

---

# **CHAPTER 4: ENVIRONMENTAL CONSEQUENCES**

*[This page is left intentionally blank]*

# Chapter Four:

## ENVIRONMENTAL CONSEQUENCES

---

This chapter describes the potential environmental consequences associated with the No Action and the Proposed Action Alternatives in accordance with FAA Order 1050.1E.

The potential impacts associated with the Proposed Action Alternative are determined by comparing the Proposed Action Alternative and the No Action Alternative, for projected conditions in 2015, consistent with the years of analysis in the BLANS.

### 4.1 Noise

This section describes the noise analysis methodology and compares forecast aircraft noise exposure levels in the Study Area for the No Action and Proposed Action Alternatives.

#### 4.1.1 Noise Modeling Methodology and Operational Input

The noise modeling methodology described in Section 3.3.1 is also used for the 2015 noise analysis. The noise modeling methodology is consistent with noise modeling of aircraft operations as required by the FAA, inclusive of requirements for consideration in airspace actions, such as changes to air traffic routes.

As part of the BLANS study, noise model input was prepared for 2015 conditions. Average daily flight schedules were developed for 2015 to supply arrival and departure times, aircraft types, and origin/destination information. Aircraft type

information is used for estimating performance and noise characteristics for each flight while the origin/destination data are used to assign trip distance at departure. Forecast operations in 2015 are projected to be approximately 1,087 on an average annual day. Runway use was forecast based on the three-year average runway use between 2007 and 2009. In 2015, Runway 33L departures are forecast to account for approximately 17% of all BOS departures (approximately 88.7 on an average annual day).

Modeled flight tracks (i.e., the path and direction the aircraft fly) are based on radar data collected during the existing 2009 condition analysis, plus incorporation of RNAV SIDs and STARs previously analyzed. The Proposed Action Alternative for the Runway 33L RNAV SID procedure was initially designed in TARGETS by the FAA and converted to INM input at the end of Phase 2 of the BLANS process. The Proposed Action would only affect departures that already depart from Runway 33L – no other change to input data was made. Appendix A provides additional detail pertaining to the No Action noise modeling in this EA.

#### 4.1.2 Noise Impact Criteria

Change in noise exposure for each point in the Study Area is evaluated based on FAA guidance to determine the degree of change in noise exposure. Aircraft noise is required, per FAA Order 1050.1E, to be evaluated in

**Boston Logan International Airport Runway 33L  
RNAV SID Final Environmental Assessment**

---

terms of the DNL metric. The Order further defines that a significant impact would occur if a proposed action would result in an increase of 1.5 DNL or more in any noise-sensitive area at or above the 65 DNL exposure level when compared to the No Action Alternative for the same timeframe.<sup>1, 2, 3</sup>

In 1992, FICON recommended that in cases where increases of 1.5 DNL or more occur at noise-sensitive locations at or above 65 DNL, further evaluation should be completed to assess whether or not noise increases of 3 DNL or more occur at noise-sensitive locations between 60 and 65 DNL. The FAA adopted FICON's recommendation into FAA Order 1050.1E for consideration in airspace actions, such as changes to air traffic routes.

The FAA issued a noise screening procedure in 1990 for determining whether certain airspace actions above 3,000' AGL might increase DNL by 5 dB or more. The procedure serves as a response to FAA experience that increases in noise of 5 dB between the DNL 45 and 60 dB has the potential to be highly controversial on environmental grounds and may be the subject of extraordinary circumstances precluding the use of a categorical exclusion. The FAA determined that 45 DNL is the minimum level at which noise needed to be considered because "even distant ambient noise sources and natural sounds such as wind in trees can easily exceed this [45 DNL] value."<sup>4</sup>

For the purpose of this noise analysis, increases of 1.5 DNL above 65 DNL are

considered significant. Per FAA Order 1050.1E, increases of 3 DNL between 60 and 65 DNL are to receive consideration when evaluating the environmental impacts of a proposed project, and will be identified regardless of whether a significant impact is identified.<sup>5</sup> Increases of 5 DNL or greater at levels between 45 and 60 DNL are to be disclosed. The increase in noise at these levels is enough to be noticeable to some people, but the cumulative noise level is not high enough to constitute a "significant impact."

The FAA noise level criteria are used to compare DNL changes at the population locations in the Study Area, which is evaluated under the following categories: (1) those receiving an increase in noise exposure relative to the No Action Alternative; (2) those receiving a decrease relative to the No Action Alternative; and (3) those having no change relative to the No Action Alternative. The reasons for defining the increase, categories and the sources for each are presented in **Table 4.1**. Additionally, in accordance with FAA Order 1050.1E, special consideration will be given to the evaluation of the significance of noise impacts on noise sensitive areas within national parks, national wildlife refuges and historic sites, as described in Sections 4.3 and 4.4, respectively. For example, the DNL 65 dB threshold does not adequately address the effects of noise on visitors to areas within a national park where other noise is low and a quiet setting is the recognized intention of the area.<sup>6</sup>

Table 4.1  
**Criteria for Determining Impact of Increases in Aircraft Noise**

DNL Noise Exposure with Proposed Action	Minimum Increase in DNL with Proposed Action	Level of Impact
65 DNL or higher	1.5 DNL <sup>1</sup>	Exceeds Threshold of Significance
60 to 65 DNL	3.0 DNL <sup>2</sup>	For Consideration When Evaluating Air Traffic Actions
45 to 60 DNL	5.0 DNL <sup>3</sup>	Information Disclosed

Source:

(1) FAA Order 1050.1E, Appendix A, Paragraph 14.3, Title CFR Part 150, Sec. 150.21(2)(d); and FICON, *Federal Agency Review of Selected Airport Noise Issues*, August 1992.

(2) FAA Order 1050.1E, Appendix A, Paragraph 14.4c and 14.5e; and FICON, *Federal Agency Review of Selected Airport Noise Issues*, August 1992.

(3) FAA Order 1050.1E, Appendix A, 14.5e.

### 4.1.3 Aircraft Noise Impact Analysis

Based upon the noise methodology described in Section 4.1.1 and the noise impact criteria described in Section 4.1.2, a noise analysis was conducted to evaluate noise exposure levels using the applicable thresholds for the Proposed Action Alternative as compared to the No Action Alternative.

### 4.1.4 No Action Alternative

Noise exposure was calculated for population centroids with a population greater than zero for the No Action Alternative. For consistency with previous BLANS analysis, **Table 4.2** presents the overall population exposed to various noise levels in 2015. **Figures 4-1** and **4-2** depict 2015 noise exposure greater than 45 DNL at Census block centroids.

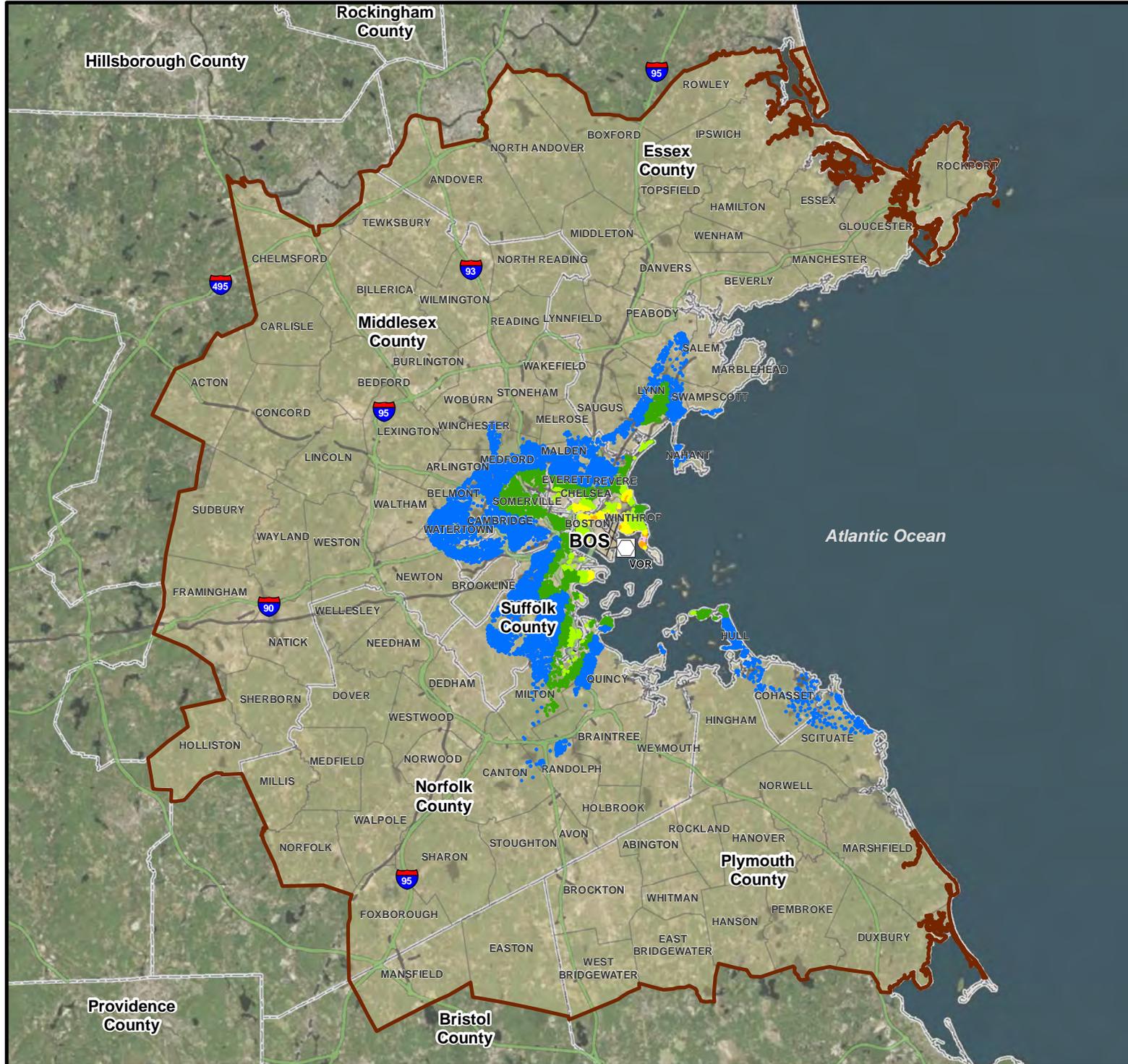
### 4.1.5 Proposed Action Alternative

The following section presents the noise results for the Proposed Action Alternative. There is no change to the number of aircraft operations or types of operations, nor does overall runway use change. The noise analysis therefore reflects changes in noise

exposure only due to the implementation of an RNAV SID from Runway 33L (the Proposed Action), as compared to the No Action Alternative.

