# *Appendix A*
# *Responses to Comments*

T.F. Green Airport
Warwick, Rhode Island

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Prepared for **Federal Aviation Administration**

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# Acronyms

| | |
|---|---|
| AC | Advisory Circular |
| APE | Area of Potential Effect |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| CO | Carbon Monoxide |
| dB | Decibel |
| DEIS | Draft Environmental Impact Statement |
| DNL | Day-Night Average Sound Level |
| DOI | United States Department of the Interior |
| DOT | United States Department of Transportation |
| EDMS | Emissions and Dispersion Modeling System |
| EIS | Environmental Impact Statement |
| EMAS | Engineered Materials Arresting System |
| EO | Executive Order |
| EPA | United States Environmental Protection Agency |
| FAA | Federal Aviation Administration |
| FEIS | Final Environmental Impact Statement |
| FEMA | Federal Emergency Management Agency |
| FHWA | Federal Highway Administration |
| GIS | Geographic Information System |
| HAP | Hazardous Air Pollutant |
| HEC-RAS | Hydrologic Engineering Center's River Analysis System |
| INM | Integrated Noise Model |
| IP | Improvement Program |
| LEDPA | Least Environmentally Damaging Practicable Alternative |
| LOS | Level of Service |
| MA | Massachusetts |
| MOA | Memorandum of Agreement |
| NAAQS | National Ambient Air Quality Standards |
| NEM | Noise Exposure Map |
| NEPA | National Environmental Policy Act |
| NITHPO | Narragansett Indian Tribe Historic Preservation Office |
| $NO_X$ | Nitrogen Oxides |
| NPS | National Park Service |
| RI | Rhode Island |
| RIAC | Rhode Island Airport Corporation |
| RICRMC | Rhode Island Coastal Resources Management Council |
| RIDEM | Rhode Island Department of Environmental Management |
| RIDOT | Rhode Island Department of Transportation |
| RIHPHC | Rhode Island Historic Preservation and Heritage Commission |

| | |
|---|---|
| RIPDES | Rhode Island Pollution Discharge Elimination System |
| RISHPO | Rhode Island State Historic Preservation Office |
| ROD | Record of Decision |
| ROFA | Runway Object Free Area |
| RPZ | Runway Protection Zone |
| RSA | Runway Safety Area |
| SWPPP | Stormwater Pollution Prevention Plan |
| TAF | Terminal Area Forecast |
| U.S. | United States of America |
| USC | United States Code |
| USACE | United States Army Corps of Engineers |
| USFWS | United States Fish and Wildlife Service |
| VOC | Volitale Organic Compound |
| WHC | Warwick Historical Cemetery |

# A.1 Summary Responses

## A.1.1 Introduction

A total of 160 comment documents with over 2,000 individual comments were submitted during the comment period for the T.F. Green Airport Improvement Program Draft Environmental Impact Statement (DEIS) including letters, emails, and individual testimony at the August 17, 2010 public meeting. According to FAA Order 1050.1E (paragraph 506 m(3)), responses to comments on a DEIS may be "included or summarized and responded to in an attachment to the Final Environmental Impact Statement (FEIS), and if voluminous, may be compiled in a separate supplemental volume for reference." This FEIS provides both summary responses and responses to individual comments. This section provides the summary responses to comments on topics that were frequently submitted by commenters. In the individualized responses to comments following this document, the FAA may refer readers to a summary response which provides more detail on technical analyses, or provides a specific response to a particular comment. These summaries also provide the reader with an overview of the key issues that were raised during the DEIS comment period. The same summary responses are provided in both Volume 3 and Volume 4 for convenient reference for reviewers.

In some cases, the FAA undertook additional analyses that are documented in the main volumes of the FEIS in direct response to comments provided on the DEIS. As a result of these comments, the following additional studies were conducted:

- Assessment of changes to impervious surfaces;
- Revised hydrologic study;
- Revised pollutant loading analysis;
- Review of Heating, Ventilating, and Air Conditioning (HVAC) in schools (associated with sound insulation);
- Reviewed anticipated fleet mix for consistency with current aircraft in the T.F. Green Airport fleet mix; and

- Additional clarification of the Level 5 Alternatives screening analysis (Alternative B3 – 8,300 feet).

The FAA received many comments on water quality specific to the assumptions on impervious surfaces within the voluntary land acquisition area, design of stormwater management systems, and pollutant loading. As a result of agency comments that asked for a reexamination of the methodology for the calculation of impervious surfaces, the FEIS contains revised assumptions for impervious areas to include the removal of buildings and driveways only and does not include the removal of roadways as was done in the DEIS. In response to specific comments by agencies, the FAA conducted a preliminary hydrologic study for the FEIS to assess feasible locations, types, and sizes of stormwater best management practices (BMPs) for the T.F. Green Airport Improvement Program. Also, in response to comments, the FAA performed a new pollutant loading analysis in the FEIS. Please refer to the summary response below Section A.13, *Water Quality – New Analysis and Revised Assumptions,* for further details on the results of these new and/or revised analyses.

The FAA received comments from a public official and members of the public that requested additional analysis on air conditioning in Warwick public schools and its relationship to noise levels in schools. As a result of these comments, the FAA prepared an analysis of HVAC systems at City of Warwick public schools for the FEIS. The purpose of this analysis is to determine which educational institutions have air conditioning systems that permit building occupants to keep windows shut throughout the year and, for those that do not have year-round HVAC systems, determine how many days per year occupants are most likely to open the windows and thereby be exposed to aircraft noise. Please refer to Appendix F.5, *Education Facility HVAC Report*, of the FEIS for the results of this new analysis.

The FAA and RIAC have continued to work closely with federal, state, local, and tribal interests to further minimize impacts associated with the T.F. Green Airport Improvement Program. Since the filing of the DEIS, the FAA and RIAC have met with the Narragansett Indian Tribe Historic Preservation Office (NITHPO), the Rhode Island Department of Environmental Management (RIDEM), the Rhode Island Department of Transportation (RIDOT), the City of Warwick, the Rhode Island Historic Preservation and Heritage Commission (RIHPHC), and local non-governmental organizations (NGOs). In response to a specific agency comment on the DEIS, the FAA and RIAC have convened a wetland mitigation working group with the RIDEM, the U.S. Environmental Protection Agency (EPA), the U.S. Army Corps of Engineers (USACE), the Rhode Island Coastal Resources Management Council (RICRMC), and the Rhode Island Rivers Council to further develop and refine the wetland mitigation program for the FEIS. The wetland mitigation working group met on October 14, 2010 and February 15, 2011 to discuss the wetland mitigation program. The FAA also met with NGOs on November 4, 2010 in response to NGO comment letters requesting a meeting. During this meeting, the FAA and RIAC held an airport tour of wetlands, answered questions, and gathered feedback on potential wetland mitigation opportunities within the Buckeye Brook watershed.

This response to comments includes a list of frequently noted acronyms at the beginning of this volume. These acronyms are not spelled out each time they are referenced but included separately for convenient reference. Volume 3 contains comments and responses from federal and state agencies, NGOs, the general public, and the

USACE letter addressing comments that USACE received on the DEIS. Volume 4 contains the comments and responses from the City of Warwick only.

## A.1.2 NEPA Process

The FAA received questions and comments on the National Environmental Policy Act (NEPA) process including the steps in the process and how decisions are made. The purpose of this summary response is to address these comments.

RIAC is proposing a program of enhancements at T.F. Green Airport to enhance safety at the airport and improve transportation in the New England Region. As the lead federal agency, and in compliance with the National Environmental Policy Act of 1969,[1,2,3,4] the FAA has determined that, because of the potential for significant environmental impacts associated with the proposed T.F. Green Airport Improvement Program, it is necessary to prepare an EIS. On January 19, 2005, the FAA issued a notice in the Federal Register stating that an EIS will be prepared for airport projects proposed by RIAC.

The FAA has followed the NEPA process, which requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. The FAA prepared a DEIS to identify the potential environmental effects associated with the construction and operation of the T.F. Green Airport Improvement Program. The DEIS focuses on the impacts of the proposed projects, but also includes an evaluation of cumulative impacts. The DEIS identifies the purpose and need for the T.F. Green Airport Improvement Program, and conducts an extensive alternatives evaluation process.

The FAA evaluated and compared the impacts and benefits of each alternative to identify the Preferred Alternative. After considering the impacts of the T.F. Green Airport Improvement Program alternatives, the FAA identified a Preferred Alternative (Alternative B4), and identified appropriate mitigation associated with the Preferred Alternative.

The FAA conducted a public outreach program for the T.F. Green Airport Improvement Program EIS to solicit information relevant to the study from agencies and the public and to keep local officials, community members and other parties informed about the process and status of the EIS. Public outreach included an initial scoping meeting in 2002 and a second scoping meeting in 2005 when the project scope was revised. There were also four public information meetings, small group meetings, a public hearing on the DEIS, public notices, mailings, emails, newspaper and cable television advertisements, and a website (www.vhb.com/pvd/eis/) dedicated to the T.F. Green Airport Improvement Program.

1 *National Environmental Policy Act of 1969*, as amended.
2 *FAA Order 1050.1E, Environmental Impacts: Policies and Procedures [Change 1 Incorporated]*, FAA, United States Department of Transportation, Effective Date: March 20, 2006.
3 *FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, FAA, United States Department of Transportation, April 28, 2006.
4 *Environmental Desk Reference for Airport Actions*, FAA, October 5, 2007.

The FAA published the DEIS and distributed the report to the regulatory agencies and members of the public in July 2010. The FAA held a public hearing in August 2010. The FAA received comments on the DEIS from federal and state agencies, the City of Warwick, and other interested parties during the public comment period.

After receiving comments raised by reviewers of the DEIS, the FAA prepared this FEIS, which included additional analysis of Alternatives B2 and B4, provided greater detail on mitigation, and addressed reviewer comments on the DEIS.

There have been several areas of change between the DEIS and FEIS:

- Revision to the No-Action Alternative operations forecast.
- Use of updated noise and air quality models.
- Additional research on affected environment.
- Changes to potential impacts for some resource categories.
- Further refinement of mitigation.
- Identification and selection of a new Section 4(f) mitigation site (Cedar Swamp Road Site).

However, based on an assessment of changes in the Proposed Action that are relevant to environmental concerns, the FAA has reached the conclusion that none of these changes are substantially different when compared to the description of impacts in the DEIS. The FEIS sufficiently documents existing conditions and the potential effects of the proposed T.F. Green Airport Improvement Program. Therefore, the preparation of a Supplemental DEIS is not necessary. Appendix E, *Purpose and Need and Alternatives Analysis,* further explains why a Supplemental DEIS is not required.

Based upon the information in the FEIS, the FAA will issue a Record of Decision (ROD) that documents findings, projected environmental impacts, and required mitigation measures for identified significant and other adverse impacts. The Airport Layout Plan (ALP) will be updated following the issuance of the ROD.

## A.1.3 Aviation Activity Forecast and Aircraft Fleet Mix

Commenters provided comments on the aviation activity forecast and aircraft fleet mix used to define the purpose and need for the T.F. Green Airport Improvement Program and the runway length requirements of the primary runway at T.F. Green Airport, respectively.

### A.1.3.1 Aviation Activity Forecast

Comments on the DEIS related to: the overall level of operations and passengers that are forecast to occur with the EIS planning period, and the number of forecast non-stop West Coast operations under Alternatives B2 and B4.

#### A.1.3.1.1 Total Forecast Aircraft Operations and Passengers

Forecasts are based on a variety of factors, including historical trends; examination of existing and future economic, technological, and other operating considerations; and reflect an expertise and informed context for

projecting future demand levels in order to conduct appropriate mid- and long-term facility improvement planning and development. Aviation activity forecasts were prepared for T.F. Green Airport as part of a strategic master planning process to guide future development at the Airport. The forecast and subsequent development of alternatives to address facility needs are initial steps in the planning process. These steps are designed to allow RIAC to respond adequately with new capacity-related facilities (e.g., automobile parking facilities) to be implemented when they are necessary as the anticipated aviation demand materializes, and not after the fact when demand already exceeds capacity, resulting in operating inefficiencies. Capacity-related airport projects typically rely on existing and/or forecast aviation demand levels to justify project implementation. Airport safety- and efficiency-related projects, such as those comprising the T.F. Green Airport Improvement Program, do not necessarily rely on existing and/or forecast aviation demand levels for justification. The need for airport safety- and efficiency-related projects are based on meeting FAA airport design standards and changes in the flow of aircraft, passengers, and automobiles within an airport or regional airport system.

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 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 annual TAF for the airport, the FAA National Aerospace Forecast, regional-specific economic trends, regional airport system factors, and site-specific restraints to growth.

The FAA found that the 2004 forecast of aircraft operations and passenger enplanements (referred to herein as the 2004 DEIS Forecast) were no longer within the FAA consistency criteria.[5] Following the issuance of the DEIS in July 2010, the FAA monitored aviation activity and determined that actual and forecasted operations and passenger levels continued to decline at T.F. Green Airport. It then compared the DEIS aviation activity forecasts with the 2010 Draft TAF for reasonable consistency. This check was performed due to the rapid changes in the aviation industry. The FAA determined that while the changes did not affect the project purpose and need, the DEIS forecast was not within the percentage difference criteria. Rather than resolve the differences FAA updated the forecast[6]. Therefore, the FEIS was revised 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.[7]

As described in Appendix E.1, *Updated Forecast of Aviation Activity,* recent and historical trends in the actual number of flights at T.F. Green Airport (based on FAA Air Traffic Control Tower data) suggest that the assumptions used in the 2010 FEIS No-Action Alternative Forecast (based on the 2010 Draft TAF) are reasonable and that the FEIS forecast remains within acceptable limits of the 2010 Draft TAF.

5 *Federal Aviation Administration Advisory Circular 150/5070-6B*, *Airport Master Plans*, *Change 1.*
6 FAA Order 5050.4B and the FAA Master Plan Advisory Circular 150/5070-6B, state that EIS forecasts should be reasonably consistent with the FAA's TAF. This is defined as within 10 percent of the TAF for the 5-year analytical period and within 15% for the 10-year analytical period. Forecasts not meeting these criteria require consultation to resolve differences.
7 The 2010 Final 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 2010 Draft TAF (see Appendix E.1).

Appendix E.1, *Updated Forecast of Aviation Activity,* outlines the forecasting assumptions, methodology, and results. The methodology used to adjust the FEIS Forecast considered changes in the individual aircraft operator categories within the TAF. The TAF forecast is broken down into the following aircraft operator groups[8] - Air Carrier, Air Taxi, General Aviation, and Military. Therefore, the forecast adjustments accounted for changing percentages of aircraft operator categories at T.F. Green Airport over time. Due to the adjustment method to take into account aircraft operator category variations, the difference in total aircraft operations between the 2010 Draft TAF and the 2010 FEIS No-Action Alternative Forecast does not exactly equal 10 percent (but the two forecasts are still considered consistent with each other according to FAA criteria). Table A.3-1 summarizes the DEIS and FEIS Forecasts for the No-Action Alternative. Table A.3-2 summarizes the 2010 No-Action Alternative FEIS Forecast, which serves as the base forecast for the FEIS environmental analysis, and the Incremental Build Alternative Forecast, which accounts for the additional operations and passengers anticipated with the proposed runway extension. The 2010 FEIS Total Build Alternative Forecast includes the base 2010 FEIS No-Action Alternative Forecast and the Incremental Build Alternative Forecast.

**Table A.3-1 DEIS and 2010 FEIS No-Action Alternative Forecast Summary**

| | 2009 DEIS Analysis Consistent with the 2008 TAF | | 2010 FEIS Analysis Consistent with the 2010 Draft TAF[1] | |
|---|---|---|---|---|
| Year | Total Aircraft Operations | Total Passengers | Total Aircraft Operations | Total Passengers |
| 2004[2] | 121,428 | 5,509,186 | 121,428 | 5,509,186 |
| 2015[3] | 103,245 | 5,951,119 | 93,500 | 5,274,876 |
| 2020[3] | 109,913 | 6,694,257 | 99,330 | 5,844,797 |
| 2025[3] | 117,097 | 7,541,438 | 105,551 | 6,519,307 |

Sources: 2004 aircraft operations and passengers data provided from *T.F. Green Airport – Monthly Airport Passenger Activity Summary*, Rhode Island Airport Corporation, December 2004; Forecast aircraft operations and passengers adjusted by Vanasse Hangen Brustlin (2009 and 2010) from FAA's Terminal Area Forecast, TAF (2008 and 2010 Draft). Refer to Appendix D, *Purpose and Need* Attachment D.A.2, *Air Passenger and Operations Forecast* of the DEIS.

Notes: Total aircraft operations equal all arrivals and departures.
Total passengers equal all enplaned and deplaned passengers (FAA's TAF only reports passenger enplanements, which can be doubled for an estimate of total passengers).

1 TAF plus 10 percent consistent with 2010 Draft TAF
2 Actual recorded operations and passenger activity levels.
3 Forecast based on existing infrastructure and facilities at T.F. Green Airport.

8 FAA Order JO 7210.3V Change 3 effective Aug 27, 2009 Facility Operation and Administration, Chapter 12 section 12-1-5 Categories of Operations and Appendix 3.

