

A large, dark green silhouette of an airplane is positioned horizontally across the upper half of the cover. The airplane is shown from a side profile, facing right, with its wings and tail clearly defined.

Executive Summary

# T.F. Green

AIRPORT IMPROVEMENT PROGRAM

Final Environmental Impact Statement  
Final Section 4(f) Evaluation



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

*Prepared in cooperation with the  
Federal Highway Administration*

JULY 2011

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## EXECUTIVE SUMMARY

# T.F. Green

## AIRPORT IMPROVEMENT PROGRAM

### Final Environmental Impact Statement Final Section 4(f) Evaluation

JULY 2011

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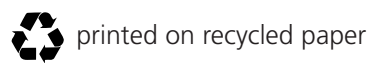
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U.S. Department of Transportation  
**Federal Highway Administration**

*Prepared in cooperation with the  
Federal Highway Administration*





**DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION  
FINAL ENVIRONMENTAL IMPACT STATEMENT AND FINAL SECTION 4(f) EVALUATION**

**T.F. GREEN AIRPORT IMPROVEMENT PROGRAM  
CITY OF WARWICK, KENT COUNTY, RHODE ISLAND**

Prepared by: Federal Aviation Administration  
Cooperating Agency: Federal Highway Administration

**Abstract:**

This Final Environmental Impact Statement (FEIS) and Final Department of Transportation (DOT) Section 4(f) Evaluation analyzes the potential environmental impacts associated with various improvements identified in the planning process for T.F. Green Airport Improvement Program, proposed by the Rhode Island Airport Corporation (RIAC). The purpose of the Improvement Program is to: enhance airport safety and enhance the efficiency of the Airport and the New England Regional Airport System, to more fully meet the current and anticipated demand for aviation services. T.F. Green Airport functions as an integral component within the Rhode Island, regional, and national air transportation networks by providing facilities and related infrastructure that will allow a level of air transportation services that meet demand. Even with the downturn in the economy, the existing runways limit the flexibility of the airlines to utilize appropriate aircraft to meet the current and anticipated demand, and to meet current and projected service to long-haul markets. This will also require enhancements in other airport facilities (such as terminal, parking and cargo facilities). The ability to accommodate non-stop long-haul service is restricted by the length of the primary Runway 5-23. The limited runway length at T.F. Green Airport has prevented some carriers from meeting current and anticipated demand to West Coast destinations. More importantly, however, several of the facilities at T.F. Green Airport do not meet FAA standard criteria for airport design or safety criteria. This includes Runway 16-34 Runway Safety Areas (RSA) dimensions, the presence of Hangar No. 1 which is in protected airspace, and Runway 16-34 - Taxiway C separation requirements. While the FAA has determined that these facilities can be operated within acceptable safety margins, these improvements will enhance overall safety.

This FEIS and Final Section 4(f) Evaluation examines a range of alternatives to address the potential environmental consequences associated with the Improvement Program. Two alternatives, Alternatives B2 and B4, emerged as a result of a multi-level screening and refinement process, and were carried forward for more detailed environmental analysis. Both alternatives include all of the proposed safety and efficiency projects. The distinguishing features between the alternatives are the locations of the proposed runway extension, RSA enhancements, and cargo facilities.

This FEIS evaluates the affected environment and environmental consequences of each alternative relating to noise, land use, environmental justice populations, air quality, social and economic environment, historical and archaeological resources, water quality, wetlands, floodplains, and surface transportation among other resources. The Final Section 4(f)/Section 6(f) Evaluation, which is in Chapter 7, assesses impacts to Section 4(f) and Section 6(f) resources associated with the T.F. Green Airport Improvement Program. This FEIS identifies Alternative B4 as the Preferred Alternative, and includes proposed mitigation measures to mitigate potential significant and other project impacts. RIAC has selected Alternative B4 as its Proposed Action. The proposed mitigation includes wetland restoration, voluntary land acquisition and sound insulation for noise mitigation, air quality and emissions controls for the construction phase, and other mitigation.

Copies of the Executive Summary, FEIS, and technical reports are available at Warwick and Cranston libraries and on the web at [www.vhb.com/pvd/eis](http://www.vhb.com/pvd/eis).

After careful and thorough consideration of the facts contained herein, and following consideration of the views of those Federal agencies having jurisdiction by law or special expertise on environmental impacts described, the undersigned finds that the proposed Federal action is consistent with existing national environmental policies and objectives as set forth in section 101(a) of the National Environmental Policy Act of 1969.

  
Michel Hovan, Acting Airports Division Manager, Ph.D., P.E.  
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## **T.F. Green Airport Improvement Program**

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# Acronyms and Abbreviations

ACHP	Advisory Council of Historic Preservation
AIP	Airport Improvement Program
ALP	Airport Layout Plan
AMF	Airfield Maintenance Facility
APE	Area of Potential Effect
ARC	Airport Reference Code
BMP	Best Management Practices
CAA	Clean Air Act
CFC	Chlorofluorocarbons
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNG	Compressed Natural Gas
CO	Carbon monoxide
CZMP	Coastal Zone Management Program
dB	Decibel
DEIS	Draft Environmental Impact Statement
DNL	Day-Night Average Sound Level
DOT	Department of Transportation
EIS	Environmental Impact Statement
EMAS	Engineered Material Arresting System
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FEIS	Final Environmental Impact Statement
FPPA	Farmland Protection Policy Act
GSE	Ground Service Equipment
HAPS	Hazardous Air Pollutants
HCFC	Hydro Chlorofluorocarbons
INM	Integrated Noise Model
LOS	Level of Service
L&WCF	Land and Water Conservation Funds
MBTA	Massachusetts Bay Transportation Authority
MOA	Memorandum of Agreement
NAAQS	National Ambient Air Quality Standards
NCP	Noise Compatibility Program
NEM	Noise Exposure Map
NEPA	National Environmental Policy Act
NERASP	New England Regional Airport System Plan
NITHPO	Narragansett Indian Tribal Historic Preservation Officer
NPL	National Priority List
NRHP	National Register of Historic Places
NO <sub>2</sub>	Nitrogen dioxide



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OFA	Object Free Area
PM	Particulate matter
RIAC	Rhode Island Airport Corporation
RICRMC	Rhode Island Coastal Resources Management Council
RIDEM	Rhode Island Department of Environmental Management
RIDOH	Rhode Island Department of Health
RIDOT	Rhode Island Department of Transportation
RIHPHC	Rhode Island Historical Preservation and Heritage Commission
RIHRA	Rhode Island Historic Resources Archive
RIPTA	Rhode Island Public Transit Authority
RISHPO	Rhode Island State Historic Preservation Office
ROD	Record of Decision
RPZ	Runway Protection Zone
RSA	Runway Safety Area
SAMP	Special Area Management Plan
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
TAF	Terminal Area Forecast
THPO	Tribal Historic Preservation Office
URA	<i>Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970</i> (the Uniform Relocation Act)
U.S.	United States of America
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
UST	Underground Storage Tank
VLAP	Voluntary Land Acquisition Program
WHC	Warwick Historical Cemetery



# Executive Summary

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## ES.1 Introduction and Background

The Rhode Island Airport Corporation (RIAC) is proposing a program of enhancements for Theodore Francis Green Airport (T.F. Green Airport or 'the Airport'), which is located six miles south of Providence in Warwick, Rhode Island (Figures ES-1 and ES-2). The purpose of the T.F. Green Airport Improvement Program is to enhance airport safety and enhance the efficiency of the Airport and the New England Regional Airport System to more fully meet the current and anticipated demand for aviation services. As the lead federal agency, and in compliance with the National Environmental Policy Act (NEPA),<sup>1,2,3</sup> the Federal Aviation Administration (FAA) determined that because of the potential for significant environmental impacts associated with the proposed T.F. Green Airport Improvement Program, it was necessary to prepare an Environmental Impact Statement (EIS). The Draft EIS (DEIS) was prepared by the FAA and published in July 2010. This Final Environmental Impact Statement (FEIS) incorporates and responds to comments on the DEIS. It also includes updated impact analyses related to revisions to forecast projections, updated wetland mitigation, and a final Section 4(f)/Section 6(f) resources evaluation.<sup>4</sup> This FEIS and associated Final Section 4(f)/Section 6(f) Evaluation (presented in Chapter 7, *Final Section 4(f)/Section 6(f) Evaluation* and Appendix J, *Section 4(f) and Section 6(f) Resources*) identifies and assesses the potential environmental impacts associated with the T.F. Green Airport Improvement Program. This FEIS also identifies the Preferred Alternative and Environmentally Preferable Alternative.

There are a set of terms used during the NEPA process. These include the Preferred Alternative, Environmentally Preferable Alternative, and the Proposed Action. These terms are defined below and used throughout out this FEIS. These designations could all be given to the same alternative.

- Preferred Alternative – Council on Environmental Quality (CEQ) regulations require the lead agency to identify its preferred alternative in the DEIS or FEIS (40 CFR section 1502.14(e)). The FAA is responsible for identifying the alternative that it believes would fulfill the agency's mission and responsibilities and would meet the Purpose and Need, giving consideration to economic, environmental, technical, and other factors.<sup>5</sup>
- Environmentally Preferable Alternative - CEQ guidance encourages the lead agency to identify the environmentally preferable alternative in the EIS. CEQ regulations require the lead agency to identify it at

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1 FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures [Change 1 Incorporated]*, FAA, United States Department of Transportation, Effective Date: March 20, 2006.

2 FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, FAA, United States Department of Transportation, April 28, 2006.

3 *Environmental Desk Reference for Airport Actions*, FAA, October 5, 2007.

4 U.S. Department of Transportation Act of 1966, Section 4(f), 49 U.S.C., section 303(c); *Land and Water Conservation Fund Act of 1965, Section 6(f)*, 16 U.S.C., section 4601 et. seq.

5 CEQ Memorandum: Questions and Answers About the NEPA Regulations, 48 Federal Regulation 18026, March 23, 1981, as amended, 51 Federal Regulation 15618 (Apr. 25, 1986). Question 4a.



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### Environmental Impact Statement and Final Section 4(f) Evaluation

the time of its decision (40 CFR section 1505.2(b)).<sup>6</sup> In the Record of Decision (ROD), the FAA will identify all alternatives considered by the agency in reaching its decision, and will specify the alternative which is considered to be environmentally preferable. Preferences among alternatives based on relevant factors including economic and technical consideration and agency statutory mission will also be discussed. The Environmentally Preferable Alternative may not meet the Purpose and Need.

- Proposed Action - The lead agency is required to identify in the EIS the solution that airport sponsor and the lead agency are proposing to solve the problem(s) they are facing.

T.F. Green Airport is owned by the State of Rhode Island, and operated by RIAC, which is responsible for planning and operating the physical infrastructure of the Airport to ensure that it functions effectively as Rhode Island's primary commercial passenger airport. The Airport is an integral component of the Rhode Island and New England regional air transportation networks. By providing the proposed facilities to meet current needs and anticipated demand in air passenger traffic while meeting FAA safety and design standards, the Airport will efficiently and safely accommodate demand, providing better service to all air travelers.

Safety and efficiency needs, and anticipated increases in passenger loads and operations, require local and regional enhancements at our nation's airports. Between 1990 and 2004, air passenger traffic at T.F. Green Airport grew by 132 percent from 2.37 million passengers in 1990 to 5.5 million in 2004.<sup>7</sup> Despite a decrease in aviation passenger demand nationwide due to economic conditions in 2008 through 2009 and short-term projected decline in operations, long-term forecasts continue to anticipate modest growth in air passenger traffic at T.F. Green Airport and in the New England region. Air passenger demand at the Airport is predicted to reach approximately 5.8 million passengers by 2020 and 6.5 million passengers by 2025, which is consistent with FAA aviation forecasts available at the time of the FEIS analysis.

The elements in the T.F. Green Airport Improvement Program were identified through a master planning process. The environmental review process, including this FEIS, was initiated shortly after the Master Plan concepts were identified. The FEIS provides the context in which to evaluate the environmental consequences of the proposed enhancements. The timeline for the process includes:

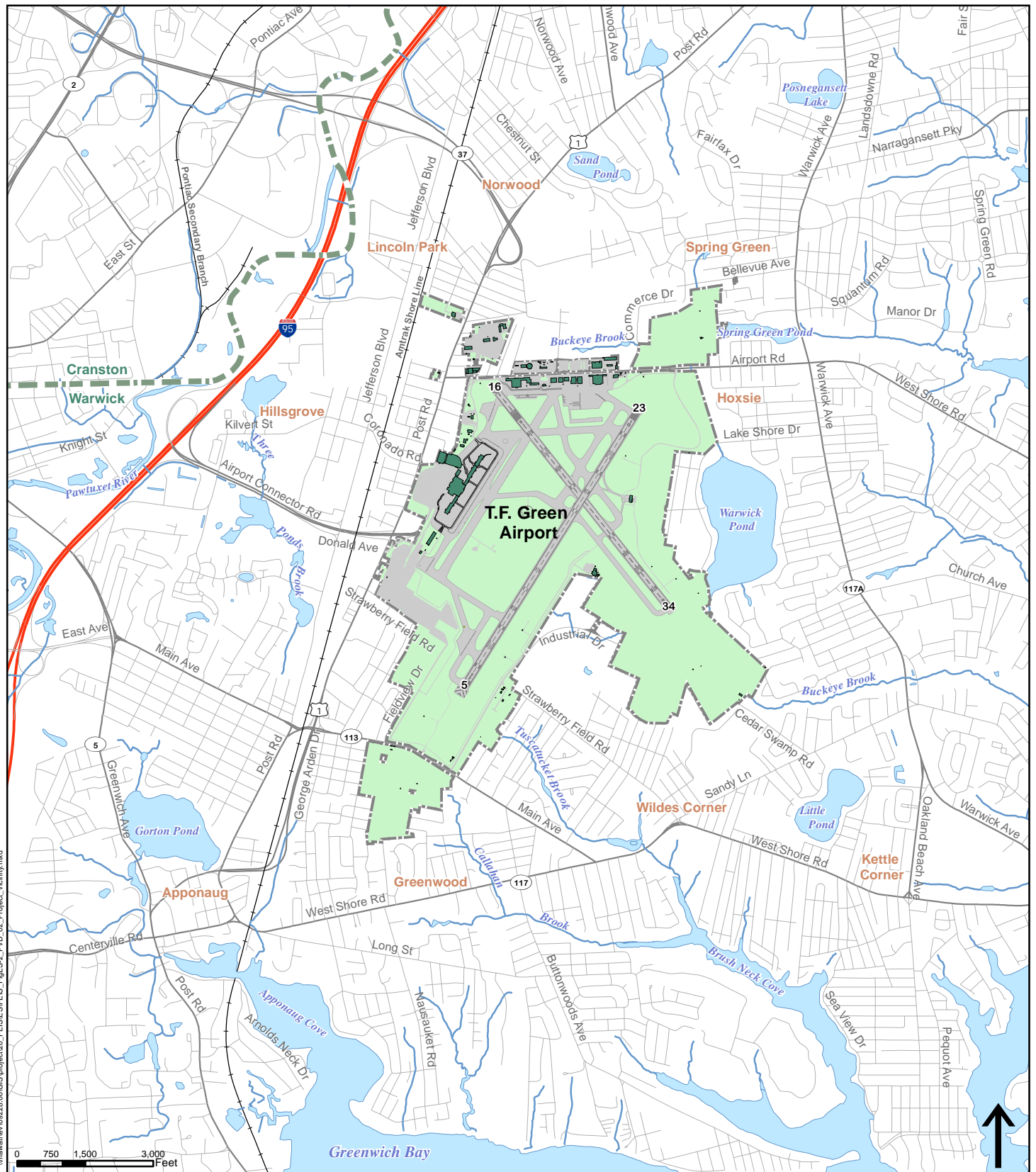
- 1999 to 2002 – Master Plan Update prepared
- 2002 – NEPA process and EIS initiated
- 2003 – Short-term and long-term operations revisited and EIS preparation postponed
- 2004 – Master Plan Supplement prepared
- 2005 – NEPA process and EIS re-initiated
- 2010 – DEIS published
- 2011 – FEIS published
- 2011 – ROD issued (pending)

<sup>6</sup> CEQ Memorandum: Questions and Answers About the NEPA Regulations, 48 Federal Regulation 18026, March 23, 1981, as amended, 51 Federal Regulation 15618 (Apr. 25, 1986). Question 8b, FAA Order 1050.1E, Par. 506e.