A comparison of the 2015 No Action and 2015 Proposed Action Alternatives noise exposure for populated centroids indicates there are no significant impacts (increases of 1.5 DNL in areas that would experience DNL noise levels of 65 or above). Even though no significant impacts were identified, the Proposed Action was evaluated for an increase of 3 DNL in population centroids between 60 and 65 DNL and an increase of 5 DNL for population centroids between 45 and 60 DNL, neither of which were identified. **Figure 4-3** and **Figure 4-4** depict noise exposure greater than 45 DNL at population centroids due to the implementation of the Proposed Action Alternative.

# Boston Logan International Airport



**Figure 4-1**  
**2015 No Action Noise**  
**Exposure at Population**  
**Centroids - Study Area**

**LEGEND**

- BOS VOR/DME
- Study Area
- Community within Study Area
- County Boundary
- Major Highway
- Major Road

**Noise Exposure**

- 45-50 DNL
- 50-55 DNL
- 55-60 DNL
- 60-65 DNL
- 65-70 DNL
- 70-75 DNL
- >75 DNL

Note:  
 Noise exposure is shown for populated census block centroids only.

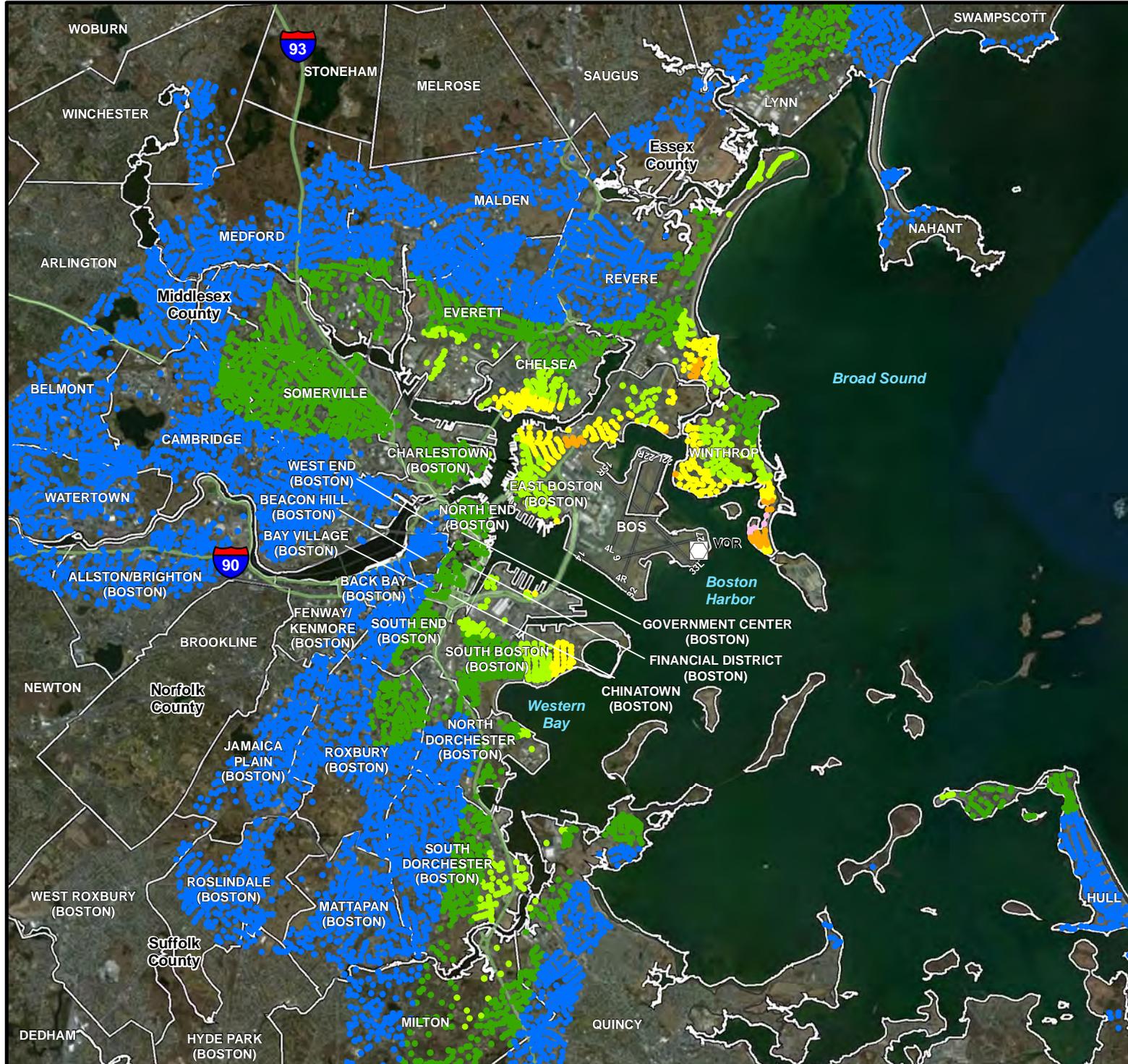


**Boston Logan**  
**International Airport**  
**Runway 33L RNAV SID**  
**Final EA**

0 1.25 2.5 5 Nautical Miles



# Boston Logan International Airport



**Figure 4-2**  
**2015 No Action Noise**  
**Exposure at Population**  
**Centroids -**  
**Logan Airport Vicinity**

**LEGEND**

- BOS VOR/DME
- Community within Study Area
- County Boundary
- Town Boundary
- Interstate
- Highway

**Noise Exposure**

- 45-50 DNL
- 50-55 DNL
- 55-60 DNL
- 60-65 DNL
- 65-70 DNL
- 70-75 DNL
- >75 DNL

Note:  
 Noise exposure is shown for populated census block centroids only.

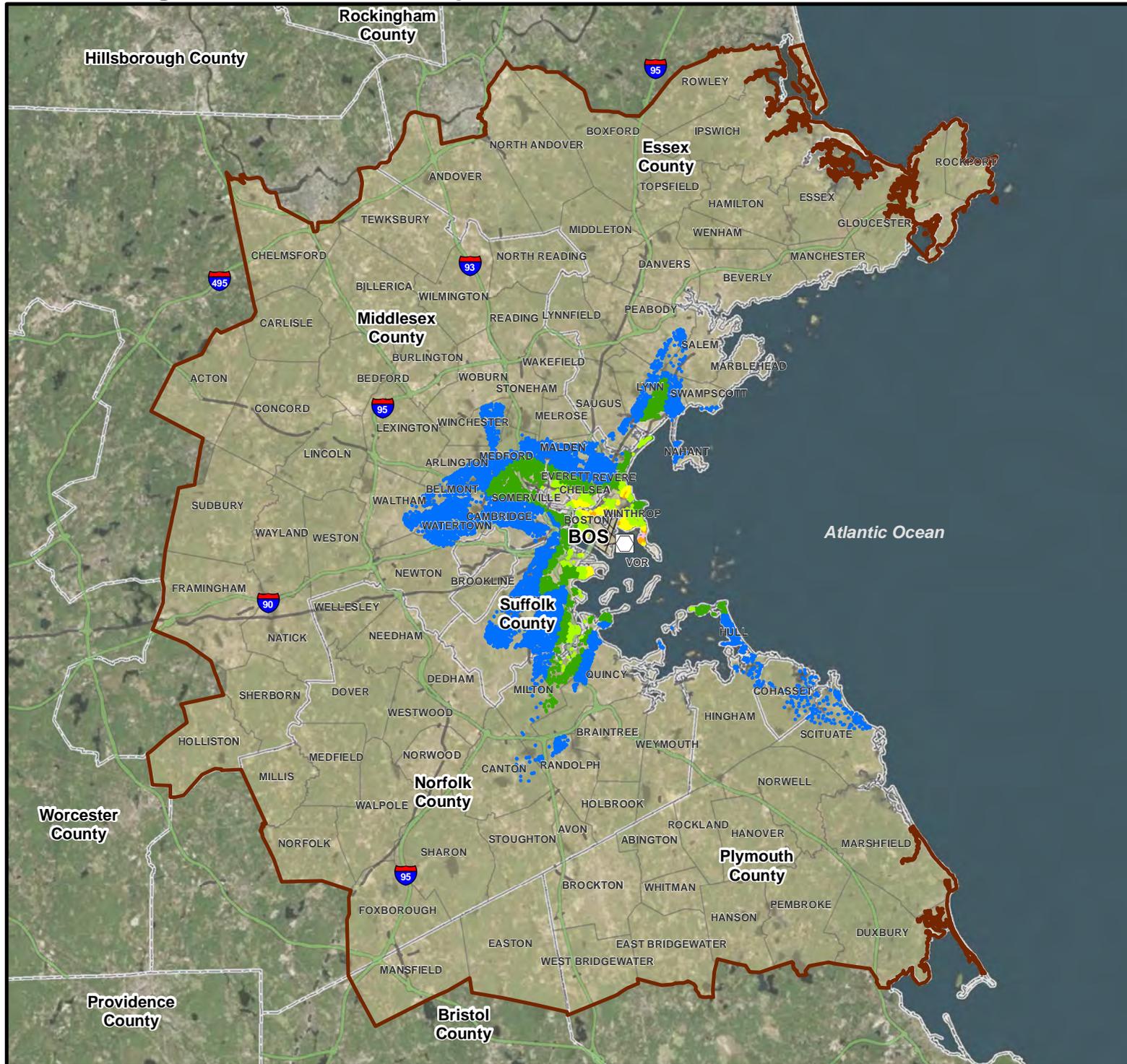


**Boston Logan**  
**International Airport**  
**Runway 33L RNAV SID**  
**Final EA**



Source: Office of Geographic Information (MassGIS), ESRI, 2010 U.S. Census Bureau

# Boston Logan International Airport



**Figure 4-3**  
**2015 Proposed Action**  
**Noise Exposure at**  
**Population Centroids -**  
**Study Area**

**LEGEND**

- BOS VOR/DME
- Study Area
- Community within Study Area
- County Boundary
- Major Highway
- Major Road

**Noise Exposure**

- 45-50 DNL
- 50-55 DNL
- 55-60 DNL
- 60-65 DNL
- 65-70 DNL
- 70-75 DNL
- >75 DNL

Note:  
 Noise exposure is shown for populated  
 census block centroids only.