**Table A.3-2 2010 FEIS No-Action Alternative and Build Alternative Forecasts**

| | No-Action | | Incremental Build | | Total Build | |
|---|---|---|---|---|---|---|
| Year | Aircraft Operations[1] | Annual Passengers | Aircraft Operations[1] | Annual Passengers | Aircraft Operations[1] | Annual Passengers |
| 2004[2] | 121,428 | 5,509,186 | n/a | n/a | n/a | n/a |
| 2015[3] | 93,500 | 5,274,876[4] | 8,760 | 765,727 | 102,260 | 6,040,603 |
| 2020 | 99,330 | 5,844,797[4] | 8,784 | 767,825 | 108,114 | 6,612,622 |
| 2025 | 105,551 | 6,519,307[4] | 8,760 | 831,935 | 114,311 | 7,351,242 |

n/a = not applicable; 2004 represents existing conditions prior to the implementation of any potential Build Alternative.
Sources: 2004 aircraft operations and passengers data provided from T.F. Green Airport – Monthly Airport Passenger Activity Summary, RIAC, December 2004; Forecast aircraft operations and passengers adjusted by Vanasse Hangen Brustlin (2010) from FAA's Draft Terminal Area Forecast, TAF (2010). Refer to Appendix E.1, Updated Forecast of Aviation Activity.
1 Total aircraft operations equal all arrivals and departures.
2 Actual recorded operations and passenger activity levels provided from T.F. Green Airport – Monthly Airport Passenger Activity Summary, RIAC, December 2004.
3 Only Build Alternative B4 would be implemented by 2015. Build Alternative B2 would be implemented in 2020. The facility requirements analysis provided only considers the 2015 implementation of the Build Alternative.
4 FAA's TAF only reports passenger enplanements, which can be doubled for an estimate of total passengers.

#### A.1.3.1.2 Forecast Non-Stop West Coast Aircraft Operations

Notwithstanding the economic downturn, the FAA determined that there is still current and anticipated demand for commercial nonstop service to West Coast U.S. markets from T.F. Green Airport. The DEIS and FEIS Alternative B2 and B4 forecasts have not been adjusted, and include an incremental increase over the No-Action forecast level to account for increased aviation activity made possible with the T.F. Green Airport Improvement Program. See Appendix E, *Purpose and Need and Alternatives Analysis,* for additional information on forecasts. Specifically, demand still exists for up to 16 non-stop flights (arrivals and departures) to West Coast markets per day starting in 2015. Therefore, the Purpose and Need for the project remains intact despite the economic downturn because the projects proposed by RIAC at T.F. Green Airport are related to meeting this demand as well as meeting the safety and efficiency needs of the Airport.

As discussed in the DEIS and FEIS, T.F. Green and Logan Airports have overlapping service areas. Historical data shows that passengers that have traditionally chosen T.F. Green Airport have increasingly chosen to use Logan Airport to reach West Coast destinations directly with nonstop low-cost carrier (LCC) service rather than using connecting airline service from T.F. Green Airport. The number of daily non-stop flights between T.F. Green Airport and West Coast destinations with a longer primary runway length was originally forecast as 16 in 2004. It is still reasonable to project passenger demand for 16 non-stop daily west coast flights with an extended primary runway at T.F. Green Airport because although total enplanements at T.F. Green Airport have decreased by 29 percent between 2004 and 2010, the total number of origin and destination (O&D) passengers[9] between T.F. Green and Logan Airports and the Los Angeles area have decreased by 1 percent, increased by 8.6 percent between the San Francisco Bay area, and increased by 20.2 percent between Seattle (see Table A.3-3) during the same timeframe. This demonstrates that regional demand (including T.F. Green and Logan Airports) between these West Coast markets has outpaced overall passenger demand from T.F. Green Airport only. Therefore, the unique demand for service to these markets is not affected by a decrease in overall operations.

9 Origin and destination (O&D) passengers are those that enplane (depart) or deplane (arrive) at an airport – either by a non-stop flight or through a connection at another airport.

Additional analysis of forecast non-stop West Coast service based on historical average O&D passenger activity and an allocation of passengers based on catchment area is provided in Appendix E.2, *Evaluation of Potential Non-stop West Coast Flights*.[10] This appendix also evaluates the characteristics of a similar regional airport system in southeast Florida.

**Table A.3-3 Total Origin and Destination (O&D) Passengers between T.F. Green and Logan Airports and West Coast U.S. Markets**

| Market | 2004 | 2010 | Percent Change |
|---|---|---|---|
| Los Angeles Area[1] | 1,274,270 | 1,262,059 | -1.0% |
| San Francisco Bay Area[2] | 1,147,981 | 1,246,582 | +8.6% |
| Seattle | 329,359 | 395,970 | +20.2% |

Sources: Airline Origin and Destination Survey (DB1B): Market, Bureau of Transportation Statistics, 2011; compiled by Vanasse Hangen Brustlin, 2011.
1 Includes LAX, Long Beach, John Wayne-Orange County, Ontario, and Burbank-Bob Hope Airports; non-stop LCC service (JetBlue Airways) was started from Logan Airport to Long Beach Airport in 2004. Additional non-stop LCC service (JetBlue Airways and Virgin America) started from Logan Airport to LAX in 2009.
2 Includes San Francisco, Oakland, and Mineta-San Jose International Airports; non-stop LCC service (JetBlue Airways) was started from Logan Airport to Oakland in 2004. Additional non-stop LCC service (Virgin America) started from Logan Airport to SFO in 2009.

### A.1.3.2 Aircraft Fleet Mix

The FAA received comments related to the aircraft fleet mix used in the runway length analysis, specifically the use of the Boeing 737-500 aircraft type. Boeing 737 "Classic Series" aircraft (-300, -400, and -500 series) currently account for a share of operations that is consistent with the FEIS forecast fleet mix.[11] All aircraft that meet the substantial use threshold should be considered when determining the efficiency of airfield facilities.

Passenger airlines, cargo airlines, and other aircraft operators can be retained or attracted to the Airport with efficient facilities, which serves RIAC's mission by providing economic opportunities for the region. In addition, adequate airfield facilities at T.F. Green Airport (in the form of primary runway length) are critical to reduce leakage of passengers to Logan and ensure the efficiency of the New England Regional Airport system.[12] A longer primary runway not only benefits service to long-haul markets, such as the West Coast, but also medium- and short-haul markets. For example, an airline that is currently serving a particular market with a regional jet may be able to serve that same route with a larger narrowbody jet that requires greater runway length, thereby offering greater schedule flexibility. This flexibility creates less inherent business risk to an airline that initiates service to a new market.

The first step in determining a recommended runway length through following the standard FAA process is to identify the potential range of critical design aircraft. FAA Advisory Circular (AC) 150/5325-4B, *Runway Length Requirements for Airport Design*,[13] provides guidance for this through establishing a "substantial use threshold" of

10 These additional non-stop flights to the West Coast are included in the assessment of the environmental consequences associated with the Build Alternatives. See Chapter 5, *Environmental Consequences*.
11 Official Airline Guide (OAG), 2009-2010.
12 *The New England Regional Airport System Plan*, New England Airport Coalition, Fall 2006, Pages 29-30; *Logan International Airport Airside Improvements Planning Project EIS*, *Boston, Massachusetts*; FAA, New England Region; 2002; *Record of Decision; Airside Improvements Planning Project; Logan International Airport, Boston, Massachusetts*; FAA, New England Region, August 2, 2002, page 6.
13 The Runway Length analysis followed the procedures as set forth in FAA's Advisory Circular (AC) 150/5325-4B, Runway Length Requirements for Airport Design, as required for airport projects receiving Federal funding.

500 or more annual itinerant operations at the airport (landings and takeoffs are considered as separate operations). If an aircraft were to meet this substantial use threshold, it would be eligible for consideration as a critical design aircraft.

The 2010 FEIS No-Action Forecast and projected fleet mix were reviewed to identify those aircraft that would meet this "substantial use threshold" for being considered a critical design airplane (see Table E.A.1-1 of DEIS Appendix E, *Purpose and Need*). It is important to note that neither RIAC nor FAA can dictate which aircraft types that airlines use on particular routes. Therefore, RIAC must plan for the most demanding aircraft types (and versions of aircraft types) to provide the maximum flexibility to existing airlines and potential new airline service.

The FAA evaluated scheduled air carrier operational data for Calendar Years (CY) 2009 and 2010 at T.F. Green Airport from the Official Airline Guide (OAG). The OAG data provides the scheduled aircraft type (aircraft type and series; for example, Boeing 737-700). The total scheduled air carrier operations from the OAG date for CY 2009 is 59,035, and 56,503 in CY 2010. The OAG data was compared to the FEIS forecast years (2012, 2020, and 2025). Table A.3-4 shows the percentage of scheduled air carrier operations by general aircraft category. The following observations were made by reviewing the OAG data and FEIS forecast comparison:

- The 2009 and 2010 OAG data for Air Carrier operations is consistent with the most prevalent air carrier jets and the FEIS forecast of Air Carrier operations. For example, the B737 Classic Series (-300/400/500; out of production) made up 13.4 percent of the 2009 OAG Air Carrier fleet, 12.4 percent of the 2010 OAG Air Carrier fleet, and 12.6 percent to 10.8 percent of the 2012 to 2025 FEIS forecast Air Carrier fleet. In fact, the B737-500 aircraft was used more in 2010 at T.F. Green Airport than in 2009 for scheduled air carrier operations (555 operations in 2009 vs. 1,155 operations in 2010). The B737 Next Generation Series (-700/800; in production) made up 25.3 percent of the 2009 OAG Air Carrier fleet, 25.4 percent of the 2010 OAG Air Carrier fleet, and 32.0 percent to 38.1 percent of the 2012 to 2025 FEIS forecast Air Carrier fleet.

- The B737 Next Generation Series aircraft and the Airbus A319/320/321 Series aircraft are capable of serving non-stop West Coast destinations in the near future, with available runway length. However, there is no certainty regarding the exact long-haul aircraft fleet that airlines would use if additional runway length were provided. The Airport must maximize its flexibility to provide adequate facilities for airlines to provide the type of service that is in demand within the T.F. Green Airport catchment area.

- Because the runway extension is not in place right now, it is not realistic to assume that all aircraft types that airlines would use at the Airport with the extension in place would be using the Airport at its current length. In other words, the purpose of the runway extension is to provide the Airport flexibility to accommodate passenger demand for non-stop West Coast service in the T.F. Green Airport catchment area. It is not to accommodate only aircraft types that airlines currently use at the Airport. In today's current economic environment, airlines are reducing capacity by using smaller aircraft with less frequent operations, while still serving markets with sufficient passenger demand. Furthermore, there is a trend in the airline industry to lease aircraft rather than to own aircraft outright. Presently, approximately 34 percent

of air carrier aircraft are leased and it is projected to increase to 50 percent by year 2019.[14] This trend toward leasing allows airlines greater flexibility in adjusting the number of aircraft and aircraft models in their fleet mix based on passenger demand on any given route.[15] This is evident by the recent capacity cuts airlines have made in response to reduced passenger demand. Therefore, airports must be flexible to accommodate airlines' fleet mix changes.

Although the evaluation of 2009 and 2010 OAG data demonstrates that the Boeing 737-500 is valid for consideration in the standard runway length analysis based on the "substantial use" criterion, the FAA evaluated the utility of the runway length alternatives based on probable aircraft to offer non-stop West Coast service from T.F. Green Airport in the future (see Chapter 3, *Alternatives Analysis*, Section 3.7.3.2, *Development of Alternative B3 South,* of the FEIS) – the B737-700, the B737-800, the A319, and the A320. The utility of runway length alternatives evaluated is based on the number of passengers and cargo that could be accommodated on various runway length alternatives according to corresponding airline revenue.

**Table A.3-4 Comparison of OAG and 2010 FEIS No-Action Alternative Forecast Scheduled Air Carrier Aircraft Operations**

| | Percentage of Scheduled Air Carrier Operations | | | | |
|---|---|---|---|---|---|
| | | | 2010 FEIS No-Action Alternative Forecast | | |
| Aircraft Category | 2009 (OAG) | 2010 (OAG) | 2012 | 2020 | 2025 |
| Commuter Turboprop | 24.8% | 28.4% | 10.0% | 8.8% | 7.9% |
| Regional Jet | 25.7% | 27.3% | 19.0% | 17.8% | 16.5% |
| Airbus A319/320/321 | 7.9% | 8.5% | 12.8% | 6.8% | 7.3% |
| DC-9/MD80 | 3.0% | 2.9% | 5.9% | 2.1% | 2.5% |
| Boeing 737-300/400/500 | 13.4% | 12.4% | 12.6% | 10.6% | 10.8% |
| Boeing 737-700/800 | 25.3% | 25.4% | 32.0% | 38.0% | 38.1% |
| Boeing 757/767 | 0.0% | 0.3% | 7.6% | 16.0% | 16.9% |
| TOTALS | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

Source: Official Airline Guide (OAG), 2009-2010; Vanasse Hangen Brustlin, Inc., 2009-2010.

## A.1.4 Construction and Land Acquisition Schedule

Many comments inquired about when the T.F. Green Airport Improvement Program would be constructed and when mandatory and voluntary land acquisition would begin. This summary response answers these questions with the best available information at the time of the FEIS publication.

14 Nicola Clark. "Woes of Aircraft Leasing Companies Could Mean higher Ticket Prices" New York Times October 6, 2009. http://www.nytimes.com/2009/10/06/business/global/06lease.html?pagewanted=2

15 Michael Daniels. "Jet-Leasing Companies Go on Buying Spree" Wall Street Journal December 23, 2010. http://online.wsj.com/article/SB10001424052748703814804576035612585256314.html

The T.F. Green Airport Improvement Program Preferred Alternative (Alternative B4) includes the construction of eleven individual projects including safety and efficiency enhancements. The safety enhancements include bringing RSAs on Runway 16-34 up to current FAA standards and must be completed by 2015 according to the congressional deadline. The efficiency projects include extending Runway 5-23, terminal enhancements, and other airport facility enhancements. The runway extension and runway safety area (RSA) enhancement projects both require off-airport roadway relocations and acquisition of homes and businesses near the Airport. The eleven program elements and anticipated implementation years are listed in Table A.4-1.

**Table A.4-1 Construction Phasing for the Preferred Alternative (Alternative B4)**

| Project Type | Program Element | Implementation Year |
|---|---|---|
| Safety Enhancements Elements | Demolish Hangar No. 1 | by the end of 2015 |
| | Enhance Runway 16-34 RSAs (including Partially Relocated Airport Road) | |
| | Relocate Taxiway C | |
| Efficiency Enhancement Elements | Extend Runway 5-23 (including Main Avenue Realignment) | by the end of 2015 |
| | Expand Passenger Terminal | by the end of 2020 |
| | Construct New Ground Support Equipment Facility | |
| | Construct New Belly Cargo Facility | |
| | Construct New Fuel Farm | |
| | Construct New Integrated Cargo Facility | |
| | Expand Automobile Parking Facilities | |
| | Reconfigure Terminal Access Roadways | |

The mandatory land acquisition for the construction of the T.F. Green Airport Improvement Program will begin once the FAA issues the ROD. The partial relocation of Airport Road and Main Avenue Realignment would be completed after land acquisition is complete. The safety projects will be the first projects completed (Hangar No. 1 demolition, Runway 16-34 RSA enhancements, and Taxiway C relocation). Then RIAC will construct the Runway 5-23 extension to the south (the Runway 5 end) by the end of 2015. All other efficiency projects listed in Table A.4-1 will be completed by the end of 2020.

The project will cause noise impacts, that RIAC will mitigate through future voluntary land acquisition programs (VLAP), funded by the FAA. For the purposes of this FEIS, the following phasing schedule is assumed for the Current Part 150 VLAP and future voluntary land acquisition programs (or VLAPs) as project-related mitigation:

- By 2015: complete the Current Part 150 VLAP (based on FAA-accepted 2020 Noise Exposure Map [NEM] dated July 27, 2010).
- By 2020: complete the Future Build VLAP (based on project-related 2015 DNL 70 dB contour with 102,260 total aircraft operations in 2015 for Alternative B4).
- By 2025: complete the Future Build VLAP (based on project-related 2020 DNL 70 dB contour with 108,114 total aircraft operations in 2020 for Alternative B4).

- Beyond 2025: complete the Future Build VLAP (based on project-related 2025 DNL 70 dB contour with 114,311 total aircraft operations in 2025 for Alternative B4; actual future voluntary acquisitions would be derived from a future FAA-accepted revised NEM).

Under the Future Build VLAP for both Alternative B2 and Alternative B4, residential property owners would be eligible for voluntary participation in a land acquisition program for noise mitigation upon issuance of the ROD. For the purposes of this FEIS, it is assumed for Alternative B2 that residential properties would be acquired between 2020 and 2025 for noise impacts in 2020; however, it is RIAC's intention to acquire residential parcels as soon as 2012, subject to availability of funding. For the purposes of this FEIS, it is assumed for Alternative B4 that residential properties would be acquired between 2015 and 2020 for noise impacts in 2015, and between 2020 and 2025 for noise impacts in 2020; however, it is RIAC's intention to acquire residential parcels as soon as 2012, subject to availability of funding. Also, assuming that FAA funding is made available, RIAC would begin the sound insulation program following the last phase of project-related land acquisition mitigation.

Under the Preferred Alternative (Alternative B4), the Runway 5-23 runway extension project also includes land acquisition to clear the newly created Runway 5-23 runway protection zone (RPZ) at the Runway 5 End, as recommended by the FAA (with voluntary participation by land owners). For the purposes of this FEIS, for Alternative B4, these acquisitions are assumed to be acquired by the time the runway extension is online and operational. The RPZ-clearing land acquisition timing is an estimate only, as land acquisition for RPZ clearing is recommended by the FAA and not considered required project mitigation and, therefore, contingent upon FAA funding availability.

