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Introduction/Executive Summary

Introduction

The Massachusetts Port Authority (Massport) is pleased to continue its practice of providing an extensive, almost three-decade record of Boston-Logan International Airport (Logan Airport or Airport) environmental trends, development planning, operations and passenger levels, and Massport’s mitigation commitments in this *Logan Airport 2016 Environmental Data Report (EDR)*. Logan Airport, owned and operated by Massport, is New England’s primary international and domestic airport. This *2016 EDR* is one in a series of annual environmental review documents submitted to the Secretary of the Executive Office of Energy and Environmental Affairs (EEA) in accordance to the Massachusetts Environmental Policy Act (MEPA)¹ Office since 1979 to report on the cumulative environmental effects of Logan Airport’s operations and activities. Logan Airport is the first airport in the nation for which an annual environmental report card on airport activities was prepared, and Massport continues to be a leader in environmental reporting.

Approximately every five years, Massport prepares an Environmental Status and Planning Report (ESPR), which provides a historical and prospective view of Logan Airport. EDRs, prepared annually in the intervals between ESPRs, provide a review of environmental conditions for the reporting year compared to the previous year. Over the long-term, environmental impacts associated with Logan Airport have been decreasing, as reported on each year in the EDR/ESPR filings. This *2016 EDR* follows the *2015 EDR* and reports on 2016 conditions.

Following the *2015 EDR*, the next annual report was originally scheduled to be a *2016 ESPR*. With prior approval of the EEA Secretary, Massport has prepared an EDR for 2016. In the past few years,

passenger demand trends for air travel have been rapidly increasing, and the air carrier landscape is changing. Additionally, ground transportation at Logan Airport has also changed rapidly with the introduction of transportation network companies (TNCs) such as Uber and Lyft. Due to these rapid changes, 2016 does not serve as a reasonable baseline for prediction of longer-range impact assessment. Therefore, Massport will



Annual Environmental Data Reports and Environmental Status and Planning Reports since 1991.

¹ Massachusetts General Laws Chapter 30, Sections 61-62H. MEPA is implemented by regulations published at 301 Code of Massachusetts Regulations (CMR) 11.00 (the “MEPA Regulations”).

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prepare a *2017 ESPR*, which will include an updated future forecast and a better understanding of future ground transportation options to and from Logan Airport, after a full year of data have been collected.

The scope for this document was established by the Secretary's Certificate dated February 17, 2017, as amended on March 9, 2018, which is included in Appendix A, *MEPA Certificates and Responses to Comments*. This *2016 EDR* fulfills all the requirements laid out in the Secretary's 2018 Certificate. This *2016 EDR* includes reporting on the following categories and provides detailed responses to comments on the Secretary's Certificate. Future year forecasts and impact assessments will be provided in the *2017 ESPR*.

This *2016 EDR* updates and compares the data presented in the *2015 EDR*, and presents the following information for 2016:

- Activity Levels (including aircraft operations, passenger activity, and cargo volumes)
- Airport Planning (including activities underway and upcoming projects)
- Logan Airport's Role in the Regional Transportation Network
- Ground Access to and from the Airport
- Noise Abatement
- Air Quality/Emissions Reduction
- Water Quality/Environmental Compliance
- Mitigation Commitments
- Sustainability and Resiliency

To enhance the usefulness of this *2016 EDR* as a reference document for reviewers, this report also presents historical data on the environmental conditions at Logan Airport dating back to 1990, in instances where historical information is available.

This *2016 EDR* includes a Spanish translation of the Executive Summary. This translated version is included after the English-version of the Executive Summary.

EEA # 3247

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Logan Airport Planning Context

Logan Airport plays a key role in the metropolitan Boston and New England passenger and freight transportation networks. The Airport boundary encompasses approximately 2,400 acres in East Boston and Winthrop, including approximately 700 acres underwater in Boston Harbor. Logan Airport, shown in **Figures 1-1** and **1-2**, is one of the most land-constrained airports in the nation, and is surrounded on three sides by Boston Harbor.

Logan Airport is close to downtown Boston and is accessible by two public transit lines, five direct bus lines, and a well-connected roadway system. Massport also provides Logan Express bus service to and from Logan Airport for air passengers and employees from park-and-ride lots in Braintree, Framingham, Woburn, and Peabody. The airfield comprises six runways, approximately 15 miles of taxiway, and approximately 240 acres of concrete and asphalt apron. Logan Airport has four passenger terminals (Terminals A, B, C, and E), each with its own ticketing, baggage claim, and ground transportation facilities. Massport continues to evaluate and implement enhancements to Logan Airport's security, operational efficiency, and accessibility to and from the Boston metropolitan area, while carefully monitoring the environmental effects of Logan Airport operations.