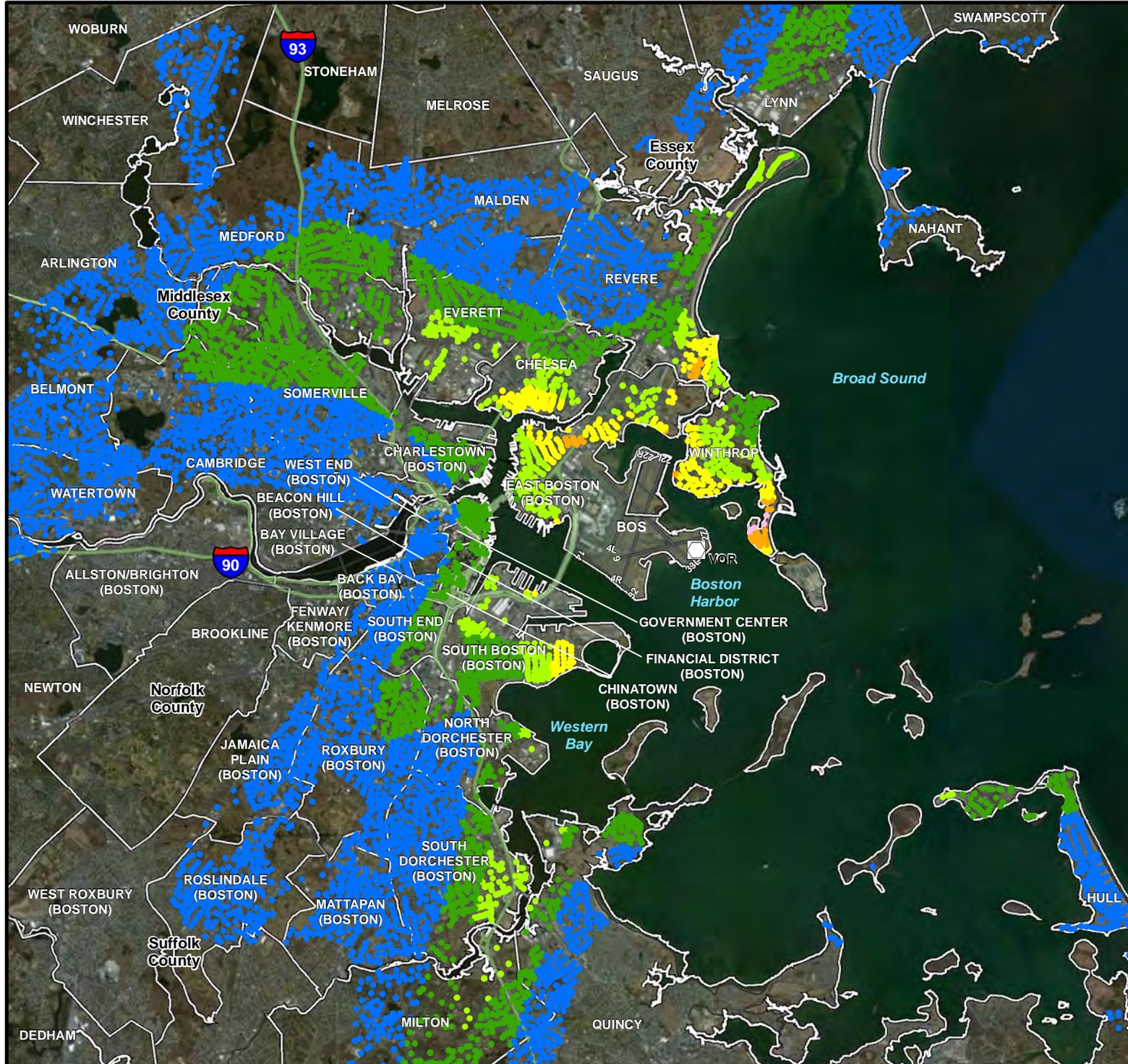


**Boston Logan**  
**International Airport**  
**Runway 33L RNAV SID**  
**Draft EA**

0 1.25 2.5 5 Nautical Miles



# Boston Logan International Airport



**Figure 4-4**  
**2015 Proposed Action**  
**Noise Exposure at**  
**Population Centroids -**  
**Logan Airport Vicinity**

**LEGEND**

- BOS VOR/DME
- Community within Study Area
- County Boundary
- Town Boundary
- Interstate
- Highway

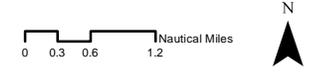
**Noise Exposure**

- 45-50 DNL
- 50-55 DNL
- 55-60 DNL
- 60-65 DNL
- 65-70 DNL
- 70-75 DNL
- >75 DNL

Note:  
 Noise exposure is shown for populated census block centroids only.



**Boston Logan**  
**International Airport**  
**Runway 33L RNAV SID**  
**Final EA**



Source: Office of Geographic Information (MassGIS), ESRI, 2010 U.S. Census Bureau

Table 4.2

**2015 No Action Alternative Population Exposed to Aircraft Noise**

DNL Range (dB)	Estimated Population	Percentage of Total
Less than 45	2,111,973	66.2%
45 to less than 50	704,091	22.1%
50 to less than 55	270,184	8.5%
55 to less than 60	64,672	2.0%
60 to less than 65	35,092	1.10%
65 to less than 70	2,680	0.1%
70 to less than 75	200	0.01%
Greater than or equal to 75	0	0.0%
<b>Total</b>	<b>3,188,892</b>	<b>100%</b>

Note: Totals may not equal 100% due to rounding.

Source: HNTB Analysis, 2012, U.S. Census 2010.

**Table 4.3** depicts the population exposed to various levels of noise under the Proposed Action Alternative. 28% of the Study Area population would be exposed to levels between 45 and 55 DNL, and less than 4% would be exposed to noise levels above 55 DNL. The areas of highest noise exposure are located in the immediate vicinity of Logan Airport.

**Table 4.4** presents the changes in the population exposed to various levels of noise exposure for the 2015 Proposed Action Alternative compared to the 2015 No Action Alternative. Although not a criteria for significance based on the use of 2010 Census data, implementation of the Proposed Action Alternative would not result in changes to the number of persons exposed to noise levels of 65 DNL or higher.

**Boston Logan International Airport Runway 33L  
RNAV SID Final Environmental Assessment**

Table 4.3

**2015 Proposed Action Alternative Population Exposed to Aircraft Noise**

DNL Range (dB)	Estimated Population	Percentage of Total
Less than 45	2,179,819	68.4%
45 to less than 50	640,539	20.1%
50 to less than 55	262,448	8.2%
55 to less than 60	67,456	2.1%
60 to less than 65	35,750	1.1%
65 to less than 70	2,680	0.1%
70 to less than 75	200	0.01%
Greater than or equal to 75	0	0.0%
<b>Total</b>	<b>3,188,892</b>	<b>100%</b>

Note: Totals may not equal 100% due to rounding.

Source: HNTB Analysis, 2012, U.S. Census 2010.

Table 4.4

**Change in Noise Exposure Between  
2015 No Action and Proposed Action Alternatives**

DNL Range (dB)	Estimated Change in Population
Less than 45	Increase of 67,846
45 to less than 50	Decrease of 63,552
50 to less than 55	Decrease of 7,736
55 to less than 60	Increase of 2,784
60 to less than 65	Increase of 658
65 to less than 70	No Change
70 to less than 75	No Change
Greater than or equal to 75	No Change

Source: HNTB Analysis, 2012, U.S. Census 2010.

The FAA recognizes and is responding to the CAC's and general public's desire to understand changes in noise exposure by community as a result of the ongoing BLANS. To that end, although not usually disclosed at this level of detail in a NEPA analysis, **Table 4.5** presents the range of noise exposure and change in noise

exposure by community. **Table 4.6** presents the range of population exposed to DNL levels above 45 DNL under the No Action and Proposed Action Alternatives. As stated previously, none of these changes meet the threshold of significance or reporting criteria as listed in Table 4.1.

