also the potential for excavation (dredge) of unconsolidated organic materials (i.e., "muck") along the pond bottom in order to provide suitable base material for the taxiway slope. Release Tracking Number (RTN) 4-28577 was identified in the proposed Taxiway D improvement area. RTN 4-28577 is associated with the presence of Polycyclic Aromatic Hydrocarbons (PAHs) and lead in soil and sediments above the MassDEP Sediment Screening Criteria at Upper Gate Pond. Pending the project sequencing, the work will be performed under the Permanent Solution Statement (PSS) (**Appendix G** dated November 2023) provisions of the Massachusetts Contingency Plan (MCP), as applicable. It is important to note that per the PSS, an Imminent Hazard evaluation per 310 CMR 40.0950 found that an imminent hazard to Human Health or the environment does not exist based on the levels of PAHs and lead detected in the sediment.

Since the proposed work is being performed within a portion of this MCP regulated site, soil, sediment, groundwater, and surface water will be managed in accordance with requirements of the MCP. The in-water work areas will be isolated via steel sheet pile coffer dams and bottom anchored turbidity curtains prior to the commencement of any in-water work, including the dredging. Groundwater and surface water will either be treated and discharged to surface water in accordance with requirements of the NPDES Remediation General Permit, recharged in accordance with local, state, and federal regulations, or collected and transported offsite for disposal.

Table 6.1-2 Proposed Work Effect on Immediate Environment and Methods of Management

Element Affected by Proposed Work	Method of Management
Soils/Sediment	Soils/Sediment Steel sheet pile coffer dams and bottom anchored
Groundwater/Surface Water	Either treated and discharged to surface water, recharged, or collected and transported offsite

6.1.5 Mitigation Measures

6.1.5.1 Wetland Replication

Mitigation for the Preferred Alternative's unavoidable impacts to BVW will be provided in accordance with local and state wetlands regulations and performance standards. For permanent impacts resulting from filling BVW, the altered BVW would be replaced (replicated) in-kind proximate to the water body or reach of the waterway area lost to meet mitigation requirements under the Barnstable Wetlands Protection Bylaw, Cape Cod Commission Water Resources Policy, Massachusetts Wetlands Protection Act (WPA) see 310 CMR 10.55(4)(b))., and MassDEP Water Quality Certificate regulations (see 314 CMR 9.06). The proposed ratio of replacement area to BVW loss is at least 1:1, and a total of 3,000 sf of BVW replication would be provided on Airport property proximate to the impact location(s). The wetland replication area will be designed and constructed as per MassDEP's *Massachusetts Inland Wetland Replication Guidelines, Second Edition* (September 2022).

The proposed wetland mitigation site is located along the eastern bank of Upper Gate Pond as shown in **Figure 6.1-2**. This area is one of the shallower sloped banks to the pond and enables the construction of a wetland mitigation site that is both accessible and requires less disturbance to pond bank than other areas around the edge of the pond with very steep banks. The proposed mitigation site is vegetated with herbaceous plants and woody shrubs. It is within the maintained Runway Visibility Zone (RVZ) which requires vegetation to be maintained at a height of five (5) feet or less above the runway centerline per FAA AC 150-5300-13A Section 207.This conceptual replication plan will be presented to the regulatory agencies as part of the permitting phase. Once consensus is reached on a permittable plan, a draft wetland replication site plan will be developed, and accompanying narrative will be completed. The wetland replication plan, to the extent compatible with the airport's safety needs, will also incorporate important wildlife habitat features into the design including burrowable soils for small mammals, flowering herbs for pollinator species, and dense herbaceous cover, designed to replicate those functions of the impacted wetlands.

6.1.5.2 Stormwater

Stormwater Pollution Prevention Plan (SWPPP) would be generated for construction-related activities. During construction, structural and non-structural controls to minimize erosion and sedimentation, including temporary stabilization, temporary seeding, permanent seeding, dust control, temporary sediment basins and check dams, diversion swales, catch basin inlet protection, and dewatering filters.

During operation, consistency with MassDEP's Stormwater Regulations through measures including infiltration, peak runoff rate and volume control, and total suspended solids removal will be implemented. Any updates to the Airport's MSGP SWPPP will be implemented.

6.1.6 Impact Summary

The FAA uses the following significance thresholds for wetlands and surface waters to determine if the action would:

1. Adversely affect a wetland's function to protect the quality or quantity of municipal water supplies, including surface waters and sole source and other aquifers;
2. Substantially alter the hydrology needed to sustain the affected wetland system's values and functions or those of a wetland to which it is connected;
3. Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety, or welfare (the term welfare includes cultural, recreational, and scientific resources or property important to the public);
4. Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically important timber, food, or fiber resources of the affected or surrounding wetlands;
5. Promote development of secondary activities or services that would cause the circumstances listed above to occur; or
6. Be inconsistent with applicable state wetland strategies.

Wetland impacts as described above in **Table 6.1-4** Taxiway D Impacts to Upper Gate Pond include permanent fill of approximately 4,500 sf of BVW, 13,700 sf Land Under Water (LUW), 300 linear feet of Inland Bank will occur as a result of the realignment of Taxiway D – which has been minimized to the greatest extent feasible by the selection of a 2:1 slope over the FAA standard 4:1 slope for taxiway side areas. As described in Section 6.1.5., mitigation will be designed in the subsequent permitting phases of the project to meet all local, state, and federal wetlands regulations and performance standards, as applicable.

Permanent impacts resulting from filling BVW, the altered BVW would be replaced (replicated) in-kind proximate to the water body or reach of the waterway area lost to meet mitigation requirements under the Barnstable Wetlands Protection Bylaw, Cape Cod Commission Water Resources Policy, and MassDEP Water Quality Certificate regulations (see 314 CMR 9.06) and the WPA (see 310 CMR 10.55(4)(b)). The proposed ratio of replacement area to BVW loss is at least 1:1, and a total of 4,600 sf of BVW replication would be provided on Airport property proximate to the impact location(s). Mitigation measures described above will be used to reduce potentially significant adverse impacts below the level of significance.

Based on the proposed avoidance, minimization, and mitigation, in Section 6.1.5., there are no significant impacts on wetlands and surface water beyond the existing condition as a result of the Proposed Action.

6.2 Coastal Resources

The MA Office of Coastal Zone Management was provided an opportunity to comment on this document relative to the consistency of the project with Massachusetts Coastal Policies. Specifically, the project was reviewed to ensure that it conforms with policies for water quality, habitat, protected areas, coastal hazards, port and harbor infrastructure, public access, energy, and ocean resources, which are embodied in relevant state regulations. A discussion on each coastal policy and discussion relative to the proposed projects was provided which determined that the proposed project will be consistent to the maximum extent practicable with the enforceable policies of the *Massachusetts Office of Coastal Zone Management Policy Guide*. Furthermore, the Projects are not located near any coastal landforms (e.g., dunes, beaches, salt marshes).and would not pose an impact to human safety, property or cause adverse impacts to the coastal environment. Based on this information, there are no significant impacts on coastal resources beyond the existing condition as a result of the Proposed Action based on the Preferred Alternative Projects and the projects would be consistent to the maximum extent practicable with the enforceable policies of the MA CZMP.

G:\Projects2\MA\Barnstable\6116\MXD\EA_EIR\6.1-2_Wetland_Replication_Area_20240806.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

LEGEND

- Airport Property Boundary
- Proposed Wetland Replication Area
- Land Under Water (LUW)
- Bordering Vegetated Wetland (BVW)
- 10-ft Contour
- 2-ft Contour
- New Pavement
- Pavement to be Removed
- Pavement to be Reconstructed
- Pavement Removal Turf
- Limits of Grading (2:1 Slope)

Scale 1:1,200
1 inch = 100 feet

0 40 80 Feet

Basemap: Nearmap Aerial, April 2023

Proposed Wetland Replication Area

BVW Impact Area

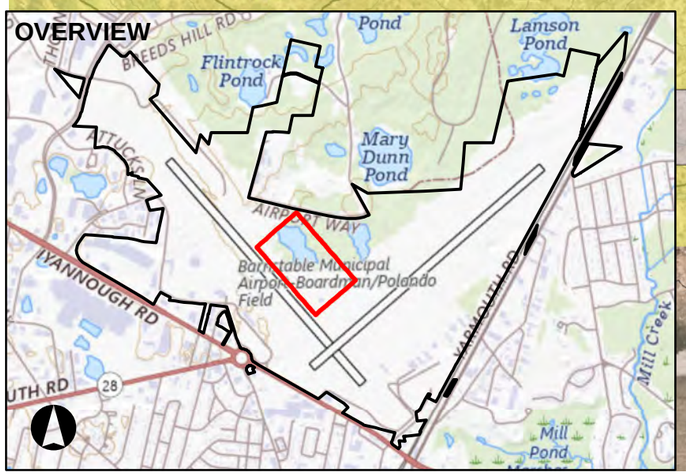
Upper Gate Pond

BVW/LUW Impact Areas

Taxiway D

Taxiway D

OVERVIEW



Cape Cod Gateway Airport Barnstable, Massachusetts

Figure 6.1-2
Proposed Wetland Replication Area

6.3 Air Quality

6.3.1 No-Build Alternative

The No-Build Alternative assumes that the Projects would not be implemented; therefore, there would be no impacts on air quality.

6.3.2 Proposed Action

The Airport is located in a NAAQS attainment area, therefore, no formal Emissions Dispersion and Modeling System or other air quality modeling is required. Instead, a qualitative analysis examining the background pollutant levels (see Table 5.6-3), which are well within applicable air quality standards, and potential for changes and/or increases in air emissions was completed. The Project is not anticipated to result in additional emissions from any changes in operation due to several factors. This includes a near-term shift in commercial aircraft to a more fuel-efficient model which provides over 10% improvement in fuel and carbon emissions. Temporary emissions associated with construction are anticipated from the Project and will be mitigated to the extent possible as discussed below. Some additional emissions may result from increased vehicle traffic as discussed in Section 6.8. However, this additional traffic will not result in emissions sufficient to result in an exceedance of the NAAQS.

Furthermore, the Proposed Actions are anticipated to have little effect on air traffic volume over the next 5-7 years as shown in Table 1.4-3, showing a modest increase of 1,000 operations by 2030, and will have minor effects on air traffic patterns, and therefore are not expected to have an adverse effect on air quality. Mitigation for permanent impacts to air quality is not proposed.

6.3.3 Construction Impacts

The construction phases of each proposed action are expected to temporarily increase air emissions from both fugitive dust generated from earth moving activities and the exhaust of non-road construction equipment. Emissions from the operation of construction machinery (i.e., carbon monoxide [CO], nitrogen oxide [NOx], particulate matter [PM10, PM2.5], volatile organic compounds [VOCs], and GHG emissions) are short-term and not generally considered substantial. Temporary air quality impacts during construction periods will be mitigated as described in the Mitigation section below under "Temporary Impacts."

6.3.4 Mitigation Measures

Several strictly enforced measures would be used by contractors to reduce potential emissions and minimize impacts including:

- Using wetting agents on areas of exposed soil on a scheduled basis;
- Using covered trucks;
- Monitoring actual construction practices to ensure that unnecessary transfers and mechanical disturbances of loose materials are minimized;
- Minimizing storage of debris on the site;
- Periodic street and sidewalk cleaning with water to minimize dust accumulations; and
- The contractor would comply with the National Emission Standards for Hazardous Pollutants (NESHAP) throughout demolition and construction activities.

In addition to measures to control earth material particulate dust, the contractor would also strive to minimize diesel emissions during construction. Emissions from the operation of construction machinery (i.e., carbon monoxide [CO], nitrogen oxide [NOx], particulate matter [PM10, PM2.5], volatile organic compounds [VOCs], and GHG emissions) are short-term and not generally considered substantial. Specific measures to be taken to reduce diesel emissions and other construction related air quality impacts include the following measures:

- Using equipment retrofitted with diesel emissions control devices. The Proponent would specify during the procurement of the subcontractors, that the majority of the heavy equipment operating on the site be retrofitted with diesel emissions control devices;
- Maintaining an "idle free" work zone of fossil fuel trucks and equipment by providing supplemental hoisting and pumping equipment along with "just-in-time" delivery methods. On-site idling would be limited to five minutes. "Do Not Idle" signs would be posted at appropriate locations;
- By locating combustion engines away from sensitive receptors such as fresh air intakes, air conditioners and windows; and
- Using Ultra Low Sulfur Diesel for all trucks and construction machinery as required by the US EPA.

6.3.5 Impact Summary

As described in Section 5.6, the FAA has established significance thresholds to serve as indicators of what constitutes a significant impact. For air quality, the significance threshold is any action that would result in criteria air pollutant concentrations that would lead to an exceedance of the NAAQS or increase the severity of any existing exceedance. Based on this information, there are no significant impacts on the air quality (neither onsite within project area nor vicinity/regional) beyond the existing condition as a result of the Proposed Action.

6.4 Climate and Greenhouse Gas Emissions[4]

An increase in aircraft activity is not anticipated as a result of the proposed Projects, rather, the Projects are to enhance the safety of aircraft flying into and out of the airport and to comply with FAA standards for airfield geometry. Aircraft operations are anticipated to maintain their existing levels and future growth is forecasted by models in the master plan. Information regarding the potential for air quality impacts is provided in Section 6.3.2 above. As noted above, the Projects are proposed primarily to safely accommodate current operations. A temporary increase in emissions is anticipated as part of the construction period. Measures will be adopted to minimize impacts from temporary emissions as described in Section 6.3.4 above.

The Airport is committed to curbing GHG emissions long-term through various strategies including improving the energy efficiency of buildings on-site, evaluating the installation of solar canopies at the Airport parking lot, limiting idling by aircrafts, upgrading airport maintenance vehicles/requiring low sulfur diesel fuel use by contractors, and carrying out regular energy audits on on-site buildings. A discussion of GHG emissions associated with proposed tree removal resulting from Taxiway D, hangar development (East Ramp), and future potential off-airport obstruction removal is discussed in Section 6.4.1.4. below.