<sup>7</sup> T.F. Green Airport – Monthly Airport Passenger Activity Summary, Rhode Island Airport Corporation, December 2004.







#### Legend

- No-Action Airport Property Boundary (2015)
- Municipal Boundary
- Airport Buildings



**Figure ES-2**  
**T.F. Green Airport**  
**Improvement Program EIS**

Project Vicinity



The goal of the 2002 Master Plan Update was to conduct an assessment of the impact of the facility and infrastructure enhancements necessary to meet safety requirements and enhance efficiency, and accommodate anticipated demand at the Airport for a 20-year planning period (2020). The 2002 Master Plan Update effort evaluated the existing infrastructure and facilities at the Airport with consideration of current and anticipated airport activity and market demand. The Master Plan identified facility deficiencies and presented a strategy that would address safety needs and enhance efficiency of the Airport. It also would accommodate the anticipated levels of aviation activity and related functions at the Airport.

Following completion of the 2002 Master Plan Update, the FAA determined that it was necessary to prepare an EIS for many of the proposed Master Plan projects due to potential significant environmental impacts. These potential impacts include wetland impacts from safety and efficiency projects and community disruption resulting from the possible relocation of a portion of U.S. Route 1 for an enabling project. The FAA initiated the NEPA process and the preparation of an EIS, which included public scoping and agency coordination (meetings held on July 25, 2002). At that time, the proposed project only addressed runway length for the short-term needs. In 2003, the EIS was put on hold to revisit longer-term options for improving efficiencies (including a runway extension up to 9,500 feet). In 2004, the Master Plan project considerations were supplemented to include a longer runway for a longer planning period. This EIS evaluates and assesses impacts of projects identified in the March 2004 Master Plan Supplement.<sup>8</sup> The 2005 NEPA process resumed with the February 8, 2005 public scoping meeting and continues through this filing.

Key changes to the previous 2002 EIS scope included an expanded area of study, updated analysis years and forecasts, and responses to regulatory changes. Changes at T.F. Green Airport since the EIS began in 2005 include the construction of an Airfield Maintenance Facility (AMF), a Compressed Natural Gas (CNG) Station, and parallel Taxiway M. In the areas surrounding the Airport, RIAC has continued its noise abatement program, including acquisition of eligible residential properties that are impacted by noise. These properties are acquired through a Voluntary Land Acquisition Program (VLAP) as part of RIAC's Noise Compatibility Program (NCP) according to the requirements of 14 CFR Part 150, *Airport Noise Compatibility Planning* (Part 150).<sup>9</sup> In 2009, based on the 2008 Noise Exposure Map (NEM) update, 285 eligible residential properties were acquired (referred to in this FEIS as the Completed Part 150 VLAP). In early 2010, RIAC continued implementation of its Part 150 NCP based on the 2020 NEM, which was accepted by the FAA on July 27, 2010.<sup>10</sup> The 2010 NEM update identified 115 residential parcels as eligible for acquisition of which 70 parcels have been acquired as of January 2011 (referred to in this FEIS as the Current Part 150 VLAP). The Current Part 150 VLAP is scheduled to be complete by 2015. Also in 2010, the InterLink, an intermodal station, located west of the Airport entrance and Post Road was completed providing direct pedestrian access to the T.F. Green Airport terminal from the Amtrak Shore Line, Rhode Island Public Transit Authority (RIPTA) Intercity bus lines, and new consolidated rental car facilities.

Since the aviation activity forecast was originally prepared in 2004, the national and global economic recession occurred in 2008-2009 and affected overall aviation demand. FAA Orders 5050.4B and 1050.1E require that the

8 The 2004 Master Plan update identified the preliminary list of proposed projects that RIAC is proposing to undertake over the several years to meet demand and address safety needs through 2020.

9 RIAC's Part 150 NCP was initiated by the 1986 NEM and NCP approval, and includes the 1991 NEM update, 1995 NEM update, 2000 NCP revision, 2008 NEM update, and 2010 NEM update.

10 The 2020 NEM was derived from the Level 6 2020 No-Action Alternative DNL 70 dB noise contour with additional neighborhood rounding, as documented in the DEIS.



sponsor and FAA consider new information regarding national, regional or site specific aviation trends that could affect the project purpose and need developed for the EIS after the start of the NEPA process. Indicators of aviation trends include the FAA's annual Terminal Area Forecast (TAF) for the airport, the FAA National Aerospace Forecast, regional-specific economic trends, regional airport system factors, and site-specific restraints to growth.

The aviation forecast developed for the EIS in 2004 was based on realistic assumptions at that time, but aircraft operations in 2008 decreased 22 percent from 2004 at T.F. Green Airport. In 2009, the FAA revised the DEIS analysis using a No-Action Alternative forecast consistent<sup>11</sup> with the most recent FAA TAF at that time (published in December 2008).<sup>12</sup> Aviation forecasts were updated in 2009 and, where appropriate, as part of the DEIS the FAA conducted environmental impact analyses that reflected the revised aviation forecasts. In addition, the on-Airport projects that were independently planned at the start of the EIS (such as the AMF) were included in the No-Action analysis conditions.

After the DEIS was issued in July 2010, actual (historical) and short-term forecast aviation activity continued to decline. The FAA compared the aviation activity forecasts with the Draft 2010 TAF to confirm that the forecast was within 10 to 15 percent of the most recent TAF at the time. The FAA found that the DEIS 2009 forecast of aircraft operations and passenger enplanements (based on the 2008 TAF) was no longer within the FAA consistency criteria. Therefore, the FAA revised the FEIS analysis using a No-Action Alternative forecast based on the Draft TAF (October 2010; see Appendix E.1, *Updated Forecast of Aviation Activity*), which was the latest forecast information available at the time the FEIS analysis was performed and was considered to reflect the recent aviation trends.<sup>13</sup> The FEIS forecast is based on the 2010 Draft TAF plus an additional ten percent and is referred to as the 2010 FEIS No-Action Forecast. The forecasted flights associated with the runway extension would remain as anticipated in the DEIS because historical regional demand (from T.F. Green and Logan Airports) for West Coast service has remained relatively constant despite the recent economic downturn and its effect on passenger demand in general. Additionally, at the time the 2010 forecast update, the FAA released a new version of the noise model (INM 7.0b). Because of anticipated changes based on the revised forecast and a new version of the noise model, the FAA determined it was prudent to revise analyses of relevant areas of environmental and social resources and report on the new analyses in this FEIS.

Other changes taken into consideration include RIAC's acquisition of land for noise mitigation under the Current Part 150 V LAP, which was initiated prior to filing this report and is assumed to be completed by 2015. Anticipated vehicular traffic from the InterLink and other likely commercial developments in the City of Warwick are also factored into the FEIS surface transportation and land use analyses. The Baseline Condition described in Chapter 4, *Affected Environment*, of this FEIS generally represents conditions in 2004, with relevant updates. Alternatives B2 and B4 are compared to the No-Action Alternative in 2015, 2020, and 2025 (as presented in Chapter 5, *Environmental Consequences*, of this FEIS).

11 FAA Order 5050.4B states that forecasts should be within 10 percent of the TAF for the 5-year analytical period and within 15 percent for the 10-year analytical period.

12 The 2010 No-Action Alternative FEIS Forecast is within 10 percent of FAA TAF passenger forecast (see Appendix E.1, *Updated Forecast of Aviation Activity*).

13 The Final 2010 TAF became available during the latter stages of the FEIS analysis, and differed from the Draft 2010 with lower short-term forecasts. However, FAA evaluated the most recent aviation activity counts recorded by the Air Traffic Control Tower, which were consistent with the Draft 2010 TAF (see Appendix E.1, *Updated Forecast of Aviation Activity*).





### **ES.1.1 Overview of T.F. Green Airport**

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Designated by the FAA as a medium-hub primary commercial service airport,<sup>14</sup> T.F. Green Airport served approximately 3.9 million passengers with over 220 daily aircraft operations (i.e., aircraft landing or departing) in 2010.<sup>15</sup> The Airport plays a vital role in fulfilling anticipated local, regional, and national demands of business and leisure travel, as well as providing air cargo capacity for the eastern New England region. According to a 2006 Economic Impact Study<sup>16</sup> the Airport is a critical catalyst for economic growth in the State of Rhode Island, generating directly and indirectly approximately \$1.96 billion in economic activity from sales taxes on additional goods and services and \$603.9 million in earnings from additional direct and indirect jobs. The Airport provides over 2,000 jobs directly, and indirectly supports hotels, rental car agencies, parking facilities, gas stations, and other travel-related businesses in the City of Warwick.

Figure ES-2 shows the area surrounding the Airport. T.F. Green Airport occupies 1,100 acres of land and is located in the dense, urban City of Warwick, Rhode Island, six miles south of the City of Providence. T.F. Green Airport is generally bounded by Airport Road to the north, Industrial Drive to the east/southeast, Main Avenue (State Route 113) to the south, and Post Road (U.S. Route 1) to the west. The Airport is accessible via several major regional and national roadways, including Interstate Highways I-95 and I-295, U.S. Route 1, and State Routes 10 and 37. The Airport is also accessible via RIPTA and the Massachusetts Bay Transportation Authority (MBTA) bus lines. Adjacent land uses include residential development to the southwest, west, southeast, and east; commercial and industrial development along Post Road and Airport Road; and industrial development along Industrial Drive. The InterLink, recently constructed west of the Airport, includes a direct pedestrian link to the Airport for rail passengers, a consolidated car rental facility, and commuter parking. Warwick Pond and Buckeye Brook and associated wetland systems are located north and east of the Airport property.

The Airport has two runways: the primary runway, Runway 5-23 (7,166 feet), and the secondary or crosswind runway, Runway 16-34 (6,081 feet). T.F. Green Airport's 352,000 square foot passenger terminal facility contains the ticketing, baggage claim, and surface transportation areas; security services; Federal Inspection Services; concessions area; two concourses with passenger hold rooms; 22 commercial air service gates with 16 jet bridges; and RIAC's administrative offices. The terminal provides approximately 16,000 square feet of passenger processing and support space per aircraft gate position. These facilities include all areas required to process the movement of commercial airline passengers and their baggage as well as providing concessions, restrooms, and building mechanical systems. In addition to the terminal, airport facilities include hangars, a fuel farm, air cargo, ground support equipment facilities, and an aircraft rescue and fire fighting facility. On-Airport parking facilities include three parking garages (Garage A, Garage B, and Garage C) and two parking lots (Hourly Lot D and Long-Term Lot E) for a total capacity of 8,422 spaces. Figure ES-3 shows the existing airport facilities.

### **ES.1.2 NEPA Process and Draft and Final Environmental Impact Statements**

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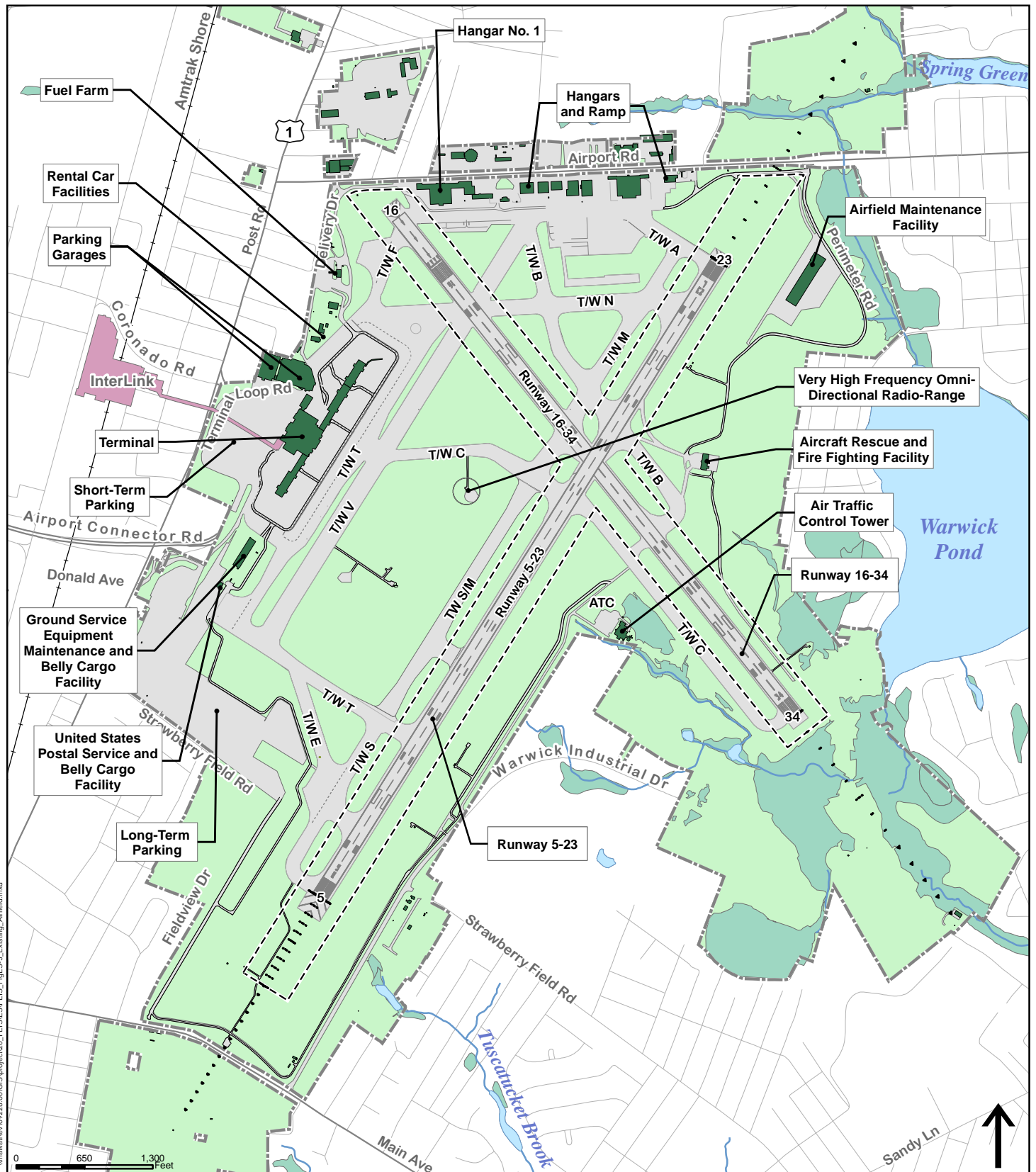
In recognizing the importance of protecting the environment, the U.S. Congress passed NEPA in 1969. NEPA requires federal agencies to analyze and consider alternatives to, and the environmental impacts of, major federal

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<sup>14</sup> The FAA defines a medium hub airport as a commercial service airport with more than 10,000 passenger boardings each year, handling 0.25 to 1 percent of the country's annual passenger boardings (accessed at [www.faa.gov/airports/planning\\_capacity/passenger\\_allcargo\\_stats/categories/](http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/categories/) on April 5, 2010).

<sup>15</sup> *T.F. Green Airport – Monthly Airport Passenger Activity Summary*, RIAC, December 2010.

<sup>16</sup> *Rhode Island Airport Economic Impact Study Update 2006*, RIAC, 2006.



#### Legend

- No-Action Airport Property Boundary (2015)
- On Airport Buildings
- Wetlands

- Runway Safety Area
- Approach Lights



**Figure ES-3**

#### Existing Airport Facilities

Note: New Deicer Management System to be constructed under the No-Action Alternative at an on-Airport location to be determined.



actions; to disclose and consider mitigation for significant impacts; and for EISs to provide interested parties with an opportunity to participate in the environmental review process. FAA approval of changes to the T.F. Green Airport Layout Plan (ALP)<sup>17</sup> and subsequent federal funding through the Airport Improvement Program (AIP) are federal actions requiring compliance with NEPA. When selecting a Preferred Alternative, the FAA considers the alternative that best meets the purpose and need<sup>18</sup> of the Proposed Action (as described in Section ES.2, *Project Purpose and Need*). The FAA also considers its statutory mission and environmental, technical, and economic factors.