**Boston Logan International Airport Runway 33L  
RNAV SID Final Environmental Assessment**

Table 4.5  
**Noise Results (2015 No Action and 2015 Proposed Action)  
for Populated 2010 Centroids Above 45 DNL**

<b>Town</b>	<b>No Action Range of DNL Values</b>	<b>Proposed Action Range of DNL Values</b>	<b>Range of DNL Increase</b>	<b>Range of DNL Decrease</b>
Arlington	45 to 48.6	45 to 49.9	0.6 to 1.9	-
Belmont	45 to 47.7	45.2 to 48.7	0 to 2.0	-0.6 to 0
Boston, Allston/Brighton	45 to 48.1	45.1 to 45.6	-	-2.7 to -2.5
Boston, Back Bay	45.1 to 48.3	45 to 48.1	-	-0.6 to -0.2
Boston, Bay Village	48.4 to 50.4	48.3 to 50.3	-	-0.2 to -0.1
Boston, Beacon Hill	47.4 to 49.6	47.1 to 49.5	-	-0.4 to -0.2
Boston, Charlestown	50.1 to 54.9	48.6 to 53.9	-	-2.2 to -0.9
Boston, Chinatown	50.3 to 52.3	50.2 to 52.2	0 to 0	-0.1 to 0
Boston, East Boston	54.7 to 65.9	54.2 to 66	0 to 0.3	-0.9 to 0
Boston, Fenway/Kenmore	45 to 46.8	45 to 46.4	-	-0.6 to -0.3
Boston, Financial District	49.7 to 53.8	49.6 to 53.8	0 to 0	-0.2 to 0
Boston, Government Center	50.3 to 50.6	50.2 to 50.4	-	-0.2 to -0.2
Boston, Harbor Islands	54.7 to 58.3	54.7 to 58.2	-	0 to 0
Boston, Hyde Park	45 to 45.4	45 to 45.2	-	-0.2 to -0.2
Boston, Jamaica Plain	45 to 48.3	45 to 48	-	-0.7 to -0.3
Boston, Mattapan	45 to 48.8	45 to 48.6	-	-0.5 to -0.2
Boston, North Dorchester	48.1 to 57.9	47.8 to 57.9	- to -	-0.3 to 0
Boston, North End	50.3 to 53.2	49.9 to 53.2	-	-0.6 to -0.1
Boston, Roslindale	45 to 47.8	45 to 47.5	0 to 0.1	-0.4 to 0
Boston, Roxbury	46.5 to 51.8	46 to 51.8	-	-0.5 to 0
Boston, South Boston	50.3 to 64.5	50.3 to 64.5	0 to 0.1	-0.1 to 0
Boston, South Dorchester	46.8 to 59.4	46.4 to 59.4	-	-0.4 to 0
Boston, South End	46.8 to 53	46.4 to 53	0 to 0	-0.4 to 0
Boston, West End	48 to 50.3	47.6 to 49.8	-	-0.5 to -0.4
Boston, West Roxbury	45 to 45.5	45 to 45	-	-0.4 to -0.4
Braintree	45 to 45.4	45 to 45.3	0 to 0	-0.2 to -0.1
Cambridge	45 to 50.4	45 to 50.4	0 to 1.4	-3.1 to 0
Canton	45 to 46.6	45.1 to 46.9	0.3 to 0.4	-
Chelsea	47.6 to 62.2	47.9 to 62.7	0 to 1.6	-0.8 to 0
Cohasset	45 to 45.8	45 to 45.7	-	-0.1 to 0
Everett	45.7 to 57.2	46 to 57.9	0.1 to 1.9	-0.6 to 0
Hingham	45.1 to 46.5	45 to 46.4	-	-0.1 to 0
Hull	45.1 to 55.7	45 to 55.7	-	-0.1 to 0
Lynn	45 to 53.8	45 to 53.8	-	-0.2 to 0
Malden	45 to 51.5	45 to 53.2	0 to 2.0	-0.2 to 0
Medford	45 to 54.6	45.1 to 54.9	0 to 2.1	-0.7 to 0
Melrose	-	45.3 to 45.3	0.4 to 0.4	-
Milton	45 to 56.8	45 to 56.8	0 to 0.5	-0.4 to 0
Nahant	45 to 48.2	45 to 48.2	-	-0.1 to 0
Newton	45 to 45.6	45 to 45.6	0 to 0.4	-0.4 to 0
Peabody	45 to 47.7	45 to 47.6	-	-0.1 to 0
Quincy	45 to 58.2	45 to 58.1	- to -	-0.4 to 0
Randolph	45 to 47.7	45 to 47.9	0.1 to 0.4	-

**Boston Logan International Airport Runway 33L  
RNAV SID Final Environmental Assessment**

Table 4.5  
**Noise Results (2015 No Action and 2015 Proposed Action)  
for Populated 2010 Centroids Above 45 DNL**

Town	No Action Range of DNL Values	Proposed Action Range of DNL Values	Range of DNL Increase	Range of DNL Decrease
Revere	45 to 65.9	45 to 65.9	0 to 0.3	-0.2 to 0
Salem	45.1 to 48.5	45.1 to 48.4	-	-0.1 to 0
Saugus	45 to 47.9	45 to 47.7	-	-0.3 to -0.1
Scituate	45 to 46.1	45 to 46.1	0 to 0	0 to 0
Somerville	47.5 to 53.9	45.7 to 53.3	0 to 1.6	-3.0 to 0
Stoneham	45 to 45.1	45 to 46.1	0.2 to 1.1	-
Swampscott	45 to 45.8	45 to 45.7	-	-0.1 to -0.1
Waltham	-	45 to 46.5	0.9 to 2.1	-
Watertown	45 to 47.8	45 to 47.5	0 to 1.6	-1.9 to 0
Winchester	45 to 45.6	45 to 46.3	0.1 to 1.3	-
Winthrop	51.4 to 71.9	51.4 to 71.9	0 to 0	0 to 0

Notes:

- DNL values represent the cumulative noise level from all operations on all runways.
- Ranges of DNL values are reported for populated family and non-family households based on US Census Block centroids within each community.
- No significant impact, per FAA Order 1050.1E would result from the Proposed Action.

Source: HNTB Analysis, 2013

Table 4.6  
**Population Results (2015 No Action and 2015 Proposed Action)  
for Populated 2010 Centroids Above 45 DNL**

Town	Total Population	No Action Population exposed to 45 DNL or Greater	Proposed Action Population exposed to 45 DNL or Greater	Net Change Exposed to 45 DNL or above
Arlington	42,552	16,219	20,298	4,079
Belmont	24,537	20,703	23,308	2,604
Boston, Allston/Brighton	65,425	33,118	0	(33,118)
Boston, Back Bay	16,053	14,643	11,880	(2,762)
Boston, Bay Village	2,392	2,392	2,392	0
Boston, Beacon Hill	9,603	9,603	9,603	0
Boston, Charlestown	16,309	16,309	16,309	0
Boston, Chinatown	4,345	4,345	4,345	0
Boston, East Boston	40,283	40,283	40,283	0
Boston, Fenway/Kenmore	22,312	9,151	5,091	(4,059)
Boston, Financial District	3,755	3,755	3,755	0
Boston, Government Center	62	62	62	0
Boston, Harbor Islands	0	0	0	0
Boston, Hyde Park	31,596	881	264	(617)
Boston, Jamaica Plain	38,457	28,290	18,830	(9,461)
Boston, Mattapan	34,144	30,070	27,703	(2,367)
Boston, North Dorchester	26,431	26,431	26,431	0
Boston, North End	11,211	11,211	11,211	0

**Boston Logan International Airport Runway 33L  
RNAV SID Final Environmental Assessment**

Table 4.6  
**Population Results (2015 No Action and 2015 Proposed Action)  
for Populated 2010 Centroids Above 45 DNL**

<b>Town</b>	<b>Total Population</b>	<b>No Action Population exposed to 45 DNL or Greater</b>	<b>Proposed Action Population exposed to 45 DNL or Greater</b>	<b>Net Change Exposed to 45 DNL or above</b>
Boston, Roslindale	31,765	23,192	22,665	(527)
Boston, Roxbury	59,174	59,174	59,174	0
Boston, South Boston	33,022	33,022	33,022	0
Boston, South Dorchester	59,258	59,258	59,258	0
Boston, South End	31,555	31,555	31,555	0
Boston, West End	4,479	4,479	4,479	0
Boston, West Roxbury	29,785	556	106	(450)
Braintree	35,199	0	0	0
Cambridge	88,057	87,487	60,402	(27,085)
Canton	21,246	173	245	72
Chelsea	34,496	34,496	34,496	0
Cohasset	7,463	4,044	3,723	(321)
Everett	41,466	41,466	41,466	0
Hingham	21,893	1,148	1,145	(3)
Hull	10,294	9,359	9,359	0
Lynn	89,498	74,765	73,243	(1,523)
Malden	59,073	44,941	46,394	1,453
Medford	54,233	53,569	53,713	144
Melrose	26,716	0	0	0
Milton	25,488	16,890	15,970	(920)
Nahant	3,357	1,687	1,636	(51)
Newton	78,048	3,417	2,934	(483)
Peabody	50,739	7,908	7,708	(200)
Quincy	90,875	28,830	25,896	(2,934)
Randolph	31,783	3,129	3,725	596
Revere	51,469	50,894	49,241	(1,653)
Salem	39,570	1,814	1,629	(185)
Saugus	26,306	3,550	2,013	(1,537)
Scituate	17,947	4,635	4,428	(207)
Somerville	73,481	73,481	73,481	0
Stoneham	21,194	0	0	0
Swampscott	13,609	639	402	(237)
Waltham	53,952	0	6,584	6,584
Watertown	31,691	29,346	30,857	1,511
Winchester	21,051	3,103	8,912	5,809
Winthrop	17,445	17,445	17,445	0
	<b>1,776,148</b>	<b>1,076,919</b>	<b>1,009,073</b>	<b>(67,846)</b>

Notes:

- DNL values represent the cumulative noise level from all operations on all runways.
- DNL values are reported for populated family and non-family households based on US Census Block centroids within each community. Those residing in group quarters are not included in this analysis.
- No significant impact, per FAA Order 1050.1E would result from the Proposed Action.

Source: HNTB Analysis, 2013

## **4.2 Compatible Land Use**

Compatibility of land uses surrounding airports is usually determined by the extent of the airport's noise impacts. Existing land use in the Study Area is discussed in Chapter 3, *Affected Environment*, Section 3.1.4. Because the Proposed Action Alternative does not result in significant noise impacts (as measured by an increase of noise exposure in populated centroids), it can be concluded that there will be no impacts to compatible land use. Additionally, existing non-compatible land uses currently exposed to noise levels greater than or equal to 65 DNL will not experience significant increases in noise levels as a result of the Proposed Action Alternative, as discussed in Section 4.1 of this chapter.