6.4.1 Greenhouse Gas Analysis

6.4.1.1 GHG Analysis - Stationary Source Mitigation Commitments

The Airport is located in the Town of Barnstable. Barnstable is not a Stretch Code community. However, in order to support the Airport's decarbonization goals, the Proponent would be willing to commit to the 2023 Stretch Energy Code measures. In lieu of modeling, the Proponent is committing to a series of GHG mitigation commitments. For any new buildings, expansions, or additions, the Proponent will commit:

- High performing envelope that complies with the 2023 Stretch code envelope performance requirements;
- 100% heat pump space heating;
- Energy recovery ventilation per the 2023 Stretch code update;
- Electric domestic hot water heating, specific method to be determined. Heat pump domestic hot water heating to be analyzed;
- Roof to be constructed PV-ready;
- Installed electric vehicle (EV) charging spaces, quantity to be determined;
- EV infrastructure for additional future EV-parking spaces to be installed, quantity to be determined.

Should any future Energy Code Updates occur prior to the commencement of work, the Project will comply with future Energy Code Updates. Specific GHG reduction has not been quantified, as there are no actual plans in place to model. The Proponent's ongoing GHG Commitments have been detailed in Section 5.7. Upon completion of the potential future buildings, additions, or expansions, the Proponent will submit a self-

[4] The NEPA process for this project was initiated in May 2024. The content of this EA was designed to satisfy the requirements not only of NEPA, but also the Massachusetts Environmental Policy Act, which requires additional categories of environmental analysis and, in some cases, more information in some resource categories than required by NEPA. Additionally, at the time the Draft EA was prepared and issued for public comment, NEPA requirements were contained in the NEPA statute, the regulations implementing NEPA issued by the CEQ, and for the FAA, in FAA Order 1050.1F. The FAA also utilized the FAA Order 1050.1F Desk Reference to complete resource category analyses, along with MEPA-specific guidance. During the pendency of this MEPA/NEPA review, the regulatory setting for NEPA generally, and the environmental impact category identified in FAA Order 1050.1F as "climate," has changed substantially. Section 6.(c) of Executive Order 14154, *Unleashing American Energy*, issued on January 21, 2025, prohibits federal agencies from relying on climate change-related information, including the social cost of carbon, in rendering decisions on major federal actions. Additionally, the Supreme Court in *Seven County Infrastructure Coalition, et. al v. Eagle County, CO*, has concluded that NEPA rarely requires disclosure of impacts that are distant in time and location from a project and that are not directly related to the proposal that triggers NEPA review. This ruling generally supports the elimination of discussion of climate change impacts in projects such as the one at issue in this EA. Although the FAA has retained the discussion of climate in this Final EA, it does so only for continuity of information from the Draft EA to the Final EA and for MEPA disclosure. However, the information contained in section 6.4 is not being considered when reaching a conclusion regarding the significance of effects for the project and plays no role in the FAA's issuance of a decision on this project.

certification to the MEPA Office, prepared in accordance with the GHG Policy. This certification will identify the GHG mitigation measures incorporated into the building and will illustrate the degree of GHG reduction achieved. Details of the Proponent's implementation of operational measures will also be included in this submittal.

6.4.1.2 GHG Analysis - Mobile Source Assessment

A mobile source emissions analysis was conducted to calculate the changes in CO2 emissions as a result of the proposed Projects and identifies options for potential reductions associated with improvements via TDM and other green initiatives at the Airport.

An estimate of CO2 emissions from mobile sources was calculated based on existing and estimated new trips, approximate distances traveled, and GHG emissions factors for vehicle trips. Potential reductions in mobile source CO2 emissions may be achieved via transportation demand management measures (e.g., subsidized bus passes, biking incentives).

Direct emissions from transportation sources (e.g., fleet vehicles) are not included in this assessment because the Airport does not anticipate additional fleet vehicles as a result of the Proposed Action.

6.4.1.2.1 Baseline Indirect Emissions from Transportation

The baseline condition for indirect transportation emissions is calculated from existing daily trips to the airport (472 vehicle trips). The improvements proposed in the Preferred Alternative include a potential range of terminal building expansions. As a result of the Preferred Alternatives, the 100 peak hour passenger scenario for the terminal building, would generate approximately 236 net new daily vehicle trips. These net new daily trips are estimated to increase annual CO2 emissions by approximately +1,139 tons of CO2 per year.

The 150 peak hour passenger scenario for the terminal building would generate approximately 472 net new daily vehicle trips. These net new daily trips are estimated to increase annual CO2 emissions by approximately +2,279 tons of CO2 per year, as shown in Table 6.4-1.

Table 6.4-1 Mobile Source CO2 Emissions

	Daily Trips	Miles/Round Trip	VMT/Day	Annual VMT	Annual CO2 Emissions (tons/year)[5,6]	Increase in GHG over baseline
Existing (Baseline/No Build Condition)	472	30	14,160	5,168,400	2,279	
Vehicle Trips (Preferred Alternative -100 Peak Hour Passengers)	708	30	21,240	7,752,600	3,418	+1,139 tons/year
Vehicle Trips (Preferred Alternative -150 Peak Hour Passengers)	944	30	28,320	10,336,800	4,558	+2,279 tons/year

Mobile Source Related Improvements

The Airport has committed to investigate several Transportation Demand Management (TDM) strategies to reduce emissions from mobile sources. The Airport proposes to investigate the feasibility of providing airport employees (and tenant employees) with subsidized public transportation options (e.g., reduced CCRTA bus passes) to reduce mobile source CO2 emissions. Additionally, the airport is committed to providing employee facilities (lockers and changing areas) to increase the number of employees traveling to the airport by walking or biking. In addition, to the above identified TDM strategies, the airport's future micro/smart grid infrastructure (currently in planning) will allow the Airport to achieve additional TDM strategies, not yet feasible, including adding EV vehicle and bus charging infrastructure utilizing onsite generated and stored renewable energy. The future micro grid is a key component to promoting trips to the airport using zero emissions vehicles. The Airport has committed to providing eight charging stations for electric vehicles.

[5] The average passenger vehicle emits approximately 400 grams of CO2 per mile. EPA, Office of Transportation and Air Quality. *Tailpipe Greenhouse Gas Emissions from a Typical Passenger Vehicle,* EPA-420-F-23-014 June 2023.

[6]. 1 ton (t) is equal to 907184 grams (g)

6.4.2 Infrastructure Resiliency

Cape Cod Gateway Airport recognizes the increasing importance of resilience and adaptation in ensuring the long-term sustainability and functionality of its facilities due to extreme weather events, extreme temperatures, and other changes in environmental and climate conditions.

According to the Town of Barnstable 2022 Hazard Mitigation Plan Update, workshops conducted through the Municipal Vulnerability Preparedness (MVP) Program identified the Town's vulnerability to several natural hazards including flooding, high winds, winter or extreme weather, coastal erosion, sea level rise, wildfire, and ocean acidification. The risk assessment conducted is based on past occurrences and identifies windstorms and severe winter weather particularly threatening to the Airport.

Windstorms

Massachusetts is susceptible to both extreme wind events such as hurricanes and tornadoes but also windstorms that do not have any other associated characteristics other than the movement of air (i.e., no precipitation). According to the Hazard Mitigation Plan Update, the Town of Barnstable is located in a Zone II, "which means the community is susceptible to winds of up to 160 mph and is also located in a hurricane susceptible region." Windstorm events can occur regularly in Barnstable and can lead to fallen trees or power lines, roof damage and dangerous marine conditions. Models predict the potential for increased severe storms that can cause more damage across the state.

Severe Winter Weather

The Hazard Mitigation Plan Update lists severe winter weather as a risk to the Barnstable area. Severe winter weather such as blizzards and ice storms are common on an annual basis throughout Massachusetts, with the Town of Barnstable being susceptible to a combination of both snow and coastal flooding during a winter storm event. These storms can down trees, cause lengthy, widespread power outages, damage property and even cause fatalities. Infrastructure is at risk and may be impacted directly by the winter storm event or by associated power outages and the inability to use safe transportation routes. Research indicates that the entire state is at risk for frequent winter storms.

Wildfire

Wildfires are typically non-structural fires that occur in vegetated areas such as grass, shrubs, and forested areas. Wildfires not only destroy the vegetated areas where they occur, but they can also impact the built environment including structures, if in close proximity. According to the 2018 Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan, the southern part of Massachusetts is particularly susceptible to wildfire due to the availability of fuel, impact of offshore winds and increasing development. Barnstable and Plymouth Counties are identified as the most fire-prone due to their vegetation, sandy soil, and the presence of a drying wind. The proposed Projects described herein do not increase the risk of wildfire in the vicinity of the Airport. The Airport's emergency response firefighting equipment enables the Airport to provide rapid response to surrounding communities should a wildfire erupt.

Increased Flooding/Extreme Precipitation

Future climate predictions for the Northeast suggest more frequent and intense rainfall, with an average annual precipitation increase of 4.42 inches by 2090 (ReslientMA.org/maps, RCP4.5 scenario). All current and future upgrades to the stormwater management system will be designed and sized to accommodate for 10-year storm events and peak precipitation values derived from the National Regional Climate Center (NRCC) for each rain event to account for the predicted increase in rainfall quantities and frequency for the region. The Airport is not located within a mapped floodplain. The Project is designed to meet the stormwater management requirements for reconstruction of existing infrastructure and additional pavement associated with the runway extension. These stormwater features will upgrade outdated or undersized stormwater infrastructure as construction takes place.

Extreme Heat

The Municipal Vulnerability Preparedness (MVP) report for the Town of Barnstable[7] predicts future weather conditions to include more frequent heat waves and droughts, as well as changes to coastal resource areas, with significant implications for the seasonal economy, In Massachusetts, temperatures are projected to increase significantly over the next century. Winter average temperatures are likely to increase more than those in summer. Estimates for the rise in temperatures is up to 3.6°F by 2030 (Resilientma.org, Interactive Map). To address extreme heat, and heat related impacts, municipalities can adopt and encourage green infrastructure, white roofs, landscaping for parking lots and redevelopment. The Airport's open space, including the significant

[7] Town of Barnstable Municipal Vulnerability Preparedness Report, 2020.

areas of grassland, along with forested areas, functions as green infrastructure providing evapotranspiration and cooling to surroundings helping to minimize and reduce the potential for heat island impacts beyond the Airport boundaries.

Urban Heat Island Effect

Urban heat island (UHI) effect from cutting trees associated with Taxiway D, and East Apron aviation development areas, is not anticipated. UHI effect results from thermal radiation of paved surfaces in proximity to residential and business structures, which results in higher ambient air temperature relative to natural, vegetated, rural areas. UHI is influenced by several parameters such as reduction in evapotranspiration, building materials, impervious cover, and wind speed (Myrup, 1969).[8]

UHI is not expected as a result of the Project. Pavement proposed in areas of the airport are balanced by ample vegetation (trees, grass, shrubs) on the airfield surrounding impervious/paved areas. Obstruction removal activities (off-airport) within future easement areas consists of selectively cutting trees that penetrate the airspace. Tree removal as a result of airspace allows for forest understory for regrowth to heights that do not penetrate the protected airspace.

Vegetated areas, including grassland areas, on and off the airport, will continue to function as a vegetation buffer (providing cooling via evapotranspiration) to surrounding neighborhoods, reducing the potential for UHI surrounding the airport. No pavement is being added in obstruction removal easements, and therefore, not adding impervious cover that would contribute to UHI.

6.4.3 Mitigation Measures

The Proponent is committed to environmental stewardship and has detailed its commitments to mitigate Projects GHG emissions. As the Project's' design develops further, the Proponent expects that additional measures described previously, or possibly new technologies developed in the interim period, may be adopted that will further decrease GHG emissions. The Proponent as part of mitigation for the proposed Project will continue investments and efforts relative to GHG reducing measures throughout the life of the Project. The Proponent is committed to the following mitigation elements for the Project:

- Replanting trees on Airport with locations compatible with airspace surfaces and in conjunction with the Greening Hyannis program;
- Reusing cut wood materials from the Projects when tree cutting takes place y taking away the need for vehicle transport of the wood chips off premises and eliminating the need for disposal of the wood chips whether it be on the Airport premises or off-site;
- Providing new EV Charging Stations; and
- Implementing the necessary infrastructure to support the use/adoption of electric aircraft.

The Proponent is committed to implementing measures to reduce GHG emissions presented in this Final EA but must retain an amount of design flexibility to allow for changes that will inevitably occur as the design progresses. If, during design of the Project, a specific combination of design strategies proves more advantageous from an engineering, economic, or safety perspective, the design project may vary from what has been described herein.

6.4.4 Impact Summary

The FAA has not established a significant threshold for Climate. It is assumed that climate related impacts to aircraft and the Airport will be positively enhanced by adding additional length to Runway 15-33 and enhancing the efficiency of the taxiway layout and geometry. The Massachusetts State Hazard Mitigation and Climate Adaptation Plan (2018), notes that "high temperatures may also impact airplane operations. If the length of existing runways is not sufficient under higher temperature conditions, planes may not be able to take off when there is less lift available." It is noted that high heat can soften the asphalt of airport runways, impairing airplane movement" (page 4-168) and reducing the life span of the pavement. The proposed Projects are consistent with, and respond to, potential future climate scenarios of higher by increasing runway length to maintain safe aircraft operations.

Listed as a critical facility to the Town of Barnstable and the region, the Airport is committed to investing in infrastructure improvements to withstand severe weather events and to continue to play a pivotal role in aiding disaster response and recovery. In alignment with local and regional plans including the Cape Cod Regional Policy Plan, the Airport has made efforts to ensure adaptation and resilience. The Airport plans to enhance flood protection through installing new leaching catch basins and infiltration chambers,

[8] Myrup, Leonard O., A Numerical Model of the Urban Heat Island, Journal of Applied Meteorology and Climatology, Dec 1969.

according to airport drainage design guidelines, to maintain existing runoff. Efforts will also be made to minimize new impervious areas to the maximum extent practicable while adhering to FAA guidelines.

The Airport has also developed and regularly updates its emergency response plans to ensure the safety and well-being of passengers, staff, and the community in the event of emergencies. Moreover, the Airport is committed to reducing its carbon footprint through initiatives (listed in section 6.5.2) such as adopting energy-efficient technologies, smart grid, installing renewable energy sources, and implementing sustainable land use practices.

Furthermore, as it relates to Project impacts to the environment, no flooding or heat island effects are anticipated based on the Projects limited impacts to natural resources. Where tree cutting Is proposed for the East Ramp aviation development areas, and from Taxiway D, the overall impacts to climate are offset by large areas of undeveloped forested lands in the northern section of the Airport, and replanting of trees, as detailed in the carbon sequestration analysis in section 6.4.1.5.

Based on this information, no significant impacts on the climate are anticipated as a result of the Proposed Action based on the Preferred Alternative.