FAA's approval of the T. F. Green ALP<sup>19</sup> is a federal action requiring compliance with NEPA. RIAC cannot undertake any new physical enhancements until they are approved and depicted on an updated ALP. This FEIS identifies the potential environmental effects associated with the construction and operation of proposed enhancements. The publication of the DEIS in July 2010 marked the beginning of a public comment period during which the FAA solicited stakeholder comments, including public comments on the DEIS and the NEPA process. After considering comments submitted by stakeholders on the DEIS, the FAA issued this FEIS, which incorporates and addresses those comments. All comments received on the DEIS have been reproduced and responded to individually in Appendix A, *Responses to Comments on the DEIS* of this FEIS. Based on the information in this FEIS, the FAA will issue a ROD that documents the FAA's approval or disapproval of federal actions necessary to implement the T.F. Green Airport Improvement Program. The ROD will document findings, projected environmental impacts, and when necessary, mitigation commitments that will be implemented to reduce potential environmental effects.

Additionally, this project is a federal undertaking under Section 106 of the *National Historic Preservation Act of 1966*, as amended.<sup>20</sup> The FAA has worked closely with the Narragansett Indian Tribe of Rhode Island and the Rhode Island Historical Preservation and Heritage Commission (RIHPHC) throughout the NEPA process. The FAA has considered the impact on the Narragansett Indian Tribe, and the Tribe is a formal member of the Inter-Agency/Tribal Coordination Group (see Section ES.6.2, *Agency and Tribal Consultation and Coordination*).

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## **ES.2 Project Purpose and Need**

This section presents the Purpose and Need for the proposed enhancements at T.F. Green Airport and a summary of the Purpose and Need for each of the program elements. Based on the deficiencies and constraints associated with the existing facilities and infrastructure identified in the 2002 T.F. Green Master Plan Update/2004 T.F. Green Master Plan Supplement (the Airport Master Plan Update/Supplement), and to accommodate unmet demand, the purpose of the T.F. Green Airport Improvement Program is as follows:

- Enhance Airport safety.
- Enhance the efficiency of the Airport and the New England Regional Airport System to more fully meet the current and anticipated demand for aviation services.

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<sup>17</sup> An Airport Layout Plan is a planning document for airports and is required for all public airports that receive state or federal funding. It shows existing conditions, near-term and long-term airport development.

<sup>18</sup> The purpose and need statement is a fundamental requirement when developing a proposal that will require future National Environmental Policy Act (NEPA) documentation and sets the stage for consideration of the alternatives.

<sup>19</sup> The latest FAA-approved Airport Layout Plan for T.F. Green Airport is dated April 18, 2002.

<sup>20</sup> *National Historic Preservation Act of 1966*, Section 106. 36 CFR 800.16(l).



The T.F. Green Airport Improvement Program that is the subject of this FEIS consists of key elements with the following needs:

■ **Safety Enhancement Elements**

- ❑ Enhance airfield safety by upgrading the crosswind Runway 16-34 Runway Safety Areas (RSAs) to meet current FAA requirements<sup>21</sup>
- ❑ Demolish Hangar No. 1 to remove an airspace penetration
- ❑ Relocate Taxiway C to increase the current lateral separation between Runway 16-34 and Taxiway C to meet current FAA standard criteria

■ **Efficiency Enhancement Elements**

- ❑ Extend primary Runway 5-23 to fulfill New England Regional Airport System needs and more fully accommodate existing and anticipated demand for commercial non-stop service to the West Coast
- ❑ Add up to seven additional commercial service gates to enhance passenger processing efficiency<sup>22</sup>
- ❑ Relocate and replace existing belly cargo facility to accommodate space needs
- ❑ Reconfigure the on-airport roadway system to improve traffic flow
- ❑ Provide additional passenger and employee parking facilities to meet seasonal needs
- ❑ Expand the airport fuel storage facility to maintain an on-airport fuel supply of five to seven days
- ❑ Provide additional ground service equipment (GSE) facilities for maintenance and storage to meet current space needs
- ❑ Expand Integrated Cargo Facilities to meet anticipated demand

The Airport Master Plan Update/Supplement identified the following actions to correct airfield facilities that do not meet current FAA airport design guidelines:

- **Enhance Runway 16-34 RSA** – The RSAs associated with Runway 16-34 do not meet current FAA airport design standards. In November 2005, the U.S. Congress, in consultation with FAA, required that all commercial passenger airports<sup>23</sup> (including T.F. Green Airport) enhance passenger safety by improving their RSAs by 2015. Additionally, Runway 16-34 pavement needs to be rehabilitated. This project also includes relocating navigational aids as appropriate.
- **Relocate Taxiway C** - The centerline of Taxiway C is 300 feet from the centerline of Runway 16-34. FAA design standards for ARC C-IV<sup>24</sup> facilities require 400 feet of lateral separation between the centerlines of

<sup>21</sup> Improving the Runway 16-34 RSA would require shifting or relocating navigational aids that support that runway.

<sup>22</sup> Since the DEIS, the need for commercial service gates has been changed from "8" to "up to 7" gates taking anticipated passenger demand into account.

<sup>23</sup> Commercial passenger airports subject to 14 CFR Part 139 conduct commercial passenger flight operations and must comply with the regulation's standards.

<sup>24</sup> According to FAA Advisory Circular 150/5300-13, *Airport Design*, Change 15, the Airport Reference Code (ARC) is a coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport.



runways and their associated parallel taxiways.<sup>25</sup> The existing separation does not meet current FAA airport design standards. Therefore, a separation of an additional 100 feet needs to be provided between Taxiway C and Runway 16-34 to enhance the safety of airfield operations.

- Demolish Hangar No. 1 – Hangar No.1 is located within the Runway 16-34 Object Free Area (OFA) and penetrates a protected airspace surface.<sup>26</sup> The hangar needs to be removed from its current location to meet current FAA airport design standards as it currently is an obstruction to air navigation.

RIAC's planning efforts have also identified facilities in the T.F. Green Airport landside, passenger terminal, and airfield areas that need to be enhanced for the efficiency of passenger movements getting to the terminal and within the terminal; of airfield operations; and, of passenger air service within the New England Regional Airport System. The FAA has confirmed the need for each of the proposed efficiency-related enhancements by considering the 2009 EIS Forecast in all relevant demand analyses. Airport facility enhancements needed for the efficiency of passenger movements include:

- Passenger terminal complex – Based on the forecast increase in passenger volumes through 2025, future modifications to the facilities associated with the terminal complex will be required to enhance efficiency and passenger convenience. Terminal complex facilities that would require modifications include the addition of up to seven aircraft gates, the concourse area, the terminal apron and taxi lanes, and the central heating and cooling plant.
- Roadways – The existing Terminal Loop Roadway experiences excessive peak hour delays as a result of deficiencies associated with the internal signalized intersection. Improvements to the roadways that provide access to the terminal area are needed to enhance the existing level of service of the roadway system and avoid further deterioration in the roadway system level of service.
- Parking facilities – The current capacity of the Airport's long-term passenger and airport employee parking facilities is sufficient for current demand. However, additional parking capacity must be provided to accommodate anticipated passenger and airport employee demand by 2020.

Airfield facilities needed to enhance the efficiency of airfield operations include:

- Primary Runway Length – The primary runway at the Airport (Runway 5-23) needs to be extended to an appropriate length to enhance the efficiency of the Airport and the New England Regional Airport System to more fully meet the current and anticipated demand for aviation services. The extended runway would more fully accommodate non-stop airline service to West Coast markets and provide alternatives to flights out of Boston-Logan International Airport. Reducing passengers using Logan Airport for air service would enhance the efficiency of the New England Regional Airport System by "reducing the region's over-reliance

<sup>25</sup> FAA Advisory Circular 150/5300-13, Change 15

<sup>26</sup> The Runway OFA is an area on the ground centered on the runway centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located within the Runway OFA for air navigation (navigational aids) or aircraft ground maneuvering purposes (airfield signage). FAA Advisory Circular 150/5300-13, Change 15, section 307 states that "the runway OFA clearing standard requires clearing the OFA of above ground objects protruding above the runway safety area edge elevation."





on Logan."<sup>27</sup> This goal is a key component of FAA's planning for a more balanced, integrated use of public airports within the New England Region, as reflected in the New England Airport Regional System Plan.<sup>28</sup> The main challenge to T.F. Green Airport's competitive position in the region is inadequate primary runway length. The range of runway lengths required for non-stop service to West Coast markets by aircraft capable of providing the service from T.F. Green Airport exceed the existing primary runway length at the Airport. A longer primary runway not only benefits service to long-haul markets, but also medium- and short-haul markets.

- Air cargo facilities – Two facilities currently accommodate cargo operations at the Airport. In addition to being undersized, the existing belly cargo and ground service equipment maintenance building would need to be demolished to accommodate the proposed terminal expansion, requiring that the belly cargo facilities be replaced. Integrated cargo operators currently have 19,400 square feet of available building space.<sup>29</sup> Based on current industry standards, a facility sized between approximately 18,000 and 35,000 square feet is needed to accommodate existing demand in 2004, and between approximately 25,000 and 51,000 square feet to accommodate demand by 2020. A replacement facility for handling belly cargo will be needed and the integrated cargo facility is currently undersized. The efficiency of air cargo facilities will decrease in the future if additional capacity is not provided at the Airport.
- Support facilities - The existing belly cargo and GSE maintenance functions are operating in a shared facility. The existing belly cargo and GSE maintenance building would need to be demolished to accommodate the proposed terminal expansion, requiring that the GSE maintenance facilities be replaced. In addition, new GSE maintenance facilities will be needed to accommodate potential new entrant air carriers, the addition of terminal gates, shifts in the fleet mix, and increased daily departure activity. Demand for Jet-A fuel exceeds the existing fuel farm's capacity to receive, process, store, and deliver fuel. The existing fuel farm would not meet industry standards for processing procedures and fuel settling times. Additional Jet-A fuel storage capacity is needed to increase throughput and ensure efficient fueling operations at the Airport.

Airline business models are changing frequently and the existing runway does not allow RIAC to meet its responsibility to provide airport facilities that offer flexibility to airline carriers to meet current and anticipated industry demands. Lengthening the runway would provide the airlines with the flexibility to change fleet mixes and accommodate changes in schedules. A longer runway would also reduce or eliminate weight penalties currently incurred by the airlines operating at T.F. Green Airport. An extended runway also reduces the inherent business risk to airlines that initiate service to new markets.

Based on the deficiencies and constraints associated with the existing facilities and infrastructure identified in the Airport Master Plan Update/Supplement and to accommodate unmet demand for service, RIAC proposes to implement the T.F. Green Airport Improvement Program made up of the individual project elements described above.

<sup>27</sup> Logan International Airport Airside Improvements Planning Project EIS, Boston, Massachusetts; FAA, New England Region; 2002.

<sup>28</sup> New England Regional Airport System Plan (NERASP), New England Airport Coalition, Fall 2006.

<sup>29</sup> Integrated cargo operators at T.F. Green Airport include Federal Express and United Parcel Service.



### **ES.2.1 Project Benefits**

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There are a number of environmental and community-related benefits associated with the T.F. Green Airport Improvement Program.

The Improvement Program, specifically the extension of Runway 5-23, would strengthen the Airport's role as a substantial economic driver for the State of Rhode Island and the region. Airport passengers would be better served by having the opportunity to reach West Coast destinations non-stop, without having to drive to Logan Airport. The Improvement Program will result in economic benefits in the form of new jobs, increased on- and off-Airport spending and business revenues, and increased state tax revenues. Since Alternative B4 includes a Runway 5-23 extension by the end of 2015 it would result in 80 percent greater economic gains between 2015 and the end of 2020 than Alternative B2 because of the expedited construction schedule.<sup>30</sup>

A key benefit to the neighborhoods surrounding the Airport is that once the ROD is issued concluding the NEPA process, FAA and RIAC can move forward with the Future Build VLAP as identified in the FEIS. During the planning and environmental impact review phases of the project, RIAC received an average of five to ten inquiries per month related to the boundaries of the future acquisition program areas from the community. Completion of the NEPA process will provide resolution of land acquisition program for the community. Furthermore, it is RIAC's intention to begin to acquire eligible residential parcels as soon as 2012, subject to availability of funding, before the project-related noise impacts would be felt (in 2015 and 2020).

Under both Alternatives B2 and B4, the relocation of Airport Road allows for better traffic signal progression along Post Road (U.S. Route 1). Under Alternative B2 specifically, Fully Relocated Airport Road would substantially improve east-west connection north of the Airport and, under Alternative B4, Realigned Main Avenue would substantially improve east-west connection south of the Airport. Retimed traffic signals throughout the Study Area would provide short term improvements to intersection delay and air quality emissions. From a regional air quality perspective, the project would reduce emissions associated with individual vehicles traveling to Boston-Logan International Airport for non-stop west coast flight options. Under Alternative B4 in 2015, traffic operations would improve at one intersection (Post Road at Partially Relocated Airport Road/Ann & Hope driveway) when compared with the No-Action Alternative. The relocated intersection would be designed to accommodate all movements at the intersection, including vehicles entering and exiting the relocated Ann & Hope driveway. Under Alternative B4, traffic operations are expected to improve at eight intersections in 2020 and six intersections in 2025. Improvements are attributed to the optimization of signal timings at a number of intersections throughout the Study Area.

Alternatives B2 and B4 would equally increase the vehicular parking supply on the Airport because they include constructing a new 2,000-space long-term commercial parking garage on part of the existing long-term parking lot, adjacent to Strawberry Field Road by 2020. The three-story garage would result in a net increase of approximately 1,300 long-term commercial parking spaces (700 spaces from the existing Long-Term Parking Lot would be lost to this construction). Appropriate new pedestrian and bicycle accommodations would be included in the final design of Fully and Partially Relocated Airport Road and Realigned Main Avenue where practicable.

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<sup>30</sup> For the purposes of the EIS, it is assumed that the runway extension would come online in 2015 for Alternative B4 and in 2020 for Alternative B2; therefore, project-related impacts and benefits associated with runway operations were considered for these years.



Regarding historically-protected resources, a physical and electronic display depicting the development of the Airport will be provided. For Section 4(f) resources,<sup>31</sup> impacted Winslow Park recreation facilities within the Runway Protection Zone (RPZ) of Runway 5-23 will be relocated to a different location under Alternatives B2 and B4.

Stormwater management at the Airport would be improved with construction of either Alternative B2 or B4, resulting in downstream improvements in water quality in furtherance of the Greenwich Bay SAMP goals. Improvements at the Airport outfalls, such as stone check dams and outlet protection will provide additional sediment capture and improve water quality from existing airport discharges. The realigned section of Main Avenue and partial relocation of Airport Road under Alternative B4 would include treatment of water quality volume that is not currently treated along this section of roadway.

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## **ES.3 Alternatives Analysis**

The T.F. Green Airport Improvement Program alternatives were evaluated through a multi-level screening process (Levels 1 through 6 and FEIS Alternatives, as described below and presented in Figures ES-4a and ES-4b) to identify which alternatives best meet the Improvement Program's Purpose and Need and to determine if the alternatives are reasonable and feasible to implement. As a result of this alternatives screening process, FAA has identified Alternative B4 as its Preferred Alternative because Alternative B4 would meet the Purpose and Need for the T.F. Green Airport Improvement Program, while expediting aviation, community, and socioeconomic benefits due to the extended Runway 5-23 coming on line by the end of 2015. Compared to Alternative B2, Alternative B4 would be substantially less disruptive to residential properties and businesses, and would impact wetlands the least. All significant impacts that would occur under Alternative B4 could be mitigated. From a constructability perspective, Alternative B4 is determined most feasible to construct because it would have the lower construction costs by \$77 million compared to Alternative B2. The following sections summarize the alternatives analysis screening process that resulted in the identification of Alternative B4 as the Preferred Alternative out of all of the alternatives evaluated.