## **4.3 Section 4(f) and 6(f) of the DOT Act**

The primary basis for determining the effect of the undertaking on potential impacts to Section 4(f) and Section 6(f) resources was based on the magnitude of the increase in aircraft noise exposure level between the No Action and the Proposed Action Alternatives. **Figures 4-5** and **4-6** depict noise exposure greater than 45 DNL at parks, forests, wildlife refuges and wilderness areas in the Study Area for the No Action Alternative in 2015, while **Figures 4-7** and **4-8** present noise exposure at Section 4(f) resources with implementation of the 2015 Proposed Action Alternative.

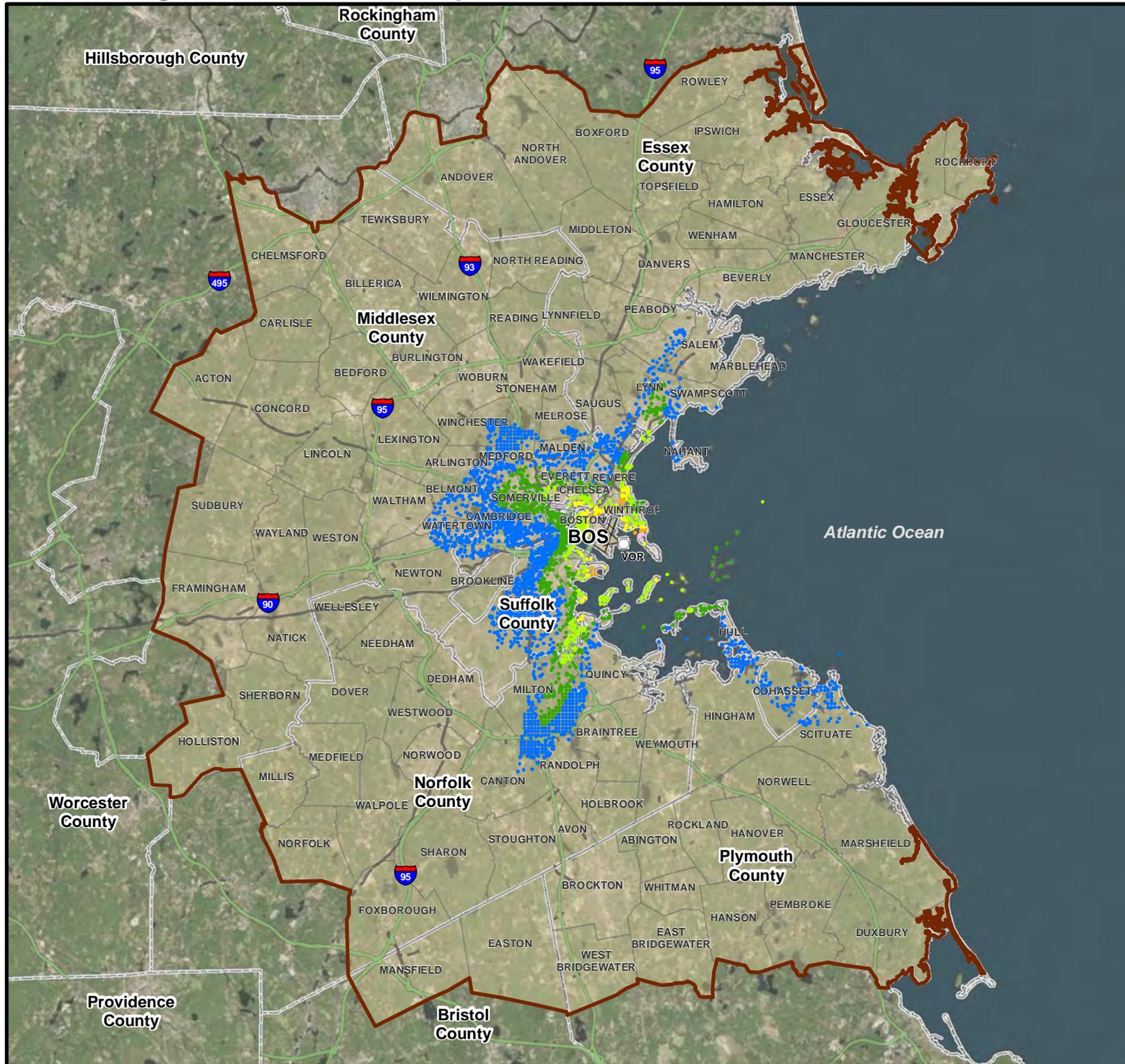
The Proposed Action Alternative does not include any land-based impacts as there is no physical disturbance or land acquisition. Therefore, the Proposed Action Alternative does not result in a direct use of any Section 4(f) property.

Adverse *indirect impacts* including noise may constitute a "constructive use" of a Section 4(f) property. When considering the potential for constructive use of a Section 4(f) property, the FAA must first determine if the possibility of adverse indirect impacts (constructive use) exists. If so, the FAA must consult with officials of the 4(f) resource to determine whether noise increases would result in the substantial impairment of the resource.

Section 4(f) properties were evaluated to identify potential noise increases that may represent an adverse impact or constructive use of the property. While a 1.5 DNL increase within the 65 DNL may result in a constructive use to all types of 4(f) properties, reportable impacts (increases of 3.0 DNL between the 60 and 65 DNL or 5.0 DNL between the 45 and 60 DNL) are intended to address those section 4(f) properties with a quiet setting as an attribute. Noise exposure was calculated for over 22,000 points representing Section 4(f) resources. Noise exposure levels were calculated for grid points at equal intervals throughout the larger Section 4(f) properties. Grid spacing was 1,000' for potential Section 4(f) resources with a size of 100 acres or more. For those less than 100 acres, (i.e., smaller parks and monuments), noise exposure was calculated as a single point located in the center of the park.

There is no possibility of constructive use of a Section 4(f) resource, such as any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance or land from an historic site of national, State, or local significance. No significant noise impact to lands devoted to traditional recreational activities, including national

# Boston Logan International Airport



**Figure 4-5**  
**2015 No Action Noise**  
**Exposure at**  
**Section 4(f) Resources -**  
**Study Area**

## LEGEND

- BOS VOR/DME
- Study Area
- Community within Study Area
- County Boundary
- Major Highway
- Major Road

## Noise Exposure

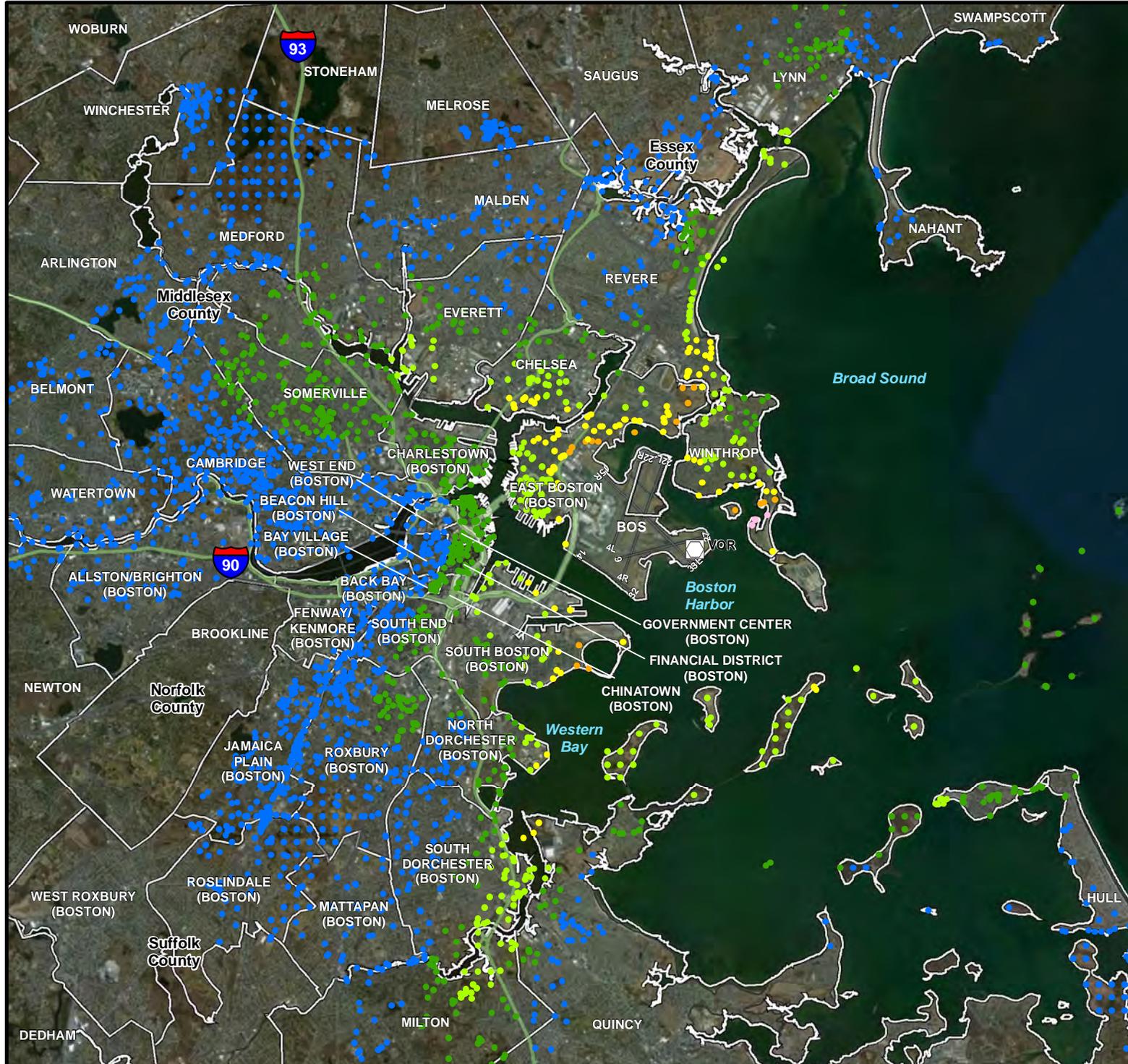
- 45-50 DNL
- 50-55 DNL
- 55-60 DNL
- 60-65 DNL
- 65-70 DNL
- 70-75 DNL
- >75 DNL