6.5 Natural Resources and Energy Supply

6.5.1 No-Build Alternative

The No-Build Alternative assumes that the existing Airport footprint and infrastructure would remain unchanged. No natural resources would be used for construction activities. Moreover, energy demand would not increase as a result of the terminal expansion.

6.5.2 Proposed Action

This section addresses the impact associated with the Proposed Action's consumption of natural resources, including water, asphalt, wood, and energy supplies (e.g., natural gas, and aircraft fuel). FAA Order 1050.1F, Exhibit 4-1, indicates that FAA has not established a significant threshold for Natural Resources and Energy Supply. However, within the EA review process, project proponents need to consider factors with "the potential to cause demand to exceed available or future supplies of these resources." The following paragraph provides further details on the Project's use of natural resources and potential for environmental consequences.

Natural Resource Materials

Construction materials considered under this category would be used during construction of the proposed Project. As noted above, construction materials for typical airport construction projects contain asphalt, aggregates (sand, gravel), and wood, and fuels. The highest consumption of natural resources related to the project will be the use of asphalt to extend the runway and related to taxiway reconstruction and geometry reconfiguration (Taxiway D and Taxiway B). This will result in a net increase in asphalt surfaces and the related materials as noted previously in sections on Land Alterations.

The total amount of fill and excavation quantities are provided in **Table 6.5-1** for the new and reconstructed surfaces, at a planning level estimate, based on preliminary design >10%. Calculations of natural resources are approximate totals and based on the assumption that cut/fill materials (e.g., soils) will be comprised of existing onsite materials to the extent possible.

Table 6.5-1 Cut/Fill Volumes

Project	Cut (CY)	Fill (CY)	Waste (CY)	Borrow (CY)
Runway 15-33 Extension	88,400	33,700	54,700	0
Taxiway B	11,300	40,000	0	23,865
Taxiway D (2:1 Slope)	60,800	43,300	17,500	0

Material from the onsite excavation to the extent feasible, will be used to fill areas of the airport (to increase elevation from existing to proposed) to limit material borrowed from outside the construction limits. Excavated material in excess of fill requirements needed, may require disposal of the material offsite. Where feasible, the designer of the project during the design phase will balance cuts and fill to avoid the need for offsite disposal.

Energy Consumption

Electricity consumption is associated with airfield lighting as well as terminal building/hangars. New or reconstruction of infrastructure represents an improvement to the Airport's electrical system via the use of efficient materials reducing the expected energy requirement of the airport overall. The Airport's future

microgrid project will utilize both renewable energy generation and storage technology, reducing the Airport's requirements for energy from the Region's electrical grid.

As a result, the proposed Project will reduce reliance on traditional fuel sources, lower emissions by committing to best practices for efficient and decarbonized buildings and enhance overall regional grid efficiency and resilience when combined with the microgrid. During the construction phase, a temporary increase in energy consumption is anticipated. This temporary increase in fuel (e.g., construction vehicles and machinery) can be met by available local/regional fuel supplies.

Aviation Fuels

While aircraft activity at the Airport is forecasted to increase into the future, this is the result of national and regional/local trends. The proposed Projects do not per se increase aviation activity at the Airport. Accordingly, the use of aviation fuels at the Airport is not anticipated to increase as a result of the Projects. Assuming no future development of electric aircraft (manned and unmanned) overall, the use of aviation fuels, nationally, at CCGA is anticipated to decrease in future planning scenarios – based on zero carbon emissions from all sectors of the economy anticipated adoption of various types of electric aircraft. In July 2023, the FAA released an implementation plan detailing the steps it will need to take to safely enable advanced air mobility (AAM) operations[9] in the near term. The "Innovate28" plan[10] includes various components and the sequence they will occur in for operations to be at scale at one or more sites by 2028. The plan addresses how the FAA will certify aircraft and pilots, manage airspace access, ensure pilot training, develop infrastructure, maintain security, and engage communities.

FAA is supporting a Sustainable Aviation Fuels (SAFs) initiatives[11]. SAF is a biofuel used to power aircraft that has similar properties to conventional jet fuel but with a smaller carbon footprint. Depending on the feedstock and technologies used to produce it, SAF can reduce life cycle GHG emissions dramatically compared to conventional jet fuel. As appropriate, CCGA will seek providers of SAFs at the Airport in coordination with based aviation companies, fuel suppliers, and aircraft owners' organizations.

Water and Sewer

The proposed Project, mainly the terminal building enhancements, is anticipated to result in a slight increase in water and wastewater usage. Water usage by the airport in 2022 is 904 CCF (one hundred cubic feet)[12] or 676,192 gallons. All the municipal systems have an adequate supply of these resources.

6.5.3 Impact Summary

The proposed Projects are not anticipated to result in a significant impact to regional or local energy sources, including electricity, fuels, and use of water and wastewater resources. As confirmed by the information provided above, adequate regional and national energy/material supplies are available for the resources needed for the Projects. The increase in energy usage will be offset by the Airport's future microgrid through generation of renewable energy sources and storage – and anticipated to result in less dependence of grid supplied electricity and gases, as well as fuel for transportation including cars, regional buses, and aircraft.

Construction activities are anticipated to result in temporary energy and fuel needs that are met by the regional and local fuel supplies. The Proposed Action will have no significant effect on energy consumption, and the use of building materials or natural resources are anticipated to be adequately supplied for the actions proposed in this EA.

6.6 Noise and Compatible Land Use

For aviation noise analyses, through FAA Order 105014 CFR part 150, the Federal Aviation Administration (FAA) has determined that cumulative noise energy exposure of individuals to noise resulting from aviation activities must be established in terms of the Day Night Average Sound Level (DNL). The DNL accounts for the noise levels of all individual aircraft events and the time period that these events occur. The DNL logarithmically averages aircraft sound levels over a complete 24-hour period, with a 10-decibel adjustment added to all events occurring during nighttime hours (10:00 pm to 7:00 am). The adjustment accounts for increased sensitivity to noise during the quietest nighttime hours.

The FAA has approved the Aviation Environmental Design Tool (AEDT) modeling software for predicting DNL sound level impacts from airports. Noise compatibility or non-compatibility of land use is determined by

[9] Advanced Air Mobility (AAM) is an umbrella term for aircraft that are likely highly automated and electric. These aircraft are often referred to as air taxis or electric Vertical Takeoff and Landing (eVTOL) aircraft.

[10] https://www.faa.gov/sites/faa.gov/files/AAM-I28-Implementation-Plan.pdf, accessed Nov. 2023.

[11] https://www.faa.gov/sustainability

[12] 1 CCF = 748 gallons of water

comparing the aircraft DNL values surrounding an airport to the FAA's land use compatibility guidelines. These guidelines indicate that all land uses are compatible with a DNL below 65 dBA. Under FAA Order 1050.1F, paragraph 4-3.3, the Significance Threshold for Noise and Noise-Compatible Land Use is:

"The action would increase noise by DNL 1.5 dB or more for a noise sensitive area that is exposed to noise at or above the DNL 65 dB noise exposure level, or that will be exposed at or above the DNL 65 dB level due to a DNL 1.5 dB or greater increase, when compared to the No Action alternative for the same timeframe. For example, an increase from DNL 65.5 dB to 67 dB is considered a significant impact, as is an increase from DNL 63.5 dB to 65 dB."

6.6.1 No-Build Alternative

The AEDT model was utilized to assess future no-build conditions. This included utilizing the future operations data developed in the 2022 Master Plan based on existing runway length conditions. Utilizing the data shown in **Tables 6.6-1 and 6.6-2** below, annual DNL Contours were generated using the AEDT noise model. Total operations forecasted for 2040 for all aircraft categories were 73,002, an increase of 5,652 operations, or 8.3% over the 2019 data (67,350 total operations in 2019). Of these, 5,564 were Touch and Go, accounting for 7.6% of Aircraft operations, a decrease of 1.6% from 2019 data (6,203 operations touch and go operations total).

Based on the modeling, assuming the no-build alternative, the 70 and 75 dBA DNL contours are entirely within the Airport property. The 65 dBA contour slightly extends into commercial land use across Yarmouth Road. **Figure 6.6-1** shows that the 65 dBA DNL sound contour (green polygon) generally falls within the airport property, extending just beyond the property to the east near Yarmouth Road. These commercial facilities are all below a DNL of 70 dBA, which is the noise compatibility threshold of commercial land uses. Therefore, the land use surrounding the Airport under the future No-Build Alternative is noise compatible as all residences are exposed to noise levels below a DNL of 65 dBA and all commercial facilities are below a DNL of 70 dBA as described by the FAA's Order 1050.1F. Under this scenario, no changes in the number of flights, flight patterns, aircraft types, or other factors that may affect noise would occur. Noise levels would be similar to current noise levels.

Table 6.6-1 2040 Runway Utilization

Runway 15	Runway 33	Runway 6	Runway 24
24.4%	30.2%	14.8%	30.6%

Table 6.6-2 2040 Forecasted Operations Data

Aircraft	AEDT Code	Aircraft Type	Ann Ops	Daily op	Day Op	Night Op
Generic Single	C172	Piston	7,136	19.55	18.26	1.29
Piper Cherokee (PA28)	P28A	Piston	1,558	4.27	3.99	0.28
Cirrus SR22	SR22	Piston	1,381	3.78	3.53	0.25
Pilatus PC-12	PC12	Turboprop	11,146	30.54	28.52	2.02
Tecnam P2012 Traveller	P212	Piston	28,850	79.04	73.83	5.22
Cessna Chancellor	C414	Piston	691	1.89	1.77	0.12
Beechcraft King Air	B360	Turboprop	9,806	26.87	25.09	1.77
Cessna Citation Excel	C56X	Jet	1,380	3.78	3.53	0.25
Cessna Citation Sovereign	C680A	Jet	1,201	3.29	3.07	0.22
Hawker 800	H25B	Jet	347	0.95	0.89	0.06
Pilatus PC-24	PC24	Jet	660	1.81	1.69	0.12
Bombardier Challenger 300	CL30	Jet	1,233	3.38	3.16	0.22
Embraer Phenom 300	E55P	Jet	424	1.16	1.08	0.08
Airbus 220	A220	Jet	270	0.74	0.69	0.05
Gulfstream 4	GLF4	Jet	469	1.28	1.20	0.08
Gulfstream 5	GLF5	Jet	208	0.57	0.53	0.04
Bombardier Global Express	GLEX	Jet	170	0.47	0.44	0.03
Eurocopter EC 145	EC45	Helicopter	254	0.70	0.65	0.05
Sikorsky S-76	S76	Helicopter	254	0.70	0.65	0.05
	Total		67,438			
Touch and Go Operations			5,564			
Total Operations			73,002			

6.6.2 Proposed Action

The proposed Projects are not anticipated to generate an increase in different aircraft operational activity at the Airport as operations are forecasted to increase regardless of the implementation of these projects (see Table 1.4-3 Annual Operations Forecast by Type). Consequently, impacts to community noise levels are not expected. Based on the future runway conditions using the above referenced operations data, AEDT modeling indicates that the 70 and 75 dBA DNL contours are entirely within the Airport property. The 65 dBA contour slightly extends into the commercial land use across Yarmouth Road, similar to the no-build conditions. **Figure 6.6-2** shows that the 65 dBA DNL sound contour generally falls within the airport property, extending just beyond the property to the east near Yarmouth Road. These commercial facilities are all below a DNL of 70 dBA, which is the noise compatibility threshold of commercial land uses. Therefore, the land use surrounding the Airport under the future Proposed Action condition is noise compatible as all residences are exposed to noise levels below a DNL of 65 dBA and all commercial facilities are below a DNL of 70 dBA as described by the FAA's Order 1050.1F. Under this scenario, noise levels would be similar to current noise levels.

6.6.3 Construction Noise Impacts

There will be a temporary increase in aviation-related noise during the construction of Runway 15 extension within the take-off and landing approach paths of Runway 6-24. All aviation activity would shift to Runway 6-24. This is consistent with the recent past project of reconstructing Runway 6-24, where all activity was shifted to Runway 15-33.

Noise impacts anticipated would be minimal and temporary due to demolition and construction activities. While sound levels resulting from construction activities vary greatly depending on the type of equipment and various conditions, as a conservative measure, the Project will include a noise mitigation plan to minimize, to the extent practicable, the generation of sound levels that will impact off-site receptors. The noise mitigation plan will involve mitigation measures such as:

- Allowable construction timeframes will adhere to local requirements, which are anticipated to be work hours between 7:00 a.m. and 5:00 p.m., and major activities such as excavation or demolition will typically be limited to normal working hours;
- In accordance with Massachusetts Vehicle Idling Regulations, idling of construction equipment will comply with 310 CMR 7.11;
- Instituting a proactive program to ensure compliance with the applicable regulations or ordinances for noise limitation;
- Using appropriate mufflers on all equipment and ongoing maintenance of intake and exhaust mufflers;
- Muffling enclosures on continuously running equipment, such as air compressors and welding generators;
- Replacing specific construction operations and techniques by less noisy ones where feasible;
- Selecting the quietest of alternative items of equipment where feasible;
- Scheduling equipment operations to keep average noise levels low, to synchronize the noisiest operations with times of highest ambient levels, and to maintain relatively uniform noise levels;
- Locating noisy equipment at locations that protect sensitive locations by shielding or distance;
- Construction equipment will be required to be properly maintained, lubricated, and fitted with properly functioning muffler systems; and
- To the extent practicable, specific activities such as crushing and pulverizing, as well as equipment staging areas, will be located at appropriate distances from residential receptors.

Specific mitigation measures will be incorporated into the contract document based on the anticipated activities and impacts related to each of the Project construction phases. Project activities will adhere to MassDEP's Noise Pollution Policy at 310 CMR 7.10.