Consideration was given to on- and off-Airport alternatives, including the use of other airports and modes of transportation, and airport infrastructure or technology improvements. The safety enhancement component of the Improvement Program is focused strictly on physical enhancements to the Airport, and cannot be met by off-Airport solutions. For example, there are no off-Airport alternatives available that would bring the deficient RSAs on Runway 16-34 at T.F. Green Airport into compliance with the current FAA design criteria. Therefore, based on the Level 1 alternative screening step (described below), the off-Airport and non-construction alternatives considered in this analysis focus on efficiency enhancement projects that would meet the Purpose and Need.

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### **ES.3.1 Levels 1 Through 3 Alternatives Screening**

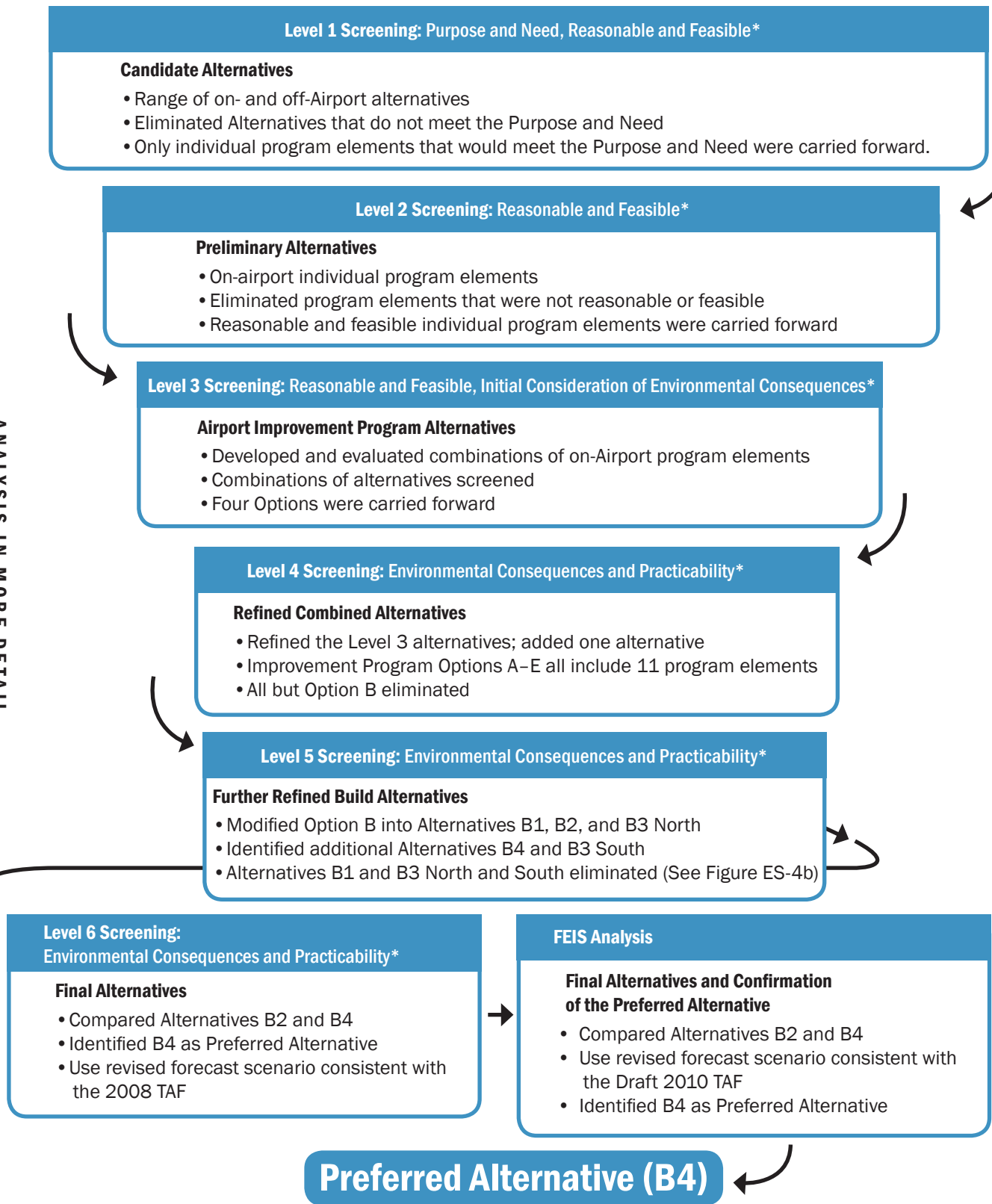
The overall intent of the first three screening levels for potential program elements was to identify alternatives that could, at an initial concept level, feasibly and reasonably fulfill the Purpose and Need. Level 1 considered nine airports other than T.F. Green Airport, three non-aviation and non-construction alternatives, and

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<sup>31</sup> Includes publicly owned parks, recreation areas, wildlife or waterfowl refuges, or historical properties of national, state, or local significance.



ANALYSIS IN MORE DETAIL



\* Documented in detail in the DEIS.



**Figure ES-4a**

**Alternatives Screening Process**

T.F. Green Airport Improvement Program EIS

**Level 5 Step 1**  
(Section 3.7.1)

- IP Option B modified into Alternative B1 (reduced impacts to wetlands and community)
- Additional runway length and utility analysis conducted
- New alternatives developed (Alternative B2—8,700 feet and Alternative B3 North—8,300 feet)
- Alternative B3 North eliminated—does not meet Project Purpose as fully as Alternative B2

**Level 5 Step 2**  
(Section 3.7.2)

- New phasing prioritizes the safety improvement elements

**Level 5 Step 3**  
(Section 3.7.3)

- New alternatives developed (Alternatives B4—8,700 feet and B3 South—8,300 feet)
- Preliminary screening analysis of Alternatives B1, B2, B4 and B3 South
- Alternative B3 South evaluated and eliminated because it:
  - Does not meet the Project Purpose as fully as Alternative B4
  - Has substantially similar environmental impacts as Alternative B4

**Level 5 Step 4**  
(Section 3.7.4)

- Alternative B1 eliminated—not practicable  
(high and unmitigatable wetland impacts, significant socioeconomic impacts due to land acquisition, and high construction costs)
- Alternatives B2 and B4 retained for Level 6 screening  
(additional detailed environmental analysis)



**Figure ES-4b**

**T.F. Green Airport  
Improvement Program EIS**

Level 5 Alternatives  
Screening Process

Source: VHB, Inc.



28 Candidate Alternatives for program elements for various T.F. Green Airport efficiency enhancements. The Level 2 screening refined and further screened the alternatives retained from Level 1, and eliminated any alternatives that, on more detailed evaluation, were found either to be not feasible, unreasonable, or unable to meet the Purpose and Need. The Level 3 screening developed and evaluated combinations of on-Airport program elements (particularly the Runway 16-34 and Runway 5-23 enhancements) that collectively form the T.F. Green Airport Improvement Program Alternatives. The Level 3 alternatives were screened to determine whether they are reasonable and feasible and should be retained for detailed environmental analysis.

The following section describes the nine alternatives that were considered in detail beginning at Level 4 (or advanced to a 30 percent engineering design level) in order to more accurately evaluate the full range of environmental impacts, and to assess practicability based on cost and construction logistics. Screening Levels 4, 5, and 6 evaluated nine alternatives made up of safety and efficiency projects and included an analysis of their potential environmental consequences. Alternatives that could meet the Purpose and Need and were found to be practicable and feasible were advanced in the alternatives screening process. Alternatives that did not meet the Purpose and Need, or were not practical or feasible, were dismissed.

The screening took into account such considerations as safety, operational efficiency, environmental impacts, and costs based on more detailed design concepts. Ultimately, this screening process provided the necessary context for identification of a Preferred Alternative.

### **ES.3.2 Level 4 Alternatives Screening**

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The Level 4 screening evaluated the No-Action Alternative and five Improvement Program (IP) Options. Each of the IP Options that emerged from Levels 1 through 3 screening, plus some additional refinements, would meet the Improvement Program Purpose and Need. Various off-Airport roadway configurations were considered to accommodate the runway extension, integrated cargo facility, and safety enhancements, including relocating a portion of Post Road, tunneling Main Avenue, fully relocating Airport Road, and partially relocating a portion of Airport Road. Consideration was also given to avoiding impacts to Buckeye Brook, which lies within the north and eastern portion of the Project Area, and its associated wetlands.

Each of the Level 4 screening IP Options includes all of the T.F. Green Airport Improvement Program elements and a proposed Runway 5-23 extension to 9,350 feet. The Level 4 screening includes the following five IP Options:

- IP Option A, designed to avoid impacts to the north of the Airport; includes a Main Avenue tunnel
- IP Option B, designed to avoid impacts to the south of the Airport; includes a full relocation of Airport Road from Warwick Avenue with a connection to Route 37
- IP Option C, designed to avoid Buckeye Brook channel; includes a Main Avenue tunnel and partially relocates the west end of Airport Road
- IP Option D, designed to minimize impacts to Buckeye Brook and minimize Airport Road relocation; includes a Main Avenue tunnel and partially relocates the east end of Airport Road



- IP Option E, designed to avoid Buckeye Brook and minimize Airport Road relocation; includes a Main Avenue tunnel and partially relocates the east end of Airport Road

Each Level 4 IP Option was designed to a conceptual level (30 percent design) and the environmental consequences of each were assessed and compared to the No-Action Alternative. In addition to considering community and natural resource impacts associated with each IP Option, FAA determined that placing Main Avenue in a tunnel would not be practicable for public safety considerations<sup>32</sup> and cost. All IP Options with the Main Avenue Tunnel (IP Options A, C, D, and E) were eliminated from further consideration. The only IP Option that does not include a Main Avenue Tunnel is IP Option B, which was moved forward in the alternatives consideration.

### **ES.3.3 Level 5 Alternatives Screening**

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In the Level 5 screening, IP Option B was further refined to evaluate several different lengths for Runway 5-23 (shorter Runway 5-23 lengths were considered to reduce community and natural resource impacts) and to consider project phasing. The alternatives with shorter Runway 5-23 lengths (8,700 feet and 8,300 feet) were developed based on physical constraints (stream channel of Buckeye Brook and Main Avenue; existing residences and businesses) and to reduce environmental impacts to the greatest extent practicable while meeting the Purpose and Need. The Level 5 Alternatives were developed and refined through an iterative process, taking environmental impacts and program element utility into account. All Level 5 Alternatives were developed to avoid a Main Avenue tunnel.

The Level 5 Alternatives include:

- No-Action Alternative
- Alternative B1 with a 9,350-foot Runway 5-23 extended to the north, Partially Relocated Airport Road at Tennessee Avenue, Fully Relocated Airport Road, and Integrated Cargo Site 3
- Alternative B2 with an 8,700-foot Runway 5-23 extended to the north and south, Partially Relocated Airport Road at Tennessee Avenue, Fully Relocated Airport Road, and Integrated Cargo Site 3
- Alternative B3 North with an 8,300-foot Runway 5-23 extension to the north and south, Fully Relocated Airport Road, and Integrated Cargo Site 3
- Alternative B4 with an 8,700-foot Runway 5-23 extended to the south, Partially Relocated Airport Road at Hasbrouck Avenue, Realigned Main Avenue, and a split Integrated Cargo Facility on the north apron
- Alternative B3 South with an 8,300-foot Runway 5-23 extended to the south, Partially Relocated Airport Road at Hasbrouck Avenue, Realigned Main Avenue, and a split Integrated Cargo Facility on the north apron

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<sup>32</sup> Currently, RIDOT does not own or operate any tunnels, and expressed concern about public safety.



#### **ES.3.3.1 Alternative B1**

Alternative B1 was developed to minimize impacts to residential communities and natural resources south of the Airport. Runway 5-23 would be extended north approximately 2,200 feet and would require a full relocation of Airport Road. Alternative B1 shifts Runway 16-34 north along its centerline approximately 400 feet to accommodate the enhanced RSAs on the Runway 16 and 34 Ends and to minimize impacts to natural resources on the Runway 34 End. Airport Road would be fully relocated from Warwick Avenue to Post Road with a direct connection to Route 37 to accommodate the Runway 5-23 extension and the Runway 16-34 safety enhancements.

In response to the substantial community and wetland impacts identified in the Level 4 Screening Step, the FAA evaluated shorter Runway 5-23 lengths. An additional runway length and utility analysis was conducted to evaluate options with a shorter extension to Runway 5-23 to the north and south (Alternatives B2 and B4 to 8,700 feet and Alternative B3 North and South to 8,300 feet).

#### **ES.3.3.2 Alternative B2**

Alternative B2 was developed to minimize impacts to natural resources and residential communities south and north of the Airport. Alternative B2 extended the Runway 23 end as far north as possible without impacting Buckeye Brook, and identified design modifications at the Runway 5 End that could allow the runway to be extended to the south. Through an engineering analysis, it was determined that it would be possible to raise the grade of the Runway 5 End by six feet. This would avoid impacts to Main Avenue, allowing it to remain outside of the Runway OFA while still providing sufficient clearance for departing and arriving aircraft. The maximum runway length that could be achieved by this modification is 8,700 feet. Runway 5-23 would be extended approximately 600 feet north and 930 feet south for a total of 8,700 feet. Fully Relocated Airport Road was designed to remain outside of the Runway 23 End Runway Protection Zone (RPZ), following FAA direction. The Runway 16-34 safety enhancements and Fully Relocated Airport Road would be the same as Alternative B1. Engineered Materials Arresting System (EMAS)<sup>33</sup> would be used on the Runway 23, 5, and 34 Ends.

#### **ES.3.3.3 Alternative B3 North**

Alternative B3 North was developed to minimize impacts to natural resources and residential communities south and north of the Airport. Alternative B3 North includes a runway extension that would extend Runway 5-23 as far north as possible without impacting the stream channel of Buckeye Brook. The maximum runway length possible given these constraints is 8,300 feet. The runway extension would be located on airport property, but would still require the full relocation of Airport Road. Fully Relocated Airport Road was designed to remain outside of the Runway 23 End RPZ in compliance with FAA guidance at that time. Runway 5-23 would be extended approximately 600 feet north and 530 feet south to a total length of 8,300 feet by shifting the runway thresholds both north and south. The Runway 16-34 safety enhancements, Fully Relocated Airport Road, and the Integrated Cargo Facility would be the same as Alternatives B1 and B2. EMAS would be used at the Runway 23 and 34 Ends.

#### **ES.3.3.4 Alternative B4**

In 2008, after a review of impacts to natural resources and community disruption for Alternatives B1 and B2, and in response to stakeholder concerns, RIAC initiated a study to determine if another option could be developed that

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<sup>33</sup> Engineered Materials Arresting System (EMAS) is a soft concrete material that can safely decelerate an aircraft to a complete stop with minimal damage if the aircraft overshoots the runway. It is typically placed within a 500-foot wide safety area that extends 600 feet beyond the end of the runway, and allows for a standard RSA that is less than 1,000-feet long.



would limit community disruption and environmental impacts. This study led to the development of Alternative B4. Alternative B4 was developed to:

- Minimize impacts to the residential communities and businesses
- Reduce mandatory land acquisition for construction by limiting construction as much as possible to land located south of the Runway 5 End already owned by RIAC
- Avoid the need to tunnel Main Avenue by adding fill to the Runway 5 End and constructing an effective and efficient realignment of Main Avenue
- Minimize impacts to natural resources north of the Airport including avoiding impacts to Buckeye Brook south and north of the Airport

In addition to environmental and community impacts, the FAA also considered construction and land acquisition program costs.<sup>34</sup> The FAA prepared preliminary cost data for Alternatives B1 and B2 based on the 30 percent level design drawings and a preliminary estimate of mitigation costs. The FAA estimated that the program's total cost would be over \$500 million. A major cost associated with both alternatives was Fully Relocated Airport Road, which would cost an estimated \$50 million. The FAA worked with the U.S. Army Corps of Engineers (USACE) and other federal and state agencies to look at other options to reduce environmental impacts and lessen community disruption. Alternative B4 would extend Runway 5-23 south approximately 1,530 feet for a total of 8,700 feet and remain within RIAC-owned land. Alternative B4 shifts Runway 16-34 north approximately 100 feet to accommodate the enhanced RSAs and minimize impacts to businesses on the Runway 16 End and limit mandatory acquisition for construction on the Runway 34 End.