**Boston Logan**  
**International Airport**  
**Runway 33L RNAV SID**  
**Final EA**



# Boston Logan International Airport



**Figure 4-6**  
**2015 No Action Noise**  
**Exposure at**  
**Section 4(f) Resources -**  
**Logan Airport Vicinity**

**LEGEND**

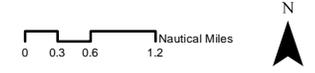
- BOS VOR/DME
- Community within Study Area
- County Boundary
- Town Boundary
- Interstate
- Highway

**Noise Exposure**

- 45-50 DNL
- 50-55 DNL
- 55-60 DNL
- 60-65 DNL
- 65-70 DNL
- 70-75 DNL
- >75 DNL

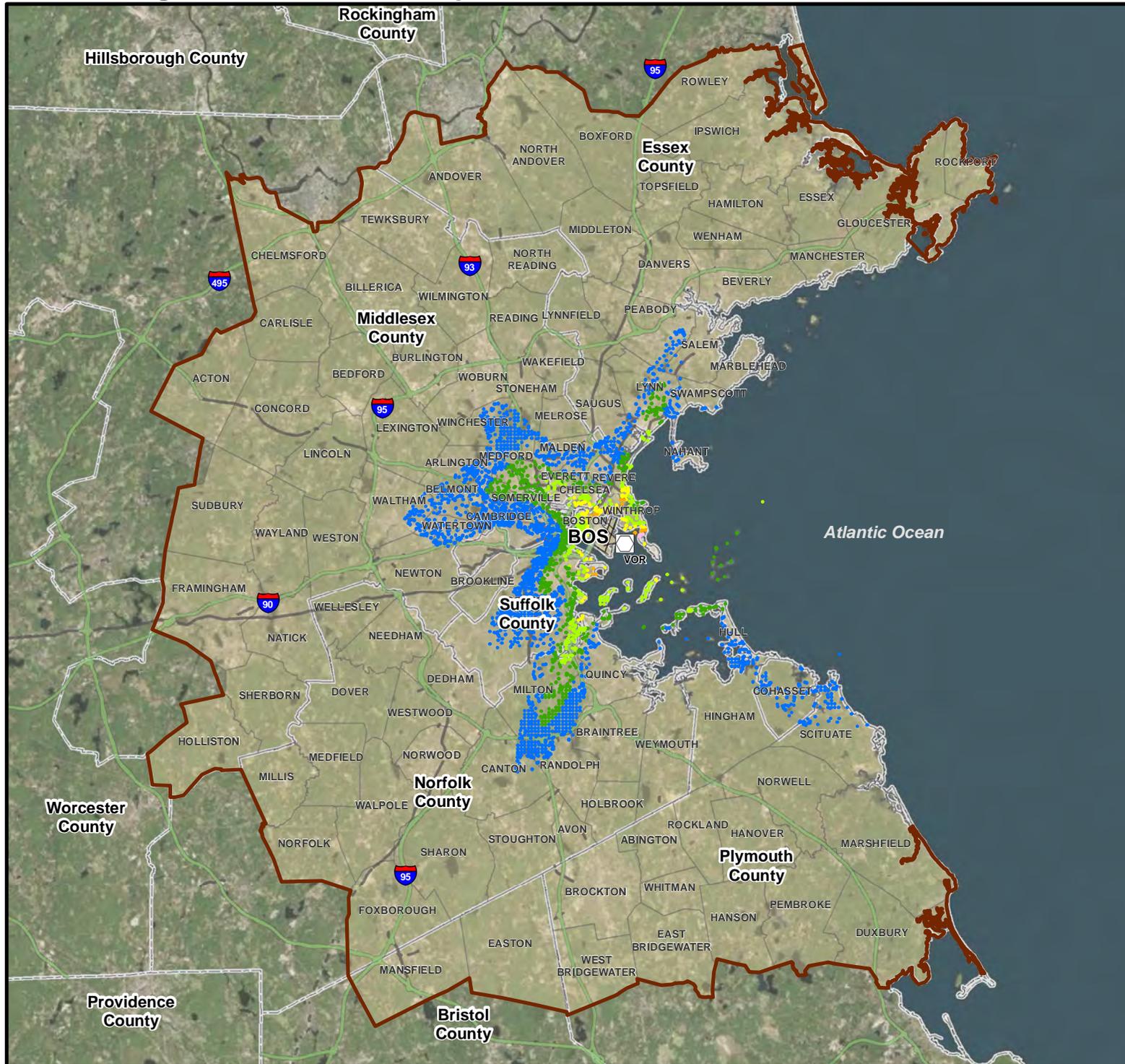


**Boston Logan**  
**International Airport**  
**Runway 33L RNAV SID**  
**Final EA**



Source: Office of Geographic Information (MassGIS), ESRI

# Boston Logan International Airport



**Figure 4-7**  
**2015 Proposed Action**  
**Noise Exposure at**  
**Section 4(f) Resources -**  
**Study Area**

**LEGEND**

- BOS VOR/DME
- Study Area
- Community within Study Area
- County Boundary
- Major Highway
- Major Road

**Noise Exposure**

- 45-50 DNL
- 50-55 DNL
- 55-60 DNL
- 60-65 DNL
- 65-70 DNL
- 70-75 DNL
- >75 DNL



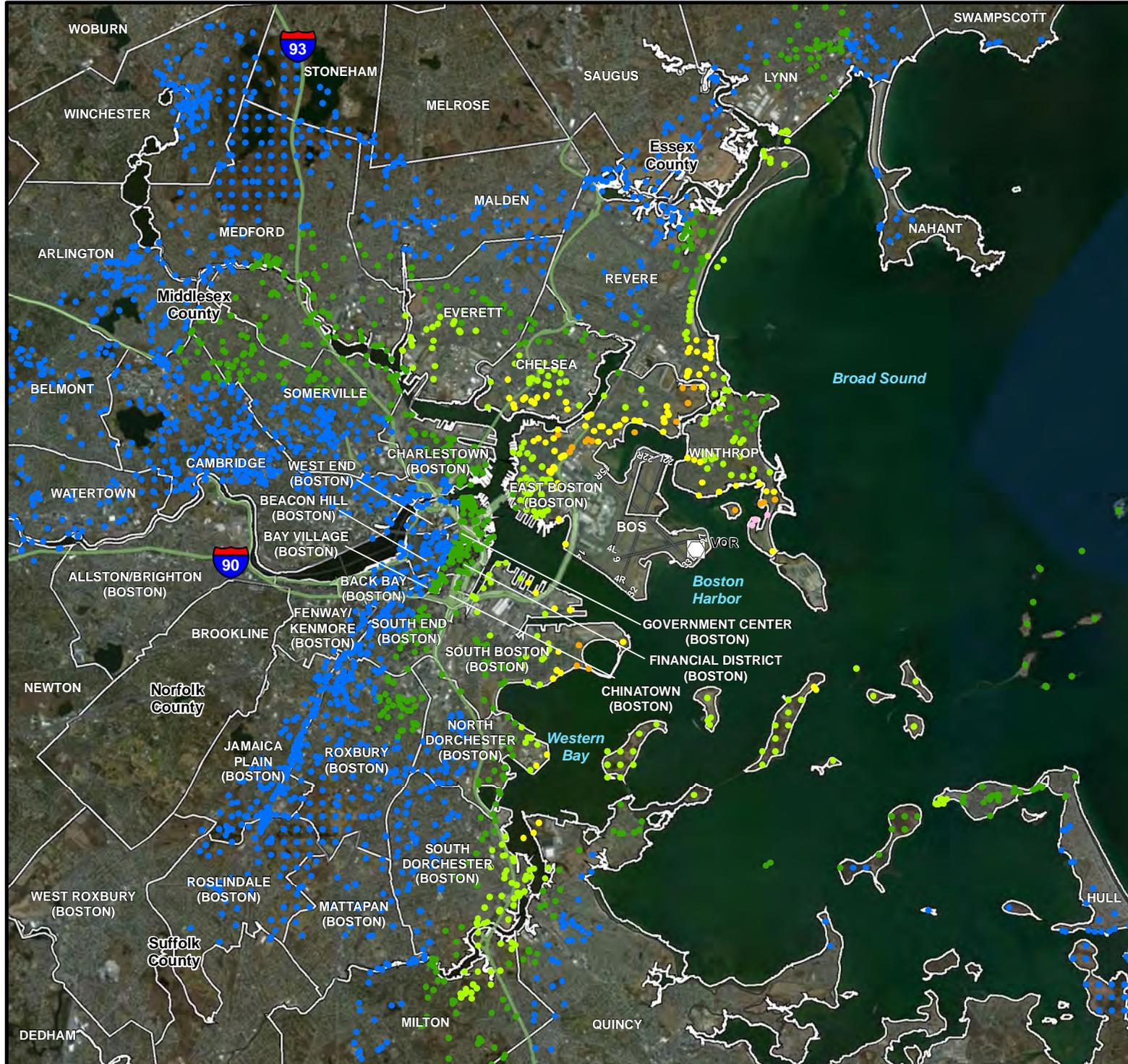
**Boston Logan**  
**International Airport**  
**Runway 33L RNAV SID**  
**Final EA**

0 1.25 2.5 5 Nautical Miles

N

Source: Office of Geographic Information (MassGIS), ESRI

# Boston Logan International Airport



**Figure 4-8**  
**2015 Proposed Action**  
**Noise Exposure at**  
**Section 4(f) Resources -**  
**Logan Airport Vicinity**

**LEGEND**

- BOS VOR/DME
- Community within Study Area
- County Boundary
- Town Boundary
- Interstate
- Highway

**Noise Exposure**

- 45-50 DNL
- 50-55 DNL
- 55-60 DNL
- 60-65 DNL
- 65-70 DNL
- 70-75 DNL
- >75 DNL



**Boston Logan**  
**International Airport**  
**Runway 33L RNAV SID**  
**Final EA**



parks, national wildlife refuges, and historic sites, was identified. In addition, there are no noise increases above 45 DNL in section 4(f) properties located in a quiet setting, where the setting is a generally recognized feature or attribute of the site's significance, such as national parks or national wildlife refuges, within the Study Area. There is no possibility of constructive use of a historic property, as no historic property would be used for Section 4(f) purposes when FAA issues a finding of No Adverse Effect under Section 106. The MHC concurred with FAA's determination that the Proposed Action would not adversely affect any historic properties, including those that could be used for Section 4(f) purposes. In addition, no possibility of constructive use would exist for Section 4(f) properties located in a quiet setting, and where that setting is a generally recognized feature or attribute of the site's significance, as no significant impacts or reportable impacts (increases of 3.0 DNL between 60 and 65 DNL or 5.0 DNL between 45 and 60 DNL) were identified. As a result, a determination under Section 4(f) of the U.S. Department of Transportation Act is unnecessary.