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

Figure 6.6-1
Aircraft Only Annual Day Night Level - No Build Alternative

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

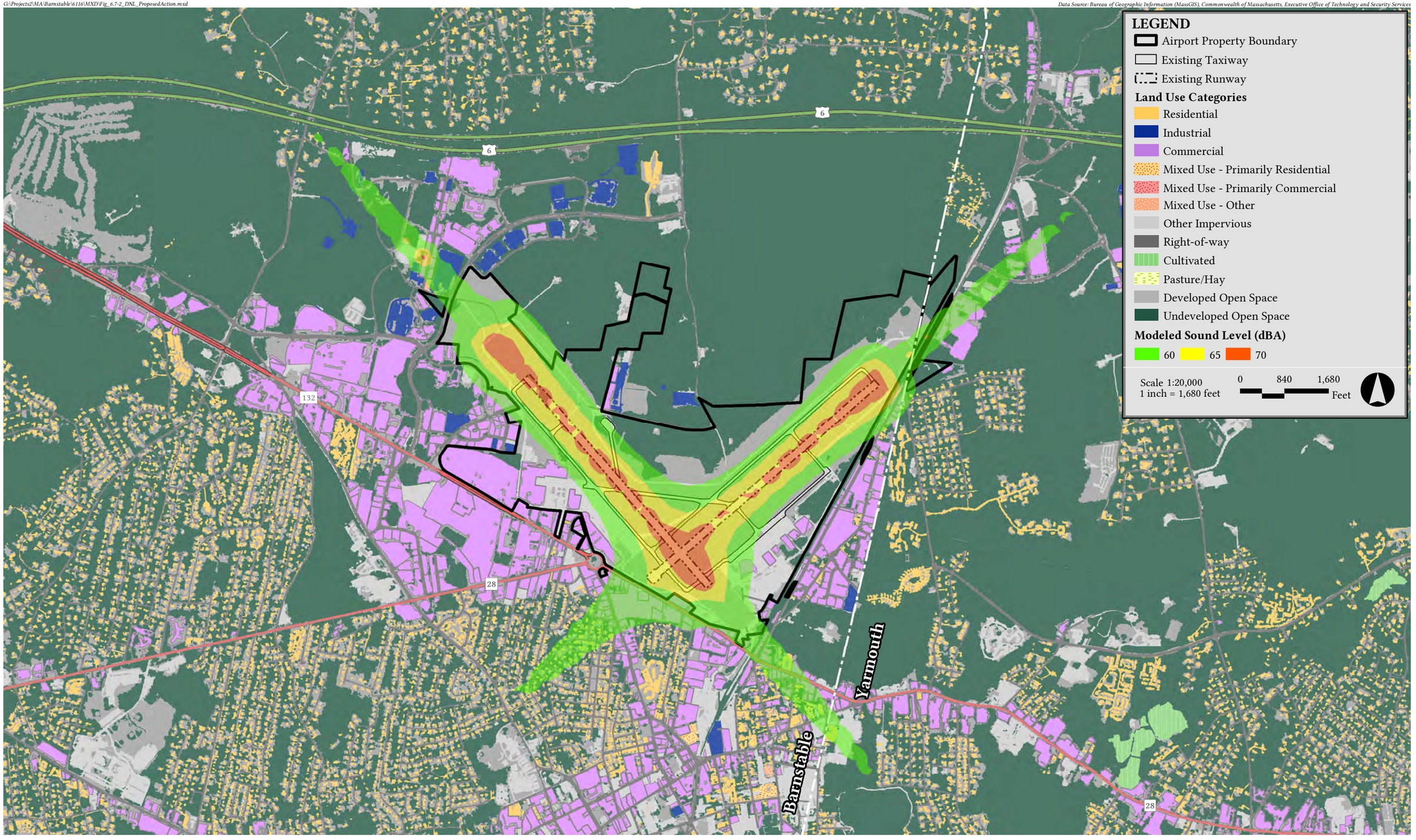


Figure 6.6-2
Aircraft Only Annual Day Night Level - Proposed Action

6.6.4 Indirect/Secondary Impacts

Indirect and/or secondary impacts from noise are not expected from the Proposed Action, such as those occurring later in time or farther removed in distance. The Project is not expected to result in an increase in noise, including impacts from changes to traffic patterns or growth induced noise. No indirect or secondary impacts are expected for noise compatible land uses.

6.6.5 Mitigation Measures

The proposed Projects do not exceed FAA noise thresholds, and no mitigation is necessary. While the proposed Projects are not anticipated to exceed FAA noise thresholds, the preferred alternative for Taxiway D/Taxiway E removal, includes a noise barrier along the runup pad for the relocated Taxiway D adjacent to the existing runup pit. The noise wall would help buffer noise from aircraft to areas surrounding the airport, particularly the north.

FAA prohibits restrictions from the Airport on flight paths, hours of operation and restricted access to airports. Federal law prohibits restricting the route by which an aircraft has access to the airport to aid in noise abatement. As discussed in Section 5.9, the airport has a long-standing voluntary noise abatement flight procedures for visual flight rules. These procedures are periodically re-evaluated and updated, as necessary.

Additionally, there are voluntary quiet hours between 10 p.m. and 6 a.m. when airport users are encouraged to restrict their flights. Touch and go nighttime flights are also prohibited. These noise abatement measures are guided by safety considerations as well as federal law. Ultimately, pilots must have control over their flight procedures to ensure safe takeoff and landings based on weather conditions and aircraft capabilities. The Airport coordinates with all users of the airport to mitigate noise issues and maintains multiple ways to report complaints when made including in person, over the phone and online reporting (see https://flyhya.com/pilot-info/noise-abatement/).

Please note that low flying is prohibited by Federal regulations except under certain conditions such as take-off or landing. See Title 14 Code of Federal Regulations, Section 91.119 Minimum Safe Altitudes.

With regards to consideration of noise mitigation for current and future operations, the Airport will consult with FAA and primary Airport air taxi operators such as Cape Air on flight path modifications that may serve to minimize noise impacts.

6.6.6 Impact Summary

The proposed Projects do not exceed FAA noise thresholds, and no mitigation is necessary. While the proposed Projects are not anticipated to exceed FAA noise thresholds, the preferred alternative for Taxiway D/Taxiway E removal, includes a noise wall along the runup pad for the relocated Taxiway D adjacent to the existing runup pit. The noise wall would help buffer noise from aircraft to areas surrounding the airport, particularly the north. Based on this information, there are no significant impacts on noise as a result of the Proposed Action.

6.7 Biological Resources (including fish, wildlife, and plants)

FAA Order 1050.1F (Paragraph 4-3.3; Exhibit 4-1; 7/16/15) includes “Factors to Consider” for Biological Resources, as follows:

- “The action would have the potential a long-term or permanent loss of unlisted [sic] plant or wildlife species, i.e., extirpation of the species from a large project area (e.g., a new commercial service airport);
- Adverse impacts to special status species (e.g., state species of concern, species proposed for listing, migratory birds, bald and golden eagles) or their habitats;
- Substantial loss, reduction, degradation, disturbance, or fragmentation of native species’ habitats or their populations; or
- Adverse impacts on a species’ reproductive success rate, natural mortality rates, non-natural mortality (e.g., road kills and hunting), or ability to sustain the minimum population levels required for population maintenance.”

There will be no significant impacts on biological resources associated with this project.

6.7.1 No-Build Alternative

The no build alternatives will not impact biological resources on the Airport.

6.7.2 Proposed Action

6.7.2.1 Threatened and Endangered Species

With regards to the federally listed species identified as possibly present at the Airport, northern long-eared bat (NLEB), tri-colored bat and the American chaffseed, review and consultation with USFWS through IPaC's Determination Key was completed. A "no effect" for these species was determined for all Projects Airport wide (see **Appendix I**).

As per the determination for these species, the Proponent will re-evaluate the Project in IPaC if the scope, timing, duration, or location of the Project changes (includes any project changes or amendments). If this circumstance arises, the proponent will engage the FAA to undertake additional Section 7 consultation with the US Fish and Wildlife Service if the FAA continues to have remaining discretionary federal action to take within the meaning of Section 7 of the Act and one of the following two circumstances arises: 1) new information reveals the Project may impact federally listed species or designated critical habitat, warranting further examination for jeopardy of listed species or adverse modification of designated critical habitat; or 2) a new species is listed, or critical habitat designated (see 50 CFR § 402.16) If there is no remaining discretionary federal action to be taken by the FAA, but new information regarding impacts to listed species arises or the scope, timing, duration, or location of the Project changes in a way that might change the previously understood impacts of the project, the proponent recognizes that it may have a duty under Section 10 of the ESA to obtain an incidental take permit from the USFWS.

With regards to the proposed listed monarch butterfly, the project area does not provide overwintering habitat. The project area does not contain suitable habitat as the areas are comprised of mowed grassland, actively managed scrub-shrub habitat or forested areas.

As sandplain gerardia is also a state-listed species and MA NHESP has not identified any mapped Priority Habitat present within the project area, it is reasonable to presume that there is not any suitable habitat for this species either. No work will occur within NHESP mapped habitat and there will be no impacts to state-listed species. Therefore, a no effect conclusion was also reached for this species.

6.7.2.2 Wildlife

The majority of the proposed Projects will take place in previously developed areas and/or actively used portions of the airfield. The majority of wildlife is incompatible with aviation activities due to the safety hazards it presents with aircraft. The Airport maintains a wildlife exclusion fence to prevent larger mammals from accessing the airfield and implements other measures to prevent wildlife from grazing, nesting, or feeding within the active operating areas.

With regards to potential habitat impacts associated with wetland resource areas, the altered areas associated with Taxiway D and work within Upper Gate Pond will be assessed as part of a Wildlife Habitat Evaluation completed as outlined in the Massachusetts Department of Environmental Protection's *Wildlife Habitat Protection Guidance for Inland Wetlands*[13] (the Guidance), Appendix B: Detailed Wildlife Habitat Evaluations. he important wildlife habitat features documented in the proposed impact areas will be incorporated into the wetland replication plan to further contribute to the protection of the wildlife habitat interest of the WPA by meeting the general conditions of 310 CMR 10.60(3)[14] and other applicable performance standards relative to restoration or replication of altered resource areas. As such, the Project will not have an adverse effect on important wildlife habitat features either locally or in the region.

6.7.3 Impact Summary

The Proposed Action is not anticipated to alter suitable habitats for the five federally listed species, pursuant to Section 7 of the Endangered Species Act. As such, the Project will not have an adverse effect on important wildlife habitat features either locally or in the region.

[13] Massachusetts Department of Environmental Protection. Wildlife Habitat Protection Guidance for Inland Wetlands (2006). http://umasscaps.org/pdf/wldhab.pdf.

[14] 310 CMR 10.60(3) contains general conditions for the restoration and replication of altered habitat to ensure that wildlife habitat replication areas, with features similar to the altered wildlife habitat, are incorporated into the Project to the extent such replication or restoration is deemed necessary to demonstrate that there is no substantial reduction in the resource area's capacity to provide important wildlife habitat functions.

6.8 Transportation

6.8.1 No-Build Alternative

Under the No-Build Alternative, the Airport would not implement the Projects. The number and types of vehicles accessing the Airport would be similar to existing trends and projections. The Airport access road would continue to have congestion and traffic delays in certain seasons and at certain times of the day.

6.8.2 Proposed Action

The forecasted increase in terminal passenger design capacity from the current level of approximately 100 passengers per peak hour to a future level of approximately 150 to 200 passengers per peak hour was developed with consideration of many market and operational factors (including, for example, airline and hub consolidation, low-cost airline growth, technology advances, fuel prices, and pilot supply). Such forecasted increases, if they occur, will happen gradually over time.

The following sections present traffic volume changes for three levels of peak passenger activity under the Preferred Alternative, including 0%, 50%, and 100% growth scenarios.

6.8.2.1 Project Trip Generation

As presented in the Master Plan, the estimated landside travel modes and associated average vehicle occupancy (AVO) for Airport passengers and visitors are shown in **Table 6.8-1**.

Table 6.8-1 Travel Mode Shares and AVOs

Characteristic	Personal Auto		Taxi/TNC	Rental Car
	Parking	Pick-up/Drop-off		
Mode Share	40%	25%	25%	10%
Average vehicle occupancy (AVO)	1.25		1.0 [1]	1.0

1. Number of passengers per vehicle, not including driver.

Based on the values in **Table 6.8-1** and recent (2022/2023) parking data from the Airport, the study team estimated the vehicle trips associated with the Baseline Condition and the Preferred Alternative as shown in **Table 6.8-2**.

Table 6.8-2 Daily and Peak Vehicle Trips under Baseline Condition and Preferred Alternative Condition with Various Terminal Activity Levels

Baseline/No Build Condition Terminal Activity Level of 100 Peak Hour Passengers		
	Vehicle Trips	Change from Baseline/ No-Build Condition
Daily	472	0
Peak Hour	81	0
Preferred Alternative with Terminal Activity Level of 150 Peak Hour Passengers		
	Vehicle Trips	Change from Baseline/ No-Build Condition
Daily	708	+236
Peak Hour	122	+41
Preferred Alternative with Terminal Activity Level of 200 Peak Hour passengers		
	Vehicle Trips	Change from Baseline/ No-Build Condition
Daily	944	+472
Peak Hour	122	+82

6.8.2.2 Trip Distribution

As described in the Master Plan, the Airport's market catchment area for commercial passengers is considered all of Cape Cod and towns that abut the Cape Cod Canal to the north. To estimate the geographic distribution of Airport vehicle trips, including the new trips related to the proposed terminal improvements, travel patterns were modeled based on the daily volumes along major roadways serving the Airport, as presented in Section 5.11.1.4. **Table 6.8-3** presents the AADT volumes and associated percentage distribution.

Table 6.8-3 Airport Vehicle Trip Distribution

Direction of Travel	AADT	Percent Distribution
To/from points northwest		
Combined: Iyannough Road, west of Phinneys Lane Attucks Lane, west of Phinneys Lane	33,156	36%
To/from points northeast		
Yarmouth Road/Willow Street, south of Crowell Road	24,001	26%
To/from points east/southeast		
Iyannough Road/Route 28, west of Main Street	13,569	15%
To/from points west/southwest		
Falmouth Road, south of Bearses Way	21,108	23%

6.8.2.3 Trip Assignment and Impact to Area Roadways

Based on the Project's trip generation shown in Section 6.8.2.1. and the trip distribution pattern shown in Section 6.8.2.2, the estimated new vehicle trips were calculated by major travel route. **Tables 6.8-4** and **6.8-5** present the resulting daily and peak hour vehicle trips for the 50% and 100% growth scenarios, respectively. As noted earlier, no change in volumes is expected under the 0% growth scenario.

Table 6.8-4 New Project Vehicle Trips under 50% Growth Scenario

Location	Baseline Roadway Volume		New Project Vehicle Trips		Percent Increase in Roadway Volume	
	Daily	Peak Hour	Daily	Peak Hour	Daily	Peak Hour
Combined: Iyannough Road west of Phinneys Lane Attucks Lane west of Phinneys Lane	33,156	2,654	86	16	0.26%	0.60%
Yarmouth Road/Willow Street, south of Crowell Road	24,001	2161	62	11	0.26%	0.51%
Iyannough Road/Route 28, west of Main Street	13,569	1086	35	7	0.26%	0.64%
Falmouth Road, south of Bearses Way	21,108	1689	55	10	0.26%	0.59%

Note: Due to rounding, the sum of new vehicle trips may not match Table 6.9-2 values.