## A.1.5 Alternatives B3 North and B3 South – Extend Runway 5-23 to 8,300 Feet

Among the EIS alternatives considered, the FAA evaluated alternatives with a Runway 5-23 extension to 8,300 feet. Two variants were examined, Alternative B3 North and Alternative B3 South. The FAA received comments on the DEIS with further questions about these alternatives and why they were not advanced or identified as the Preferred Alternative. The following describes the alternatives screening process, the development of the two 8,300 runway variants, and the rationale for their elimination from further consideration.

In Step 1 of the Level 5 alternative screening analysis, the FAA evaluated Alternative B3 North, which would extend Runway 5-23 to the north and south to a total of 8,300 feet. The runway extension would be located on airport property, but would still require the full relocation of Airport Road to the north to accommodate the RPZ. 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 similar environmental impacts. RIAC considered this information when deciding whether the development of an 8,300-foot runway alternative would justify the financial investment. RIAC, as the airport sponsor, decided not to support this

option because does not provide the air carriers with maximum flexibility. "[I]t does not meet the service benefits sought to be achieved as generally stated in the Environmental Impact Statement (EIS) Purpose and Need Statement, and provides only limited potential environmental and costs savings benefits over and 8,700 foot runway.[16] FAA determined that Alternative B3 North 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 an 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.

In Step 3 of the Level 5 alternative screening analysis, the FAA also developed Alternative B3 South as an alternative with a Runway 5-23 extension also to 8,300 feet to explore an alternate layout with different impacts and costs than Alternative B3 North. This alternative would extend Runway 5-23 to the south only. This alternative would require the realignment of Main Avenue.

The runway utility analysis considers service to nonstop West Coast markets by the B737-700, B737-800, A319, and A320 aircraft, which is consistent with the detailed fleet mix forecast. For each aircraft type, the least performing variant (engine type and winglet configuration) was analyzed pursuant to standard airfield facility planning practices and to ensure the greatest flexibility to airlines. Although the least performing variant of the B737-700 and B737-800 aircraft types do not exist in the fleets of the airlines that currently operate out of T.F. Green Airport they are still considered in this analysis because they are still in production, available for purchase or lease, or used by other air carriers. Therefore, the least performing variants of these two aircraft types could be used by an air carrier to conduct non-stop West Coast service from T.F. Green Airport in the future. The analysis also considers payload reductions of belly cargo before any passenger and baggage payload reductions. According to discussions with several airlines operating at T.F. Green Airport, if payload reductions are required, belly cargo would be the first category of payload to be removed from the aircraft to meet payload capacity. However, if additional payload reductions are necessary beyond cargo payload reductions, passengers and baggage must be removed. A runway length of 8,700 feet (Alternatives B2 and B4) would result in a maximum annual payload reduction of approximately 64,400 passengers, and a runway length of 8,300 feet would result in a maximum annual payload reduction of 120,050 passengers. The difference in maximum annual payload reductions between Alternatives B2 and B4, and Alternative B3 South is approximately 55,000 passengers. Passenger payload penalties could result in a maximum of approximately $13.7 million in lost airline revenue alone per year for Alternative B3 South when compared to Alternatives B2 and B4.

Based on conceptual design, and as shown in Table 3-7, of Chapter 3, *Alternatives Analysis*, Alternative B3 South would have substantially similar construction impacts and costs, and identical impacts to wetlands, floodplains, and historic resources as Alternative B4. Alternatives B4 and B3 South have identical wetland impacts (7.3 acres) in one wetland system, with no impacts to Buckeye Brook. Floodplain impacts for the two Alternatives are identical. The RPZ associated with Alternative B3 South and Alternative B4 would both impact Winslow Park, a 4(f) property, and both would require removal of four full-sized softball fields, clubhouse, two parking lots, soccer fields, and one playground. Both alternatives would have the same impact on historic resources and would require demolishing

16 See May 30, 2007 RIAC Board Vote in DEIS Supporting Attachment E.A.6, RIAC Decision Documents, in DEIS Appendix E, Alternatives Analysis.

Hangar No. 1 and internal reconfiguration of Hangar No. 2. In addition, Alternative B3 South and Alternative B4 would both reduce views of the Rhode Island State Airport Terminal and would have the same direct impacts to the Terminal's landscaping.

The noise impacts of Alternative B4 compared to Alternative B3 South are substantially similar. Approximately 10 additional units would be exposed to significant noise levels by Alternative B4 compared to Alternative B3. An additional 12 homes (28 people) would be impacted by DNL 70 dB and above by Alternative B4 compared to Alternative B3. However, this does not take neighborhood rounding into account, and these homes could well be included in a land acquisition program for noise mitigation. An additional 52 homes would be exposed to noise levels DNL 65 dB and above, by Alternative B4; however, many of these could have already received sound insulation mitigation.

In all aspects considered in the FEIS, Alternative B3 South would provide less flexibility and utility to airlines than Alternatives B2 and B4 for a relatively minor difference in construction costs. Based on the reductions in flexibility and utility provided by Alternative B3 South, it is less likely that an airline would initiate service to the West Coast and meet the purpose and need of the Airport Improvement Program. Alternative B3 South would have substantially similar construction impacts, and identical impacts to wetlands, floodplains, and historic resources as Alternative B4. RIAC evaluated this additional analysis and reaffirmed its position in 2010 that an 8,300 foot runway (Alternative B3 South) does not provide the air carriers with maximum flexibility. FAA did not advance Alternative B3 South further in the alternative screening process because it would result in a decreased likelihood 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.

## A.1.6 Noise Model

The Integrated Noise Model (INM) is the recommended model for assessing noise impacts in a NEPA analysis. The INM is used to produce the DNL contours for the No-Action and each alternative for each evaluation year. Impacts from the Build Alternatives are compared to the No-Action Alternative for the same analysis year, not the baseline year, which is in accordance with the Council on Environmental Quality (CEQ) regulations implementing NEPA. For example, projected noise levels in 2015 under Alternatives B2 and B4 are compared to the noise levels in 2015 under the No-Action Alternative. Three versions of the INM have been used in this FEIS. INM Version 6.1 was used for all modeling for the 2004 Baseline, Level 4 and 5 analyses. During the summer of 2009, FAA determined that the noise analysis should be reevaluated using the fleet mix developed for the EIS adjusted to the latest FAA forecast levels. The version of the INM model available at the start of the final set of noise results for the DEIS was Version 7.0a. Since the complete analysis was being redone due to the forecast, the decision was made to update the model version to leverage the latest technology in noise modeling.

For the FEIS, the FAA determined that the noise analysis should be again reevaluated using the fleet mix developed for the FEIS adjusted to the most recent FAA forecast levels (2010) and the latest version of the INM (Version 7.0b).

### A.1.6.1 Integrated Noise Model (INM)

Several noise metrics are used to evaluate the anticipated changes in the noise environment associated with Alternatives B2 and B4. FAA Order 1050.1E specifies a number of requirements, including which noise models are acceptable to the FAA, what constitutes significant impact, and when additional noise analyses are needed.

For the purposes of this FEIS, the appropriate model is the INM which, as required by the FAA (section 14.2b of FAA Order 1050.1E) is used to determine the significance of changes in exposure to noise.

The INM produces DNL contours at DNL 75 dB, DNL 70 dB, and DNL 65 dB, and others as needed. The model also produces results at specific locations which can be defined in the model. In this FEIS, these locations are the noise-sensitive sites, Section 4(f) sites, and other sites that detailed noise results were desired.

#### A.1.6.1.1 INM data

The model requires input in two principal categories: physical and operational. The INM contains standard noise and performance data for most commercial aircraft types and standard noise data for many military aircraft types. An airport database is also included with some physical data (runway end coordinates and field elevations) for some airports. The model contains sophisticated calculation algorithms that take the input data and standard database information to create the noise results.

##### Physical Input Data Requirements

The physical input data requirements of the INM are the geometrical features that will determine the shape of the contours. Specifically, these include:

- Runway layout,
- Flight tracks,
- Airport elevation, and
- Average airport weather conditions.

Related elements include:

- Runway usage rates, and
- Flight track usage rates.

The current Airport Layout Plan (ALP) was the source for the 2004 Baseline and No-Action runway information. The average annual weather conditions were developed from a historical average of weather conditions at the airport.

The best source for the runway use and flight track data is the permanent flight tracking systems. The airport operations monitoring system (AOMS) logs the runway use, time of day, flight track along the ground, and the flight track profile.

### Operational Input Data Requirements

The operational input data is the airport's fleet mix. The INM requires information on the number of arrivals and departures (by stage length) for all significant types in the fleet mix. INM Version 7.0b contains 287 aircraft types in its database. Operations are assigned to these aircraft types along with the time of day that the flight occurs. The time of day is important, since nighttime operations are assessed a 10 dB penalty in the computation of DNL (equivalent to ten times as many operations), it is important to have as accurate an estimate of nighttime activity as possible.

Departure operations also use the stage length. Stage length is the trip distance which is a surrogate for the aircraft weight. Stage length is important because longer flights typically carry more fuel (weight), which affects aircraft performance. The new long-haul flights in the alternative analysis of this FEIS use Stage Length 4. Table A.6-1 defines the stage lengths for the INM used in this FEIS.

**Table A.6-1 Stage Lengths Assumed for FEIS Analysis**

| Stage length | Trip Distance |
|---|---|
| 1 | 0 to 500 nmi |
| 2 | 501 to 1000 nmi |
| 3 | 1001 to 1500 nmi |
| 4 | 1501 to 2500 nmi |

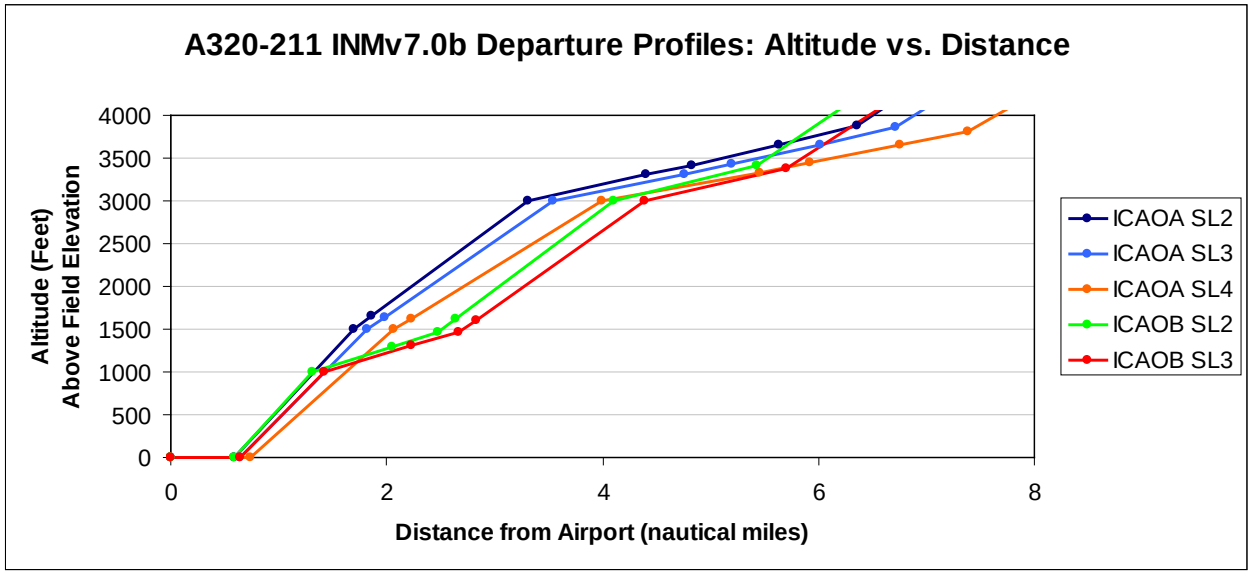
nmi = nautical mile

### Noise and Performance Data

The model contains a database of aircraft with noise level vs. distance curves. For most of these aircraft, the database contains aircraft performance profiles. The aircraft flight profiles consist of three components relating distance to actual performance characteristics (Figure A.6-1). These include:

- Altitude (Climb or Descent) profiles that depict the altitude of the aircraft (in feet, relative to the airport elevation) as a function of track distance (i.e., distance from start of takeoff roll);
- Power level (Thrust) profiles that depict the aircraft engine thrust (in pounds or percent of maximum) as a function of track distance; and
- Speed profiles that depict the aircraft's speed (in knots) as a function of track distance.

**Figure A.6-1 - A320 INM Version7.0b Departure Profiles in Feet Above Field Elevation (ft AFE)**

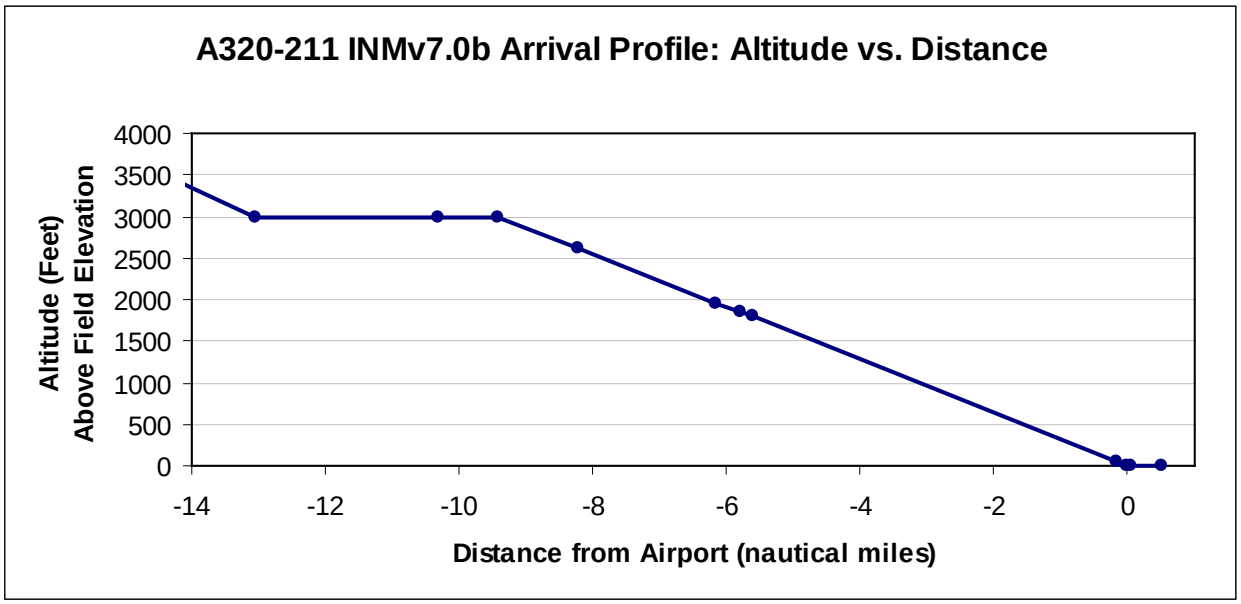



The database includes a complete departure profile set for each stage length identified for the aircraft type, and a complete arrival profile set. Figure A.6-1, displays the departure profiles used in this FEIS for the Airbus 320 (A320) aircraft. For the A320, there are two different profiles types shown in Figure A.6-1, ICAOA and ICAOB. ICAOA profiles climb higher (to 1,500 feet) before reducing thrust and adjusting flaps. ICAOB profiles reduce thrust and adjust flaps after 1,000 feet. The higher stage length ICAOA SL3 has a higher weight and uses more thrust to depart the airport than the lower stage length ICAOA SL2. The higher weight aircraft use more runway length for takeoff and a slightly higher thrust all of which generate more noise.

For some aircraft, the profile data is in absolute terms in relation to the distance flown along a flight path. For most of the standard aircraft for which profile data is available; however, the data is given as a set of parameters that the INM uses together with other physical data to generate a specialized set of profiles.

Arrival profiles use a standard 3-degree glide slope approach with a hold down at 3,000 feet as shown in Figure A.6-2.

**Figure A.6-2 - A320 INM Version 7.0b Arrival Profile**




These profiles allow the INM model to determine where the aircraft is relative to the receiver. The power level of the aircraft is matched to the noise-power-distance curves which provide the noise level for various metrics for that aircraft.

These noise levels are produced for each location on a grid and at each noise-sensitive site for every flight. They are then combined to determine the modeling results at each site.

Consistent with FAA policy, the most current release of the model at the time the EIS was initiated, INM Version 6.1, was used for all noise exposure computations and specific point analyses for the 2004 Baseline Condition assessment. The noise analysis conducted to identify noise impacts in the DEIS used the most recent version at that time INM Version 7.0a. INM Version 7.0b which is the latest version of the model was released shortly after the beginning of work on the DEIS and was used for the contours developed for the FEIS.

#### A.1.6.1.2 Improvements to the Noise Model

Beginning with the release of INM Version 6.2 in May of 2006, FAA has been updating the fleet database used within the model to reflect the current "in service" fleet. The latest version of the model in December 2010, INM Version 7.0b contains 21 current aircraft which have been updated. The majority of these aircraft are used in the modeling for this FEIS. The updated data is in the form of new noise data, updated performance profiles, updated weight information and other information all of which affect the noise levels generated by the model.

Several aircraft types have also been added to the noise model database including the Beech 1900, Cessna 208, Piper 42, Canadair RJ-700 and RJ-900. The new aircraft reduce the need to use “substitute” aircraft for the types not available in the aircraft database. The Beech 1900 is a turboprop operating at T.F. Green Airport which was

modeled in INM Version 6.1 using a substitute aircraft which was several decibels louder than the Beech 1900. The addition of these new aircraft has further enhanced the accuracy of the results.