#### **4.3.1 National Park Service Lands**

None of the listed NPS lands would experience a 1.5 DNL increase resulting in a noise exposure level greater than or equal to 65 DNL in the Study Area. Further, per FAA criteria provided in Table 4.1, there would be no reportable change in noise (increases of 3 DNL between 60 and 65 DNL or 5 DNL between 45 and 60 DNL) due to the Proposed Action Alternative. Noise exposure at NPS lands range from approximately 38 to 59 DNL under the No Action Alternative, while changes in noise exposure with the Proposed Action Alternative range from a decrease of 1.6

DNL to an increase of less than 0.1 DNL, changes that would be imperceptible to negligible to the human ear.

#### **4.3.2 National Wildlife Refuge System**

Under the No Action Alternative, none of the National Wildlife Refuges in the Study Area would be exposed to noise levels of 45 DNL or above. With implementation of the Proposed Action Alternative, noise exposure changes range between an increase and decrease of less than 2 DNL at all locations, levels which are generally imperceptible at noise levels lower than 45 DNL, particularly in areas that currently experience aircraft overflights.

#### **4.3.3 State Parks, Forests and Other Areas of Significance**

In state parks, forests, reservations or other areas of state significance, noise levels range from below 45 DNL to 68 DNL. With implementation of the Proposed Action Alternative, the largest increase in noise would be an increase of 2 DNL and the largest decrease in noise is nearly 3 DNL. These changes occur in areas that currently experience aircraft overflights. None of these resources would experience a 1.5 DNL change resulting in a noise exposure level greater than or equal to 65 DNL or reportable changes in noise due to the Proposed Action Alternative.

#### **4.3.4 Section 6(f) Properties**

Section 6(f) properties within the Study Area are described in Section 3.3.2. NPS has determined that conversion of 6(f) parkland occurs under four conditions: 1) property interests are conveyed for non-public outdoor recreation uses; 2) non-recreation uses are made of the project area, or a portion of it; 3) non-eligible indoor facilities

are developed within the project area without approval; and 4) public outdoor recreation use of the property is terminated.

Because the Proposed Action Alternative would not convey Section 6(f) property and would not include the construction of indoor facilities, there would be a Section 6(f) impact only if the Proposed Action Alternative would result in the constructive use of a park such that it would cause a permanent and substantial use of the Section 6(f) property.

There are no Section 6(f) properties that would experience a 1.5 DNL change resulting in a noise exposure level greater than or equal to 65 DNL. As with Section 4(f) resources, the Proposed Action Alternative would not cause reportable increases in noise. Therefore there will be no constructive use of a Section 6(f) property and no further analysis is required.

#### **4.4 Historical, Architectural, Archaeological, and Cultural Resources**

Archaeological and historic architectural resources that will be affected by federally funded and licensed undertakings come under the protection of the NHPA. Section 106 of this Act requires Federal agencies to consider the effects of such undertakings on properties listed, or eligible for listing, on the NRHP.

An adverse effect is considered to be one that diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. If a determination of adverse impact is made, the consultation procedures of the Advisory Council on Historic Preservation must be followed.<sup>7</sup>

*Primary impacts* include the removal or alteration of historic resources. There would be no ground disturbance as a result of the Proposed Action Alternative. Therefore, there would be no direct impacts on properties listed on or eligible to be listed on the NRHP.

*Secondary or indirect impacts* include changes in noise, vehicular traffic, light emissions, or other changes that could interfere substantially with the use or character of the resource. Indirect impacts include noise impacts that would diminish the integrity of the property's setting.

To assess the potential indirect effects on historic resources, noise exposure was calculated at each NRHP listed resource within the Study Area. No historic properties would experience a 1.5 DNL increase in areas of noise exposure of 65 DNL or higher, nor are there reportable changes between 45 and 60 DNL. The maximum change in noise exposure with implementation of the Proposed Action Alternative is an increase of 2 DNL and a decrease of 3 DNL. Thus there are no adverse effects to historic properties resulting from implementation of the Proposed Action Alternative. Appendix B provides a letter from the MHC dated May 1<sup>st</sup>, 2013, stating their concurrence with the FAA's finding of "no adverse effect" to historic properties.

#### **4.5 Natural Resources and Energy Supply**

FAA Order 1050.1E, Section 13 requires the identification of any proposed changes in stationary facilities or the movement of aircraft for the Proposed Action that may have a measurable effect on local supplies of energy or natural resources. The Proposed Action Alternative would not

require the need for unusual natural resources and materials, or those in short supply. The Proposed Action Alternative would not increase the number of aircraft operations or runway use compared to the No Action Alternative, nor does implementation of the RNAV SID increase the overall flying distance for Runway 33L departures. Therefore the Proposed Action Alternative would have minimal impact to natural resources and energy supply and no further analysis is required.

#### **4.6 Light Emissions and Visual Impacts**

Although FAA Order 1050.1E does not identify specific regulatory requirements, Appendix A, Section 12.2 provides guidance for the assessment of light emissions and visual impacts.

##### **4.6.1 Light Emissions**

Lighting associated with the Proposed Action should be evaluated to identify if it would create an annoyance among people in the vicinity or interfere with their normal activities. However, lighting associated with NAVAIDS and air traffic typically represent relatively low levels of light intensity, light emissions impacts are unlikely to have an adverse impact on human activity or the use or characteristics of the Section 4(f) properties. No change from the No Action Alternative would be expected to occur; therefore no further analysis is required.

##### **4.6.2 Visual Impacts**

Federal guidance does not identify thresholds of significance for visual impacts. Because the Proposed Action Alternative does not represent a change in the location of aircraft departing from Runway 33L, no significant visual impact would occur.

#### **4.7 Air Quality**

The CAA requires that all Federal actions conform to an applicable SIP. FAA actions are subject to the General Conformity Rule. General Conformity refers to the requirements under Section 176(c) of the CAA for federal agencies (other than FHWA and FTA) to show that their actions conform to the purpose of the applicable SIP. The EPA established criteria and procedures for Federal agencies to use in demonstrating conformity with an applicable SIP (40 CFR 93.150 *et seq.*).

On July 30<sup>th</sup>, 2007, the FAA issued a presumed to conform list of actions under General Conformity [FR 41565]. In the aforementioned notice, the FAA summarized documentation and analysis which demonstrated that certain actions will not exceed the applicable *de minimis* emissions levels for nonattainment and maintenance areas as specified under 40 CFR 93.153(b). The FAA includes air traffic control activities and adopting approach, departure and enroute procedures for air operations in their list of presumed to conform actions thereby indicating that these types of actions will not exceed *de minimis* emissions levels.

The Proposed Action includes airspace and air traffic actions (e.g., changes in routes, flight patterns, and arrival and departure procedures) above the mixing height (generally 3,000' AGL) that are needed to enhance safety and increase the efficient use of airspace by reducing congestion, balancing controller workload and improving coordination between controllers handling existing air traffic. The FAA's presumed to conform list is therefore applicable to the Proposed Action. Additionally, the Proposed Action is not regionally significant. Specifically, the total number of aircraft

operations would not differ between the No Action and Proposed Action Alternatives.

In terms of air quality impacts related to vehicle emissions, neither the No Action nor the Proposed Action Alternative would induce changes to vehicular traffic. Aircraft operations and vehicular traffic would grow with or without the proposed RNAV SID. In addition, the implementation of the Proposed Action Alternative would not significantly alter the distribution of vehicular traffic among the airports because the RNAV SID would not likely change airline service trends and/or air passenger preferences on use of an airport. Air passengers traditionally select an airport based on the ticket cost, airport location, and service to a desired destination.

Since the Proposed Action is presumed to conform and would have a negligible effect on vehicle traffic no further analysis is required.

#### **4.8 Climate**

Although there are no federal standards for aviation-related GHG emissions, it is well-established that GHG emissions can affect climate.<sup>8</sup> The CEQ has indicated that climate should be considered in NEPA analyses. As noted by CEQ, however, “it is not currently useful for the NEPA analysis to attempt to link specific climatological changes, or the environmental impacts thereof, to the particular project or emissions; as such direct linkage is difficult to isolate and to understand.”<sup>9</sup>

GHG emissions are commensurate with fuel consumption. Because the Proposed Action Alternative overlays as closely as possible (given existing RNAV design criteria), the existing LOGAN SIX procedure, implementation of the Proposed Action

Alternative is not anticipated to increase fuel consumption and consequently, CO<sub>2</sub> emissions. It is possible that, because the use of RNAV procedures increase the reliance on on-board avionics to control the speed, thrust, and flap settings of an aircraft, fuel consumption could be reduced, thereby causing a net reduction in CO<sub>2</sub> emissions.