The Runway 16-34 safety enhancements would require a partial relocation of Airport Road at the intersection of Post Road and Airport Road. Airport Road would be partially relocated to the north. Alternative B4 would require Main Avenue to be realigned to the south at the Runway 5 End. EMAS would be used on the Runway 5, 16, and 34 Ends. The Integrated Cargo Facility would consist of a split operation in the vicinity of Site 3 including the reuse of existing Hangar No. 2, where cargo operations currently are housed, and a new cargo building east of the Runway 16 End. Wetland impacts were minimized at the AMF access road.

Key elements of Alternative B4 (all the safety projects as well as the extension of Runway 5-23, and related preparatory/associated work) could be completed by the end of 2015. This expedited schedule, proposed by RIAC, would only be possible for Alternative B4 because it would require substantially fewer parcels for mandatory land acquisition for construction than would be required to construct Alternatives B1 and B2. Some of the benefits associated with an accelerated schedule would be the earlier realization of important safety and operational benefits, earlier resolution of homeowner uncertainty regarding the necessary associated property acquisitions, shortening the overall timeframe for community disruption and temporary construction impacts, acceleration of enhancements that will accommodate West Coast flights, and attendant revenue and local economic benefits.

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<sup>34</sup> If RIAC applies for a Letter of Intent under the AIP, the FAA will require a benefit-cost-analysis according to FAA Order 5100.38C page 186 b.





#### **ES.3.3.5 Alternative B3 South**

The FAA developed a second conceptual layout of an alternative with a Runway 5-23 extension to 8,300 feet to explore an alternate layout with different impacts and costs than Alternative B3 North. This layout is referred to as Alternative B3 South. After the development of Alternative B4, the FAA revisited an alternative with a runway length of 8,300 feet to evaluate if this alternative, with reduced impacts and construction costs, would be retained.

With the same general configuration and engineering solution as Alternative B4, Alternative B3 South would extend Runway 5-23 to a total of 8,300 feet and would remain on-Airport property, but would still require a realignment of Main Avenue within the OFA to allow for sufficient aircraft clearances. For this alternative, Runway 5-23 would be extended approximately 1,100 feet south to a total length of 8,300 feet by shifting the Runway 5 threshold to the south. Alternative B3 South shifts Runway 16-34 north approximately 100 feet to accommodate the enhanced RSAs and minimize impacts to businesses on the Runway 16 End. The Runway 16-34 safety enhancements would require a partial relocation of Airport Road at the intersection of Post Road and Airport Road. Airport Road would be partially relocated to the north. The existing Airport Road would remain in the Runway 23 End RPZ. EMAS would be used on the Runway 5, 16, and 34 Ends. The Integrated Cargo Facility would consist of a split operation in the vicinity of Site 3 including the reuse of existing Hangar No. 2, where cargo operations currently are housed, and a new cargo building east of the Runway 16 End.

#### **ES.3.3.6 Construction Phasing**

The Level 5 environmental consequences analysis assumed the following construction phasing schedule:

- 2015: Interim Build year (implementation of all Safety Enhancement Elements, including partial relocation of Airport Road). For Alternatives B4 and B3 South only, Runway 5-23 extension would also come on line in 2015.
- 2020: Build year (all runway enhancements and other program elements, including Efficiency Enhancements and roadway improvements completed and in operation).
- 2025: Design year (represents the future growth with all program elements in place for more than five years).

For Alternatives B4 and B3 South only, an expedited construction schedule is possible because the number of parcels required for mandatory land acquisition for construction would be substantially fewer than the number of parcels that would be required to construct Alternatives B1, B2, and B3 North. The construction phasing schedule for Alternatives B4 and B3 South proposes that the efficiency enhancement elements (the Runway 5-23 extension and associated required realignment of Main Avenue) would be complete by 2015 along with the safety enhancements (Runway 16-34 and the partial relocation of Airport Road).

#### **ES.3.3.7 Comparison of the Level 5 Alternatives**

The following section compares the utility and impacts of the Level 5 Alternatives

##### **Comparison of Alternatives B2 and B3 North**

The purpose of the Runway 5-23 extension is to “enhance the efficiency of the Airport and the New England Regional Airport System, to more fully meet the current and anticipated demand for aviation services.” The goal of the runway extension is to maximize the operational flexibility of the airport to the greatest practical extent to



allow non-stop West Coast passenger airline service with a variety of aircraft types. Airlines prefer to have the ability to operate at maximum gross takeoff weight, or as close as practicable, as much as possible because it represents a full passenger and cargo load, thereby maximizing the profitability of each flight.

The flexibility of the airfield to accommodate various aircraft types that are capable of operating non-stop to West Coast destinations at maximum gross takeoff weight decreases as the length of the proposed runway extension decreases. Therefore, the flexibility of Alternative B3 North is less than Alternative B2 because it would be able to accommodate one less West Coast capable aircraft than Alternative B2 at maximum gross takeoff weight, and two fewer aircraft with reductions in belly cargo payload. Alternative B3 North would also cost \$15 million, or approximately 12 percent, less than Alternative B2 and result in substantially similar environmental impacts.

RIAC considered that an 8,700 foot runway would accommodate a substantially greater percentage of West Coast capable aircraft and passengers than an 8,300 foot runway, with only slightly higher costs and residential parcel acquisitions. Based on the implications of the passenger differential, The RIAC Board decided not to support Alternative B3 North because it would decrease the likelihood that an airline would choose to commence non-stop West Coast service from T.F. Green Airport. The RIAC Board resolution on May 30, 2007 states that "an 8300 foot Runway 5-23 conceptual option will not produce the level of service benefits sought to be achieved through the Airport Improvement Program as generally stated in the EIS Purpose and Need Statement and will provide only limited potential environmental and costs savings benefits over those provided by an 8700 foot Runway 5-23 alternative."

An 8,700-foot runway maximizes the flexibility of the airfield within the constraints surrounding the Airport, and meets the Purpose and Need of the proposed T.F. Green Airport Improvement Program by enhancing the efficiency of the Airport and the New England Regional Airport System, to more fully meet the current and anticipated demand for aviation services. Therefore, Alternative B2 was advanced to the Level 5 environmental consequences screening step. Conversely, FAA determined that Alternative B3 North (extending Runway 5-23 to 8,300 feet) would not meet the Purpose and Need as fully as Alternative B2 because it would not enhance the efficiency of the New England Regional Airport System as greatly as an alternative with a 8,700-foot runway extension and RIAC determined it was not practicable to justify the financial investment. Therefore, FAA did not advance Alternative B3 North further in the alternatives screening process.

#### **Comparison of Alternatives B4 and B3 South**

Alternative B3 South Runway 5 23 extension to 8,300 feet would result in substantially similar noise impacts, Section 4(f) impacts, historical resources impacts, construction impacts and costs, and identical impacts to wetlands and floodplains as Alternative B4 (see Section 3.7.3, *Level 5 Screening Step 3 - Development of Alternatives B4 and B3 South*, of Chapter 3, *Alternatives Analysis* of the FEIS). RIAC evaluated this additional analysis and reaffirmed its position in 2010 that "a runway length of 8,300 feet for Runway 5-23 would not meet the service benefits sought to be achieved as generally stated in the EIS Purpose and Need statement, and provide only limited potential environmental and cost savings benefits over an 8,700 foot runway."<sup>35</sup> FAA did not advance Alternative B3 South further in the alternative screening process because it would result in a decreased likelihood

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<sup>35</sup> See April 22, 2010 Letter from RIAC to FAA in DEIS Supporting Attachment E.A.6, *RIAC Decision Documents*, in DEIS Appendix E, *Alternatives Analysis*.





that an airline would choose to commence non-stop West Coast service due to the runway utility findings presented in this section, and its potential environmental impacts would be substantially similar to Alternative B4.

#### **Practicability Analysis of Alternative B1**

Although Alternative B1, with a Runway 5-23 extension to 9,350 feet, most fully meets the Purpose and Need, it also has the greatest impacts to natural resources and the community, and has the highest costs. Mitigation for Alternative B1 adverse environmental impacts would be substantial and likely not possible to mitigate (i.e., impacts to wetlands).

Based on the Level 5 impact analysis of wetlands, Alternative B1 would result in wetland impact more than two and a half times greater than either Alternative B2 or B4. The selection of Alternative B1 is inconsistent with federal and state regulations and policies governing federal activities which alter wetlands.

Conceptual mitigation opportunities for Alternative B2 and B4 appear practicable. Developing and implementing a compensatory wetland mitigation program for Alternative B1, even if possible, would be substantially more costly and difficult to achieve especially given the impact to higher values of wetlands and streams. Based on these considerations, Alternative B1 is impracticable and is eliminated from further consideration. Therefore, only Alternatives B2 and B4 were carried forward in the Level 6 analysis.

#### **ES.3.4 Level 6 Alternatives Screening**

The Level 6 screening step was required because of changes in aviation forecasts. In 2009, the 2004 forecasts that formed the basis for the EIS environmental analysis were reviewed to determine if they were current with the state of the aviation industry and consistent with the FAA's latest approved TAF (2008). The forecast review found that the forecast differed from the TAF by over 30 percent, well above the 10 to 15 percent deviation identified in FAA's NEPA Orders.<sup>36</sup> The EIS Forecast for the No-Action Alternative was updated (2009 Forecast), which in turn prompted a revised analysis of the environmental categories that are dependent on the number of aircraft operations for their impact assessment. The analysis conducted in Level 6 used the 2009 Forecast. The Level 6 Alternatives analyzed with the revised No-Action Alternative 2009 Forecast include:

- No-Action Alternative (see Figure ES-5)
- Alternative B2 (8,700-foot Runway 5-23 extended to the north and south)
- Alternative B4 (8,700-foot Runway 5-23 extended to the south)

The environmental analysis performed in the Level 6 screening compared the No-Action Alternative to Alternatives B2 and B4 and was discussed in detail in DEIS Chapter 5, *Environmental Consequences*. The Level 6 Screening includes a full comparison of the environmental impacts of the Level 6 Alternatives B2 and B4, and informs the FAA in its identification of the Preferred Alternative.

The environmental assessment of Alternatives B2 and B4 was reevaluated in the FEIS under again revised forecast conditions and is discussed below in Section ES.3.5, *FEIS Analysis – Final Alternatives*. A discussion of the FAA's

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<sup>36</sup> FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, U.S. Department of Transportation, April 28, 2006, paragraph 504b.



identification of the Preferred Alternative is in Section ES.5, *Identification of the Preferred Alternative and Environmentally Preferable Alternative*.

### **ES.3.5 FEIS Analysis - Final Alternatives**

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This section is a summary of the FEIS analysis, which includes additional environmental assessment of Alternatives B2 and B4 (refer to Figure ES-4a). This analysis concludes that Alternative B4 would have greater aviation benefits than Alternative B2, fewer community impacts related to land acquisition and increases in vehicle traffic noise, and lower construction costs. This analysis provides the basis for FAA's identification of Alternative B4 as the Preferred Alternative.

#### **ES.3.5.1 Final Alternatives**

This section describes the final alternatives analyzed in the FEIS. These include Alternative B2, Alternative B4, and the No-Action Alternative. The conceptual design of the FEIS Alternatives was the same as the 30 percent conceptual design underlying the alternatives analysis in the DEIS, except for modifications on the Runway 34 End to minimize wetland impacts.

#### **Alternative B2**

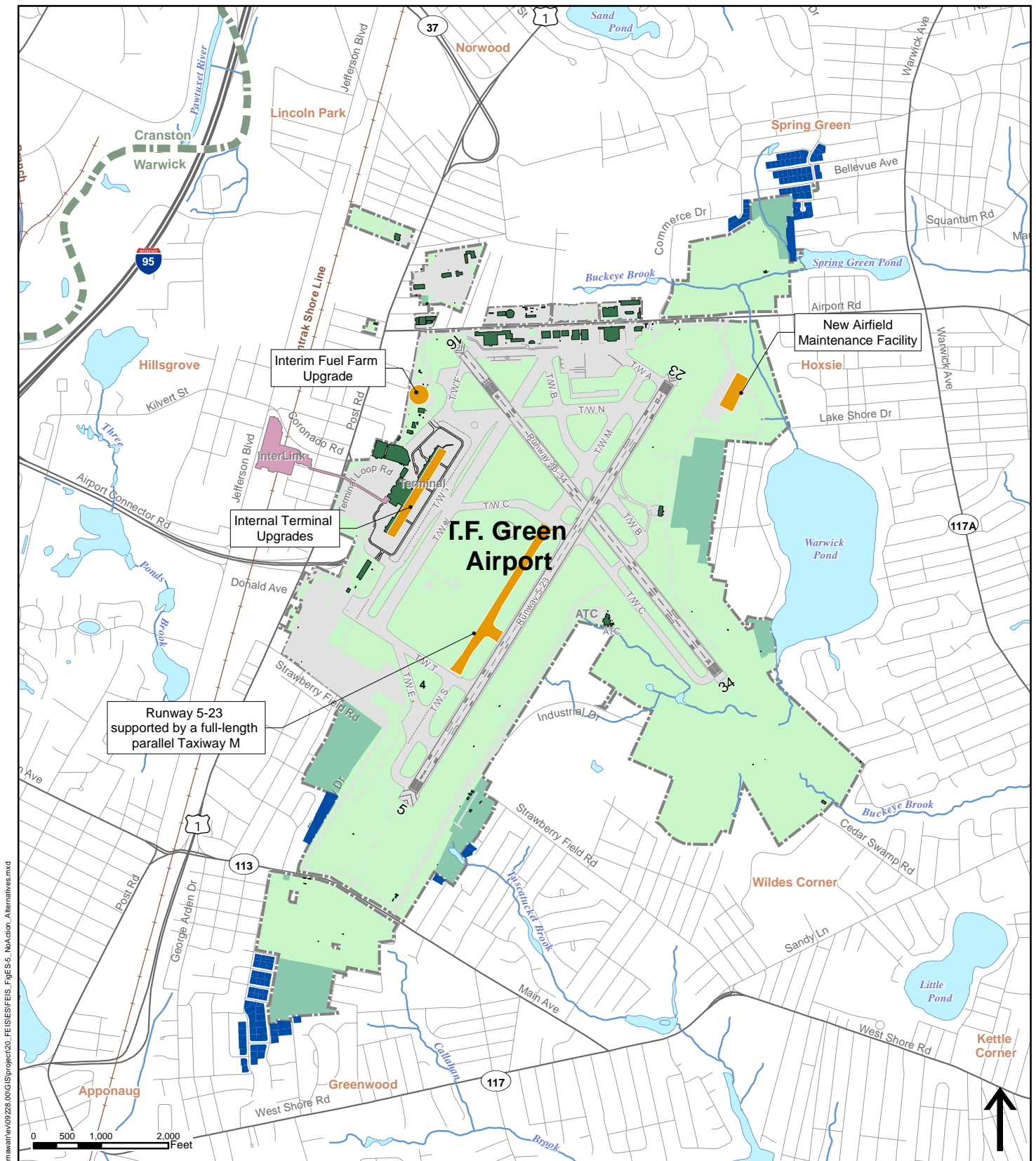
Alternative B2 (Figure ES-6) was developed to avoid impacts to Main Avenue and minimize impacts to natural resources and residential communities south and north of the Airport. Runway 5-23 would be extended approximately 600 feet north and 930 feet south for a total resulting length of 8,700 feet. The Runway 16-34 safety enhancements, Partially Relocated Airport Road, Fully Relocated Airport Road, and the Integrated Cargo Facility would be the same as Alternative B1. EMAS would be used on the Runway 23, 5, and 34 Ends.