INM Version 7.0a used in the DEIS contains enhancements over INM Version 6.1 which follows best practices for modeling aircraft noise. The majority of the new methods come from international guidance documents including European Civil Aviation Conference (ECAC) Document 296 and SAE-AIR-56627. The aircraft performance calculations and the acoustic computations have all been updated in these documents.

Additionally, INM Version 7.0a allows for the use of more accurate terrain data allowing noise levels to be modeled at the correct elevation. An older format of terrain data was available for INM Version 6.1 but was of a lower quality and did not adequately define small terrain changes; it was therefore not used in the DEIS Level 4 and 5 analyses. The newer data available for INM Version 7.0a is of a higher quality and defines small terrain changes well enough that it was used for all of the DEIS Level 6 analyses. The terrain data provides the elevation at each modeled location which is used to adjust the distance between the aircraft and the location. The terrain data are not used to modify aircraft performance.

INM Version 7.0b includes updated arrival profiles for almost all of the Airbus aircraft. These improvements allow the model to adjust the performance of the aircraft (as it does with the majority of the aircraft in the model database) based on the conditions on the airfield at the airport and the weather conditions.

The typical method of applying the INM involves developing operational inputs for aircraft on the average annual day and calculating the DNL for a typical day, which is mathematically the same as the DNL for the total year. In order to provide an accurate depiction of noise conditions, a comprehensive approach was used to develop the inputs to the INM. The INM pre-processor, RealContours™, takes the maximum possible advantage of the INM's capabilities. RealContours™ automates the process of preparing the INM inputs directly from recorded flight operations, to model the full range of aircraft activity as precisely as possible. RealContours™ improves the precision of the INM modeling by utilizing the airports radar data.

### A.1.6.2 INM Pre-Processor

To simplify the task of manually collecting, refining, and entering the enormous amount of data related to a full year of activity at an airport, the standard method of applying the INM involves development of operational inputs for activity on the average annual day and calculating the DNL for that prototypical day, which is mathematically the same as the DNL for the total year. This approach requires a certain amount of consolidation and simplification. For example, the model inputs typically include an aircraft fleet mix with on the order of several dozen representative aircraft types, a relatively limited number of prototypical flight tracks (on the order of 100 to 300 is common for an airport comparable to T.F. Green Airport), and runway use and track use percentages for three or four categories of aircraft types with similar performance characteristics.

This approach meets accepted professional standards, and reduces the effort and cost that would be associated with manually entering the parameters for every actual operation. However, it represents a significant simplification of the extraordinary diversity of actual aircraft operations over a year.

The INM pre-processor used in the DEIS called RealContours™ takes maximum possible advantage of both the INM's capabilities and historical radar data from the airports AOMS. RealContours™ automates the process of preparing the INM inputs directly from the flight operations, which allows the full diversity of activity to be modeled as precisely as possible. RealContours™ improves the precision of modeling by utilizing the AOMS data in five key areas:

- It directly converts the radar flight track for every identified aircraft operation into an INM track, rather than assigning all operations to a limited number of prototypical tracks.
- It selects each operation on the specific runway that it actually used, rather than applying a generalized distribution to broad ranges of aircraft types.
- It matches the specific airframe and engine combination to model, on an operation-by-operation basis, to an actual radar track flown by that type.
- It ensures that the horizontal dispersion of flights that occur at the airport is modeled.
- In addition to using the actual runway, tracks are assigned to the proper time of day.

As defined in INM User's Guide[17] the annual DNL is used for quantifying airport noise. Yearly day-night average sound level (YDNL) means the 365-day average, in decibels, day-night average sound level. If you were to use this definition to model noise in INM, you would have to run 365 cases of the model and average the results. RealContours™ accomplishes that task. The system uses the actual radar data to develop INM input files for each day of the year and then averages the results to obtain the annual contour.

#### A.1.6.2.1 Modeled Flight Tracks

The primary noise model input is T.F. Green Airport's radar data. Chapter 4, *Affected Environment,* provides a description of the analysis of nearly 80,000 radar flight tracks. These tracks were used to prepare noise model inputs for the baseline 2004 noise contour. The operations were scaled to match the FAA tower counts for 2004 to provide an accurate baseline contour set.

The same track set was used for the No-Action Alternative and Alternatives B2 and B4 in 2015, 2020, and 2025. Flight patterns have not changed at the airport since the original collection of this data and therefore it is still valid for the DEIS Level 6 and FEIS analysis. As in the DEIS Level 5 analysis, the operations were scaled by airline and aircraft type to match the total number of aircraft operations projected for the No-Action Alternatives and Alternatives B2 and B4. The start and end of the tracks are adjusted due to the changes in the runway lengths and location of the runways. These changes adjust the altitude of the aircraft along the track. Figures 5-3 through 5-6 show a sample of the modeled flight tracks. These graphics show the flight tracks using the noise abatement flight patterns and also the horizontal dispersion of the tracks in those flight patterns.

#### A.1.6.2.2 Runway Use

The INM pre-processor obtains its runway use directly from the radar data. Instead of using groups of aircraft with similar performance, the pre-processor uses the actual runways which are being used each day. The runway use is compiled into aircraft with similar performance for the tables in the FEIS. This permits

17 INM 6.0 User's Guide, FAA –AEE-99-03,Page 2-2.

comparison between the No-Action Alternative and Alternatives B2 and B4. The future year runway use varies slightly from the baseline due to the changing fleetmix (i.e., the additional long haul flights only use Runway 5-23 for departures).

## A.1.7 Mandatory and Voluntary Land Acquisition

The purpose of this summary response is to address a number of public comments on how land acquisitions, specifically voluntary residential acquisitions for noise mitigation are determined in the FEIS and why certain homes are considered for voluntary acquisition and others within the same neighborhood are not. This summary response provides a detailed description of the FAA-required methodology used to identify mandatory and voluntary land acquisitions as part of the FEIS impact assessment. An overview of the NEPA and FAA requirements as well as the Part 150 VLAP process is provided for context.

### A.1.7.1 Regulatory Context

The FAA is the primary agency responsible for addressing the airport noise environment, as specified by statutes and its implementing regulations, including FAA Orders 1050.1E, 5050.4B, and the *Environmental Desk Reference for Airport Actions*.[18,19,20] The FAA regulation, 14 CFR Part 150, *Airport Noise Compatibility Planning* (Part 150) is the primary federal regulation guiding and controlling planning for aviation noise compatibility on and around airports.[21] The Part 150 Noise Compatibility Program (NCP) is FAA's mechanism for mitigating the noise impacts of airports upon their neighbors.

The identification of significant noise impacts and associated mitigation for this FEIS was conducted in accordance with NEPA and FAA Orders 1050.1E, 5050.4B, and the *Environmental Desk Reference for Airport Actions*. This FEIS provides an analysis of whether that impact is significant, based on FAA NEPA guidance for significant adverse effects provided in FAA Order 1050.1E. Based on the criteria of FAA Order 1050.1E presented in Table A.7-1, all land uses are considered to be compatible with noise levels less than DNL 65 dB. The FAA and HUD established the threshold of land use compatibility at DNL 65 dB based on a nation-wide survey that measured public responses to aircraft noise, in particular levels of annoyance in relation to aircraft noise.[22,23] Several land use categories (such as residential, some public use, and outdoor music shells) are not considered to be compatible with noise levels of DNL 65 dB or higher (Table A.7-1).

Measures proposed to avoid, reduce, and/or minimize the potential impacts to noise-sensitive land uses include sound insulation or land acquisition. Significant noise impacts are 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. Noise-sensitive land uses would be eligible for voluntary participation in a sound insulation program for significant noise impacts. Noise-sensitive land uses would also

18 *FAA Order 1050.1E, Change 1, Environmental Impacts: Policies and Procedures*, U.S. Department of Transportation, March 20, 2006.
19 *FAA Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, Federal Aviation Administration, United States Department of Transportation, April 28, 2006.
20 *FAA Environmental Desk Reference for Airport Actions*, Federal Aviation Administration, United States Department of Transportation, October 5, 2007.
21 *14 Code of Federal Regulations, Airport Noise Compatibility Planning*, Federal Aviation Administration Definitions, paragraph 150.7.
22 *FAA Order 1050.1E Environmental Impacts: Policies and Procedures*, June 8, 2004.
23 *Environmental Criteria and Standards of the Department of Housing and Urban Development*, Department of Housing and Urban Development, 24 Code of Federal Regulations Part 51; 44 Federal Register 40861, Washington, DC, July 12, 1979.

be eligible for voluntary participation in a sound insulation program if exposed to project-related noise levels between DNL 65 dB and DNL 69 dB,[24] consistent with the criteria of the Part 150 NCP. Also consistent with the criteria of the Part 150 NCP, residential properties exposed to noise levels of DNL 70 dB and above would be eligible for voluntary participation in a land acquisition program. All home owners of residences acquired for noise mitigation would be compensated in accordance with the Uniform Relocation Act (URA) relocation process.[25]

### A.1.7.2 Part 150 Voluntary Land Acquisition Program Process

The Part 150 NCP is FAA's approach for mitigating the noise impacts of airports upon their neighbors while maintaining the efficiency of the national aviation system. Part 150 establishes procedures, standards, and methodologies used by airport operators for the preparation of NEMs and Airport NCPs. Specifically, Part 150:

- Establishes standard noise methodologies and units;
- Establishes standard noise modeling methodology (using the FAA-approved INM);
- Identifies compatible and non-compatible land uses with various levels of airport noise;
- Provides for voluntary development of NEMs and NCPs by airport operators;
- Provides for FAA review of NEMs to insure compliance with the Part 150 regulations;
- Provides for FAA review and approval of Part 150 NCPs submitted by airport operators; and
- Establishes procedures and criteria for making project eligible for funding as noise projects through the T.F. Green Airport Improvement Program.

Implementation of a Part 150 NCP is not required for every airport. However, an approved Part 150 NCP is the primary vehicle for gaining approval of applications for Federal grants for noise mitigation and abatement projects, which are obtained from the Aviation Trust Fund (a fund sustained by taxes and fees largely paid by those who benefit from aviation services).

24 Includes homes exposed to noise levels up to DNL 69.9 dB.
25 *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*, U.S. Department of Housing and Urban Development.

## Table A.7-1 Federally Defined Land Use Compatibility with Annual Day-Night Average Sound Level (DNL)

| | Annual DNL in Decibels | | | | | |
|---|---|---|---|---|---|---|
| Land Use | <65 | 65-70 | 70-75 | 75-80 | 80-85 | >85 |
| **Residential** | | | | | | |
| Residential other than mobile homes and transient lodgings | Y | N[2] | N[2] | N | N | N |
| Mobile home parks | Y | N | N | N | N | N |
| Transient lodgings | Y | N[2] | N[2] | N[2] | N | N |
| **Public Use** | | | | | | |
| Schools | Y | N[2] | N[2] | N | N | N |
| Hospitals and nursing homes | Y | 25[1] | 30[1] | N | N | N |
| Churches, auditoriums, and concert halls | Y | 25[1] | 30[1] | N | N | N |
| Governmental services | Y | Y | 25[1] | 30[1] | N | N |
| Transportation | Y | Y | Y[3] | Y[4] | Y[5] | Y[5] |
| Parking | Y | Y | Y[3] | Y[4] | Y[5] | N |
| **Commercial Use** | | | | | | |
| Offices, business and professional | Y | Y | 25[1] | 30[1] | N | N |
| Wholesale and retail building materials, hardware and farm equipment | Y | Y | Y[3] | Y[4] | Y[5] | N |
| Retail trade – general | Y | Y | 25[1] | 30[1] | N | N |
| Utilities | Y | Y | Y[3] | Y[4] | Y[5] | N |
| Communication | Y | Y | 25[1] | 30[1] | N | N |
| **Manufacturing and Production** | | | | | | |
| Manufacturing – general | Y | Y | Y[3] | Y[4] | Y[5] | N |
| Photographic and Optical | Y | Y | 25[1] | 30[1] | N | N |
| Agriculture (except livestock) and forestry | Y | Y[7] | Y[8] | Y[9] | Y[9] | Y[9] |
| Livestock farming and breeding | Y | Y[7] | Y[8] | N | N | N |
| Mining and fishing, resource production and extraction | Y | Y | Y | Y | Y | Y |
| **Recreational** | | | | | | |
| Outdoor sports arenas and spectator sports | Y | Y[6] | Y[6] | N | N | N |
| Outdoor music shells, amphitheaters | Y | N | N | N | N | N |
| Nature exhibits and zoos | Y | Y | N | N | N | N |
| Amusements, parks, resorts and camps | Y | Y | Y | N | N | N |

Source: FAA Order 1050.1E.

Notes: Y (YES) – Land use and related structures compatible without restrictions;
N (NO) – Land use and related structures are not compatible and should be prohibited.
Noise Level Reduction (NLR) (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

1 25, 30, or 35 – Land use or related structures generally compatible; measures to achieve NLR of 25, 30 or 35 dB must be incorporated into design or construction of structure.

2 Where the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor NLR of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus the reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.

3 Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas or where the normal noise level is low.

4 Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas or where the normal noise level is low.

5 Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas or where the normal noise level is low.

6 Land use compatible provided special sound reinforcement systems are installed.

7 Residential buildings require an NLR of 25.

8 Residential buildings require an NLR of 30.

9 Residential buildings not permitted.

#### A.1.7.2.1 RIAC's Part 150 Noise Compatibility Program

T.F. Green Airport was one of the first airports in New England to participate in the FAA's Noise and Land Use Compatibility Program.[26] The Airport's first Part 150 Study and NEM were approved by the FAA in 1986. In 1991, the NEM was updated and in 1993 RIAC's first Part 150 study update was completed. Both Part 150 studies included aircraft-related noise abatement measures some of which been adopted and continue to be implemented, and others were not enacted. In 1999, RIAC undertook a complete update of the original Part 150 Study that evaluated the effectiveness and/or applicability of previously implemented noise abatement and land use compatibility measures, and provided recommendations. During the course of this Part 150 Study update and based on an revised NEM (dated 2000), 58 additional noise abatement and land use alternatives were evaluated on their feasibility to reduce the effects of noise on surrounding communities.[27] Based on the 2008 Noise Exposure Map (NEM) update, 285 residential properties (270 housing units) were identified as eligible for acquisition and were acquired in 2009 (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.[28] The 2010 NEM update identified 115 residential parcels (135 housing units) as eligible for acquisition of which 70 properties 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 and, therefore, have been taken into account when determining project-related impacts. It is the intent of the RIAC's NCP to continue to evaluate noise levels and mitigate, as necessary either through voluntary acquisition or sound insulation, in order to reduce noise impacts on noise-sensitive land use and reduce non-compatible land uses around the Airport.

### A.1.7.3 Land Acquisition Identification Methodology for the EIS

Land acquisition for the T.F. Green Airport Improvement Program falls into the following three categories:

- Land acquisition required for construction (mandatory), as defined by those areas that fall within the limits of disturbance for construction;
- Land acquisition for the FAA-required program-related noise mitigation for homes exposed to noise levels at or above DNL 70 dB (with voluntary participation in a VLAP by residents); and
- Land acquisition to clear the RPZ areas as recommended by the FAA (with voluntary participation by land owners).

Chapter 5, *Environmental Consequences,* Section 5.4, Compatible Land Use, identifies all land acquisitions by acquisition type for each alternative. Chapter 6, *Mitigation,* Section 6.2, *Noise*, specifically identifies the number of residences eligible for voluntary participation in a VLAP for noise mitigation (i.e., the number of housing units that are within the noise contour of DNL 70 dB or above) based on the FEIS. Refer to Section A.4, *Construction and Land Acquisition Schedule*, for the acquisition scheduled assumed for the purposes of this FEIS.

26 RIAC's Part 150 NCP was initiated by the 1986 NEM and NCP approval, and includes the1991 NEM update, 1995 NEM update, 2000 NCP revision, 2008 NEM update, and 2010 NEM update.
27 *T.F. Green Airport FAR Part 150 Study Update*, Appendix B, Noise Abatement and Land Use Alternatives, Landrum & Brown, April 2000.
28 The 2020 NEM was derived from the Level 6 2020 No-Action Alternative DNL 70 dB noise contour with additional rounding, as documented in the DEIS.

### A.1.7.3.1 Steps Taken to Identify Land Acquisitions

The residential and commercial land acquisitions were identified by comparing the GIS mapping database to the limits of disturbance of construction of T.F. Green Airport Improvement Program in 2015 (for safety and efficiency enhancements for Alternative B4) and in 2015 and 2020 (for safety and efficiency enhancements for Alternative B2, respectively). The residential parcels that would be exposed to noise levels at or above DNL 70 dB (residences eligible for voluntary participation in a VLAP for noise mitigation) and the parcels within the newly created RPZ areas (FAA-recommended) were identified in the same manner. The housing and economic impacts due to land acquisition are presented in Chapter 5, *Environmental Consequences*, Section 5.5, *Social and Socioeconomic, Environmental Justice and Children's Health and Safety Risks*. The noise mitigation land acquisition program would be conducted in accordance with the Part 150 program requirements.

For the purposes of the FEIS, 100 percent participation in the VLAPs was assumed in order to disclose all potential impacts related to land acquisition and because property owners that initially elect not to participate in a VLAP continue to be eligible and could voluntarily participate at any time, contingent upon funding availability. Throughout RIAC's ongoing Part 150 Program, the rate that residents choose to voluntarily participate in the program is as high as 95 percent under the Completed Part 150 VLAP and currently at approximately 90 percent under the Current Part 150 VLAP. The decrease is due to the current economic conditions, including more stringent guidelines for obtaining mortgages.