In 2016, over 17,000 people were employed at Logan Airport. This included approximately 1,200 Massport airport staff and administrative employees. The Massachusetts Department of Transportation (MassDOT) Aeronautics Division's *Massachusetts Statewide Airport Economic Impact Study Update* found that in 2014, Logan Airport supported approximately 132,000 direct and indirect jobs and contributed nearly \$13.3 billion annually to the local economy; this includes all on-Airport businesses, construction, visitor, and multiplier impacts.²

In 2016, Logan Airport was the 17th busiest U.S. commercial airport by number of commercial passengers, and the 18th busiest U.S. commercial airport by aircraft movements.³ Boston is an important domestic and international destination, and air carriers seek to expand international service at Logan Airport based on current and anticipated passenger demand. New international service in the last five years alone has contributed more than \$1.3 billion per year to the local economy and \$49 million in new incremental tax revenue through income and sales.⁴

Logan Airport fulfills a number of roles in the local, New England, and national air transportation networks. It is the primary airport serving the Boston metropolitan area, the principal New England airport for long-haul services, and a major U.S. international gateway airport for transatlantic services.

2 Massachusetts Aeronautics Commissions. 2014. *Massachusetts Statewide Airport Economic Impact Study*. <https://www.massdot.state.ma.us/portals/7/docs/airportEconomicImpactSummary.pdf>.

3 Airports Council International. September 2017. *Worldwide Airport Traffic Report*.

4 InterVISTAS. 2015. *Economic Impact of Recent International Routes*.



Source: Nearmap Color Ortho Imagery (08/26/2017)