The construction of Alternative B2 would be phased so that the safety enhancements associated with Runway 16-34 would be completed by the end of 2015, while the efficiency enhancements, including the extension of Runway 5-23, would be completed by 2020. As described above, the elements expected to be completed by the end of 2015 include:

- Runway 16-34 RSAs, taxiways and aprons, navigational aids and lighting, the Runway 16-34 Perimeter Road, drainage and utilities, necessary land acquisition, Delivery Drive relocation, and Partially Relocated Airport Road (to accommodate the Runway 16 End enhancements), including drainage and utilities and necessary land acquisition;
- Taxiway C Relocation; and
- Hangar No. 1 Demolition.

The elements expected to be completed by 2020 include:

- Runway 5-23 extension and safety areas, taxiways and aprons, navigational aids and lighting, the Runway 5-23 Perimeter Road, drainage and utilities, necessary land acquisition, and Fully Relocated Airport Road (to accommodate the Runway 5-23 extension), including drainage and utilities and necessary land acquisition;
- Runway 5-23 and 16-34 reconstruction and repaving; and
- Expanded passenger terminal and gates; new GSE facility; new belly cargo facility; new fuel farm; new Integrated Cargo Facility; expanded auto parking facilities; and reconfigured terminal access roadways.



## Legend

- No-Action Airport Property Boundary (2015)
- 2004 Airport Boundary
- Completed Part 150 VLP
- Airport Buildings
- Municipal Boundary
- No-Action Alternative Project
- Current Part 150 VLP

Note: New Deicer Management System to be constructed under the No-Action Alternative at an on-Airport location to be determined.



**Figure ES-5**

**No-Action Alternative:  
Conceptual Layout**

**T.F. Green Airport  
Improvement Program EIS**



#### Alternative B4

Alternative B4 (Figure ES-6) would have fewer mandatory land acquisitions and lower construction costs when compared to Alternative B2. Therefore, the phasing of Alternative B4 differs from that for Alternative B2. Because of the reduced costs, the safety projects and the extension of Runway 5-23 would be phased so that work could be completed by the end of 2015. Chapter 3, *Alternatives Analysis*, Section 3.7.3, *Level 5 Screening Step 3 - Development of Alternative B4 and B3 South*, provides more detail on the rationale for developing Alternative B4.

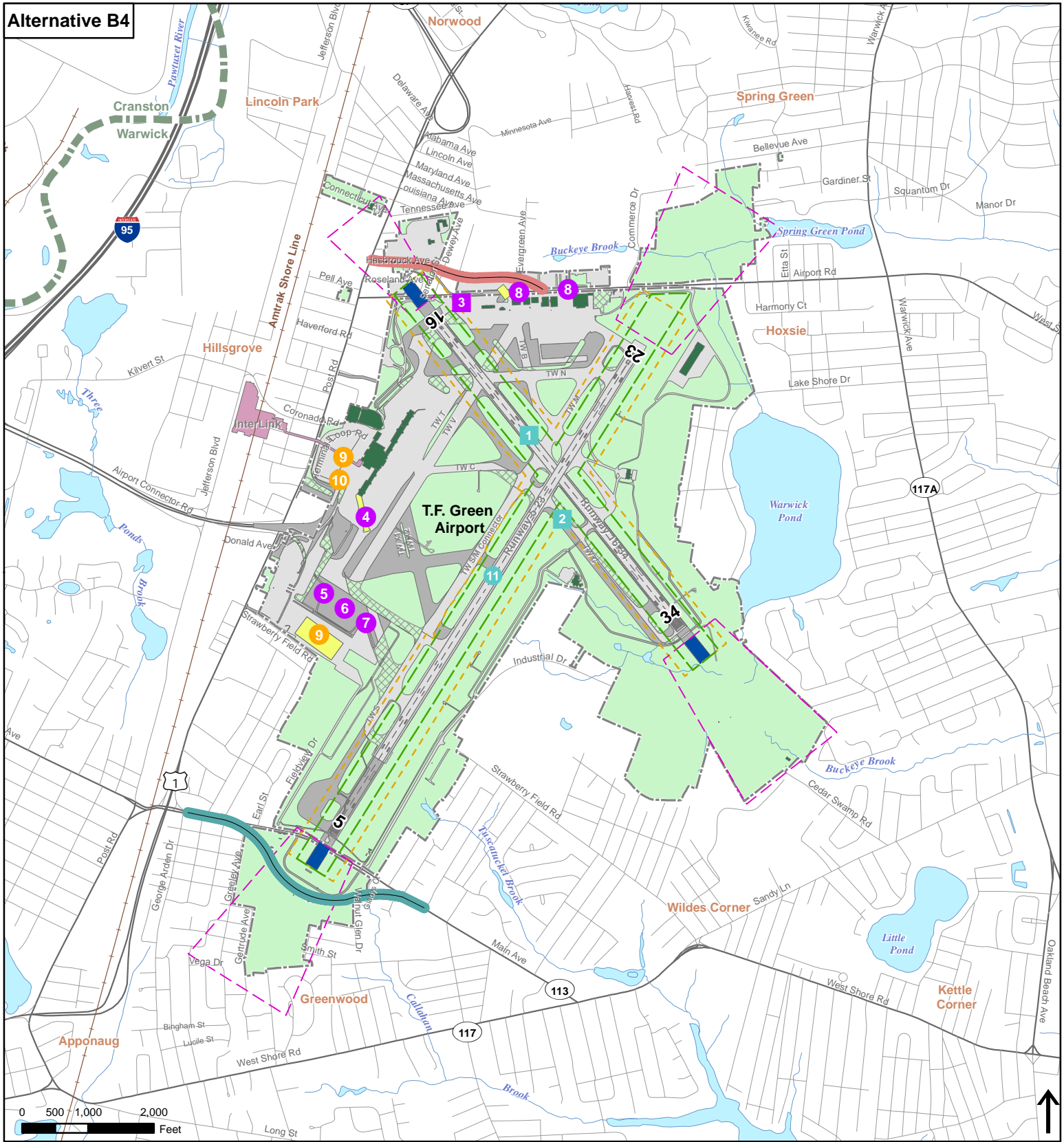
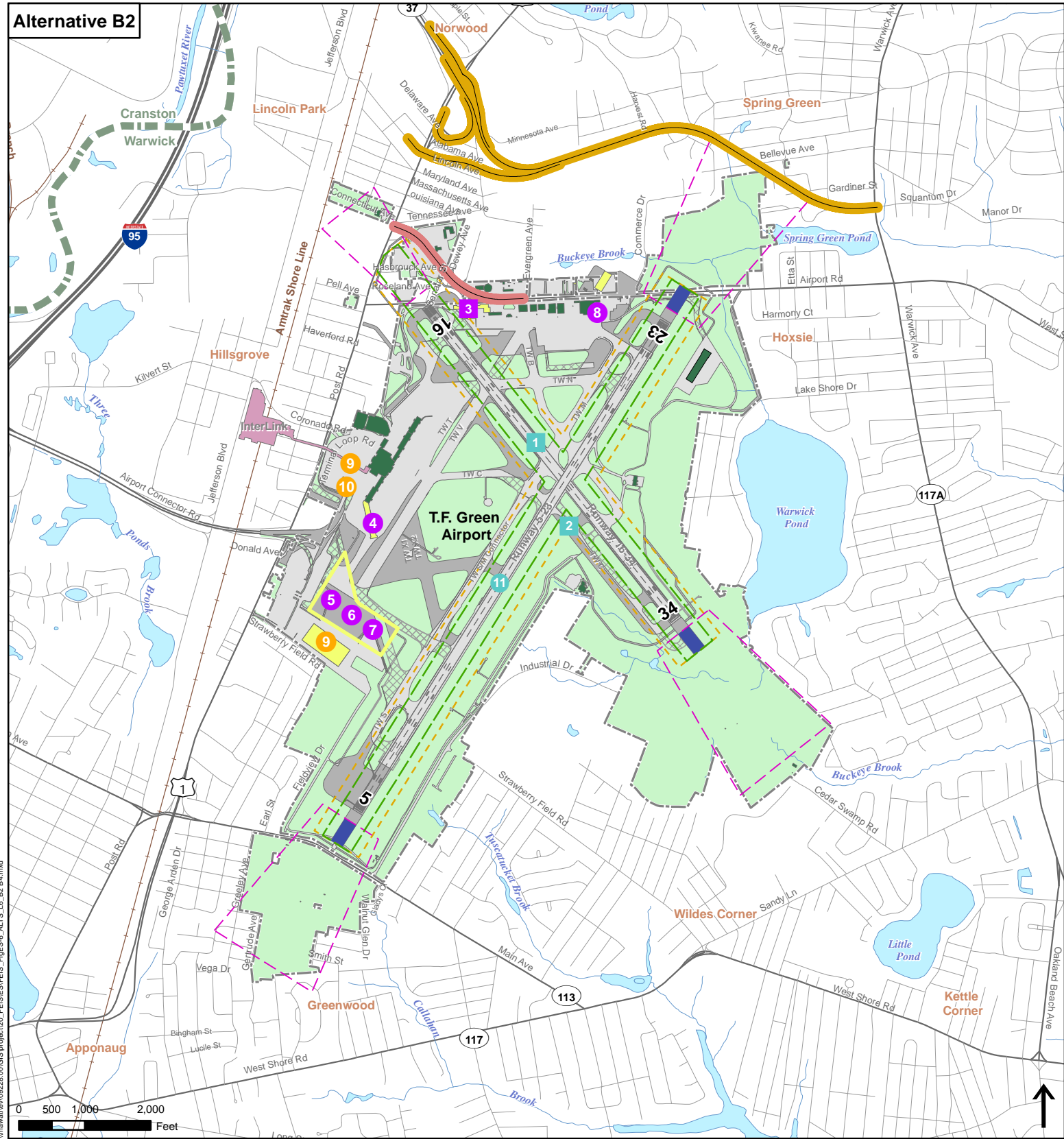
Alternative B4 would extend Runway 5-23 south approximately 1,530 feet for a total of 8,700 feet by the end of 2015. Alternative B4 shifts Runway 16-34 north approximately 100 feet to accommodate the improved RSAs and minimizes impacts to businesses on the Runway 16 End and impacts to natural resources on the Runway 34 End. The Runway 16-34 safety enhancements would require a partial relocation of Airport Road at the intersection of Post Road and Airport Road. Airport Road would be partially relocated to the north by the end of 2015. Main Avenue would be shifted to the south at the Runway 5 End by the end of 2015. EMAS would be used on the Runway 5, 16, and 34 Ends. The Integrated Cargo Facility would consist of a split operation in the vicinity of Site 3 including the existing Hangar No. 2, where cargo operations currently are housed, and a new cargo building east of the Runway 16 End.

In order to meet the FAA's deadline that all RSAs be brought up to standard by 2015, as well as to address community concerns about which houses would be acquired, RIAC is considering ways to move certain program elements forward. An expedited schedule is only possible for Alternative B4 because the number of parcels required for mandatory land acquisition for construction is substantially less than the number of parcels that would be required to construct Alternative B2. For Alternative B4 only, it is assumed that construction would be phased so that the safety enhancements associated with Runway 16-34 and the Runway 5-23 extension would be completed by the end of 2015. Specifically, those elements expected to be completed by the end of 2015 include:

- Runway 16-34 RSAs, taxiways, navigational aids and lighting, the Runway 16-34 Perimeter Road, drainage and utilities, land acquisition required for construction, Delivery Drive relocation, and Partially Relocated Airport Road (to accommodate the Runway 16 End Enhancements), including drainage and utilities and land acquisition required for construction;
- Taxiway C Relocation;
- Hangar No. 1 demolition; and
- Runway 5-23 extension and safety areas, taxiways and aprons, navigational aids and lighting, the Runway 5-23 Perimeter Road, drainage and utilities, land acquisition required for construction, and Realigned Main Avenue (to accommodate lengthening at the Runway 5 End), including drainage and utilities and land acquisition required for construction.

The Runway 5-23 and Runway 16-34 reconstruction and repaving and the remaining efficiency enhancement elements should be completed by 2020, including the expanded passenger terminal and gates; new GSE facility; new belly cargo facility; new fuel farm; new Integrated Cargo Facility; expanded auto parking facilities; and reconfigured terminal access roadways.





- Legend**
- No-Action Airport Property Boundary (2015)
  - Airport Buildings
  - EIS Project
  - Efficiency Enhancement Element
  - Safety Enhancement Element
  - Fully Relocated Airport Road (2020)
  - Partially Relocated Airport Road (2015)
  - Realigned Main Avenue (2015)
  - No-Action Existing Pavement
  - Proposed Pavement to be Removed
  - Proposed New Pavement
  - Runway Object Free Area
  - Runway Safety Area
  - Runway Protection Zone
  - EMAS

Note: New Deicer Management System to be constructed under the No-Action Alternative at an on-Airport location to be determined.

#### Airfield Facilities

- 1 Enhance Runway 16-34 Runway Safety Areas
- 2 Relocate Taxiway C
- 11 Extend Runway 5-23 to 8,700 Feet

#### Roadways and Parking Facilities

- 9 Expand Automobile Parking Facilities
- 10 Reconfigure Terminal Access Roadways

#### Terminal and Support Facilities

- 3 Demolish Hangar No. 1
- 4 Expand Passenger Terminal
- 5 Construct New Ground Support Equipment Facility
- 6 Construct New Belly Cargo and USPS Facilities
- 7 Construct New Fuel Farm
- 8 Construct New Integrated Cargo Facility



Figure ES-6

Alternatives B2 and B4  
(Conceptual Layouts)

T.F. Green Airport  
Improvement Program EIS



## **T.F. Green Airport Improvement Program**

Environmental Impact Statement and Final Section 4(f) Evaluation

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### No-Action Alternative

The future No-Action Alternative (Figure ES-5) provides a base scenario for assessing the impacts of Alternatives B2 and B4. The No-Action Alternative comprises any and all actions that RIAC intends to complete, independent of the T.F. Green Airport Improvement Program (i.e., projects would be undertaken whether or not the Improvement Program moves forward). The No-Action Alternative assumes that periodic maintenance and minor modifications needed to maintain safe operations at T.F. Green Airport would be undertaken. Other planned actions within, on, or near T.F. Green Airport, by RIAC (i.e., land acquisition under the Part 150 NCP) or by other parties (i.e., private development), are assumed in the No-Action Alternative to have occurred prior to constructing the first phase of the proposed Improvement Program (2015). Figure ES-5 identifies the No-Action Airport projects that would change the physical footprint of the Airport. These include the same projects mentioned in Section ES.3.4.1, *The No-Action Alternative*.

See Section ES.5, *Identification of the Preferred Alternative and Environmentally Preferable Alternative*, for a comparison of the Final Alternatives.

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## ES.4 Environmental Consequences and Proposed Mitigation

This section describes the environmental consequences of each Alternative considered in the FEIS analysis (No-Action Alternative, Alternative B2, and Alternative B4). The environmental consequences analyses consider impacts of Alternatives B2 and B4 as defined by the FAA's NEPA thresholds of significance (discussed further below) and provide additional analyses to gain a better understanding of the T.F. Green Airport Improvement Program's effects on the environment. Chapter 5, *Environmental Consequences*, documents the findings of the environmental analysis including cumulative impacts.

This section also summarizes the proposed mitigation measures for Alternatives B2 and B4 for significant impacts, identified pursuant to FAA Order 1050.1E (significance thresholds) and as required by NEPA, and for other impacts, as required for state and/or local regulatory compliance (presented more fully in Chapter 6, *Mitigation*). Chapter 5, *Environmental Consequences*, of this FEIS describes the avoidance and minimization measures for the environmental consequences, as required by NEPA.

The following provides a discussion of environmental consequences, including the potential significant adverse environmental impacts and other impacts as a result of Alternatives B2 and B4 that cannot be avoided. The environmental categories that distinguish the Alternatives from one another include:

- |  |                                       |
|--|---------------------------------------|
| ■ Noise  | ■ Section 4(f)/Section 6(f) Resources |
| ■ Compatible Land Use  | ■ Wetlands and Waterways              |
| ■ Social and Socioeconomic                                       | ■ Floodplains                         |
| ■ Historic, Architectural, Archaeological and Cultural Resources | ■ Surface Transportation              |



An overview of the environmental consequences for the other impact categories is also provided, including:

- Air Quality
- Water Quality
- Environmental Justice and Children's Health and Safety Risks
- Fish, Wildlife, and Plants
- Federal Threatened and Endangered Species
- Coastal Resources
- Farmlands
- Hazardous Materials and Solid Waste
- Light Emissions and Visual Environment
- Natural Resources and Energy Supply
- Construction Period

No significant adverse environmental impacts would result under either Alternative B2 or B4 for the environmental resource categories listed above.