#### Previous and Ongoing Part 150 VLAPs

Refer to Section A.7.2.1, *RIAC's Part 150 Noise Compatibility Program*, for a description of the Part 150 VLAPs previously implemented by RIAC. As part of the No-Action Alternative it is assumed that RIAC will continue to implement its Part 150 NCP that is independent of the T.F. Green Airport Improvement Program. RIAC's ongoing Part 150 VLAP, which is based on the most recent 2010 NEM update, was initiated in early 2010 and is scheduled to be complete by 2015. The 115 eligible residential properties (135 housing units) under were identified by the FAA-accepted 2020 NEM, which was approved in July 2010 as part of the Current Part 150 VLAP. Because RIAC considers reinstating the property owners that initially elected not to participate as part of a 'Future Phase' contingent on funding availability, 100 percent participation in RIAC's ongoing Part 150 NCP is assumed for the No-Action Alternative.

#### Identifying Project-Related Land Acquisitions

***Mandatory Residential and Commercial Land Acquisitions for Construction***

- The mandatory residential and commercial land acquisitions due to construction of Alternatives B2 and B4 were identified by the limits of disturbance and, for the purposes of this FEIS, are assumed to be acquired by 2020 for Alternative B2 and 2015 for Alternative B4 due to the expedited construction schedule.
  - Mandatory full acquisitions would occur when the entirety of a parcel would be within the limit of disturbance of construction, when any portion of a parcel is within the limit of disturbance and a structure would be demolished, and when approximately two-thirds or more of the parcel would be within the limit of disturbance.

- A partial mandatory land acquisition would occur when approximately one-third or less of the parcel is within the limit of disturbance and no structures would require demolition and, therefore, would not change the land use.
- For businesses, a full mandatory land acquisition would occur if access and/or if parking ratios would be reduced below zoning requirements, and/or if a portion of the site access or parking is within the limit of disturbance rendering the business inaccessible.

***Voluntary Residential Land Acquisitions for Noise Mitigation***

Residential land acquisitions for noise mitigation (impacted residences eligible for voluntary participation in a Future Build VLAP) were first identified using the predicted noise contours based on the noise impact analyses for the FEIS Alternatives. The noise impact analyses were conducted in accordance with the FAA Order 1050.1E, FAA Order 5050.4B, and the *Environmental Desk Reference for Airport Actions* and in compliance with the National Environmental Policy Act of 1969 (NEPA). Consistent with the criteria of the Part 150 Program, residential properties that would be fully or partially exposed to future noise levels at or above the DNL 70 dB as a result of Alternative B2 or Alternative B4 would be eligible for voluntary participation in a Future Build VLAP. The voluntary land acquisitions for noise mitigation were determined after first considering all residential properties identified as eligible for land acquisition as part of RIAC's Part 150 NCP updates, specifically the Current Part 150 VLAP, which is assumed to have been acquired as part of the No-Action Alternative as well as residential parcels identified to be acquired through mandatory acquisition for construction. These properties are deemed eligible for acquisition upon issuance of the ROD. For the purposes of this FEIS, it is assumed for Alternative B2 that residential properties would be acquired between 2020 and 2025 for noise impacts in 2020; however, it is RIAC's intention to acquire residential parcels as soon as 2012, subject to availability of funding. For the purposes of this FEIS, it is assumed for Alternative B4 that residential properties would be acquired between 2015 and 2020 for noise impacts in 2015, and between 2020 and 2025 for noise impacts in 2020; however, it is RIAC's intention to acquire residential parcels as soon as 2012, subject to availability of funding.

The FAA and RIAC closely reviewed the noise contours for Alternatives B2 and B4 in order to maintain neighborhood cohesion and limit community disruption due to land acquisition for noise mitigation. The FAA can only fund for noise mitigation (sound insulation or land acquisition) on properties where noise levels caused by a project meet specific federal criteria. If a residential property is located inside the DNL 65 dB noise contour then it is considered an incompatible land use and federal funds can be used for noise mitigation on that property. Most airports mitigate noise between the DNL 65 and 70 dB noise contours by offering sound insulation, and mitigate for noise above the DNL 70 dB noise contour by offering to acquire the property and relocate the occupants. FAA Order 5100.38 provides the following guidance to the FAA on how it may consider additional properties eligible for noise mitigation: "...projects within DNL 65 dB may be expanded beyond the DNL 65 dB contour to include a reasonable additional number of otherwise ineligible parcels contiguous to the project area, if necessary to achieve equity in the neighborhood. Neighborhood or street boundary lines may help determine what is reasonable, in addition to numbers of properties."[29] For the purposes of this FEIS, this concept of "neighborhood equity," also referred to as "neighborhood rounding," has been applied where the FAA identified some residential parcels outside the DNL 70 dB noise contour as eligible for federal noise

29 *FAA Order 5100.38C, Airport Improvement Program Handbook*, U.S. Department of Transportation, Chapter 8, § 810.b, page 137, effective June 28, 2005.

mitigation funding (voluntary participation in a land acquisition program). This includes homes where any portion of the lot was included inside the DNL 70 dB noise contour, homes that would have been the few remaining residences on the block (or dead-end street) after the project, or homes that would be left isolated or surrounded by non-residential land use.

***Voluntary Residential and Commercial Land Acquisitions for RPZ Clearing***

The land acquisitions for the RPZ areas proposed for the Runway 23 and 5 Ends, as recommended by FAA and with voluntary participation by land owners, were identified when a parcel fully or partially is within the limits of the newly created RPZ. Under Alternative B4, a newly created RPZ would be at the Runway 5 End only. For the purposes of this FEIS, for Alternatives B2 and B4, these acquisitions are assumed to be completed by the time the runway extension is online and operational; however, this RPZ-clearing land acquisition timing is an estimate only. Land acquisition for the newly created RPZ is recommended by the FAA and not considered project mitigation and, therefore, contingent upon FAA funding availability.

#### A.1.7.3.2 Reuse of Noise Lands

In accordance with FAA guidance to manage the land surrounding an airport that has been acquired by the airport sponsor to reduce or eliminate incompatible land uses, or "noise lands" (issued in February 2008 as Program Guidance Letter 08-2, or PGL 08-2), RIAC has documented and mapped all of its held noise lands and their current use in a Noise Land Reuse Plan. Noise land acquired with grant funds is subject to Grant Assurance 31, *Written Assurances on Acquiring Land*, which is based on 49 USC section 47107 (c)(2)(A). The purpose of the grant assurance is to ensure optimal use of the land and if the land is no longer needed for noise compatibility purposes, it may be converted to an airport-compatible use and the federal share of the Fair Market Value of the land is reused or is returned to the airport (such as to support its Part 150 NCP) and Airway Trust Fund established under the *Internal Revenue Code of 1986* (section 9502) to fund future noise compatibility projects. Whether unneeded noise land is sold, kept by the airport and leased, or exchanged is the airport operator's decision. Specifically, if the land was acquired for a noise compatibility purpose:

- The airport owner or operator must determine whether these lands are needed for airport development and lands not needed are disposed of;
- The airport owner or operator will dispose (sell or lease) of the land at Fair Market Value at the earliest practicable time after the land no longer is needed for a noise compatibility purpose;[30]
- The disposition will be subject to the airport retaining or reserving an interest in the land necessary to ensure that the land will be used in a way that is compatible with noise levels associated with operating the airport; and
- The part of the proceeds from disposing of the land that is proportional to the Government's share of the cost of acquiring the land will be paid to the U.S. Secretary of Transportation for deposit in the Aviation Trust Fund or, as the Secretary prescribes, reinvested in an approved noise compatibility project.

30 According to the FAA Program Guidance Letter 08-2 dated February 1, 2008, a parcel is no longer needed for noise compatibility when its use is compatible with noise levels as reflected by the location of the parcel in the associated noise contour. The most current noise contours accepted by the FAA under 14 CFR Part 150 for existing and future conditions at the airport, or prepared as part of a final EA or EIS must be used to determine whether a parcel is still needed for noise compatibility purposes. This contour may be a different contour than the one used to initially acquire the parcel.

### Overview of Noise Land Reuse Plans

An airport sponsor manages the acquisition, disposal, and reuse determinations of its noise land through the Noise Land Inventory and Noise Land Reuse Plan, which is submitted to FAA for approval and generally includes:

- A land inventory which is a compilation of all of the noise land parcels (such as acreage, parcel number, current land use and zoning, a map(s) that clearly identifies the parcels, grant number under which the parcels were acquired, purchase price, and current FAA-accepted noise contour) that were acquired with AIP grant funds.
- A list of all disposal parcels on the inventory (based on the determination of what noise lands, if any, are required for airport development purposes) and the proposed use of all noise land.
- Reuse options through integrating noise contour maps, land-use compatibility, ongoing development and Master Plans.
- An area market study to assess fair market value.
- A study of the market potential and opportunities for local and regional economies to form the basis of plan's reuse recommendations.
- Noise land disposal type, or category, with the repayment requirements.

In accordance with FAA guidance, as part of the analysis of feasible compatible use of potentially releasable noise land, any current state plan, comprehensive municipal plan, zoning ordinances and other local or regional land use plans should be reviewed to develop an understanding of the local government's long-range views of the development potential of the area. While historically comprehensive land use plans have only minimally recognized the implications of planning for airports and off-site, airport-related development, comprehensive planning is an effective way of ensuring land use compatibility near airports to prevent future incompatible land use. The compatible land use analysis should consider any future comprehensive airport plan, land use designations, and any current zoning in the vicinity of each noise parcel as well as the availability of municipal water and sanitary sewer service to the potentially releasable noise lands.

### RIAC's Noise Land Reuse Plan

As previously mentioned, RIAC has compiled a list of all lands acquired under the Completed Part 150 VLAP and their current usage to determine if land is required for airport purposes as part of a Noise Land Reuse Plan. As EIS projects are implemented, or within 18 months of the issuance of the ROD, whichever comes first, RIAC will update the Noise Land Reuse Plan. RIAC's Noise Land Update will first determine what noise lands, if any, are required for airport development purposes, and then RIAC will consider other compatible uses for release of these lands in an Update. In order to develop compatible land uses, such as commercial or industrial uses within the airport noise lands (former residential properties), RIAC will continue to consult with the City of Warwick.

RIAC will continue to maintain the airport noise lands (i.e., mowing). Structures are demolished as quickly as possible following acquisition; however, the timeline for demolition depends on when asbestos abatement is completed and the time of year. RIAC does not remove any existing trees or vegetation during demolition unless it is related to an obstruction removal project, per FAA regulation.

**Potential Reuse of Noise Lands**

There are many potential reuse outcomes in different areas around the Airport dependant on a number of factors such as, the size of the available vacant land, the access to that land, and state and municipal planning processes. Under the FAA Grant Assurances, RIAC is restricted from releasing any noise lands for land uses that FAA considers incompatible due to noise, such as residential land uses. Also, because the FAA requires that all lands that are not needed for airport purposes be released at fair market value and the monies put back into the VLAP, RIAC cannot provide for visual buffers, open space, or other uses that might interfere with the intended, viable reuse.

After updating its Noise Land Reuse Plan, RIAC will attempt to coordinate with the City to rezone land, as appropriate, to allow compatible land uses, such as commercial or industrial land uses for those lands that will not be needed for airport purposes and will be released for private development. Upon completion of the FEIS, it is anticipated that the City of Warwick will update its Comprehensive Plan to reflect land use changes as a result of the T.F. Green Airport Improvement Program and to ensure its consistency with the State Guide Plan. As recommended as part of the 2000 Part 150 Study Update, updates to the Comprehensive Plan should address informal and formal fair disclosure policies, encourage amendments to the building code, and, where appropriate, recommend zoning that is compatible with the Airport. RIAC is currently participating in the City's update of its Comprehensive Plan (see Appendix C, *Federal, State, City, and Tribal Coordination*).

As discussed in Chapter 7, *Final Section 4(f)/Section 6(f) Evaluation*, one example of reuse of RIAC's noise lands is for the replacement of park facilities impacted by the T.F. Green Airport Improvement Program. Since the DEIS, RIAC has selected the Cedar Swamp Road site as the location for the replacement Winslow Park facilities (refer to Figure 7-10). This site is just east of the Airport is part of the RIAC's noise lands under a previous Part 150 VLAP. The impacts to Winslow Park are unavoidable since Winslow Park lies with the RPZ under the No-Action Alternative and Alternatives B2 and B4 (refer to Chapter 7, *Final Section 4(f)/Section 6(f) Evaluation*).[31]

## A.1.8 Socioeconomic Impacts

The social and socioeconomic analyses presented in Chapter 5, *Environmental Consequences*, Section 5.5, *Social and Socioeconomic, Environmental Justice, and Children's Health and Safety Risks*, of this FEIS consider economic impacts of Alternatives B2 and B4 as defined by the FAA's thresholds of significance.[32] Additional impact analyses were also conducted to gain a full understanding of the potential future socioeconomic conditions, such as a local fiscal impacts assessment. For the purposes of this FEIS, direct impacts refer to the actual on-Airport effects of additional air operations and passenger activity generated by an Alternative and indirect impacts include the total impact for the City of Warwick and Rhode Island (secondary impacts added to the

31 U.S. Department of Transportation Act of 1966, Section 4(f), 49 U.S.C., section 303(c), or Section 4(f), requires DOT agencies to protect certain public resources.
32 See FAA Order 1050.1E, Appendix A paragraphs 16.3 and 16.4.

direct impacts). Refer to Appendix G.1, *Social and Socioeconomic Impacts Methodology*, of this FEIS for the methodologies used for the social and socioeconomic impact analyses.

The FEIS social and socioeconomic analyses concluded that Alternatives B2 and B4 would not result in significant social and economic impacts (as defined by FAA's NEPA guidelines). Both Alternative B2 and Alternative B4 would result in economic growth (new jobs and an increase in business revenues as well as sales and income tax revenue) from on- and off-Airport impacts when compared to the No-Action Alternative. Future operations would decrease under the No-Action Alternative, based on the FAA's 2010 Draft TAF for T.F. Green Airport (as directed by FAA Order 5050.4B section 504 b), due to continuing changes in the aviation industry associated with the national economic downturn. Therefore, there would be losses in direct jobs, wages and business sales for passenger airlines, airport operations, and support services when compared to the 2004 Baseline Condition. Off-Airport visitor spending (indirect, or secondary, impacts), which is based on passenger levels, is also projected to decrease in 2015, but would increase only slightly in 2020 and 2025 under the No-Action Alternative. Forecast passengers increase at a higher rate than operations due to more efficient utilization of aircraft by airlines (resulting in decreased "capacity", or operations) while still accommodating greater passenger demand resulting in higher aircraft load factors (greater percentage of seats filled by paying passengers on each flight).

### A.1.8.1 No Significant Socioeconomic Impacts

The significance factors to be considered in determining the significant threshold socioeconomic impacts, in accordance with FAA Order 1050.1E, is when an action would cause: extensive relocation of residents, but sufficient replacement housing is unavailable; extensive relocation of community businesses that would cause a severe economic hardship for affected communities; disruption in local traffic patterns that would substantially reduce the level of service of roads serving the airport and surrounding communities; or a substantial loss in the community tax base.

Alternatives B2 and B4 would not result in significant impacts to socioeconomic conditions because:

- There would be sufficient replacement housing within Warwick and its surrounding communities.
- There would be sufficient commercial space for relocating businesses within Warwick and its surrounding communities.
- There would be no substantial reduction in the Level of Service of roads serving the airport and its surrounding communities. Alternatives B2 and B4 would improve traffic circulation surrounding the Airport, specifically with the proposed improvements to Airport Road and the gateway to the Airport on Post Road (refer to Section 5.6, *Surface Transportation*).
- There would be no substantial loss in community tax base. For both Alternative B2 and Alternative B4, the total potential annual property tax loss (for mandatory and voluntary land acquisitions) is significantly less than one percent of the total annual tax revenue base for the City of Warwick[33] ($1,173,997 would be lost

33 Based on the City of Warwick's 2010 estimated total local tax revenue base of $204,173,334, as provided by Rhode Island Municipal Affairs, Department of Administration.

annually starting in 2020, or 0.57 percent of the base, under Alternative B2 and $567,521 would be lost annually starting in 2020, or 0.28 percent of the base, under Alternative B4). Over time, cumulative decreases in City of Warwick property tax revenue would total $5.9 million by 2025 for Alternative B2 and $3.2 million by 2025 for Alternative B4. (These losses in property tax revenue represent significantly less than one percent of the City or Warwick's tax base for 2010 and, therefore, is not considered significant.)

### A.1.8.2 Economic Benefits of Alternatives B2 and B4

As demonstrated by the economic analysis for aviation activity presented in of Chapter 5, *Environmental Consequences*, Section 5.5.4, *Social and Socioeconomic Impact Assessment*, under either Alternative B2 or B4, the Airport would continue to serve as a contributing economic driver for the State of Rhode Island and the region by providing additional economic benefits in the form of new jobs, increased on- and off-Airport spending and business revenues, and increased state tax revenues. Increases in state sales and income tax revenue would be related to on-Airport and off-Airport spending by visitors and Airport-related workers as well as impacts of anticipated local off-Airport job attraction generated by airline and other Airport-related business activities. Since Alternative B4 includes a Runway 5-23 extension by 2015, this expedited schedule would result 80 percent greater economic gains between 2015 and the end of 2020 than Alternative B2. Specific economic benefits from the Alternatives B2 and B4 include:

- Alternative B4: Potential economic gains between 2015 and the end of 2020 would total $385 million in business revenues in the City of Warwick and $816 million for the State of Rhode Island, and $13 million in state tax revenue (sales and income taxes). (Alternative B4 would begin to generate economic gains due to commencement of operations on the extended runway in 2015 compared to Alternative B2 where the extended runway would not come on line until 2020).
- Alternative B2: By the end of 2020, potential economic gains would total $63 million in business revenues in the City of Warwick and $136 million for the State of Rhode Island, and $2 million in state tax revenue (sales and income taxes).
- Cumulative gains in sales and income taxes would reach approximately $13.3 million under Alternative B2 (between 2020 and 2025) and more than $22.7 million under Alternative B4 (between 2015 and 2025).