Table 6.8-5 New Project Vehicle Trips under 100% Growth Scenario

Location	Baseline Roadway Volume		New Project Vehicle Trips		Percent Increase in Roadway Volume	
	Daily	Peak Hour	Daily	Peak Hour	Daily	Peak Hour
Combined: Iyannough Road west of Phinneys Lane Attucks Lane west of Phinneys Lane	33,156	2,654	171	31	0.51%	1.14%
Yarmouth Road/Willow Street, south of Crowell Road	24,001	2161	124	22	0.51%	1.30%
Iyannough Road/Route 28, west of Main Street	13,569	1086	70	13	0.51%	1.02%
Falmouth Road, south of Bearses Way	21,108	1689	109	19	0.51%	1.12%

Note: Due to rounding, the sum of new vehicle trips may not match Table 6.8-2 values.

As summarized in **Table 6.8-4**, with a 50% increase in peak hour passenger design capacity at the terminal, area roadways could experience an increase in traffic volume of between 35 and 86 vehicle trips per day and between 7 and 16 vehicle trips per peak hour. These increased trips represent less than a 1% increase in overall traffic volume along each major route to and from the Airport.

As summarized in **Table 6.8-5**, with a 100% increase in peak hour passenger design capacity at the terminal, area roadways could experience an increase in traffic volumes between 70 and 171 vehicle trips per day and between 13 and 31 vehicle trips per hour. These increased trips represent between a 0.51% and 1.30% increase in daily and peak hour volumes, respectively, along the major travel routes.

Under either scenario, such a small number of daily and peak hour increases in traffic volumes travelling to and from the Airport would be imperceptible to local traffic patterns and not have an impact on area roadway or intersection operations. It should also be emphasized that any increase in passenger enplanements, and therefore associated roadway activity, is dependent on a myriad of influencing factors such as airline and hub consolidation, low-cost airline growth, technology advances, fuel prices, and pilot supply. Forecasted increases in enplanements, if they occur, will happen gradually over time. The changes in traffic volumes presented in this chapter reflect a future condition that would evolve over the 20-year planning horizon and not occur as a direct result of the terminal improvements planned under the Preferred Alternative.

6.8.2.4 Parking

As presented in the Master Plan, the existing parking lot in front of the terminal, with 585 spaces. will have sufficient capacity to meet parking demand under the baseline and various forecasted growth scenarios.

6.8.2.5 Other Airport Vehicle Activity

The 645-acre Airport site, in addition to being a commercial transportation facility, also contains more than 40 local business tenants related to passenger airline services, general aviation services, maintenance and servicing of aircraft and aviation equipment, aviation fuel transfer, temporary aircraft parking and long-term aircraft storage, and light transportation warehousing. The majority of the 1,700 on-site employees work for Cape Air, Atlantic Aviation, Griffin Avionics, and the FAA.

The terminal improvements are not anticipated to affect activity associated with these other local business tenants. While the improvements may influence terminal-related services, such as security or food service, any increase in such travel activity is expected to be minor.

6.8.3 Construction Impacts

Prior to any construction projects detailed in this document, the Airport's selected engineer will produce a Construction Management Plan (CMP) for review and approval by the Town. The CMP will detail the schedule, staging, parking, delivery, and other associated impacts of the construction of the Project. Construction activities will be accommodated within the current Project Site boundaries. Details of the overall construction schedule, working hours, number of construction workers, worker transportation and parking, number of construction vehicles, and routes will be addressed in detail in the CMP to be filed with the Town.

Temporary construction-period air quality impacts are a potential source of negative health impacts for the local community. To avoid or minimize the effects of fugitive dust and exhaust emissions from construction vehicles, appropriate mitigation measures will be employed, such as the use of diesel retrofitted equipment and wetting down areas during construction. To avoid, mitigate, or minimize temporary construction-period noise pollution impacts, the Project will comply with the local ordinances. Efforts will be made to minimize the noise impact of construction activities, including appropriate mufflers on all equipment such as air compressors and welding equipment, maintenance of intake and exhaust mufflers, turning off idling equipment, replacing specific operations and techniques with less noisy ones, and other appropriate noise reduction measures.

6.8.4 Mitigation Measures

The Airport is committed to increasing the number of electric vehicle (EV) charging stations and providing electrical conduit for future EV stations. Additionally, in 2022, the Airport received a $1.95M grant through the US Department of Transportation's Strengthening Mobility and Revolutionizing Transportation (SMART) Grants Program, to plan, permit, and design a smart microgrid project. The microgrid will ultimately generate and distribute clean, reliable power to the airport and facilitate reliable charging of electric ground fleet vehicles (including buses) and in the future, aircraft.

The Airport does not have an existing Transportation Demand Management (TDM) program and the increase in trips from the terminal improvements, as detailed under different peak hour increase scenarios (see **Tables 6.8-4 and 6.8-5**), will be minimal. Some typical "low hanging" TDM commitments include the following:

- Orientation packets for employees, including information about alternative means of transportation such as rideshare services, tenant-employee carpool options and rideshare matching service with other nearby employers.

- Showers and lockers for employees;
- Lunchroom with a microwave and refrigerator for employees;
- Flexible work schedules for employees;
- Telecommuting accommodations for employees (where applicable);
- "Guaranteed Ride Home" program;
- Transit pass subsidies;
- Secure bicycle parking;
- Carpool and vanpool program; and
- Preferential parking for carpool/vanpool.

6.8.5 Impact Summary

Due to the small number of daily and peak hour increases in traffic volumes under different peak hour increase scenarios (**Tables 6.8-4 and 6.8-5**) traffic increase on area roadways or intersection operations would be minimal. Impacts from construction and operations associated with the preferred alternative would be considered short-term and minor.

It should also be emphasized that any increase in passenger enplanements, and therefore associated roadway activity, is dependent on a myriad of influencing factors such as airline and hub consolidation, low-cost airline growth, technology advances, fuel prices, and pilot supply. Forecasted increases in enplanements, if they occur, will happen gradually over time. The changes in traffic volumes presented in this chapter reflect a future condition that would evolve over the 20-year planning horizon and not occur as a direct result of the terminal improvements planned under the Preferred Alternative.

6.9 Socioeconomics and Children's Environmental Health and Safety Risks

6.9.1 No-Build Alternative

Under the No-Build Alternatives, the Airport would not alter infrastructure or the nature of operations within the Project areas. The existing and projected levels of passenger and aircraft operations at the Airport would not be affected. Therefore, no children's health and safety effects are anticipated from the No-Build Alternatives.

Conversely, the No-Build Alternatives could result in no change to socioeconomic impacts related to traffic. The No-Build Alternative would not support job creation within the community, including direct and induced jobs associated with the construction phase.

6.9.2 Proposed Action

6.9.2.1 Socioeconomics

Principal social impacts typically resulting from 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. The Preferred Alternatives would not result in the above-mentioned social impacts. The proposed Projects allow the Airport to continue to manage the Airport safely and efficiently, supporting its role as a gateway to and an economic driver for both the Town of Barnstable and Cape Cod as a region. The Project is expected to generate approximately 41 additional peak hour vehicle trips for an anticipated increase of 150 peak hour passengers, and approximately 82 additional peak hour vehicle trips for an anticipated increase of 200 peak hour passengers. According to the transportation analysis presented in Section 6.8.2, an addition of 150 peak hour passengers could result in an estimated traffic volume increase of between 7 and 16 vehicle trips per peak hour. These increased trips represent less than a one percent increase in overall traffic volume along each major roadway to and from the Airport. Under the 200 peak hour passengers' scenario, roadways could experience an increase in traffic volumes between 13 and 31 vehicle trips per hour. These increased trips represent between a 0.51 and 1.3 percent increase in peak hour volumes along the major travel routes.

The Project is not expected to result in a significant increase in vehicle and truck traffic. Impacts on surrounding roadways are anticipated to be minor under both future growth scenarios. The Airport's transportation improvement program that has been developed and will be advanced as a part of the Project.

6.9.2.2 Children's Environmental Health and Safety Risks

In accordance with Executive Order 13405, Protection of Children from Environmental Health Risks and Safety Risks, this section also serves to identify and assess the potential health and safety risks that could disproportionately affect children, specifically related to air quality.

The key vulnerability criteria that are likely to be associated with air quality impacts from traffic include heart attacks and asthma. Childhood asthma can be caused and exacerbated by a large number of environmental exposures, including many indoor sources and allergens. Although outdoor air pollution could be a contributing factor, the air quality analysis discussed in Section 6.3, shows that air quality near the Project Site is improving and current levels are well below health-based standards that are protective of health effects such as asthma, with a margin of safety for protecting vulnerable population groups (e.g., children).

6.9.3 Impact Summary

Overall, the Proposed Action is not expected to cause major shifts in employment, to cause significant changes in traffic patterns or volume, or to have adverse impacts on children's environmental health and safety, particularly nearby schools or camps listed in section 5.16.3. The FAA has not established a significance threshold for Socioeconomics or Children's Environmental Health and Safety Risks..

6.10 Historical, Architectural, Archaeological, and Cultural Resources

6.10.1 No-Build Alternative

The No-Build alternative would not meet the need for Airport infrastructure that complies with FAA planning and design standards and improves overall operational safety and efficiency at the Airport.

6.10.2 Proposed Action

An archaeological site avoidance and protection plan (ASAPP) has been prepared by the Project's Cultural Resource Consultant and submitted the MHC in September 2024. No comments were received. Available documentation and mapping for the two significant ancient Native American sites (19-BN-827 and 19-BN-828) have been reviewed and field visits made to the locations of sites 19-BN-827 and 19-BN-828 by a Senior Archaeologist, confirming that the sites are outside of proposed Project work areas. The ASAPP addresses Pre-Construction, Construction and Post-Construction Activities. Avoidance and protection measures include installation of high-visibility temporary fencing (i.e., orange construction fence) around and barring access to the two significant sites (sensitive cultural resource areas).

6.10.3 Construction Impacts

Based on the mitigation measures noted below, there will not be any construction related impacts to historic resources.

6.10.4 Mitigation Measures

Signs with *No Trespassing* will be posted along the fence to indicate that the sensitive cultural resource areas are off-limits. No access or impact will be allowed within the fenced areas. Construction personnel and contractors will be instructed to neither perform nor permit any construction, excavation, grading, tree stumping, filling, dumping, or the storage or staging of equipment vehicles, or supplies within the boundaries of the fenced area. Trained cultural resource personnel will assist in facilitating the installation of protection measures (i.e., placement of fencing) with monitoring and/or flagging of the limits of the sensitive cultural resource areas. Cultural resource personnel will make field visits to ensure that the avoidance and protective measures are carried out as specified, with photographic documentation prior to, during and after construction. A pre-construction meeting will be held with Project personnel and contractors and cultural resource personnel to review these measures.

Cultural resource personnel will conduct a post-construction inspection immediately after the construction phase of the Project to evaluate the condition of the sensitive areas and determine whether or not project-related impacts had taken place within the protected areas. The findings of the inspection will be reported to the MHC and the FAA via a memorandum.

6.10.5 Impact Summary

The FAA has not established a significance threshold for Historical, Architectural, Archeological, and Cultural Resources. The FAA has issued a finding of No Adverse Effect through the Section 106 process.

6.11 Land Use

6.11.1 No-Build Alternative

Under the No-Build Alternative, the existing Airport footprint would remain unchanged; therefore, no incompatible land uses would be introduced, and no surrounding land uses would be altered.

6.11.2 Proposed Action

As discussed in Sections 2.2.3 and 3.3, avigation easement acquisition would be pursued on a willing seller basis for those parcels within both the existing Runway Protection Zones (RPZ) for both runways and the future RPZ for the runway extension of Runway 15. As avigation easements are acquired, some land uses would shift as a result from residential to those more compatible with aviation. Some land uses within the RPZ are already compatible and would not change.

Additionally, four parcels contain buildings that are penetrations into the Runway Object Free Area (ROFA). Should these easements be obtained, or parcels obtained outright, these buildings (or portions thereof) would be removed from the ROFA.

Unless the Airport has control (either through easement or ownership) of parcels, there will be no other change in land uses outside of the current Airport property boundary.

Within the Airport property boundary, there will be some modification of undeveloped, vegetated areas converting to either impervious surface (runway, taxiway, etc.) or maintained turf areas. Please see **Table 3.5-1**.

6.11.3 Impact Summary

The FAA has not established a significance threshold for land use. There are no specific independent factors to consider for land use. The determination that significant land use impacts is dependent on the significance of other impacts.

The proposed Projects are located on existing Airport property and are consistent with existing aviation uses. The land use alterations summarized in **Table 3.5-1** are not anticipated to have impacts on land use and zoning surrounding the Airport. The proposed Projects are anticipated to have minimal changes in Airport operations, the land use and zoning areas are anticipated to remain compatible, and no adverse effects are anticipated. The Proposed Action will not result in community disruption, business relocations, or negative induced socioeconomic impacts. Based on this information, there are no significant impacts on land use as a result of the Proposed Action.

6.12 Hazardous Materials, Solid Waste, and Pollution Prevention

As discussed in Chapter 5.0, a total of 64 Sites with documented releases of OHM to soil and/or groundwater were identified on or adjacent to the Airport property. The locations of the Sites were compared to proposed improvements for the Airport.

Each project area will be evaluated independently, and as required, work will be performed in accordance with either the Preliminary or Comprehensive Response Actions of the MCP (310 CMR 40.0000).

A summary of Sites in relation to proposed or potential Airport improvements are discussed below. The proposed work areas and Sites are on **Figure 6.12-1**.

6.12.1 No-Build Alternative

The No-Build Alternatives would not result in any new construction; therefore, there would be no new solid waste generation, disturbance of soil/groundwater or need for disposal of hazardous materials. Active Massachusetts Contingency Plan (MCP) disposal sites would continue to be assessed and remediated to achieve regulatory closure under the No-Build Alternatives.