#### **ES.4.1 Significance Thresholds**

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Significance thresholds identify the minimum attributes and/or characteristics that need to be present in a resource category (such as Noise, Water Quality, or Historic Resources) in order for that category to be identified as potentially adversely affected by the Alternatives. For each category, Alternatives B2 and B4 were compared to the No-Action Alternative to determine the effect (beneficial or adverse) of the Alternative. Where either alternative would result in an environmental impact, this FEIS provides an analysis of whether that impact is significant, based on FAA guidance provided in FAA Order 1050.1E, FAA Order 5050.4B, and the *Environmental Desk Reference for Airport Actions*.<sup>37,38,39</sup> A summary of the significant impact thresholds is provided in Table ES-1.

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<sup>37</sup> FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, FAA, United States Department of Transportation, March 20, 2006.

<sup>38</sup> FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, U.S. Department of Transportation, April 28, 2006.

<sup>39</sup> *Environmental Desk Reference for Airport Actions*, FAA, October 5, 2007.





# T.F. Green Airport Improvement Program

## Environmental Impact Statement and Final Section 4(f) Evaluation

Table ES-1 FAA Order 1050.1E Impact Thresholds for Significant Adverse Effects

Executive Summary Section	Impact Category	FAA Order 1050.1E Impact Threshold for Significant Adverse Effects	Is there a Significant Adverse Effect? Alternative B2/ Alternative B4
ES.4.3	Noise	When an action, compared to the no action alternative for the same timeframe, would cause noise-sensitive areas located at or above DNL 65 dB to experience a noise increase of at least DNL 1.5 dB.	Yes
ES.4.4	Compatible Land Use	See significance threshold for Noise (since land use compatibility is defined by noise levels).	Yes
ES.4.5; ES.4.6	Social and Socioeconomic Impacts, and Environmental Justice, Children's Health and Safety Risks	<p>For social and socioeconomic issues: When an action would cause:</p> <ul style="list-style-type: none"> <li>▪ Extensive relocation, but sufficient replacement housing is unavailable;</li> <li>▪ Extensive relocation of community businesses that would cause a severe economic hardship for affected communities;</li> <li>▪ Disruption in local traffic patterns that would substantially reduce the level of service of roads serving the airport and surrounding communities; or</li> <li>▪ A substantial loss in the community tax base.</li> </ul> <p>For environmental justice issues: When an action would cause disproportionately high and adverse human health or environmental effects on minority and low-income populations.</p> <p>For children's health and safety risks: When an action would cause disproportionate health and safety risks to children.</p>	No
ES.4.7	Surface Transportation	None established. See significance threshold for Social and Socioeconomic issues.	No
ES.4.8	Air Quality	When a project or action exceeds one or more of the National Ambient Air Quality Standards (NAAQS).	No
ES.4.9	Historical, Architectural, Archaeological, and Cultural	When an action adversely affects a protected property and the responsible FAA official determines that the information from the State and/or Tribal Historic Preservation Officer addressing alternatives to avoid adverse effects and mitigation warrants further study.	Yes
ES.4.10	Section 4(f) Resources <sup>1</sup>	A significant impact would occur pursuant to NEPA when a proposed action either involves more than a minimal physical use of a Section 4(f) property or is deemed a "constructive use" substantially impairing the property, and mitigation measures do not eliminate or reduce the effects of the use below the threshold of significance.	Yes
ES.4.11	Wetlands and Waterways	<p>When an action would:</p> <ul style="list-style-type: none"> <li>▪ Adversely affect a wetland's function to protect the quality or quantity of a municipal water supply, including sole source aquifers and a potable water aquifer</li> <li>▪ Substantially alter the hydrology needed to sustain the affected wetland's values and functions or those of a wetland to which it is connected</li> <li>▪ Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety, or welfare. The last term includes cultural, recreational, and scientific public resources or property</li> <li>▪ 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</li> <li>▪ Promote development that causes any of the above impacts</li> <li>▪ Be inconsistent with applicable state wetland strategies</li> </ul>	Yes



## T.F. Green Airport Improvement Program

### Environmental Impact Statement and Final Section 4(f) Evaluation

Table ES-1 FAA Order 1050.1E Impact Thresholds for Significant Adverse Effects (continued)

Executive Summary Section	Impact Category	FAA Order 1050.1E Impact Threshold for Significant Adverse Effects	Is there a Significant Adverse Effect? Alternative B2/ Alternative B4
ES.4.12	Water Quality	When an action would not meet water quality standards. Potential difficulty in obtaining a permit or authorization may indicate a significant impact.	No
ES.4.13	Fish, Wildlife, and Plants	For federally listed species: When the U.S. Fish and Wildlife Service or the National Marine Fisheries Service determines a proposed action would likely jeopardize a species' continued existence or destroy or adversely affect a species' critical habitat.  For non-federally listed species: Consider scientific literature on and information from agencies having expertise addressing on the affected species. Consider information on: project effects on population dynamics; sustainability; reproduction rates; natural and artificial mortality (aircraft strikes); and the minimum population size needed to maintain the affected population.	No
ES.4.14	Threatened and Endangered Species	See significance threshold for Fish, Wildlife, and Plants	No
ES.4.15	Floodplains	When notable adverse impacts on natural and beneficial floodplain values would occur.	Yes
ES.4.16	Coastal Resources	None established.	No
ES.4.17	Farmlands	When the total combined score on Form AD-1006 ranges between 200 and 260. Impact severity increases as the total score approaches 260.	No
ES.4.18	Hazardous Materials and Solid Waste	When an action involves a property on or eligible for the National Priority List (NPL). Uncontaminated properties within a NPL site's boundary do not always trigger this significance threshold.  For solid waste: None established.	No
ES.4.19	Light Emissions and Visual Impact	For light emissions: When an action's light emissions create annoyance to interfere with normal activities.  For visual effects: When consultation with federal, state, or local agencies, tribes, or the public shows these effects contrast with existing environments.	No
ES.4.20	Natural Resources, Energy Supply, and Sustainable Design	When an action's construction, operation, or maintenance would cause demands that would exceed available or future (project year) natural resource or energy supplies.	No
ES.4.21	Construction Impacts	See significance threshold for the resource(s) construction would affect.	No
n/a	Wild and Scenic Rivers	None established.	n/a
1	Section 4(f) of the <i>U.S. Department of Transportation Act of 1966</i> , 49 U.S.C., section 303(c) requires DOT agencies minimize harm to certain public resources. These resources, now collectively referred to as Section 4(f) resources, include publicly owned parks, recreation areas, wildlife or waterfowl refuges, or historic properties of national, state, or local significance.		
n/a	There are no designated wild and scenic rivers in Rhode Island.		

## ES.4.2 Analysis Years

The FEIS environmental consequences analysis assumes the following phasing schedule for Alternatives B2 and B4:

- 2015: Interim Build year (implementation of all Safety Enhancement Elements, including partial relocation of Airport Road. For Alternative B4 only, the extension of Runway 5-23 would be complete by the end of 2015);
- 2020: Build year (all runway enhancements and other program elements, including Efficiency Enhancements and roadway improvements completed and in operation); and
- 2025: Design year (represents the future growth with all program elements in place for more than five years).



For Alternative B4 only, RIAC is proposing an expedited construction schedule with the efficiency enhancement element (the Runway 5-23 extension and associated realignment of Main Avenue) to be completed by the end of 2015 along with the safety enhancements (Runway 16-34 and the partial relocation of Airport Road and Delivery Drive, demolition of Hangar No. 1, and relocation of Taxiway C). This schedule is possible for Alternative B4 because the number of parcels required for mandatory land acquisition for construction would be substantially less than the number of parcels that would be required to construct Alternative B2. Therefore, all environmental impact categories affected by aviation activities, as well as associated construction impacts and cumulative effects, have been assessed under the 2015 analysis year for Alternative B4 (including noise, land use, socioeconomic, environmental justice, surface transportation, air quality, historical resources, Section 4(f) and Section 6(f) resources, construction, and cumulative impacts). For the purposes of the FEIS, it is assumed that the runway extension would come online by the end of 2015 for Alternative B4 and by the end of 2020 for Alternative B2; therefore, project-related impacts and benefits associated with runway operations were considered for these years. In accordance with the NEPA and CEQ regulations, this chapter provides information and analysis sufficient to compare Alternative B2, Alternative B4, and the No-Action Alternative. Table ES-2 summarizes the analysis years evaluated for resource category.

**Table ES-2 Resource Categories Evaluated and FEIS Analysis Years**

Resource Category	Analysis Years		
	2015	2020	2025
Noise	X	X	X
Compatible Land Use	X	X	X
Social and Socioeconomic Impacts, and Environmental Justice and Children's Health and Safety Risks	X	X	X
Surface Transportation	X	X	X
Air Quality	X	X	X
Historic, Architectural, Archaeological, and Cultural Resources	X	X	X
Section 4(f) and Section 6(f) Resources	X	X	X
Wetlands and Waterways		X	
Water Quality	X	X	X
Fish, Wildlife, and Plants		X	
Federal Threatened and Endangered Species		X	
Floodplains		X	
Coastal Resources		X	
Farmlands		X	
Hazardous Materials, Pollution Prevention, and Solid Waste	X	X	
Light Emissions and Visual Environment		X	
Energy Supply, Natural Resources, and Sustainable Design		X	

Notes: Construction impacts are considered in each environmental category.

The environmental resource category of 'Wild and Scenic Rivers' is not included because there are no wild or scenic rivers within the State of Rhode Island, as defined by the *Wild and Scenic Rivers Act* of 1968.

**ES.4.3 Noise**

The FAA is required to determine how airport projects may change levels of aircraft noise and non-aviation noise affecting communities in areas surrounding the Airport. Changes in noise were assessed by comparing the noise levels for the No-Action Alternative with the noise levels predicted for Alternatives B2 and B4, and calculating the change in noise. The FEIS noise assessment evaluated three sources of noise to understand complete noise exposure resulting from the T.F. Green Airport Improvement Program. These include: noise associated with aircraft operations (or flights);<sup>40</sup> ground operations (for example, taxiing, idling, and ground and auxiliary power units); and traffic noise from vehicles, including trucks and cars on- and off-Airport roadways. The noise analysis was used to identify significant noise impacts on land use, historical sites, and public parks and recreation areas protected under Section 4(f).

**ES.4.3.1 Finding: Significant Noise Impacts**

As defined by FAA noise compatibility criteria, both Alternatives B2 and B4 would result in an increase of at least DNL 1.5 dB at or above DNL 65 dB<sup>41</sup> to noise-sensitive areas. Significant noise impacts were identified after accounting for all land acquisitions.<sup>42</sup> Project-related full parcel land acquisitions are summarized in Section ES.4.4, *Compatible Land Use*. Table ES-3 summarizes the significant noise impacts for Alternatives B2 and B4. Figures ES-7 and ES-8 illustrate the DNL 60, 65, and 70 dB contours and the areas of significant noise impacts for Alternatives B2 and B4, respectively. Alternative B2 would not result in a significant noise increase to any residential areas in 2015 since only the safety enhancements, which would not affect aircraft operations, would be implemented.

**Table ES-3 Alternatives B2 and B4: Summary of Significant Noise Impacts<sup>1,2</sup>**

Type	2015		2020		2025	
	Alt. B2	Alt. B4	Alt. B2	Alt. B4	Alt. B2	Alt. B4
Housing Units	.. <sup>3</sup>	184	74	174	49	108
Population	.. <sup>3</sup>	432	174	409	115	254
Non-Residential Noise-Sensitive Sites	.. <sup>3</sup>	2 <sup>4</sup>	0	2 <sup>4</sup>	0	3 <sup>4</sup>

Source: HMMH, 2009. U.S. Census Data, 2000. Although some 2010 census data was released in March 2011, a sufficient level of census data for the FEIS analysis was not released prior to the filing of the FEIS.

Notes: Compared to the No-Action Alternative. May include homes already sound insulated as part of a previous sound insulation effort under the Part 150 NCP.

1 Significant impacts are noise impacts that occur if analysis shows that the proposed action would cause noise-sensitive areas to experience an increase in noise of at least DNL 1.5 dB at or above DNL 65 dB noise exposure when compared to the No-Action Alternative for the same timeframe. These residences would be eligible for sound insulation mitigation.

2 Excludes people that would be relocated and housing units that would be acquired for construction (mandatory), noise mitigation under a Future Build VLAP and RPZ area clearing (voluntary participation by property owner).

3 Alternative B2 in 2015 is based only on runway safety enhancements, which would not change aircraft operations, and, therefore, does not require program-related significant impact analysis.