#### **4.9 Socio-economic Impacts, Environmental Justice and Children’s Health and Safety Risk**

The Proposed Action will not involve any construction of physical facilities or change in noise exposure levels in excess of the applicable thresholds of significance. There would be no acquisition of real estate, no relocation of residents or community businesses, no disruption to local traffic patterns, no loss in community tax base, and no changes to the fabric of the community. Accordingly, there would be no socioeconomic impacts.

Because there are no significant impacts as a result of the Proposed Action, there are no adverse human health or environmental effects associated with the Proposed Action (including the noise, air quality, or cultural resource categories), which would exceed applicable thresholds of significance. As such, no persons of low income or minority populations would be affected at a disproportionately higher level than would other population segments. Accordingly, there would be no significant environmental justice impacts.

There are no impacts associated with the Proposed Action (including the noise, air quality, or cultural resource categories) which would exceed applicable thresholds of significance. The Proposed Action would

not affect products or substances that a child is likely to come into contact with, ingest, use, or be exposed to, and would not result in environmental health and safety risks that could disproportionately affect children. Accordingly, there would be no significant impacts related to children's environmental health and safety risks.

#### **4.10 Federally Threatened and Endangered Species and Migratory Birds**

This resource category includes consideration of impacts to threatened and endangered avian species, including migratory birds.

##### **4.10.1 Threatened and Endangered Species**

Potential impacts to threatened and endangered avian species were evaluated in accordance with FAA Order 1050.1E. A significant impact would occur if the Proposed Action Alternative would jeopardize the continued existence of federally listed threatened or endangered species or result in the destruction or adverse modification of critical habitat for any species.

There are two threatened or endangered avian species known to or believed to exist in the Study Area counties. The Piping Plover is designated a federally threatened species, and the Roseate Tern is a federally endangered species. The Proposed Action Alternative will not introduce aircraft to new areas; aircraft depart Runway 33L in the same general direction currently. Therefore the Proposed Action Alternative is not expected to impact any threatened or endangered species.

The Proposed Action Alternative involves implementation of an RNAV SID which involves airborne aircraft only and does not include any ground-based impacts. Thus, it will not destroy or modify critical habitat for any species. Additionally, in accordance with Executive Order 13112, no species that meet the definition of an invasive species will be introduced in the project area due to the Proposed Action Alternative.

Coordination with the USFWS was undertaken. On February 19<sup>th</sup>, 2013, the New England Field Office of the USFWS provided their concurrence that the proposed project is not likely to adversely affect either the roseate tern or the piping plover. Coordination is shown in Appendix B. Therefore, no significant impacts to threatened or endangered species are expected.

##### **4.10.2 Migratory Birds**

The FAA National Wildlife Strike Database contains records of reported wildlife strikes since 1990. The database includes over 121,000 (civilian and United States Air Force (USAF)) wildlife strikes between 1990 and 2010. In 2009, there were a total of 149 reported wildlife strikes in the Commonwealth of Massachusetts, with 76 of those reported at Logan Airport.<sup>10</sup>

Migratory birds do not generally fly at altitudes greater than 10,000 feet and the majority (92 percent) of the bird strikes to commercial aircraft occur at or below 3,500 feet AGL and occur during the approach and landing roll.<sup>11</sup>

Any changes to flight paths/patterns due to the Proposed Action Alternative would occur above 3,500 feet AGL, at a higher altitude than where the majority of bird strikes occur. Additionally, the Proposed Action

Alternative will not change the arrival and departure flows at Logan Airport so the approaches and departures are not expected to differ from those today. Therefore, based on the available information from the FAA National Wildlife Strike Database, it is concluded that the impacts to migratory bird patterns resulting from the Proposed Action Alternative would be minimal.

#### **4.11 Cumulative Impacts and Connected Actions**

Airport development activities, including airport improvements and airspace redesigns, often create the potential for cumulative impacts. This analysis of cumulative impacts defines cumulative impacts, identifies potential impact categories, and presents the potential cumulative impacts of these categories.

##### **4.11.1 Definition of Cumulative Impacts**

The concept of cumulative impacts addresses the potential for individually minor but collectively significant impacts to occur over time. CEQ Regulations, Section 1508.7, defines “Cumulative Impact” as the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of the agency (Federal or non-federal) undertaking such actions. CEQ Regulations, Section 1508.25, defines the types of actions that should be considered in assessing cumulative impacts. These actions include the following:

- (1) Connected actions, which are defined as:
  - Actions that automatically trigger other actions which may require an Environmental Impact Statement;

- Actions that cannot or would not proceed unless other actions are taken previously or simultaneously; and/or
  - Actions that are interdependent parts of a larger action and depend upon that action for their justification.
- (2) Cumulative actions that, when considered with other proposed actions, would have cumulatively significant impacts; and
  - (3) Similar actions that have similarities such as timing or location with other reasonably foreseeable or proposed projects that provide a basis for evaluating their environmental impacts in the same NEPA document.

#### **4.12 Projects for Consideration of Cumulative Impacts**

There are no connected actions that apply to the Proposed Action. Independent of this EA, the FAA has transitioned the current RNAV SID design for Runway 27 (WYLYY ONE) into the NAS via the exit fixes HYLND, PATSS, LBSTA, CELTK, BRUWN, SSOXS, BLZZR and REVSS. This action was not dependent on the implementation of an RNAV SID for Runway 33L. An RNAV SID for Runway 27 has been in place since the late 1990s and the WYLYY ONE remains in place after the RNAV SID design is incorporated to the existing RNAV procedures. Recent noise modeling results in the BLANS showed that there were no DNL changes with the Runway 27 RNAV SID modification and the activity was therefore categorically excluded from the preparation of an EA or EIS. The FAA has also informed the CAC of this proposal.

In addition, the FAA conducted a cumulative noise analysis inclusive of both the Runway

**Boston Logan International Airport Runway 33L  
RNAV SID Final Environmental Assessment**

---

27 and Runway 33L RNAV SID and prepared a comparison to the No Action Alternative. Implementation of both procedures cumulatively resulted in no significant or reportable increases in noise. The FAA will use this cumulative noise analysis as a baseline to study potential runway use measures in Phase 3 of the BLANS expected to begin in June 2013.

The typical airport capital improvement project (CIP) planning horizon is five years, and includes the identification of individual airport capital improvement projects. No projects that would be anticipated to cause an environmental impact related to the Proposed Action (i.e. an action, such as an airspace redesign, opening of a new runway, runway extension, etc.) are anticipated to occur within the five-year planning horizon.

The Level 3 analysis completed under the BLANS project includes some noise abatement measures that are being carried forward for implementation, such as single-engine taxi operations. Measures implemented in Phase 1 of the BLANS, including RNAV procedures, have resulted in noise decreases. Future BLANS analysis will include an evaluation of the preferential runway use system in place at Logan Airport, which will include an analysis of potential noise benefits, and, accordingly, cumulative impacts.

#### **4.13 Summary**

The following environmental impact categories were evaluated for potential

impacts in accordance with FAA Order 1050.1E due to the Proposed Action:

- Noise and Land Use;
- Department of Transportation Section 4(f) and 6(f) Resources;
- Historical, Architectural, Archaeological, and Cultural Resources;
- Natural Resources and Energy Supply;
- Light Emissions and Visual Impacts;
- Air Quality;
- Climate;
- Socio-economic Impacts, Environmental Justice and Children's Health and Safety Risk;
- Federally Threatened and Endangered Species and Migratory Birds; and
- Cumulative Impacts and Connected Actions.

No significant impacts are associated with the Proposed Action Alternative. Furthermore, the procedures would not result in any ground based impacts, as no construction is required for the RNAV procedure implementation.

**Boston Logan International Airport Runway 33L  
RNAV SID Final Environmental Assessment**

---

**Endnotes**

---

- <sup>1</sup> Federal Aviation Administration, Order 1050.1E, CHG 1: *Environmental Impacts: Policies and Procedures*, Appendix A, Section 14.3, March 20, 2006.
- <sup>2</sup> 14 C.F.R. Part 150, Section 150.21(a)(2)(d).
- <sup>3</sup> Federal Interagency Committee on Noise (FICON), “*Federal Agency Review of Selected Airport Noise Analysis Issues*,” August 2992, p.3-5.
- <sup>4</sup> Federal Aviation Administration, “*Final Environmental Impact Statement, Expanded East Coast Plan – Changes in Aircraft Flight Patterns Over the State of New Jersey*,” 1995.
- <sup>5</sup> Federal Aviation Administration, Order 1050.1E, CHG 1: *Environmental Impacts: Policies and Procedures*, Appendix A, Section 14.5e, March 20, 2006.
- <sup>6</sup> Federal Aviation Administration, Order 1050.1E, CHG 1: *Environmental Impacts: Policies and Procedures*, Appendix A, Section 14.3, March 20, 2006.
- <sup>7</sup> 36 CFR Part 800 (<http://www.achp.gov/regs-rev04.pdf>).
- <sup>8</sup> See *Massachusetts v. E.P.A.*, 549 U.S. 497, 508-10, 521-23 (2007).
- <sup>9</sup> *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions*, CEQ (2010).  
[http://ceq.hss.doe.gov/nepa/regs/Consideration\\_of\\_Effects\\_of\\_GHG\\_Draft\\_NEPA\\_Guidance\\_FINAL\\_02182010.pdf](http://ceq.hss.doe.gov/nepa/regs/Consideration_of_Effects_of_GHG_Draft_NEPA_Guidance_FINAL_02182010.pdf).
- <sup>10</sup> FAA, FAA Wildlife Strike Database, <http://wildlife-mitigation.tc.faa.gov/wildlife/database.aspx>, accessed 12/7/12, dates used: 1/1/2009 – 12/31/2009.
- <sup>11</sup> FAA, FAA Wildlife Strike Database, <http://wildlife-mitigation.tc.faa.gov/wildlife/default.aspx>, accessed 4/3/12.