6.12.2 Taxiway D

The current Taxiway D is located on the northwest side of the airport adjacent to runway 15-33 (Fig. 4). The goal of the project is to reconfigure the taxiway as a partial-length, parallel, taxiway with a 400-foot standard separation from Taxiway B to Taxiway A1. Approximately 60,000 cubic yards of soil will be excavated for this work. The project will also include the following excavation areas:

- Constructing a run-up area along the north side of the new partial parallel Taxiway D.
- Removing Taxiway D between Taxiway A and the new partial parallel Taxiway D.
- Removing Taxiway D between Taxiway B and Runway 6-24.
- Installation of new stormwater utilities and structures.

Based on the review of existing conditions presented in Chapter 5.0, one release of OHM tracked under RTN 4-28577 was identified in the proposed Taxiway D improvement area. RTN 4-28577 is associated with the presence of PAHs and lead in soil and sediments above the MassDEP Sediment Screening Criteria at Upper Gate and Lewis Ponds. A summary of existing conditions is presented in Chapter 5.0.

Since the proposed work is being performed within a portion of this open Site, soil, sediment, groundwater, and surface water will be managed in accordance with requirements of the MCP. The work will be performed as Release Abatement Measure (RAM) plan per the Permanent Solution Statement (PSS).

At this time, it is anticipated that excess soil or sediment will either be reused on-site during construction, stockpiled in accordance with the MCP for future reuse, or transported offsite for reuse, recycling, or disposal. Groundwater and surface water will either be treated and discharged to surface water in accordance with requirements of the NPDES DRGP, recharged in accordance with local, state, and federal regulations, or collected and transported offsite for disposal.

6.12.3 Taxiway B Relocation

The existing Taxiway B is located on the southeast side of the airport adjacent to runway 6-24 (Fig. 4). The goal of the proposed improvements to Taxiway B is to remove the existing taxiway and move/extend it to a standard, 400-foot, separation south of Runway 6-24. Approximately 11,000 cubic yards of soil will be excavated for this work. This project will also include:

- Constructing two midfield taxiways to Runway 6-24.
- Constructing a northern taxiway spanning Runway 6-24 to Taxiway C.
- Installation of new stormwater utilities and structures.

Contaminants of concern (COCs) that may be encountered during construction of the proposed improvements for Taxiway B include PFAS and residual petroleum compounds in soil, and PFAS and 1,4-dioxane in groundwater.

Since the proposed work is being performed in portions of an open MassDEP Disposal Site (e.g., RTN 4-26347) and there is potential for encountering residual contamination from closed releases, soil and groundwater will be managed in accordance with requirements of the MCP and consistent with the state disposal requirements for these contaminants. Pending the project sequencing, the work will be performed under the Preliminary Response Action or Comprehensive Response Action provisions of the MCP, as applicable.

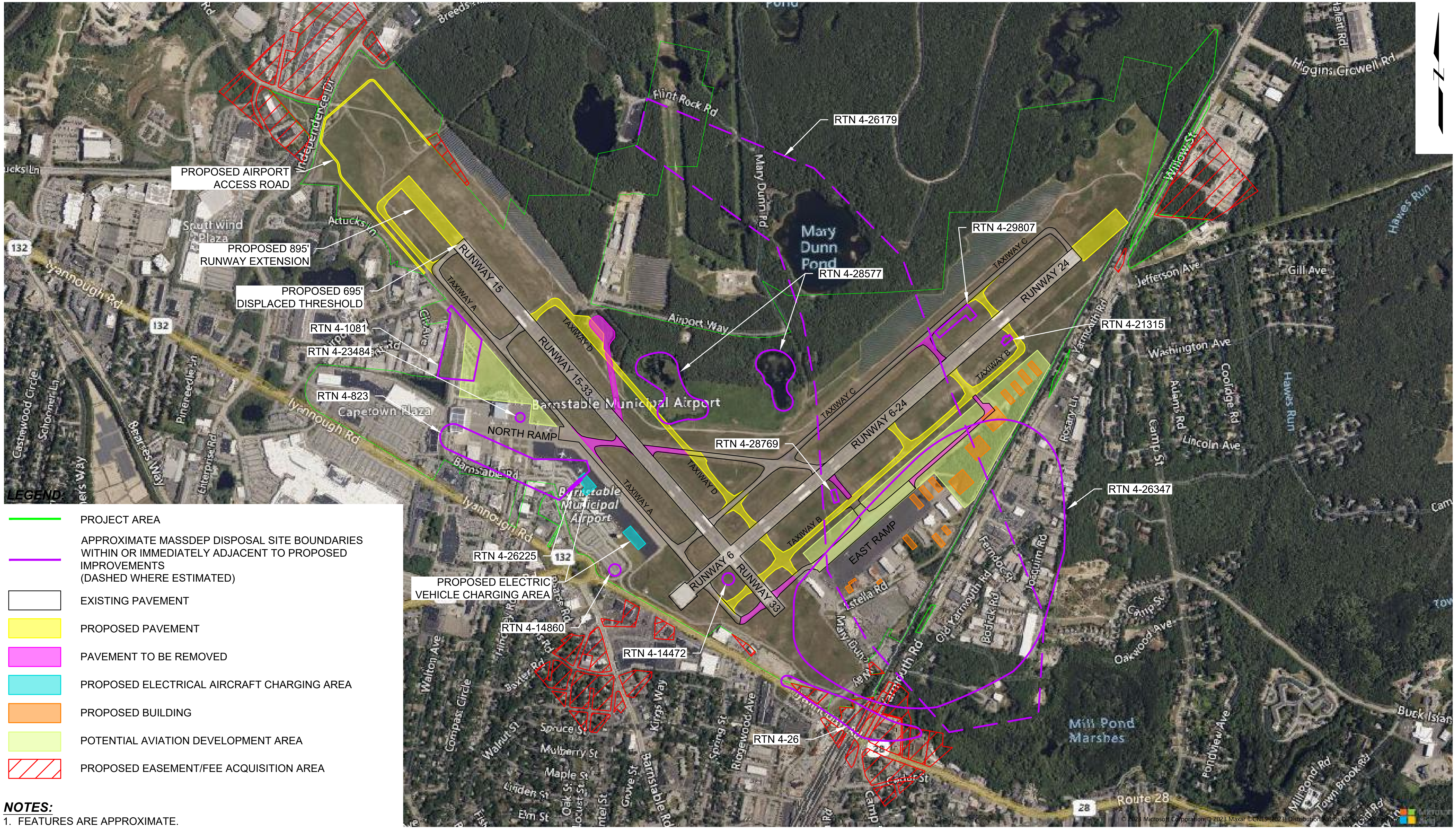
MCP submittals to MassDEP for review and approval will include the following:

- Plans, as necessary, to sample and analyze asphalt and soil beneath Taxiway B during airport upgrades for the presence of PFAS.
- Descriptions of how the PFAS-containing asphalt and soil, if identified, will be managed, and whether the findings impact the remediation options being performed under RTN 4-26347.
- During this effort, the Airport will maintain the existing monitoring wells to the extent feasible. Wells that cannot be maintained due to their location with respect to improvement effort will be decommissioned in accordance with MassDEP requirements and replaced, if necessary.
- At this time, it is anticipated that soil will either be reused on-site during construction, stockpiled in accordance with the MCP for future reuse, or transported offsite for reuse, recycling, or disposal. While it is not expected that significant groundwater management will be encountered as part of this project, if groundwater is encountered it will either be recharged in accordance with local, state, and federal regulations, treated and discharged to surface water in accordance with requirements of the National Pollution Discharge Elimination System Dewatering and Remedial General Permit (NPDES DRGP), or collected and transported offsite for disposal.

6.12.4 Runway 15 and Taxiway A Extension

The current Runway 15 is located on the northwest end of the airport (**Figure 1.1-1**). The goal of the project is to extend the runway approximately 895 feet, which includes an approximately 695-foot displaced threshold. Approximately 60,000 cubic yards of soil will be excavated for this work. The project will also include installation of new stormwater utilities and structures.

Based on the review of existing conditions presented in Chapter 5.0, no releases of OHM were identified in or adjacent of proposed improvements to Runway 15. However, due to atmospheric deposition, background concentrations of PFAS may be present in surficial soils. Since there is potential for encountering background levels of PFAS in shallow soil, soil will be managed in accordance with requirements of the MCP. Pending the project sequencing, the work will be performed under the Preliminary Response Action or Comprehensive Response Action provisions of the MCP, as applicable.



LEGEND:

- PROJECT AREA
- APPROXIMATE MASSDEP DISPOSAL SITE BOUNDARIES WITHIN OR IMMEDIATELY ADJACENT TO PROPOSED IMPROVEMENTS (DASHED WHERE ESTIMATED)
- EXISTING PAVEMENT
- PROPOSED PAVEMENT
- PAVEMENT TO BE REMOVED
- PROPOSED ELECTRICAL AIRCRAFT CHARGING AREA
- PROPOSED BUILDING
- POTENTIAL AVIATION DEVELOPMENT AREA
- PROPOSED EASEMENT/FEE ACQUISITION AREA

NOTES:

1. FEATURES ARE APPROXIMATE.
2. RTN = RELEASE TRACKING NUMBER.

SOURCE:

1. PROJECT AREA DIGITIZED FROM ENVIRONMENTAL NOTIFICATION FORM, CAPE COD GATEWAY AIRPORT, EPSILON ASSOCIATES, INC., NOVEMBER 30, 2022.

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SCALE, FEET

Draft Environmental Impact Report
Cape Cod Gateway Airport
Hyannis, Massachusetts

Epsilon Associates, Inc.
Manyard, Massachusetts

GEI Consultants

Project 2203788

APPROXIMATE DISPOSAL SITE BOUNDARIES AT PROPOSED CONSTRUCTION AREAS

October 2023 **Figure 6.12-1**

RAGNELLI, CHRIS B:\Working\EPSILON ASSOCIATES\2203788 CC Gateway Master Plan\00_CAD\Figures\EIR\2203788-EIR-Figs_Rev Oct 2023.dwg - 10/9/2023

At this time, it is anticipated that soil will either be reused on-site during construction, stockpiled in accordance with the MCP for future reuse, or transported offsite for reuse, recycling, or disposal. While it is not expected that groundwater will be encountered as part of this project, if groundwater is encountered it will either be recharged in accordance with local, state, and federal regulations, treated and discharged to surface water in accordance with requirements of the NPDES DRGP, or collected and transported offsite for disposal.

6.12.5 North Ramp Aviation Development Area

The existing North Ramp is located on the western side of the airport adjacent to Taxiway A and Runway 15-33 (**Figure 1.1-2**.). The goal of the potential work at the North Ramp Aviation Development Area is general aviation improvements for apron and/or hanger development. The proposed construction encompasses approximately 8.7 acres.

Since there is a potential for encountering residual contamination from closed releases (e.g., RTN 4-1081), soil and groundwater will be managed in accordance with requirements of the MCP. Pending the project sequencing, the work will be performed under the Preliminary Response Action or Comprehensive Response Action provisions of the MCP, as applicable.

As discussed in Section 5.17.3, the 1991 drill location, located near the north end of Taxiway A, had documented use of AFFF. When development begins for Taxiway A, MCP submittals will include a plan to sample and test disturbed soil in areas not previously sampled for PFAS. Further, this submittal will describe how PFAS-containing soils will be managed, if identified.

At this time, it is anticipated that soil will either be reused on-site during construction, stockpiled in accordance with the MCP for future reuse, or transported offsite for reuse, recycling, or disposal. While it is not expected that significant groundwater management will be encountered as part of this project, if groundwater is encountered it will either be recharged in accordance with local, state, and federal regulations, treated and discharged to surface water in accordance with requirements of the NPDES DRGP, or collected and transported offsite for disposal.

6.12.6 East Ramp General Aviation Development

The existing East Ramp is located on the southeast side of the airport, adjacent to Taxiway B and Runway 6-24 (**Figure 1.1-2**). The proposed available space for new aviation development encompasses approximately 31.3 acres within the East Ramp, inclusive of space made available via the re-alignment of Taxiway B.

Based on the review of existing conditions presented in Section 5.17, one release of OHM tracked under RTN 4-26347 was identified in the potential East Ramp Aviation Development Area for Taxiway B. As discussed above, this RTN is associated with historical releases of PFAS and 1,4-dioxane to soil and groundwater. Response actions to address these releases are ongoing.

An additional release tracked under RTN 4-26179 is also estimated to be within the potential East Ramp Aviation Development Area. As previously discussed, this RTN is associated with historic releases of PFAS from the Barnstable County Fire Training Academy, resulting in impacted groundwater 32 feet to 70 feet below ground surface. Due to the depth of groundwater impacts, it is unlikely that the proposed work will encounter groundwater conditions at these depths. Therefore, releases of PFAS from the Barnstable Fire Training were not included as a site of concern for this area. A summary of existing conditions is presented in Section 5.17.

Since the proposed work is being performed in portions of an open MassDEP Disposal Site (e.g., RTN 4-26347) and there is potential for encountering residual contamination from closed releases, soil and groundwater will be managed in accordance with requirements of the MCP. Pending the project sequencing, the work will be performed under the Preliminary Response Action or Comprehensive Response Action provisions of the MCP, as applicable.

This area coincides with the asphalt caps located at the ARFF area and the Deployment area. As discussed in Section 5.17.3, these caps were installed to mitigate the leaching of PFAS from the soil to the groundwater. MCP submittals will describe how the caps' integrity will be maintained during and after construction. Any asphalt removed from the taxiway, including the capped area, will be sampled, and analyzed for PFAS and managed appropriately if PFAS is detected.

During this effort, the Airport will maintain the existing monitoring wells to the extent feasible. Wells that cannot be maintained due to their location with respect to improvement effort will be decommissioned in accordance with MassDEP requirements and replaced, if necessary.

At this time, it is anticipated that soil will either be reused on-site during construction, stockpiled in accordance with the MCP for future reuse, or transported offsite for reuse, recycling, or disposal. While it is not expected that significant groundwater management will be encountered as part of this project, if groundwater is encountered it will either be recharged in accordance with local, state, and federal regulations, treated and discharged to surface water in accordance with requirements of the NPDES DRGP, or collected and transported offsite for disposal.

6.12.7 Proposed Electrical Aircraft Charging Area

The goal of this work is to install EV charging spaces and electric aircraft charging stations.

Since there is a potential for encountering residual contamination from closed releases (e.g., RTN 4-26225), soil and groundwater will be managed in accordance with the requirements of the MCP. Pending the project sequencing, the work will be performed under the Preliminary Response Action or Comprehensive Response Action provisions of the MCP, as applicable.