Additionally, the following temporary construction-related economic benefits are expected for Alternative B2 and Alternative B4:

- Constructing Alternative B2 would directly generate a total of 803 jobs, $37.7 million in personal income, and nearly $92.1 million in business spending in the City of Warwick during the 2012 to 2020 construction period. When including indirect and induced impacts, the total benefit would be 1,173 jobs, $50.1 million in income, and $134.3 million in additional spending in the City of Warwick, and additional benefits statewide (1,227 jobs, $53.6 million in wages, and $161.5 million in business revenue).
- Constructing Alternative B4 would directly generate a total of 872 jobs, $40.9 million in personal income and $90.6 million in business spending in the City of Warwick during the 2012 to 2020 construction period.

When including indirect and induced impacts, the total benefit would be 1,335 jobs, $58.3 million in income and $157.8 million in additional spending in the City of Warwick, and additional benefits statewide.

## A.1.9 Affordable Housing Analysis

While there is no NEPA significance threshold specified for subsidized or low-income housing impacts, according to FAA Order 1050.1E, an assessment of the proposed T.F. Green Airport Improvement Program in terms of its potential impact (losses) to affordable housing, as defined by Rhode Island state law, was conducted as part of this FEIS at the request of the City of Warwick. As discussed in Appendix G.2, *Affordable Housing Analysis* of this FEIS, the affordable housing analysis evaluates whether Alternatives B2 and B4 would result in direct impacts (substantial reductions of the affordable or subsidized housing stock with no replacement options) or secondary impacts (significantly impact housing affordability by removing a substantial number of units from the City of Warwick's housing stock when compared to the No-Action Alternative). Consideration is given to both owner-occupied and rental residential properties.

### A.1.9.1 Definitions of Affordable Housing Types

To determine the effects of property acquisition for the T.F Green Airport Improvement Program on the affordable housing stock, properties were first evaluated to see if they meet the state definition of affordable housing. For the purposes of this FEIS, the following "affordable" housing types, in accordance with the State definitions, per RI General Laws are defined as follows:

- ***Affordable housing*** refers to residential properties (homeownership and rental properties) that must have a sales price or rental amount that is within the means of a household that falls within a moderate income or less thresholds, including:[34]
  - Households earning 120 percent of Area Median Income (AMI) for dwelling units for homeownership. Rhode Island Housing provides a calculation of the affordable home price in the City of Warwick for 2- and 3- bedroom homes in 2010: $221,501 for a 2-bedroom home; and $247,019 for a 3-bedroom home.
  - Households earning 80 percent of AMI for dwelling units for rent. Rhode Island Housing provides a calculation of the 2010 affordable rents for the City of Warwick: $1,622 per month for a 2-bedroom apartment; and $1,802 per month for a 3-bedroom apartment.
- ***Subsidized low- and moderate-income housing*** refers to housing that is subsidized.
  - This includes any housing built or operated by any public agency or any nonprofit organization or by any limited equity housing cooperative or any private developer that is subsidized by a federal, state, or municipal government subsidy under any program to assist the construction or rehabilitation of housing that is affordable to low or moderate income households, as defined in the applicable federal or state statute, or local ordinance and that will remain affordable through a land lease and/or deed restriction for ninety-nine (99) years or such other period that is either agreed to by the applicant and

34 *Rhode Island Low- and Moderate-Income Housing Act*, RI General Laws 45-128-8.1(d)(1).

town or prescribed by the federal, state, or municipal government subsidy program, but that is not less than thirty (30) years from initial occupancy.[35]

The affordable rents and housing prices were then compared to the estimated rents and market prices of the residential properties to be acquired (mandatory and voluntary). Consideration was also given to whether housing was subsidized by a municipal, state, or federal source, and is managed by a public entity or non-profit organization (refer to as low-and moderate-income housing in this FEIS). The only subsidized low- and moderate-income housing within the Study Area consists of multi-family housing.

## A.1.9.2 Summary of Affordable Housing Impacts

This section summarizes the comparative direct impacts to affordable housing among the FEIS No-Action and Alternatives B2 and B4.

### A.1.9.2.1 Affordable Housing Impacts

Many of the residential units to be acquired (mandatory and voluntary) under the FEIS No-Action Alternative, Alternative B2, or Alternative B4 are considered "affordable housing" (as defined according to applicable Rhode Island Law). Of the 135 units total to be acquired under the No-Action Alternative (as part of the Current Part 150 VLAP), 134 units, or 99 percent, are considered affordable housing units (108 of these units are affordable single-family units and 26 of these units are affordable multi-family units). Out of the 237 units total to be acquired under Alternative B2 (mandatory and voluntary), 235 units, or 99 percent, are considered affordable housing units (131 of these units are affordable single-family units and 104 of these units are affordable multi-family units). Out of the 140 units to be acquired under Alternative B4 (mandatory and voluntary), 135 units, or 96 percent, are considered affordable housing units (131 of these units are affordable single-family units and four of these units are affordable multi-family units). Alternative B2 would result in the acquisition of more housing units that are considered affordable compared to Alternative B4. Also, Alternative B2 would result in the acquisition of a higher amount of affordable multi-family units (104 multi-family units most of which are located north of the Airport) compared to Alternative B4 (which would result in the acquisition of four affordable multi-family units).

### A.1.9.2.2 Low- and Moderate-Income Housing

None of the residential units to be acquired (mandatory and voluntary) under the FEIS No-Action Alternative and Alternatives B2 and B4 are considered low- and moderate income housing, per applicable Rhode Island Law.

## A.1.9.3 Replacement Affordable Housing

State and federal laws and regulations, including NEPA do not require mitigation for a significant loss in affordable housing or effect to housing affordability. Appendix G.4, *Conceptual Relocation Plan* of this FEIS describes the acquisition process for both affordable and non-affordable residential properties and commercial properties, in accordance with the Uniform Relocation Act, 42 U.S.C. Chapter 61, and related U.S. Department

35 *Rhode Island Low- and Moderate-Income Housing Act*, RI General Laws §45-53-3(9).

of Transportation Regulations, 49 CFR Part 42, and U.S. Housing and Urban Development (HUD) policy and guidance under HUD Handbook 1378.

#### A.1.9.3.1 Affordable Housing

At the request of the City of Warwick, the affordable housing analysis includes an evaluation for replacing affordable housing units that would be acquired and demolished. A number of units impacted under Alternative B2 and Alternative B4 are priced such that the private market could likely not provide replacement housing at the same price point without subsidies. While Alternative B4 would reduce the availability of affordably-priced housing stock (as defined by the state) in the City of Warwick, and, in general, state and city housing policies seek to preserve and expand the availability of such housing stock, Alternative B4, identified as the Preferred Alternative, would result in less residential land acquisitions. Therefore, affordable housing impacts in terms of both units lost and estimated replacement subsidy required to replace units lost compared to Alternative B2. Refer to Appendix G.2, *Affordable Housing Analysis* of this FEIS for the evaluation of replacement affordable housing, including cost estimates.

In accordance with the URA, displaced residents would be offered assistance in locating comparable replacement housing. Comparable replacement housing means: "any dwelling that is (A) decent, safe, and sanitary; (B) adequate in size to accommodate the occupants; (C) within the financial means of the displaced person; (D) functionally equivalent; (E) in an area not subject to unreasonable adverse environmental conditions; and (F) in a location generally not less desirable than the location of the displaced person's dwelling with respect to public utilities, facilities, services, and the displaced person's place of employment." (42 USC Chapter 61)

As part of the Conceptual Relocation Plan (presented as Appendix G.4 of this FEIS), a search was conducted to identify the availability of housing in the surrounding areas with similar housing stock. Per review of the current real estate market, there is sufficient available housing to meet the relocation housing needs of all displaced residential households identified in both Alternative B2 and Alternative B4. Housing markets in Warwick, West Warwick, Coventry, and North Kingstown, RI were considered. Additionally, based on the ongoing Current Part 150 VLAP, there are sufficient mitigation opportunities (available real estate) to relocate residents and businesses in or around Warwick. Based on information obtained from the Current Part 150 VLAP, displaced residents have been successfully relocated within Warwick or surrounding areas, such as West Warwick, Coventry and North Kingston. Therefore, it is confirmed that there are sufficient relocation replacement sites available.

#### A.1.9.3.2 Low- and Moderate-Income Housing

The June 2006 *Rhode Island Five-Year Strategic Housing Plan* recommended a broad range of specific strategies to address the housing needs of Rhode Island's population. The recommendations included the replacement of low- and moderate-income housing units on a one-to-one basis.[36] No subsidized low- and moderate-income housing units would be acquired under any of the FEIS Alternatives and, therefore, the replacement of this type of housing would not be required as part of the project.

36 State of Rhode Island Division of Planning, *Rhode Island Five Year Strategic Housing Plan: 2006-2010: Five Thousand in Five Years*, Report Number 110, State Guide Plan Element 423, June 2006.

## A.1.10 Air Quality Monitoring

The FAA received many comments about the existing condition of air quality near the airport and air quality monitoring. As stated in Chapter 4, *Affected Environment,* Section 4.6.2.4, *Air Monitoring Data*, of the FEIS, the RIDEM conducted air monitoring for particulate matter (PM), black carbon (BC) and a wide assortment of substances classifiable as "volatile organic compounds" (VOCs) or "hazardous (or "toxic") air pollutants" (HAPs) in areas around the Airport to the north, east, south and west for in 2005/2006. The outcomes from this monitoring program are available on the RIDEM web site and include comparisons to appropriate health-based criteria. RIAC expanded this monitoring program in 2008 which has been in operational since 2008 and is ongoing. The data from the RIAC program are also provided to RIDEM on a quarterly basis in compliance with state law.

Although these RIDEM and RIAC air monitoring programs and monitoring stations were established and operated independently from the T. F. Green Airport Improvement Program, the collected data is considered to be representative of the residential, commercial and special use areas (recreational facilities, educational facilities, etc.) that surround the Airport. By design, these data are also inclusive of emissions from airport-related sources (i.e., aircraft, ground service equipment (GSE), on-site motor vehicles); under varying operational modes (i.e., idle, acceleration, etc.); as well as off-airport sources (i.e., motor vehicles, industry, long-range transport, etc.). For those areas located further away, it is expected that any contributions from the airport-related emissions will be less by comparison – given that the impacts generally diminish with increasing distance from the source.

## A.1.11 Wetland Impacts to Buckeye Brook

The purpose of this summary response is to address a number of public comments concerning impacts to Buckeye Brook and adjacent wetlands by the Preferred Alternative (Alternative B4) and Alternative B2. Several comments received after the DEIS was issued in July 2010 refer to alternatives that were eliminated during the EIS Process. This summary response highlights important functions and values provided by Buckeye Brook and other wetlands in the Project Area and the measures incorporated into site designs to avoid and minimize impacts to wetland, especially wetlands which provide important ecological functions.

### A.1.11.1 Buckeye Brook, Warwick Pond, and Spring Green Pond

Buckeye Brook is notable for the existing unaided[37] anadromous spawning run of river herring into Warwick Pond and Spring Green Pond. American eel elvers also travel up the brook to Warwick Pond and Spring Green Pond where they mature before returning to the ocean to spawn. Warwick Pond is a natural "kettlehole" pond with a water surface of approximately 85 acres. The 8.9-acre Spring Green Pond north of Airport Road was created by impounding a headwater stream which once flowed east into Occupessatuxet Cove.[38] Within the

37 Unaided means that fish are able to swim up the brook from the coast to spawning areas without the aid of fish ladders or other assistance.

38 This earthen dam now is now concealed as the roadway fill section of Warwick Avenue where it crosses east of the pond. Perhaps contemporaneous with the dam construction to create the pond, an outlet channel was excavated which drains west to a small stream in the headwaters Buckeye Brook north of Airport Road. The existing configuration of Spring Green Pond and its outlet stream appears on the Dept. of Interior U.S. Geological Survey, June 1892 Edition of the Rhode Island Narragansett Bay Topographic Map Sheet. Fieldwork for this sheet was completed in 1888.

boundaries of the Airport property, Buckeye Brook flows through Wetland A4 north of Airport Road, Wetland A5 between Airport Road and Lakeshore Drive, and Wetland A10 downstream of the outlet of Warwick Pond.

### A.1.11.2 Alternative B4

The FEIS identifies Alternative B4 as the Preferred Alternative based on several evaluation criteria (such as ability to meet the project purpose and need and the least environmentally damaging practicable alternative). Alternative B4 would result in the smallest area of impact to wetlands (5.0 acres) and unlike Alternative B2 would avoid any direct impact to valuable fishery habitat within Buckeye Brook, and would also avoid direct impact to Wetlands A4, A5, and A10 which border Buckeye Brook within the Airport property. Alternative B4 avoids impact to Wetland A5 by extending Runway 5-23 south only, maintaining the current location of the Runway 23 End RSA, and FAA-mandated Object Free Area (OFA) at the Runway 23 End. The Runway 5 End would shifted south by 1,500 feet requiring the relocation of Main Avenue. No wetlands are present at the Runway 5 End. A summary of impacts to each wetland and the wetlands associated functions and values are provided in Table A.11-1.

**Table A.11-1 Alternative B4: Summary of Impacts to Wetland Functions and Values**

| Program Element | Wetland ID | Wetland Impact (ac) | Wetland Area (ac) | GWR/D-SWGW | FFA | S/T/P R-WQ | NR/R/T-WQ | PE | S&S S | F&SH | WLH-WWH | T&E SH | REC | U/H-AES | VQ/A-AES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Runway 34 | A6 | 1.5 | 3.1 | X | | | | | | | | | | | |
| | A8 | 0.1 | 16.3 | X | P | P | X | | | | X | | | | |
| | A10 | 0 | 25.6 | X | P | | P | X | X | P | P | | X | X | |
| | A11 | 0.6 | 2.7 | X | | | | | | | | | | | |
| | A13 | 2.8 | 19.4 | | P | P | P | | | | X | | | | |

| | | | |
|---|---|---|---|
| P | Principal Wetland Function or Value | F&S H | Fish and Shellfish Habitat |
| X | Additional Wetland Function or Value likely provided by wetland | WLH | Wildlife Habitat |
| GWR/D | Groundwater Recharge/Discharge | WWH | Wildlife and Wildlife Habitat |
| SWGW | Surface Water and Groundwater | T&E SH | Threatened and Endangered Species Habitat |
| FFA | Floodflow Alteration | REC | Recreation |
| S/T/P R | Sediment/Toxicant/Pathogen Retention | ED/SV | Educational/Scientific Value |
| NR/R/T | Nutrient Removal/Retention/Transformation | U/H | Uniqueness/Heritage |
| WQ | Water Quality | AES | Aesthetic |
| PE | Production Export | VQ/A | Visual Quality/Aesthetics |
| S&S S | Sediment and Shoreline Stabilization | | |

All of the wetland area proposed to be filled under Alternative B4 is located within the watershed of Buckeye Brook; however the brook itself and adjacent wetland corridor are avoided. The stream channel segments that would be relocated or placed in culverts were originally constructed as diversion channels around existing Taxiway C and Runway 34 during an earlier airport expansion. These streams do not contain fish or shellfish habitat. New replacement channels would be designed to be stable and where adequate slope is present, include riffles over permanent stone checks to enhance aeration and improve water quality.

### A.1.11.3 Alternative B2

Alternative B2 would extend Runway 5-23 north and south and would require the full relocation of Airport Road. Alternative B2 would result in the filling of approximately 5.8 acres of wetland. This fill would include 1.8 acres to construct fully relocated Airport Road, 1.5 acres at the Runway 23 End associated with extending Runway 5-23, and 2.5 acres at the Runway 34 End associated with improving the Runway 34 RSA and relocating Taxiway C. The northward shift of Runway 23 would also require the existing access drive for the Airport Maintenance Facility (AMF) to be relocated outside of the OFA. Relocation of this access drive and construction of the new OFA would result in the filling of 1.5 acres of Wetland A5, adjacent to Buckeye Brook. This fill would occur in two locations. The new OFA and Perimeter Road would impact forested wetland in the northwestern portion of Wetland A5 and the new AMF access road would require the existing Airport security road which runs through Wetland A5 along the eastern Airport Boundary to be widened. This improvement would also require approximately 142 linear feet of Buckeye Brook to be altered through minor channel relocation (112-linear feet) and extension of the culvert at Lake Shore Drive by 30-feet. A summary of impacts to each wetland and the wetlands associated functions and values are provided in Table A.11-2.