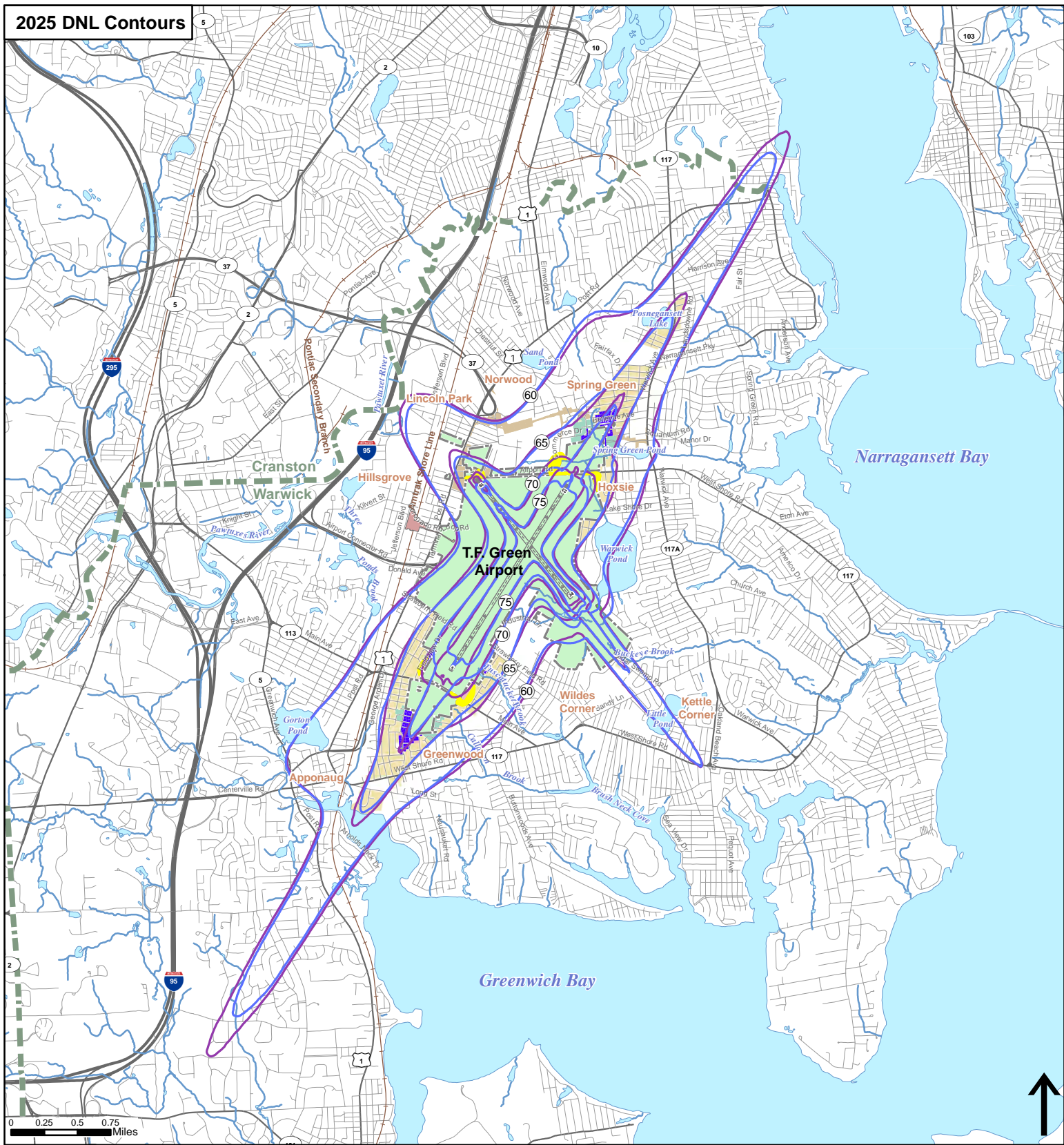
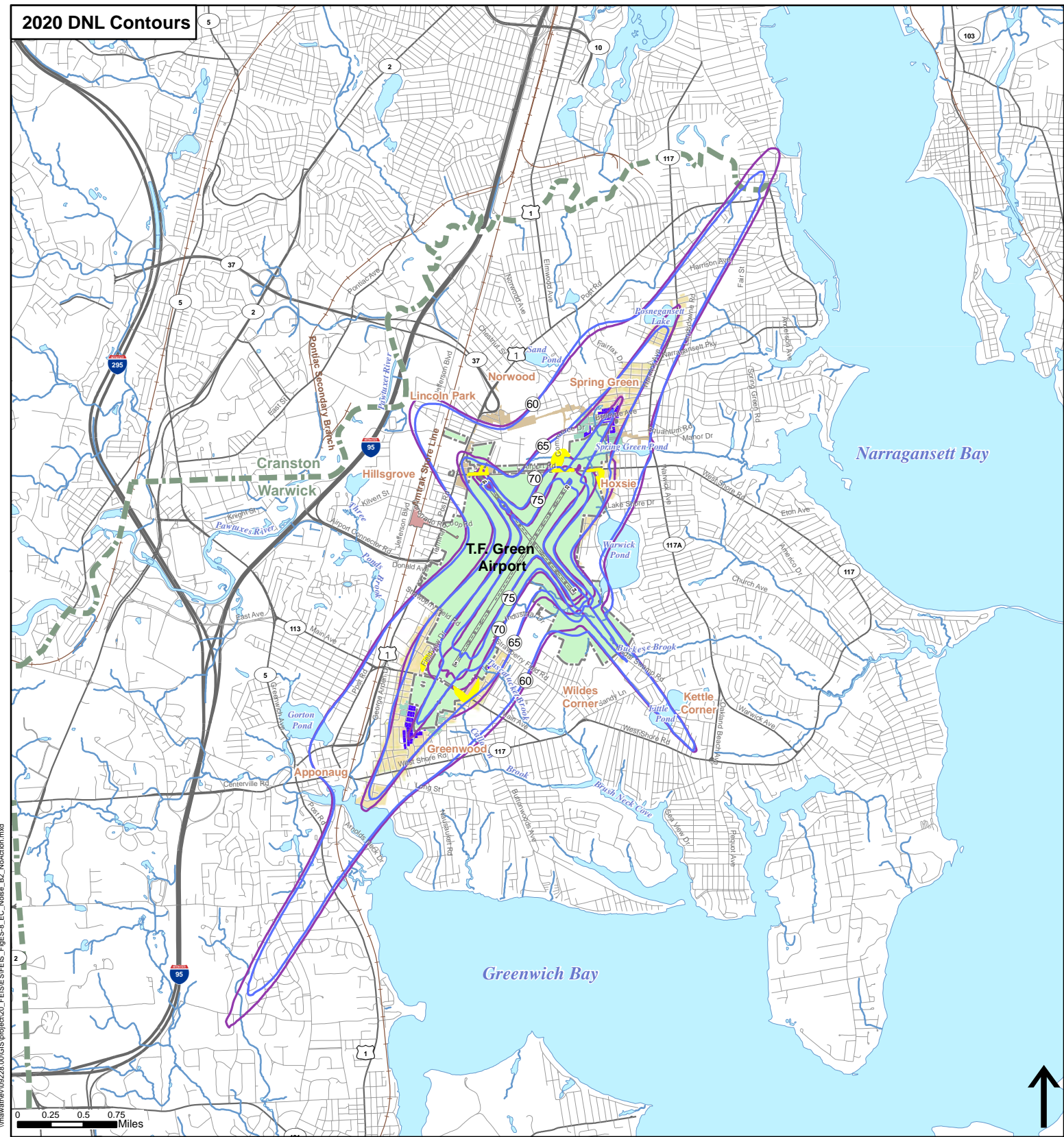
4 In both 2015 and 2020, Alternative B4 would expose two non-residential noise-sensitive properties to a significant increase in noise levels when compared to the No-Action Alternative: Jehovah's Witnesses of Warwick, Site PW017; and Baha'i Faith, Site PW039 (Figure 5-9). In 2025 under Alternative B4, three non-residential noise-sensitive sites would experience a significant noise increase: Jehovah's Witnesses of Warwick, Site PW017; Baha'i Faith, Site PW039; and the John Wickes School, Site SCH524. Baha'i Faith and the John Wickes School (SCH524) have been sound insulated as part of a previous sound insulation effort under the Part 150 NCP. Concurrent with the construction of the runway extension, RIAC will conduct additional acoustical testing of non-residential noise-sensitive properties that would be exposed to a noise level increase of at least DNL 1.5 dB at or above DNL 65 dB.

<sup>40</sup> An operation is defined as a takeoff or a landing.

<sup>41</sup> Changes in sound levels less than 1.5dB are imperceptible to the human ear.

<sup>42</sup> Including the Completed and Current Part 150 VLAPs associated with the No-Action Alternative, and project-related mandatory acquisition for construction, Future Build VLAPs for noise mitigation consistent with the Part 150 NCP, and for newly created RPZs, as recommended by the FAA.





### Legend

- No-Action Airport Property Boundary (2015)
- Municipal Boundary
- Mandatory Land Acquisition for Construction
- Voluntary Land Acquisition for 2020 Future Build VLAP\*
- Voluntary Land Acquisition for RPZ Impacts
- Voluntary Sound Insulation for Project-Related Noise Mitigation\*\*
- (dB) No-Action Alternative DNL Contour
- (dB) Alternative B2 DNL Contour
- Areas of Significant Noise Exposure Increase
- 1.5 dB Increase above 65 DNL

\* Assumes all residential parcels within the FEIS Alternative B2 2020 DNL 70 dB noise contour would be eligible for acquisition under a Future Build Voluntary Land Acquisition Program between 2020 and 2025. Under Alternative B4, residential parcels within the FEIS Alternative B4 2015 DNL 70 dB noise contour and Runway 5 End RPZ area would be eligible for acquisition between FY2012 and 2020 because of the expedited construction schedule.

\*\* May include homes already sound insulated.

Note: The No-Action Alternative includes the removal of the Winslow Park facilities within the Runway 5 End Runway Protection Zone.



Figure ES-7

**Alternative B2 and No-Action Alternative: Comparison of 2020 and 2025 Noise Contours and Areas of Significant Noise Impacts**

T.F. Green Airport Improvement Program EIS  
Source: Noise Contours (HMMH)

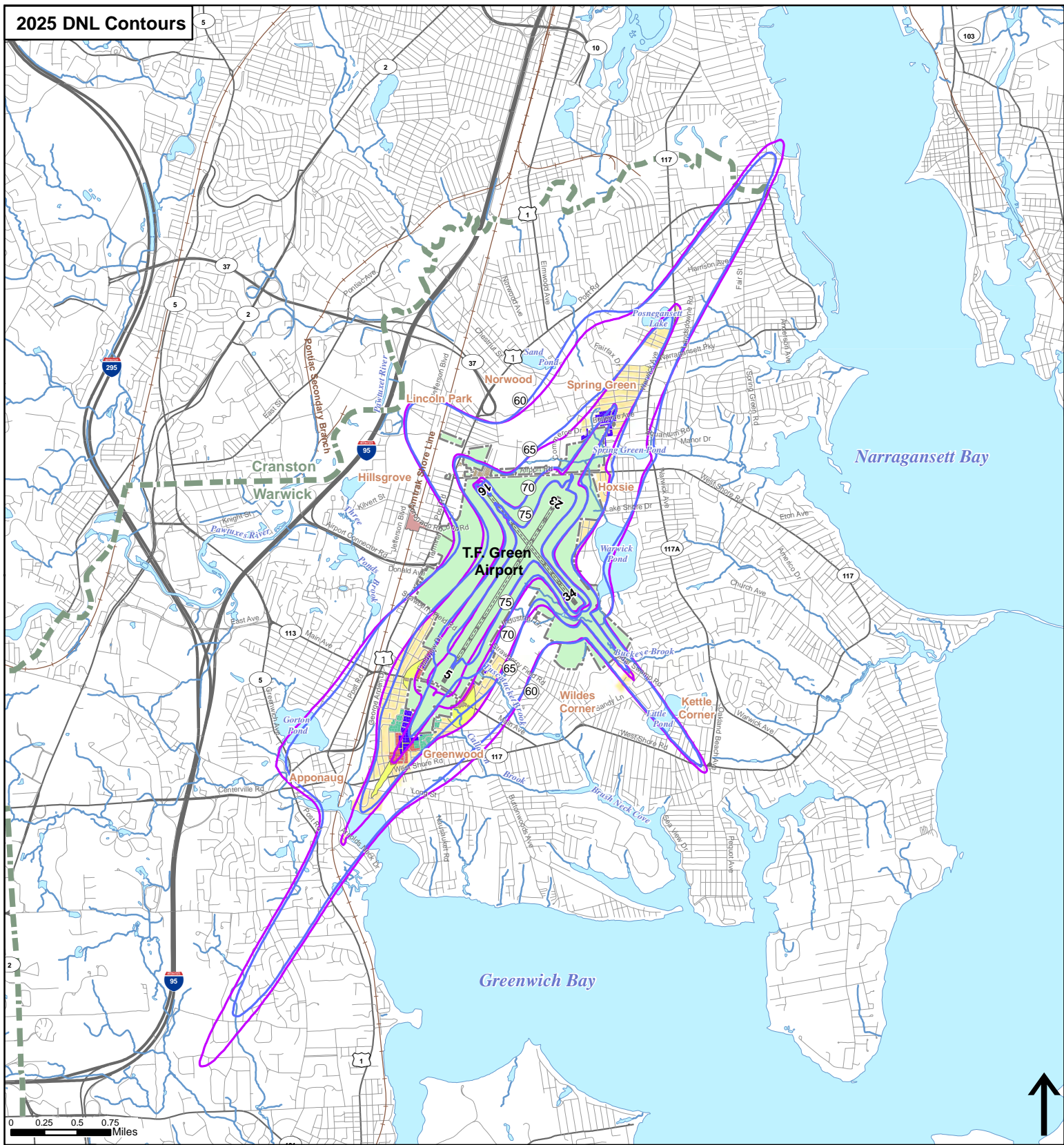
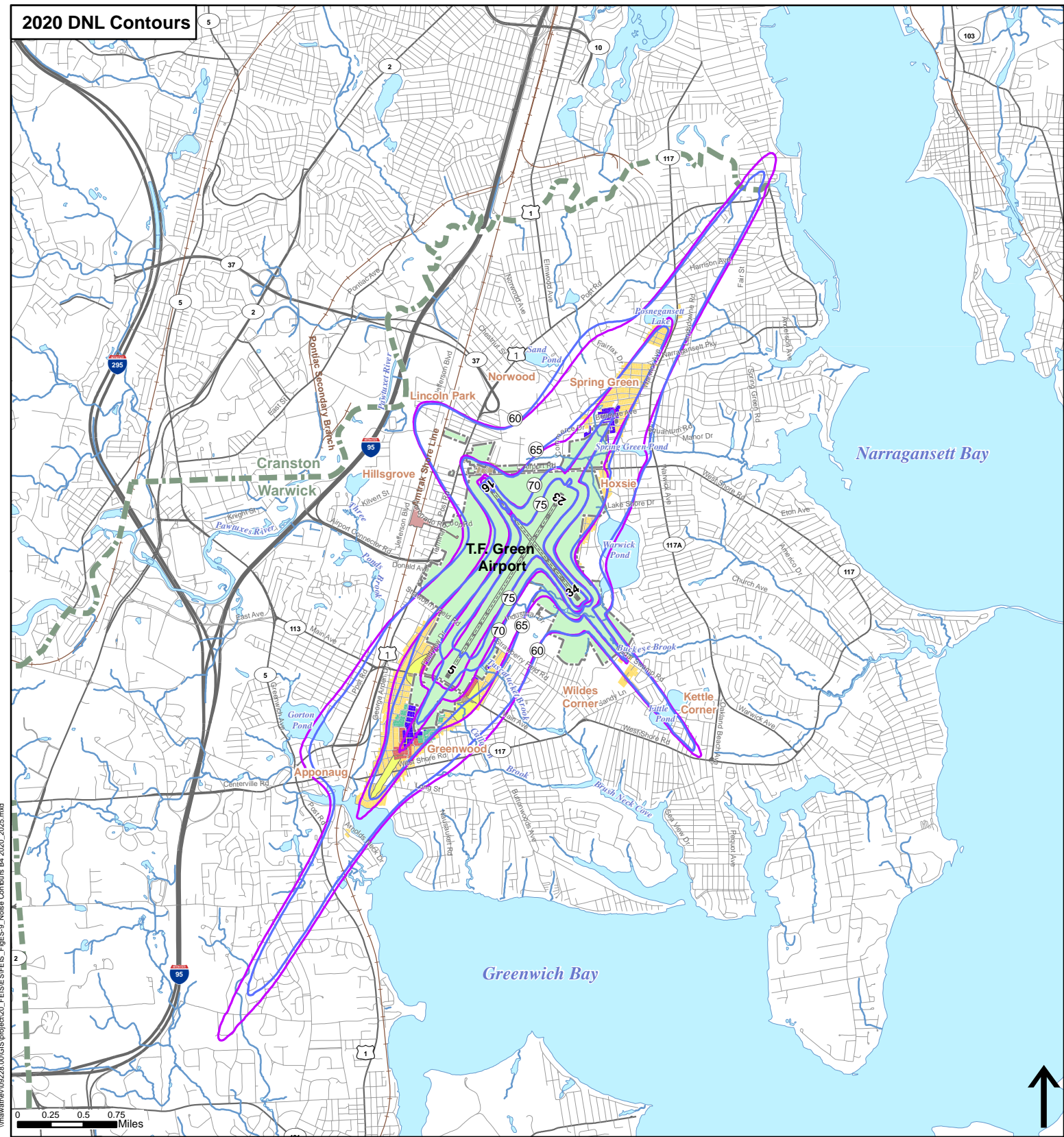


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- Legend**
- No-Action Airport Property Boundary (2015)
  - Municipal Boundary
  - Mandatory Land Acquisition for Construction
  - Voluntary Land Acquisition for Project-Related Noise Mitigation\*
  - Voluntary Land Acquisition for FAA-Recommended RPZ Clearing
  - Current Part 150 VLAP
  - No-Action Alternative DNL Contour
  - Alternative B4 DNL Contour

Voluntary Sound Insulation for Project-Related Noise Mitigation\*\*

**Areas of Significant Noise Exposure Increase**

1.5 dB Increase above 65 DNL

\* Assumes all residential parcels within the FEIS Alternative B2 2020 DNL 70 dB noise contour would be eligible for acquisition under a Future Build Voluntary Land Acquisition Program between 2020 and 2025. Under Alternative B4, residential parcels within the FEIS Alternative B4 2015 DNL 70 dB noise contour and Runway 5 End RPZ area would be eligible for acquisition between FY2012 and 2020 because of the expedited construction schedule.

\*\* May include homes already sound insulated.

Note: The No-Action Alternative includes the removal of the Winslow Park facilities within the Runway 5 End Runway Protection Zone.



**Figure ES-8**

**Alternative B4 and No-Action Alternative: Comparison of 2020 and 2025 Noise Contours and Areas of Significant Noise Impacts**

T.F. Green Airport Improvement Program EIS

Source: Noise Contours (HMMH)





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