At this time, it is anticipated that soil will either be reused on-site during construction, stockpiled in accordance with the MCP for future reuse, or transported offsite for reuse, recycling, or disposal. While it is not expected that significant groundwater management will be encountered as part of this project, if groundwater is encountered it will either be recharged in accordance with local, state, and federal regulations, treated and discharged to surface water in accordance with requirements of the NPDES DRGP, or collected and transported offsite for disposal.

6.12.8 Solid Waste

The selected contractor will apply relevant and practicable procedures to allow for the reuse and recycling of construction materials. Prior to construction, the contractor will develop a Construction Waste Management Plan to ensure that a minimal amount of waste debris is disposed in landfills. For materials that cannot be recycled, solid waste will be transported in covered trucks to an approved solid waste facility per the DEP Regulation for Solid Waste Facilities, 310 CMR 16.00.

6.12.9 Pollution Prevention

It is estimated that up to approximately 200,000 cubic yards of soil may be generated over the course of the various projects being executed. As discussed above several Sites with documented releases of OHM are located within or adjacent to areas of proposed Airport improvements. Based on the location of these Sites, it is anticipated that potentially contaminated soil or groundwater may be encountered during the implementation of the various projects.

Excavation and management of soil contaminated with, or potentially contaminated with, OHM will be conducted in general accordance with Response Action Performance Standards (RAPS) as defined in the MCP (310 CMR 40.0191). RAPS considers testing requirements, disposal options, and construction-period mitigation measures to minimize impacts to public health and the environment associated with the excavation and handling of contaminated soil, at a minimum.

Due the presence of at least background concentrations of PFAS in soil and the limited options for offsite disposal of PFAS-impacted soil of any concentration currently available, the airport will attempt to reuse soil during construction to the extend feasible. If reuse of soil is not possible for a specific project, the excess soil will be stockpiled and managed in accordance with the MCP for future reuse at the airport. If the excess material is not suitable or, ultimately will not be reused at the airport, the excess soil will be transported offsite for reuse, recycling, or disposal, as applicable, and in accordance with local, state, and federal regulations.

If soil is reused during construction, it is anticipated that the soil will be reused in the general proximity of the location of the original excavation. If excess soil is retained for future reuse, it will be placed in an area designated by the Airport for materials management. Soils placed in the Airport materials management area(s) will be covered with polyethylene sheeting to minimize potential fugitive dust or otherwise stabilized. Secondary containment such as berms or siltation fence will be installed, as necessary, to prevent sediment in runoff from leaving the material management area.

6.12.10 Impact Summary

The FAA has not established a significance threshold for Hazardous Materials, Solid Waste, and Pollution Prevention. Based on the information provided in Section 6.13, the Proposed Action does not exceed the considerations, per the FAA Order 1050.1F, as the Project does not have the potential to: Violate applicable Federal, state, tribal, or local laws or regulations regarding hazardous materials and/or solid waste management; Produce an appreciably different quantity or type of hazardous waste; Generate an appreciably different quantity or type of solid waste or use a different method of collection or disposal and/or would exceed local capacity; or adversely affect human health and the environment. While portions of the proposed projects do involve a contaminated site, as described above, appropriate mitigating measures have been and will be implemented during construction to avoid impacts as per Paragraph 6-2.3.a of FAA Order 1050.1F.

6.13 Light Emissions and Visual Effects (including Open Space, Scenic Values)

6.13.1 No-Build Alternative

The No-Build Alternatives would not result in any new construction; therefore, there would be no changes in light emissions or visual effects.

6.13.2 Proposed Action

Taxiway D construction and East Ramp construction will have mature tree removal. However, this tree removal is not anticipated to change the view for passing motorists or pedestrians as it is interior to the Airport property and there are not any public streets within the vicinity. The closest roadway to Taxiway D is Airport Road to the north within a heavily vegetated area. The East Ramp abuts Mary Dunn Way, an internal roadway. Between this roadway and the nearest public road are a corridor of trees as well as the railroad tracks. This visual screening will remain.

There would be additional lighting for any new hangars at the East Ramp and extended Runway 15 and Taxiway A. Lighting (primarily lighted signs and taxiway lights) would be relocated for Taxiway B and D. PAPI lights would be located on the north side of Runway 15 by the new extension, a significant distance from any roadway. Any new lighting would mostly be toward the interior of airport property; would be consistent in character with existing lighting; and are not likely to noticeably alter views from off airport property.

No other Projects are expected to affect local scenic or aesthetic qualities during the construction period.

6.13.3 Construction Impacts

Any visual impacts from the presence of construction vehicles and equipment would be temporary. Only discrete portions of the airport closest to the various Project areas are visible from the roadway.

6.13.4 Impact Summary

The Proposed Action does not exceed the considerations as per the FAA Order 1050.1F, and does not have the potential to: Create annoyance or interfere with normal activities from light emissions; Affect the visual character of the area due to the light emissions; Affect the nature of the visual character of the area; or Block or obstruct the views of visual resources, including whether these resources would still be viewable from other locations

6.14 Cumulative Impacts

The proposed project is not expected to result in any negative or long-term significant indirect or cumulative impacts.

Indirect Effects

Under NEPA, "indirect effects" are those "caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable." Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems 40 CFR Part 1501(40 CFR 1508.8).

The proposed projects are not expected to cause any significant indirect impacts in any of the impact categories considered in this EA. All impacts are expected to occur only at the specific locations where construction will occur. The potential for indirect impacts occurring later on or distant from the site due to on-going operations will be minimized by mitigation measures, such as wetland restoration/replication, stormwater management, carbon emission mitigation, and use of sustainable energy sources. The project will not create any significant secondary air quality impacts as it is not expected to significantly affect the amount of air traffic.

Cumulative Effects

Cumulative effects are defined as "effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time."[15] Therefore, this evaluation considered those effects that are "reasonably foreseeable" and within the geographic area of concern for this analysis, which is generally the Airport and its immediate vicinity, i.e., the land adjacent to the Airport.

Table 6.14-1 below presents the Airport projects overtime since the first NEPA filing. This section considers recent Airport projects, those included in the Airport's 2022 Master Plan Update, and other past, present, and reasonably foreseeable future projects located within the project vicinity. Past projects include reasonably foreseeable projects include miscellaneous projects anticipated to occur on and around the Airport property within the next five years.

[15] CEQ regulations at 40 CFR § 1508.1(g) (revised April 20, 2022)

Potential future development, from a cumulative standpoint, is consistent with The Town of Barnstable's Comprehensive Plan (2010) to promote positive economic change and to support the prioritization of building and maintaining appropriate infrastructure. The plan is also intended to promote sustainable development and encourage the growth of new economic sectors. The proposed Projects will have a cumulative effect of supporting these economic development goals identified in the Plan by maintaining the facilities at the Airport, responding to the Airport's current and future aviation needs, and positioning the Airport to meet future aviation industry shifts (integration of electric aircraft).

6.14.1 Past Projects

The Airport has, since its inception in 1928 as a single grass runway, continuously improved and maintained its assets in an economically responsible manner consistent with its purpose and in collaboration as a part of the Massachusetts Airport System. Today, the airport consists of a 35,000 sq. ft. passenger terminal, 85 ft. air traffic control tower, extensive parking facilities, aircraft ramps, taxiways, an airport rescue firefighting team, maintenance building and an aircraft fuel farm. More than 40 private tenants lease hangar space on parts of the airport property.

Table 6.14-1 Past Projects

EEA No.	Year	Projects
14642	2012	Master Plan Improvements: up to 210,000 sf of additional corporate and general aviation hangars on the East and North Ramp; and leasing of the former Mildred's Restaurant site
12267	2010	New terminal building, air traffic control tower (ATCT), access roads, apron areas, parking areas, and various airfield improvements.
10078	1994	Rescue fire and snow removal building
9206	1992	Airport 5-Year Capital Plan improvements
8017	1982	Rehabilitate and strengthen Runway 6-24
4480	1982	Runway 15-33 Extension
4247	1981	Land Acquisition of multiple sites adjacent to the airport
2522	1977	Pave Auto Parking
2315	1976	Construct Six T-Hangars

6.14.2 Current Projects (2023 through 2029)

Runway 06-24/EMAS Reconstruction: The airport is currently undertaking a $25 million project to reconstruct Runway 06-24 and replace the Engineered Materials Arresting System (EMAS). The project improves safety and usability at the airport facility for both passengers and airport personnel. The reconstructed Runway 06-24 is expected to extend the design life of the pavement for 20-30 years and improve safety and operational flows.

Reconstruction includes in-pavement and edge lighting, regarding turf safety areas, and miscellaneous related airfield improvements to navigational aids and power sources. The EMAS, located at the approach end of Runway 06-24, is comprised of high-energy absorbing materials which reliably and predictably deform under the weight of an aircraft. The construction is scheduled to be completed in late 2023. This project is considered a maintenance project, conducted within the footprint of the previous surfaces, and therefore is not subject to NEPA/MEPA review.

Micro/Smart Grid: The airport is planning a Micro/Smart Grid, via a $1.95 million SMART grant received by MassDOT Aeronautics Division, to provide robust infrastructure for the electrification of ground vehicles and aircraft. Power from the smart grid will facilitate the charging of electric ground vehicles, including buses, and in the future, electric aircraft. In collaboration with the airport and the Cape Cod Regional Transit Authority, the initiative aims to increase clean energy independence while helping to support the disadvantaged community living near the airport in Hyannis. Construction is anticipated to occur in 2025-2026.

6.14.3 Future Projects (2030-2040)

Terminal Building Improvements: The Proposed Action will renovate the terminal building and expand it by up to 5,000 sf to current Airport needs and standards, including Transportation Security Administration (TSA) requirements (TSA's Recommended Security Guidelines for Airport Planning, Design, and Construction). The current terminal building capacity is insufficient to meet current needs and future demand. The current terminal building has existing deficiencies which include check-in space; inbound/outbound baggage screening; passenger holdroom; and terminal support space. To meet the potential future needs of 200 peak hour passengers, an expansion of up to 20,000 sf for a total terminal space of 55,000 sf is required. Future

terminal building improvements, based on demand, of up to 25,000 sf to meet anticipated Airport needs and standards, including Transportation Security Administration (TSA) requirements[16].

Furthermore, the Airport has committed to meet the provisions of the 2023 Stretch Code update, even though Barnstable is not a Stretch Code community. The 2023 Stretch Code includes energy efficiency strategies that provide a pathway to meet 2050 decarbonization goals. These commitments include, for any new buildings, expansions, or additions:

- High performing envelopes that comply with the 2023 Stretch code envelope performance requirements;
- 100% heat pump space heating;
- Energy recovery ventilation per the 2023 Stretch code update;
- PV-ready roofs.

Runway 6-24 Runway Safety Area EMAS: The Runway 24 end currently has a non-standard Runway Safety Area (RSA) that does not fully meet the FAA standard sizing of 800 feet by 1,000 feet per FAA AC 150/5300-13B. Per FAA Order 5200.8, *Runway Safety Area Program*, construction of a 200-foot by 400-foot engineered material arresting system (EMAS) on the approach end of Runway 24 is proposed to correct the non-standard RSA and enhance safety for aircraft landing on Runway 6. An EMAS is built at the end of a runway to reduce the severity of the consequences of a runway overrun and is equivalent to a full-dimension RSA.

Self-fueling Fuel Tanks: The Airport currently offers both Jet-A and 100LL Avgas fuel. All fuel is provided via full-service fuel trucks. The existing fuel farm has space for an additional 20,000-gallon Jet-A fuel tank to be constructed as demand arises. The Airport will add a self-fueling option for 100LL Avgas. A card reader would be installed to provide a 100LL self-fueling option. Should these additional tanks be installed, a supplemental air emissions analysis will be completed prior to installation to assess air quality impacts.

Non-Aeronautical Development Areas: The Master Plan designates existing Airport-owned land for non-aeronautical development. Airport currently has nine land leases on Airport property that are used for non-aviation purposes. These land leases generate additional revenue for the Airport outside of those leases inside the terminal or leases used for aeronautical purposes. There are additional vacant lease spaces that may be developed at some point in the future should demand arise. Any buildings or structures would be required to meet the same commitments to the 2023 Stretch Code as listed above under Terminal Improvements. Should any MEPA thresholds be exceeded for the planned development of these areas, MEPA review will be initiated at that time.

[16] 49 CFR Part 1544 – Aircraft Operator Security: Air Carriers and Commercial Operators

Chapter 7.0

Mitigation Measures

7.0 MITIGATION MEASURES

This Chapter provides a summary of proposed mitigation for the Project. In addition, it describes measures to which the Proponent has committed to mitigate potential impacts on wetlands, air quality and greenhouse gas emissions, noise, and stormwater quality or quantity, as well as construction period mitigation measures.