**Table A.11-2 Alternative B2: Summary of Impacted Wetland Functions and Values**

| Program Element | Wetland ID | Wetland Impact (ac) | Wetland Area (ac) | Wetland Functions and Values (USACE, RIDEM) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | GWR/D-SWGW | FFA | S/T/P R-WQ | NR/R/T-WQ | PE | S&S S | F&SH | WLH-WWH | T&E SH | REC | ED/SV | U/H-AES | VQ/A-AES |
| Runway 23 | A2 | 0.0 | 7.6 | P | X | X | X | | | | P | | | | | |
| | A3 | 0.0 | 12.9 | | | P | P | X | | P | X | | X | | X | |
| | A4 | 0.0 | 4.4 | P | | | | X | | X | X | | | | X | |
| | A5 | 1.5 | 14.5 | X | X | | | X | | X | P | | | | X | |
| Runway 34 | A6 | 1.6 | 3.1 | X | | | | | | | | | | | | |
| | A8 | 0.1 | 16.3 | X | P | P | X | | | | X | | | | | |
| | A10 | 0.1 | 25.6 | X | P | | P | X | X | P | P | | X | | X | |
| | A11 | 0.6 | 2.7 | X | | | | | | | | | | | | |
| | A13 | 0.1 | 19.4 | | P | P | P | | | | X | | | | | |
| Fully | A2 | 1.1 | 7.6 | P | X | X | X | | | | P | | | | | |
| Relocated | A3 | 0.1 | 12.9 | | | P | P | X | | P | | | X | | X | |
| Airport Road | I | 0.5 | 15.3 | X | | P | P | | | | X | | | | | |
| | P | 0.1 | 17.1 | P | | P | P | | | | X | | | | | |

See Table A.11-1 for abbreviations used in this table.

### A.1.11.4 Additional Minimization to Alternatives B2 and B4

After the DEIS was issued, the FAA and RIAC continued to investigate design measures to further reduce impact to wetlands associated with safety enhancements for Runway 34 to the greatest extent practicable. The reductions were achieved by reconfiguring the Perimeter Road along the eastern side of Runway 34 by grading

to keep it below the elevation of the OFA and steepening side slopes from 4:1 to 3:1 around the limits of the RSA and Taxiway C. The minimization resulted in a reduction in proposed wetland impact from 7.3 acres to the current 5.0 acres for Alternative B4 and 7.5 acres to 5.8 acres for Alternative B2. Alternative B4 remains as the Preferred Alternative identified in the FEIS.

The remaining unavoidable wetland impacts will be mitigated through a program involving wetland restoration, creation, enhancement and preservation as detailed in the FEIS, Chapter 6, *Mitigation*, Section 6.9, *Wetlands and Waterways*.

## A.1.12 Cumulative Impacts and Wetland Mitigation

The purpose of this summary response is to provide information on the assessment of cumulative wetland impacts and mitigation program proposed to compensate for unavoidable impacts to wetlands necessary to complete safety enhancements to Runway 34.

### A.1.12.1 Cumulative Impacts

The analysis of cumulative effects was performed in accordance with the requirements of the CEQ NEPA regulations at 40 CFR 1508.7, and the CEQ's guidance document, "Considering Cumulative Effects under the National Environmental Policy Act" (January, 1997), as well as FAA's regulations at FAA Order 5050.4B, section 1007(i). The results of this analysis are provided in the FEIS, Chapter 5, *Environmental Consequences*, Section 5.10, *Wetlands and Waterways.*

The assessment uses a chronological series of aerial photographs starting in 1939 to evaluate wetland losses and changes in land use in the Study and Project Areas, which primarily involve the Buckeye Brook wetland system. Activities which occurred on the Airport as well as off-site development are included in the assessment. Publications reporting on statewide wetland losses are also cited. The results of this analysis indicate that wetland losses in the Airport Project Area have been large and are estimated at approximately 70 percent. Significant contributors to this loss include landfills for waste disposal, airport expansion, residential and commercial development, and road construction.

Despite these past encroachments, the Buckeye Brook wetland corridor and stream system including Warwick Pond and Spring Green Pond were found to continue to provide important fish and shellfish and wetland wildlife habitat. Avoidance of this important natural resource was one of several criteria (including total wetland impact area) used to identify Alternative B4 as the Least Environmentally Damaging Practicable Alternative as documented in the FEIS Chapter 5, *Environmental Consequences*, Section 5.10, *Wetlands and Waterways.*

### A.1.12.2 Compensatory Mitigation

The DEIS presented several conceptual wetland mitigation sites with the intention of demonstrating that compensatory mitigation for wetland losses was possible. In developing the conceptual mitigation sites, guidance documents from the USACE, the jurisdictional federal agency that oversees wetland mitigation, as

well as the agency itself were consulted. Per the guidance provided, the majority of conceptual mitigation sites proposed was located within the impacted watersheds, which are identified as Upper Narragansett Bay and Greenwich Bay watersheds. RIAC will develop a compensatory mitigation program that will include a combination of some of the listed sites.

After the DEIS was issued, the FAA and RIAC continued to investigate design measures to reduce impact to wetlands associated with safety enhancements for Runway 34. This resulted in a reduction in the area of wetland impact from 7.3 acres to 5.0 acres. The FAA and RIAC also continued to refine and seek additional sites for the wetland mitigation program to compensate for the remaining unavoidable impacts. The wetland mitigation working group has met on numerous occasions throughout the process. On October 14, 2010, the FAA and RIAC met with the USACE, EPA, RIDEM, the Rhode Island Rivers Council, and the RICRMC at the RIDEM Office to review the conceptual wetland mitigation program and learn of additional opportunities for wetland mitigation. This was followed by a meeting with City officials, the Buckeye Brook Coalition, Save the Bay, the Rhode Island Rivers Council, and other NGOs on November 4, 2010 at the RIAC to obtain information on additional mitigation opportunities within the Buckeye Brook watershed and the City of Warwick. The sites within the Buckeye Brook watershed added to the mitigation program from this effort are presented in the FEIS.

During preparation of the FEIS, the floodplain associated with Buckeye Brook was modeled to better quantify impacts associated with fill placement in Wetland A13. This model was used to verify the effectiveness of the proposed wetland mitigation in maintaining the flood storage function.

The wetland mitigation program provided in the FEIS follows guidance provided in:

- Compensatory Mitigation for Losses of Aquatic Resources; Final Rule 4/10/08; 33 CFR Parts 325 and 332;
- Regulatory Guidance Letter 08-03: Minimum Monitoring Requirements for Compensatory Mitigation Projects Involving Restoration, Establishment, and/or Enhancement of Aquatic Resources; and
- New England District Compensatory Mitigation Guidance. 7/20/2010. USACE New England District Regulatory Division.

### A.1.12.3 Commitment to Implement Mitigation

Several comments questioned the commitment of the FAA and RIAC to actually implement the NEPA- and USACE-mandated wetland mitigation. The ROD is a legal document that outlines the FAA's and RIAC's commitments to mitigate significant environmental impacts. Specific funding mechanisms will be determined after the ROD is issued at the time of planning and implementation.

## A.1.13 Water Quality – New Analysis and Revised Assumptions

The FAA received many comments on water quality specific to the assumptions on impervious surfaces within the voluntary land acquisition area, design of stormwater management systems, and pollutant loading. This summary response addresses these comments.

### A.1.13.1 Revised Assumptions on Impervious Area

The assumptions on impervious areas within the voluntary land acquisition areas were revised for the FEIS. The DEIS assumed roads and structures in any areas of mandatory or voluntary land acquisitions (such as the area south of Main Avenue) would be acquired, demolished, and planted with grass, resulting in an increase of impervious surfaces in these areas. This assumption was revised for the FEIS to exclude the removal of roadways, since the roadways within the Completed and Current Part 150 VLAPs for T.F. Green Airport still remain. All roadways within the acquisition areas were assumed to remain for the FEIS with the exception of roadways that are to be relocated, such as Airport Road, or are physically impacted by the T.F. Green Airport Improvement Program.

Table A.13-1 shows the changes in impervious area within the affected drainage areas for Alternative B4 that have been revised based on the changes in assumptions. Based on the revised analysis, Alternative B4 would increase the total impervious area by 70.2 acres compared to the No-Action Alternative. The majority of the new impervious surfaces are on the Airport and in the Buckeye Brook North drainage area (caused by the new taxiways, and Integrated Cargo areas), the Buckeye Brook South drainage area (caused by the Runway 16-34 RSA enhancements, the new taxiways, and the South Service Area development) and the Tuscatucket Brook watershed (the Runway 5-23 extension). The increases would be partially offset by decreases due to removing commercial and residential parking lots and structures required for construction. The T.F. Green Airport Improvement Program would include stormwater controls designed to manage discharges to Warwick Pond, Buckeye Brook North, Buckeye Brook South, and Tuscatucket Brook and would limit peak flows and erosion at the outfalls and in the downstream reaches of these brooks. In addition, Callahan Brook would have reduced overall peak flow due to the decreased impervious area in the watershed.

**Table A.13-1 Impervious Surfaces by Drainage Area (Alternative B4)**

| | Impervious Area (acres)[1] | | Alternative B4 Change in Impervious Area (acres)[2] | | |
|---|---|---|---|---|---|
| Drainage Area | No-Action | Alt. B4 | Required for Construction[3] (On-airport, Partially Relocated Airport Road, and Realigned Main Ave) | Voluntary Land Acquisition Areas[4] (Off-airport) | Total |
| Buckeye Brook North | 237.0 | 258.9 | +21.9 | 0 | +21.9 |
| Warwick Pond | 11.7 | 12.9 | +1.2 | 0 | +1.2 |
| Buckeye Brook South | 161.6 | 196.5 | +34.9 | 0 | +34.9 |
| Mill Cove (cumulative)[5] | 410.3 | 468.3 | +58.0 | 0 | +58.0 |
| Tuscatucket Brook | 35.0 | 49.6 | +15.0 | (0.4) | +14.6 |
| Callahan Brook | 24.3 | 21.9 | +1.1 | (3.5) | (2.4) |
| Brush Neck Cove (cumulative)[6] | 59.3 | 71.5 | +16.1 | (3.9) | +12.2 |
| Total | 469.6 | 539.8 | +74.1 | (3.9) | +70.2 |

Source: VHB, Inc.

1 Portions of the watersheds that fall within the maximum combined footprint of the Alternatives (including both on and off Airport areas).
2 Includes existing pavement, proposed pavement, and impervious surfaces from land acquisitions.
3 Construction elements include EMAS, parking, roadways, taxiways, and RSA and RPZ construction, depending on drainage area.
4 Associated with the Completed and Current Part 150 VLAP.
5 The Mill Cove drainage area consists of the combined Buckeye Brook North, Warwick Pond, and Buckeye Brook South drainage areas evaluated in this analysis.
6 The Brush Neck Cove drainage area consists of the combined Tuscatucket Brook and Callahan Brook drainage areas evaluated in this analysis.

Table A.13-2 shows that Alternative B4 would not result in any change to the total area of on and off-Airport roadways and parking. Since the construction of any new impervious areas (the partial relocation of Airport Road and the relocation of portions of the airport service roads in the Mill Cove drainage area, and the 3.5 acres of new roadways from the relocation of Main Avenue, and parking areas in the Brush Neck Cove drainage area) would be designed to meet the 2010 Rhode Island Stormwater Design and Installation Standards Manual, would not adversely affect downstream water quality and would reduce potential pollutant loading to receiving streams.

Alternative B4 would decrease the amount of road and parking lot impervious surfaces by 1.0 acres in the Brush Neck Cove watershed, thus improving water quality by removing potential pollutant sources. The 1.0 acre increase in roadway and parking lot impervious surfaces in the Mill Cove watershed would include mitigation measures designed to meet state stormwater requirements and would not adversely affect water quality in the receiving waters of Buckeye Brook and Warwick Pond.

**Table A.13-2 Alternative B4: Impervious Roadway and Parking Areas by Drainage Area[1]**

| | | | Change in Roadway and Parking Area (acres)[2] | | |
|---|---|---|---|---|---|
| Drainage Area | No-Action Alternative | Alternative B4 | Required for Construction[3] | Voluntary Land Acquisition Areas[4] | Total |
| Buckeye Brook North | 106.8 | 106.8 | 0.0 | 0.0 | 0.0 |
| Warwick Pond | 0.8 | 0.8 | 0.0 | 0.0 | 0.0 |
| Buckeye Brook South | 50.5 | 51.5 | +1.0 | 0.0 | +1.0 |
| Mill Cove (cumulative)[5] | 158.1 | 159.1 | +1.0 | 0.0 | +1.0 |
| Tuscatucket Brook | 21.0 | 18.5 | (4.0) | +1.5 | (2.5) |
| Callahan Brook | 19.1 | 20.6 | (0.5) | +2.0 | +1.5 |
| Brush Neck Cove (cumulative)[6] | 40.1 | 39.1 | (4.5) | +3.5 | (1.0) |
| Total | 198.2 | 198.2 | (3.5) | +3.5 | 0.0 |

Source: VHB, Inc.
1 The areas in this table represent the portions of the watersheds that fall within the maximum combined footprint of the Alternatives (including both on- and off-Airport areas). Totals are rounded.
2 The roadway and parking areas are a subset of the impervious areas (e.g., 198.2 acres of the 539.8 acres total impervious acres are attributed to parking and roadway surfaces).
3 Construction elements include EMAS, parking, roadways, taxiways, and RSA and RPZ construction, depending on drainage area.
4 Associated with the Completed and Current Part 150 VLAP.
5 The Mill Cove drainage area consists of the combined Buckeye Brook North, Warwick Pond, and Buckeye Brook South drainage areas evaluated in this analysis.
6 The Brush Neck Cove drainage area consists of the combined Tuscatucket Brook and Callahan Brook drainage areas evaluated in this analysis.

## A.1.13.2 Hydrologic Analysis

A preliminary hydrologic study has been performed to assess feasible locations, types, and sizes of stormwater BMPs for the T.F. Green Airport Improvement Program. A HydroCAD model was developed using Technical Release 20 (TR-20) to determine the resultant increase in stormwater runoff for the 100-year storm event between the 2004 Baseline Condition and the Alternatives B2 and B4 (see Appendix K, *Water Quality*). The HydroCAD preliminary basin sizing analysis was then used to determine the maximum volume of stormwater retention required to mitigate any increases in stormwater runoff. The application for the RIPDES and/or

freshwater wetlands permits from the RIDEM Office of Water Resources for the T.F. Green Airport Improvement Program projects will include a more detailed analysis. This analysis will also include design of the outlet control structures to increase the efficiency of these systems resulting in smaller systems than those determined in this FEIS.

In this FEIS, the proposed enhancements were evaluated for impacts to the five watersheds that discharge to one of five design points where peak discharge rates were evaluated for both the 2004 Baseline Condition and Alternative B4. Table A.13-3 shows the net change in the peak flow rate requiring mitigation for the 100-year storm event and the maximum required stormwater BMP storage volume for Alternative B4.

**Table A.13-3 Alternative B4: Required Stormwater BMP Storage Volume**

| | Peak Flow (cubic feet per second)[1] | | | Maximum Required Storage Volume (acre-feet)[2] |
|---|---|---|---|---|
| Drainage Area | 2004 Baseline Condition | Alternative B4 | Net Change Requiring Mitigation | Alternative B4 |
| Buckeye Brook North | 1437 | 1514 | 77 | 14.2 |
| Warwick Pond | 85 | 94 | 9 | 0.3 |
| Buckeye Brook South | 1025 | 1214 | 189 | 22.4 |
| Tuscatucket Brook | 230 | 300 | 70 | 8.6 |
| Callahan Brook | 281 | 245 | (36) | NA[3] |

Source: VHB, Inc.
1 Peak Outflow determined from hydrologic model calculations performed using HydroCAD (see Appendix K)
2 Required storage volume determined using TR-20 Preliminary Basin Sizing Analysis in appendix K.2.1
3 No increase in peak flow is anticipated that would require mitigation through storage

No mitigation is required aside from compliance with RIDEM standards, including the proper design of stormwater treatment in accordance with the requirements of the 2010 Rhode Island Stormwater Design and Installation Standards Manual.

### A.1.13.3 Pollutant Loading Analysis

The impacts from pollutant loading were considered in the water quality analysis for the FEIS. Pollutant loading within a given drainage area was determined using the Simple Method (Schueler, 1987) which is based on annual rainfall, percent site impervious cover, land use type, and pollutant loading coefficients based on land use.

The findings of this analysis indicate Alternative B4 without mitigation could result in a potential 0.9 percent increase to the total pollutant load when compared to the No-Action Alternative. However, infiltrating stormwater BMPs in Spring Green Pond, Buckeye Brook, and Warwick Pond and pervious surfaces located between impervious surfaces (taxiways and runways, including the stormwater collection systems) would mitigate pollutant loading impacts in receiving waters.

Alternative B4 would decrease the amount of pollutant loading by 0.3 percent in the Brush Neck Cove watershed, improving water quality by removing potential pollutant sources. The potential 1.2 percent increase

to pollutant loads in the Mill Cove watershed would be offset by mitigation measures designed to meet state stormwater requirements and therefore would not adversely affect water quality.