Table 7.1-1 Summary of Mitigation Measures

Mitigation Measures	Schedule	Cost
Water Resources		
♦ Construction of an approximately 3,000 sf BVW replication area for mitigation compliance for MassDEP. ♦ Utilization of revised rainfall intensities by NOAA Atlas 14, Point Precipitation Frequency Estimates including for future climate conditions.	During and post construction.	Included in the overall Project cost
Biological Resources		
♦ Wildlife habitat features to be incorporated into wetland replication area.	Design	Included in the overall Project cost
Climate		
♦ Roof to be constructed PV-ready. ♦ Installation of electric vehicle (EV) charging spaces, quantity to be determined. ♦ EV infrastructure for additional future EV-parking spaces to be installed, quantity to be determined. ♦ Tree planting program on Airport and off-Airport in EJ Communities	Design and post construction	Included in the overall Project cost
Natural Resources		
♦ Recycling of asphalt for new taxiway and runway surfaces. ♦ Stockpiling of excess aggregate from grading and excavation activities for use as fill material.	Ongoing, During and post-construction	Included in the overall Project cost
Noise		
♦ Installation of noise barrier along the runup pad for the relocated Taxiway D adjacent to the existing runup pit.	Post construction	Included in the overall Project cost
♦ Consultation with FAA and primary Airport air taxi operators such as Cape Air on flight path and approach angle modifications for take-offs and landings that may serve to minimize noise impacts.	Ongoing	Additional cost by Airport

Table 7.1-2 Summary of Construction Period Mitigation Commitments

Mitigation Measures	Schedule	Cost
Biological Resources		
♦ Necessary tree removal of 8.65 acres will be accomplished during time periods appropriate for minimizing impacts to any potential bat populations outside of the summer roosting period (April through September), and optimally during the winter months (October 1 through March 31 when possible). ♦ Wildlife habitat features to be incorporated into wetland replication area.	Ongoing, During and post-construction	Included in the overall Project cost
Hazardous Materials		
♦ Existing PFAS disposal site caps will not be altered or impacted.	Ongoing, During and post-construction	Included in the overall Project cost
Historical, Archeological, and Cultural Resources		
Protection of archeological sites during construction will include: ♦ Construction personnel briefing. ♦ High visibility fencing with No Trespassing signs around the sensitive cultural resource areas to be protected. ♦ Pre-and post-construction inspections.	Before and during construction	Included in the overall Project cost
Traffic and Transportation		
♦ Prior to the start of construction, the general contractor will submit a Construction Period Traffic Management Plan to the Town. The plan will identify designated construction truck routes and any temporary roadway improvements necessary to accommodate truck traffic, while maintaining safe and efficient passage for vehicles, pedestrians, and bicyclists. ♦ The Proponent will avoid full or partial street closures to the extent possible. Should a partial street closure be necessary to accommodate materials transport or construction-related activities, the closure will be limited to off-peak hours. and ♦ Parking for construction workers will be provided within the Project site, and workers will be prohibited from parking along adjacent roadways.	Before and during construction	

Chapter 8.0

Regulatory Compliance

8.0 REGULATORY COMPLIANCE

8.1 Summary of Regulatory Compliance

A number of regulatory agencies will review the proposed Project. Federal agencies that will be involved include the Federal Aviation Administration and U.S. Environmental Protection Agency. State programs will include several divisions within the MA Department of Environmental Protection along with the Massachusetts Department of Transportation Aeronautics Division. No further review by MA Natural Heritage and Endangered Species Program is anticipated to be required.

The Project triggers review as a Development of Regional Impact (DRI) under the Cape Cod Commission Act and as such the project must be consistent with the CCC's Regional Policy Plan. Local review will be conducted by the Barnstable Planning Board, Conservation Commission, and Board of Health.

This section summarizes the specific regulatory programs and performance standards that are applicable to the Project and describes how the project meets those performance standards.

Table 8-1 List of Federal, State and Local Permits

Agency Name	Permit or Action	Summary
Federal		
Environmental Protection Agency	Coverage under National Pollutant Discharge Elimination System (NPDES) Construction Activities Permit	As part of the Notice of Intent Form, the Airport must certify that it has developed and will implement a Stormwater Pollution Prevention Plan (SWPPP) during construction. The SWPPP describes measures that will be taken during construction to ensure that construction activities do not cause impact to wetlands and water resources. These include structural measures to temporarily store runoff and trap sediment; an inventory of hazardous materials used during construction and measures to prevent a spill; schedule for inspecting measures; and contact information for personnel responsible for implementing the SWPPP. All measures outlined in FAA AC 150/5370-10A Standards for Specifying Construction of Airports will be incorporated into project plans and specifications.
	Sole Source Aquifer Review	EPA SSA program has reviewed the EA and provided comments which are addressed in **Appendix B.**
Federal Aviation Administration (FAA), U.S. Army Corps of Engineers; Tribal Consultation; State Historic Preservation Officer (SHPO)	Review under Section 106 of the National Historic Preservation Act (36 CFR 800)	Per request of the MHC comment letter on the ENF, the Proponent has prepared an avoidance plan which was submitted to MHC for review prior to any land disturbing project. FAA has issued a "no effect" determination under Section 106. FAA consulted with the Tribal Historic Preservation Officers with no responses.
FAA	Federal Aviation Administration (FAA) planning, design, and safety Standards: AC 150/5300-13B Airport Design, Part 77	FAA design standards control matters such as penetration of airspace by fixed objects (e.g., antennas, utility poles), proximity of taxiways to runways, maneuvering of aircraft on the ground both when the Air Traffic Control Tower (ATCT) is open and when it is closed, dimensions of runway safety areas, and interference with aircraft guidance systems. The purpose of the standards is to promote safe and efficient operation of Airports. FAA is responsible for considering the environmental impacts of proposed FAA approvals of Airport Layout Plan (ALP) modifications (regardless of funding sources), FAA-funded airport actions, and ensuring compliance with NEPA requirements and other Federal environmental laws, regulations, and orders. FAA personnel must comply with the NEPA requirements in Order 1050.1F, supplemented by the current version of FAA Order 5050.4, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects*.
Department of Interior, U.S. Fish and Wildlife Service (USFWS)	Section 7 Consultation under U.S. Endangered Species Act	Before initiating an action, under Section 7 of the ESA the Federal agency (i.e., FAA) must coordinate with the USFWS as to the species that may be within their action area. If a listed species is present, the Federal agency must determine whether the project may affect it. If so, consultation may be required. Initial consultation regarding the American chaffseed resulted in a "no effect" determination. Initial consultation with regards to the Northern Long-eared Bat resulted in a "no effect". Based on the lack of habitat, a No Effect determination was also made for the sandplain gerardia.
U.S. Army Corps of Engineers	Section 404 Review, Massachusetts General Permit	Section 404 of the Clean Water Act (CWA) regulates the discharge of dredged or fill materials into the Waters of the United States (waters of the U.S.), including adjacent wetlands. Any discharge of dredged or fill material into Waters of the U.S. and/or adjacent wetlands within the project will require approval from the U.S. Army Corps of Engineers (USACE) in accordance with Section 404 of the CWA.

Table 8-1 List of Federal, State and Local Permits (continued)

Agency Name	Permit or Action	Summary
State		
Massachusetts Environmental Policy Act Office ("MEPA")	MEPA Certificate	The project has completed MEPA review (submittal of Environmental Notification Form, Draft Environmental Impact Report and Final EIR). A Certificate on the Final EIR was issued by the Secretary of Energy and Environmental Affairs (EEA) documenting full compliance with MEPA and is provided in **Appendix A**.
Massachusetts Department of Environment (MassDEP)	401 Water Quality Certification pursuant to Section 401 of the Clean Water Act	Constructing the proposed Airport improvements will require work in state wetlands and waterways and will exceed the above thresholds and require an Individual Water Quality Certification. Estimates of the total area of wetland resources that will be altered are greater than 5,000 square feet (see Section 6.1.2.3). Therefore, a Section 401 Water Quality Certification permit will be required. Massachusetts Stormwater Regulations found in 314 CMR 9.06, establish stormwater standards as a regulatory requirement. See Section 6.1.2 – Stormwater Management for a discussion of stormwater assessment, best management practices (BMPs) and compliance with the Massachusetts Stormwater Standards.
	Massachusetts Contingency Plan Review	Since a portion of the proposed Projects will be performed in portions of an open MassDEP Disposal Site (see Section 6.13 for discussion of which sites) and there is potential for encountering residual contamination from closed releases, soil and groundwater will be managed in accordance with requirements of the MCP. Pending the project sequencing, the work will be performed under the Preliminary Response Action or Comprehensive Response Action provisions of the MCP, as applicable. All activities and submittals will be done in coordination with the Airport's Licensed Site Professional of Record to ensure compliance with all existing managed sites.
	Underground Injection Control	Future project designs (not completed until later project phases, i.e., permitting) details of the stormwater system will be reviewed to determine whether an underground injection permit from DEP under MassDEP Underground Injection Control regulations, provided in 310 CMR 27.00, will be required for any proposed stormwater treatment systems.
Massachusetts Historical Commission (MHC)	State Historic Register Review (Chapter 256)	Per request of the MHC comment letter on the ENF, the Proponent has prepared an avoidance plan submitted to MHC for review prior to any land disturbing project which will likely result in a "no effect" determination under Chapter 256.
Massachusetts Office of Coastal Zone Management (CZM)	Federal Consistency Determination	The MA Office of Coastal Zone Management received the Final EIR and was asked to comment on this document relative to the consistency of the project with Massachusetts Coastal Policies. Specifically, the project will be reviewed to ensure that it conforms with policies for water quality, habitat, protected areas, coastal hazards, port and harbor infrastructure, public access, energy, and ocean resources, which are embodied in relevant state regulations. CZM will also provide consistency review during Section 404 permitting.
Regional		
Cape Cod Commission	Development of Regional Impact (DRI) determination pursuant to the Cape Cod Commission Act.	This Project will require a DRI Application to the CCC and public hearings on the application. The DRI Application will address to the extent feasible, each project's consistency with applicable goals including Natural Systems, Built Systems and finally, Community Systems. The DRI application will also discuss public benefits.

Table 8-1 List of Federal, State and Local Permits (continued)

Agency Name	Permit or Action	Summary
Town of Barnstable		
Barnstable Conservation Commission	Local Wetlands Ordinance Chapter 237	A NOI will be prepared and submitted to the Barnstable Conservation Commissions for activities within areas subject to protection under the Ordinance requesting an Order of Conditions. The NOI will be submitted following the Decision on the DRI. See Section 5.4 of this EA for more detail regarding onsite wetland resources, Section 6.1 for anticipated wetland alteration and Section 7.0 for proposed mitigation measures.
Barnstable Planning Department	Local Zoning Code Chapter 240	All work will be conducted in accordance with local zoning. Projects which require site plan review will be submitted accordingly.

Chapter 9.0

Public and Agency Coordination

9.0 PUBLIC AND AGENCY COORDINATION

9.1 Consultation with Agencies

Agency	Date	Notes
Cape Cod Commission	August 23, 2023, November 8, 2024	Internal meeting with FAA, MassDOT, Airport and consultant team Comment letter on Final EIR
Environmental Protection Agency	February 9, 2024	Letter providing comments on the Draft EA/EIR
MEPA Office	January 5, 2023 (public mtg), November 15, 2024	ENF/EIR review process, Final EIR Certification
MassDEP	February 9, 2024, November 8, 2024	Comment letters on Draft and Final EIR
MA Department of Energy Resources	February 7, 2024, November 14, 2024	Comment Letters on Draft and Final EIR

9.2 Public Outreach

Table 9.2-1 Summary of Communications to Community and General Public

Date	Format	Notes
N/A	Project Website Frequently Asked Questions Project Email	https://flyhya.com/airport-info/environmental-assessment/ Posted on Project website Public is welcome to send questions to the Project email: **enviroHYA@epsilonassociates.com**
09/30/2024	Stakeholder email	Email to Cape Cod Gateway Airport Stakeholders and Community Members on the Final Environmental impact Report
08/09/2024	Stakeholder email	Email to Cape Cod Gateway Airport Stakeholders Public Meeting #5
07/01/2024	Stakeholder email	Email to Cape Cod Gateway Airport Stakeholders update on the 5th public meeting.
02/01/2024	Stakeholder email	Email to Cape Cod Gateway Airport Stakeholders re: comment deadline on the Draft EA/EIR
12/25/2023	Stakeholder email	Availability of the Draft Environmental Assessment/Environmental impact Report (EA/EIR)
09/06/2023 09/20/2023	FAA Noise Policy Letter	Sent via Project email to gather feedback from stakeholders on aircraft noise.
6/2023	Public Access TV advertisements for June 21, 2023 meeting	Shared on: ♦ Falmouth Community Television (FCTV) ♦ Cape Cod Community Media Center ♦ Provincetown
06/16/2023	Newspaper Ad Public Notice for 06/21/2023 meeting	Run in Barnstable Patriot in English, Portuguese, and Spanish

Table 9.2-1 Summary of Communications to Community and General Public (continued)

Date	Format	Notes
06/07/2023	Newspaper Ad Public Notice for 06/21/2023 meeting	Run in Cape Cod Times in English, Portuguese, and Spanish
05/26/2023	Stakeholder Informational Letter	Sent to stakeholders on the Project Distribution List
03/06/2023	Stakeholder Informational Letter	Promoting 06/21/2023 meeting
12/26/2022-1/5/2023	Public Access TV advertisements for January 5, 2023 meeting	Shared on: ♦ Falmouth Community Television (FCTV) ♦ Cape Cod Community Media Center ♦ Bourne TV
12/21/2022	Stakeholder Informational Letter Public Notice for 01/05/2023 meeting	Sent via Project email to those on the Project distribution list
12/01/2022	Stakeholder Informational Letter Follow-Up on 10/27/22 Meeting	Sent via Project email to those on the Project distribution list
10/17/2022-10/21/2022	Pop-up event to promote public meeting and flyer throughout the community	Held at the Barnstable Town Hall
10/17/2022-10/21/2022	Postcard	Promoting 10/27/2022 meeting, translated to Spanish and Portuguese. Distributed within a 5-mile radius of the Airport.
10/07/2022	Press Release	Promoting 10/27/2022 meeting
10/27/2022	Project Summary Handout	Provided during 10/27/22 public meeting
10/16/2022, 10/19/2022, 10/21/2022 and an online ad every day for 2 weeks leading up to the meeting	Newspaper Ad Public Notice for 10/27/22 Meeting	Published in Cape Cod Times
10/14/2022	Newspaper Ad Public Notice for 10/27/22 Meeting	Published in Barnstable Patriot
10/12/2022	EJ Screening Forms	Translated to Spanish and Portuguese Sent to MEPA EJ Distribution List

Table 9.2-2 Summary of Public Meetings

Date Held	Meeting	Description
8/27/ 2024	Public Meeting #5	2:00 PM (virtual via Zoom) 6:00 PM (in-person at Town Hall)
12/12/2023	Public Meeting #4	2:00 PM (virtual via Zoom) 6:00 PM (in-person at Town Hall)
12/1/2023	PFAS Meeting #2	6:00 PM (in-person at Town Hall)
8/7/2023	PFAS Meeting #1	6:00 PM (in-person at Town Hall) Presentation published on website
06/21/2023	Public Meeting #3	2:00 PM (virtual via Zoom) 6:00 PM (in-person at Town Hall) Meeting video published on website
01/05/2023	MEPA Site Visit and Consultation Session, Public Meeting #2	11:00 AM (in-person at Airport) 6:00 PM (virtual via Zoom)
10/27/2022	Public Meeting #1	Virtual at 6 PM Slides shared on Project website

Chapter 10.0

List of Preparers

10.0 LIST OF PREPARERS

This Final EA has been prepared under the direction of the Cape Cod Gateway Airport, along with Epsilon Associates, Inc., ASG, GEI Consultants, and HSH to fulfill the requirements of NEPA for the Cape Cod Gateway Airport Master Plan Improvements Project at Cape Cod Gateway Airport, Barnstable, MA.

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