**Table A.13-4 Annual Pollutant Loading by Drainage Area (Alternative B4)[1]**

| | Pollutant[2] (mg/l) | | | | | | | | | Percentage Change from |
|---|---|---|---|---|---|---|---|---|---|---|
| Drainage Area | TSS | P | N | Cu | Pb | Zn | BOD | COD | Bacteria | No Action |
| Buckeye Brook North | 46,346 | 77 | 711 | 0 | 11 | 16 | 2,472 | 30,897 | 525,256 | 0.6% |
| Warwick Pond | 2,123 | 4 | 33 | 0 | 0 | 1 | 113 | 1,415 | 24,060 | 13.5% |
| Buckeye Brook South | 35,507 | 59 | 544 | 0 | 8 | 12 | 1,894 | 23,671 | 402,413 | 1.2% |
| Mill Cove (cumulative)[3] | 83,976 | 140 | 1,288 | 1 | 20 | 29 | 4,479 | 55,984 | 951,729 | 1.2% |
| Tuscatucket Brook | 12,184 | 20 | 187 | 0 | 3 | 4 | 650 | 8,122 | 138,080 | 11.0% |
| Callahan Brook | 8,596 | 14 | 132 | 0 | 2 | 3 | 458 | 5,731 | 97,424 | -12.9% |
| Brush Neck Cove (cumulative)[4] | 20,780 | 35 | 319 | 0 | 5 | 7 | 1,108 | 13,853 | 235,505 | -0.3% |
| Total | 104,756 | 175 | 1,606 | 1 | 24 | 36 | 5,587 | 69,837 | 1,187,234 | 0.9% |

Source: VHB, Inc.

1 A Highway Land Use Category was assumed the most appropriate Land Use Category for T.F. Green to determine the Event Mean Concentrations (EMCs) values. Other categories include Residential, Commercial, Industrial, and Undeveloped/Rural.

2 The pollutants loading listed in this table represent the potential annual loading rate for the five drainage areas, totaling 1,360 acres, without the installation of stormwater BMPs. Pollutants were calculated using the Simple Method (Schuster, 1987) which requires estimates of annual rainfall, site impervious cover, land use type, and pollutant loading coefficients based on land use. Totals are rounded.

3 The Mill Cove drainage area consists of the combined Buckeye Brook North, Warwick Pond, and Buckeye Brook South drainage areas evaluated in this analysis.

4 The Brush Neck Cove drainage area consists of the combined Tuscatucket Brook and Callahan Brook drainage areas evaluated in this analysis.

| | | | |
|---|---|---|---|
| BOD | Biological Oxygen Demand | P | Phosphorus |
| COD | Chemical Oxygen Demand | Pb | Lead |
| Cu | Copper | TSS | Total Suspended Solids |
| N | Nitrogen | Zn | Zinc |

## A.1.14 RIPDES and Deicing Impacts

The FAA received many comments on water quality, the RIPDES permit, and deicing. This summary response addresses these comments.

### A.1.14.1 Status of the RIPDES Permit

The Airport is currently authorized to discharge stormwater under a RIPDES permit and Memorandum of Agreement (MOA) executed on February 19, 2009.[39]

### A.1.14.2 Stormwater Pollution Prevention Plan

The RIPDES Permit for T.F. Green Airport required a Stormwater Pollution Prevention Plan (SWPPP) that described potential pollutant sources at the airport and established BMPs to manage stormwater and protect water quality.

39 Memorandum of Agreement between RIAC (Kevin Dillon, President and CEO) and RIDEM (W. Michael Sullivan, Director). February 19, 2009.

The goal of the T.F. Green SWPPP is to eliminate or reduce the stormwater discharge of pollutants associated with industrial activities such as fueling, deicing, repair, cleaning, and storage.

#### A.1.14.2.1 Overview

The T.F. Green Airport SWPPP was originally prepared in January 1998 and has been periodically updated to reflect changes in Airport operations. The SWPPP was updated in August 2009 to include the map showing deicing areas and controls. A RIPDES Permit was issued by RIDEM for T.F. Green Airport on November 12, 2004, with an effective date of January 1, 2005. The permit was appealed by RIAC and a conditional stay of the permit was granted by RIDEM. On February 19, 2009, RIAC and RIDEM executed an MOA which interprets the 2004 RIPDES Permit. In November of 2010, RIDEM sent a letter to RIAC attempting to lift the Stay of the Permit and RIAC filed an action in Superior Court appealing the letter. However, the action in Superior Court has not been pursued by either party and RIAC is moving forward with the design of the new Deicer Management System in accordance with the MOA and with ongoing input from RIDEM. The Conceptual Design Report for the new Deicing Management System was submitted to RIDEM and approved in April 2011. Stormwater discharges are regulated by the 2004 RIPDES Permit as modified by the February 19, 2009 MOA between RIAC and RIDEM.

#### A.1.14.2.2 Summary of Components

The August 2009 SWPPP incorporated information from the Drainage Master Plan completed in May 2008, the Airfield Maintenance Facility SWPPP (that was previously under separate cover), the Consolidated Glycol Storage and Blending Facility, the modified fuel farm, and the extension of Taxiway M. The SWPPP was also modified to include updated sampling parameters, an implementation schedule, activity and materials storage locations, and a summary of operations and BMPs used at T.F. Green Airport. The Annual Site Compliance Evaluation Form and the catch basin and manhole inspections forms were also modified and the T.F. Green Airport Long-Term Deicing Management Plan was added to the SWPPP.

#### A.1.14.2.3 Summary of Best Management Practices

The SWPPP includes a list of BMPs for Source Reduction, Source Control, and Treatment Control, including:

- Emergency Spill Cleanup Plans
- Elimination of Non-stormwater Discharge to Storm Drains
- Aircraft, Vehicle, and Equipment Maintenance
- Aircraft, Vehicle, and Equipment Fueling
- Aircraft, Vehicle, and Equipment Washing
- Aircraft Deicing
- Outdoor Handling of Material
- Outdoor Material and Equipment Storage
- Waste Handling and Disposal
- Building Maintenance
- Stormwater Pollution Prevention Education
- Lavatory Service Operations
- Equipment Cleaning

- Fire Fighting Discharges
- Aircraft Sump Fuel Management
- Pavement Deicing
- Potable Water Line Flushing
- Oil/Water Separators
- Vortechs Stormwater Treatment System
- Aboveground storage tank (AST) Fuel Farm Water Treatment System
- Deicing Stormwater Management

#### A.1.14.2.4 Requirements for Plan Understanding and Compliance Certification

RIAC has a training program designed to inform appropriate airport and airport tenant personnel of the components and goals of the SWPPP. RIAC tenants are required to provide a Statement of Understanding and Compliance with the SWPPP on an annual basis. This statement must acknowledge all applicable BMPs have been implemented, training has been provided to employees in accordance with the SWPPP, and adherence to all applicable State and Federal requirements and the practices, policies, and programs described in the SWPPP.

#### A.1.14.2.5 Monitoring Program

RIAC has been monitoring stormwater runoff from T.F. Green Airport for many years. The RIPDES Permit includes quarterly and annual effluent limitations and monitoring requirements for Outfalls 001A through 012A, and effluent limitations and monitoring requirements for Outfall 100A and Outfall 200A,This data is summarized and provided to RIDEM in an end of season Deicing Report and in quarterly monitoring reports.

#### A.1.14.2.6 Implementation

RIAC annually prepares a Deicing Management Program Plan in October of each year. The 2010-2011 Annual Deicing Management Program Plan set forth the updated requirements for reducing the discharges of stormwater impacted by aircraft and pavement deicing for the upcoming season.

The Long Term Stormwater Runoff Management and Treatment Plan was prepared in August 2009 and describes coordination, planning, and analysis completed by RIAC pertaining to proposed glycol-impacted stormwater management strategies, design considerations, and proposed next steps for implementation at T.F. Green Airport. As stated above, the Conceptual Design Report for the new Deicer Management System was submitted to RIDEM in March of 2011. The Conceptual Design Report includes a siting analysis in addition to the specifics on the components of the anaerobic fluidized bed reactor (AFBR) treatment system.

RIAC maintains and implements a Spill Prevention, Control and Countermeasures Plan in accordance with federal oil spill prevention regulations of 40 CFR 112 and a Hazardous Waste Contingency Plan in accordance with Section 9.09 of the RIDEM Hazardous Waste Regulations.

### A.1.14.3 Summary of the RIPDES Memorandum of Agreement (MOA) Requirements

On February 19, 2009, RIAC and RIDEM executed an MOA which interprets the 2004 RIPDES Permit. The MOA outlines a proposed Deicer Management System at T.F. Green Airport. As part of the conceptual design for the new Deicer Management System, in December of 2010, RIAC determined that it would treat glycol-impacted

stormwater on-site and discharge the treated stormwater to the Warwick sewer. The main requirements impacting the deicer management system include:[40]

- Glycol-impacted stormwater from the passenger terminal will be diverted to storage and treatment at propylene glycol (PG) concentrations greater than the 2,950 parts per million (ppm) diversion set point.
- Diversion will be based on real-time PG monitoring for a suitable surrogate.
- Diversion will occur at one point in the terminal collection system. The system design will be capable of incorporating two additional diversion points.
- Detailed engineering will be performed to finalize the size of storage and treatment facilities.
- The diverted deicer-impacted stormwater runoff will be treated on-site and discharged to the Warwick Sewer Treatment Facility.
- The terminal collection system will eliminate approximately 3 acres from the terminal deicing area, and approximately 3 acres from the cargo deicing area will be eliminated.
- Glycol-impacted snow will be collected, melted and diverted to storage and treatment at PG concentrations greater than 2,950 ppm.
- Glycol recovery vehicles (GRVs) and a scrubber will be utilized during dry weather deicing events and in conjunction with catch basin inserts at secondary deicing locations.
- Glycol-impacted stormwater from cargo will be diverted to storage/treatment at concentrations above 1,000 ppm PG.

### A.1.14.4 Deicer Management System

The 2010-2011 Deicing Management Program Plan (DMPP) prepared for T.F. Green Airport describes continuing efforts and actions to improve collection of glycol-impacted stormwater and deicing activities. RIAC previously implemented a blending facility to reduce the amount of glycol used at the Airport, as well as to improve record keeping and control.

A Long-Term Deicer Management and Treatment Plan was prepared for T.F. Green Airport in August 2009 to provide design considerations, conceptual level strategies, and next steps for design and implementation of the proposed Deicing Management System. Further studies and analyses in furtherance of the design of the system were conducted and a Conceptual Design Report was prepared in March 2011.

RIAC manages snow, ice, freezing rain, and slush (winter weather) on airport movement surfaces (runways, taxiways, aprons) to minimize hazardous conditions and maintain airport operations. Snow is removed by plows, and chemicals may be used under certain weather conditions to prevent ice from adhering to runway and taxiway surfaces. Compounds used on the taxiways and runways include potassium acetate as well as

40 Gresham, Smith and Partners, T.F. Green Airport Long Term Deicing Management and Treatment Plan, August 2009.

solids like sodium formate. RIAC's DMPP limits the area in which aircraft deicing occurs and, whenever possible, requires the removal of snow in areas prior to deicing operations.

Aircraft deicing fluids (ADF) are used to remove snow and ice from aircraft (deicing) and to prevent snow and ice from adhering to aircraft surfaces. The Air carriers use propylene glycol in two different formulations. Type I fluids are unthickened (propylene glycol diluted with water and less than one percent additives) and used for deicing. Type IV fluids contain additives, including wetting agents, corrosion inhibitors, flame retardants, and thickeners to protect aircraft surfaces and increase holdover time (the length of time that the fluid protects the aircraft) and are used primarily for anti-icing. Both types of fluid will be referred to as ADF. Storm drain inserts are closed prior to deicing in designated areas in accordance with the SWPPP. RIAC collects glycol-impacted stormwater with GRVs and vacuum trucks.

#### A.1.14.4.1 Components

The major components of the deicer management system include collection, conveyance, monitoring, storage, treatment, and discharge of effluent.[41] The proposed improvements to the Deicing Management System would include control of deicing impacted stormwater from the terminal and cargo area through monitoring, controlled diversion structures, or pumps that would allow the discharge of stormwater below the 2,950 ppm PG threshold from the terminal area and below 1,000 ppm PG from the cargo area to the outfalls. The system would collect stormwater exceeding 2,950 ppm PG from the terminal area and above 1,000 ppm PG from the cargo area to storage tanks. The glycol-impacted stormwater in the storage tanks will be sent to a biological treatment system, an AFBR treatment system. The treated effluent from the AFBR system will then be discharged to the sanitary sewer. Secondary deicing areas are used only under limited, extreme weather circumstances, when additional deicing may be required. Catch basin inserts will continue to be utilized at secondary deicing locations and GRVs will collect glycol-impacted stormwater and transfer it to storage tanks for onsite treatment and discharge to the sewer.

#### A.1.14.4.2 Monitoring

Real time monitoring will be conducted upstream of the diversion structure and make programmed routing decisions based on the PG concentrations (or suitable surrogate).

#### A.1.14.4.3 Stormwater Treatment

The AFBR will be designed to biologically degrade glycols and other organic compounds in the deicer runoff.

#### A.1.14.4.4 Implementation and Schedule

Implementation of the proposed Deicing Management System improvements will require regulatory approval, a more detailed design, and construction. It is anticipated that the system will be operational in 2015.

41 Gresham, Smith and Partners, T.F. Green Airport Long Term Deicing Management and Treatment Plan, August 2009

## A.1.15 Truk-Away Landfill

Several comments on the DEIS, made reference to the Truk-Away Landfill (the landfill). The landfill is not on the T.F. Green Airport property. For the most part the comments related to the potential ramifications regarding contaminant migration should Wetland A13 be altered in conjunction with facility enhancements.

The landfill is located adjacent to T.F. Green Airport in the vicinity of the Runway 34 End and is owned by the State of Rhode Island and managed by the Rhode Island Department of Administration (RIDOA). The landfill is currently inactive, and according to records made available by the Rhode Island Department of Environmental Management (RIDEM), has not been properly capped. The landfill has been investigated by several environmental consulting firms working on behalf of either the State of Rhode Island or the United States Environmental Protection Agency.

The following environmental investigation reports were reviewed in conjunction with the FEIS:

- Site Investigation Report - EA Engineering, Science and Technology, Inc., September 2008;
- Limited Site Investigation Proposal – Lincoln Environmental, September 29, 2005;
- Groundwater Monitoring Letter Reports – Lincoln Environmental, February 17, 2005 and August 1, 2005;
- Preliminary Cost Estimate – Camp Dress & McKee, January 2002;
- Limited Environmental Site Investigation Report – Camp Dresser & McKee, March 2001; and
- Final Site Inspection Prioritization – CDM Federal Programs Corporation, December 18, 1993.

The landfill was most recently investigated by EA Engineering, Science and Technology, Inc. (EA). EA was hired by the RIDOA. In September 2008, the RIDOA submitted a Site Investigation Report (SIR) to RIDEM. As of this filing of the FEIS, this study is still under review by RIDEM.

Based the findings of the March 2001 report by CDM (shown on Figure 1-2 of the CDM report) and supplemented by information provided in the September 2008 report by EA, the filled area of the landfill is estimated to be approximately 34 acres. The boundaries of the filled area are generally understood to be: the fence line/property line on the west at the end of Industrial Drive, the fence line/property line and Wetland A14 to the south and Wetland A13 to the north and east (refer to Figure 4-36 of Chapter 4, *Affected Environment*, of this FEIS). It should be noted that the extent of fill may extend slightly beyond any of these features. The filled area has been reported by EA to be up to 40 feet thick.

Waste that is reported to have been disposed of at the landfill includes: residential, commercial, industrial, and medical waste. The completed investigations have identified in soil and groundwater many of the typical hazardous substances found at landfills. However, in addition to those findings, an area of separate phase waste liquid consisting primarily of petroleum compounds of up to two-feet in thickness is floating on top the

groundwater in the central portion of the landfill. This same area was also identified as having elevated levels of landfill gas consisting primarily of methane.

Based upon discussion with RIDEM personnel, the likely next step is for RIDEM to issue a response to the September 2008 SIR submitted by the RIDOA to RIDEM. In the SIR, EA recommended the following remedial actions: passive recovery (bailing by hand from monitoring wells) of the liquid waste, capping the landfill (with two feet of clean fill or its regulatory equivalent) and recording a deed restriction limiting future use of the landfill. The RIDEM will either: (a) approve the SIR and request that RIDOA provide public notice which would indicate that the investigation is complete and describe the proposed remedy; or (b) the RIDEM will provide comments on the SIR and request that their comments be addressed by RIDOA.

As currently designed the enhancements to Runway 34 RSAs and the relocation of the Taxiway C would not fall within the limits of the Truk-Away landfill site. Wetland A13, which is located down gradient of the landfill, will be altered as part of the T.F. Green Airport Improvement Program. This wetland currently may provide water quality benefits through filtering the groundwater downstream of the landfill. The airport enhancements will be designed and implemented in a manner that is consistent with RIDEM Rules and Regulations Governing the Administration and Enforcement of the Freshwater Wetlands Act and the RIDEM Rules and Regulations for the Investigation and Remediation of Hazardous Materials Releases.

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# A.2

# Comments and Responses

FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instruction for Airport Actions*, section 1200 requires that the FEIS contains FAA's responses to all substantive comments on the DEIS, to comply with 40 CFR 1503.4(a), and requires that all substantive comments are attached to the FEIS. Volume 3 and Volume 4 contain the comment letters and transcript of the public hearing on the DEIS. Specifically, Volume 3 includes the federal, elected official, state, non-governmental organization, public, and verbal comments and responses, as well as the comments and responses to letters received by the U.S. Army Corps of Engineers (USACE) on the DEIS. These comments and responses are found on pages A-59 through A-614. Volume 4 includes the City of Warwick's comments and responses. These comments and responses are found on pages A-615 through A-1184. Comment letters were received during the comment period which was open from July 16, 2010 through September 15, 2010. The public hearing was held on August 17, 2010.

Each comment on the T.F. Green Airport Improvement Program has been assigned a unique code, appearing on the left-hand side of the letter. A direct narrative response to each comment appears to the right, and is identified with the corresponding comment code.

The following list of comment letters and verbal comments made at the public hearing is provided to allow commenters to locate their comments and others of interest.

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