FIGURE 1-1 Aerial View of Logan Airport



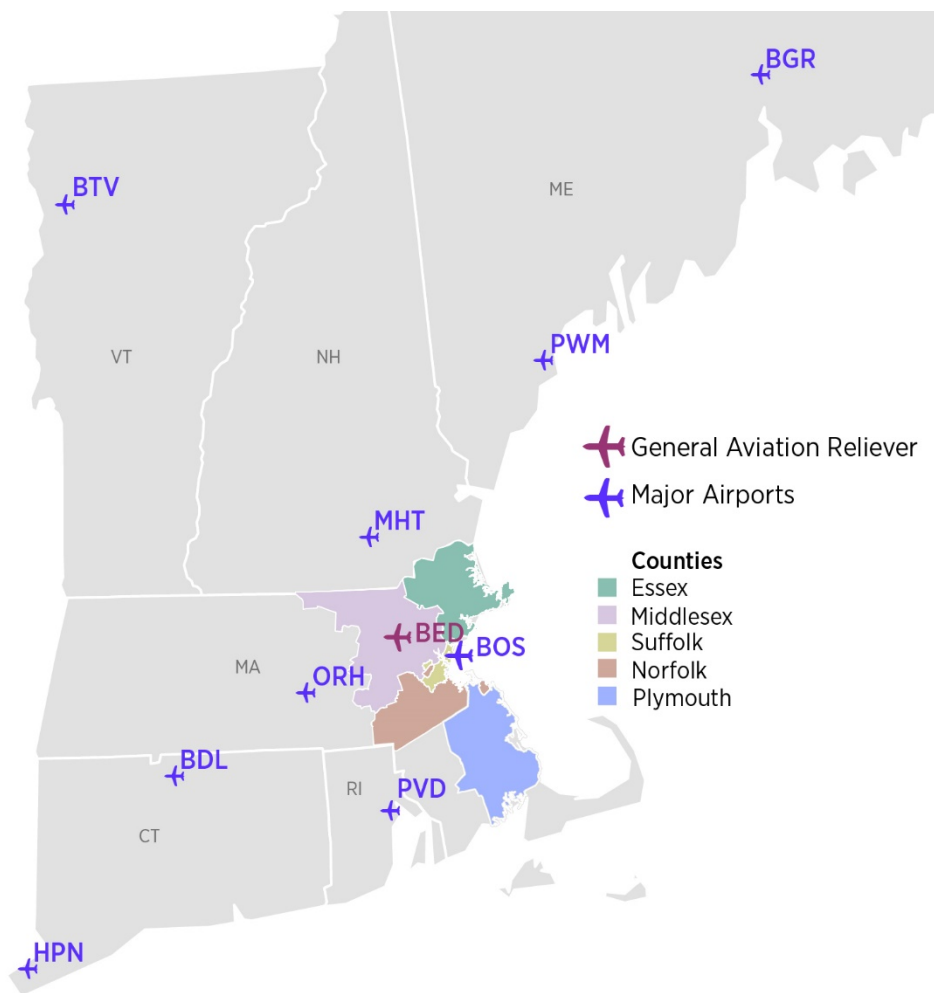


FIGURE 1-2 Logan Airport and Environs

Logan Airport is a Regional Economic Driver

Logan Airport plays an important role in the New England area and is the largest airport in the six-state region (see **Figure 1-3**). Located in Massachusetts, which is home to 14.8 million residents, the Airport draws passengers from across New England, with its primary catchment area consisting of five Massachusetts counties: Essex, Middlesex, Norfolk, Plymouth, and Suffolk (which includes the City of Boston). According to the most recently available statistics, 4.4 million people reside in this five-county area (see **Table 1-1**).

Figure 1-3 Boston Logan International Airport Catchment Area



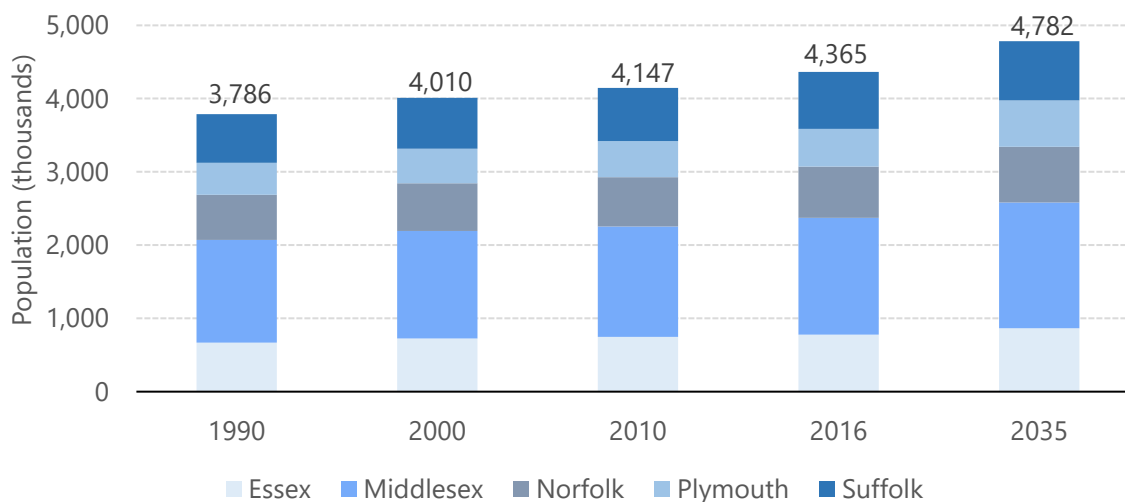
Notes: BDL – Bradley International Airport; BED – Lawrence G. Hanscom Field; BGR – Bangor International Airport; BOS – Boston-Logan International Airport; BTV - Burlington International Airport; HPN – Westchester County Airport; MHT - Manchester-Boston Regional Airport; PVD - T. F. Green Airport; PWM – Portland International Jetport

County	Population (thousands)				Compound Annual Growth Rates		
	1990	2000	2010	2016	1990-2000	2000-2010	2010-2016
Essex	671	725	746	780	0.8%	0.3%	0.8%
Middlesex	1,399	1,467	1,507	1,591	0.5%	0.3%	0.9%
Norfolk	617	651	672	699	0.5%	0.3%	0.6%
Plymouth	436	474	495	516	0.8%	0.5%	0.7%
Suffolk	663	693	725	780	0.4%	0.5%	1.2%
Boston Catchment Area	3,786	4,010	4,146	4,366	0.6%	0.3%	0.9%
Massachusetts	6,023	6,361	6,565	6,825	0.5%	0.3%	0.6%
New England	13,230	13,950	14,468	14,798	0.5%	0.4%	0.4%
United States	249,623	282,162	309,347	324,161	1.2%	0.9%	0.8%

Source: Complete Economic and Demographic Data Source (CEDDS), Woods & Poole Economics, Inc., 2017.

The role of Logan Airport is expected to continue its dominance since the population of the catchment area has grown faster (0.9 percent) than the population of the United States (0.8 percent), Massachusetts (0.6 percent), and New England (0.4 percent) since 2010 (see **Table 1-1**). The catchment area population is projected to increase at an average rate of 0.5 percent each year over the next 19 years (see **Figure 1-4**).

Figure 1-4 Logan Airport Primary Catchment Area Population Growth, 1990, 2000, 2010, 2016, 2035



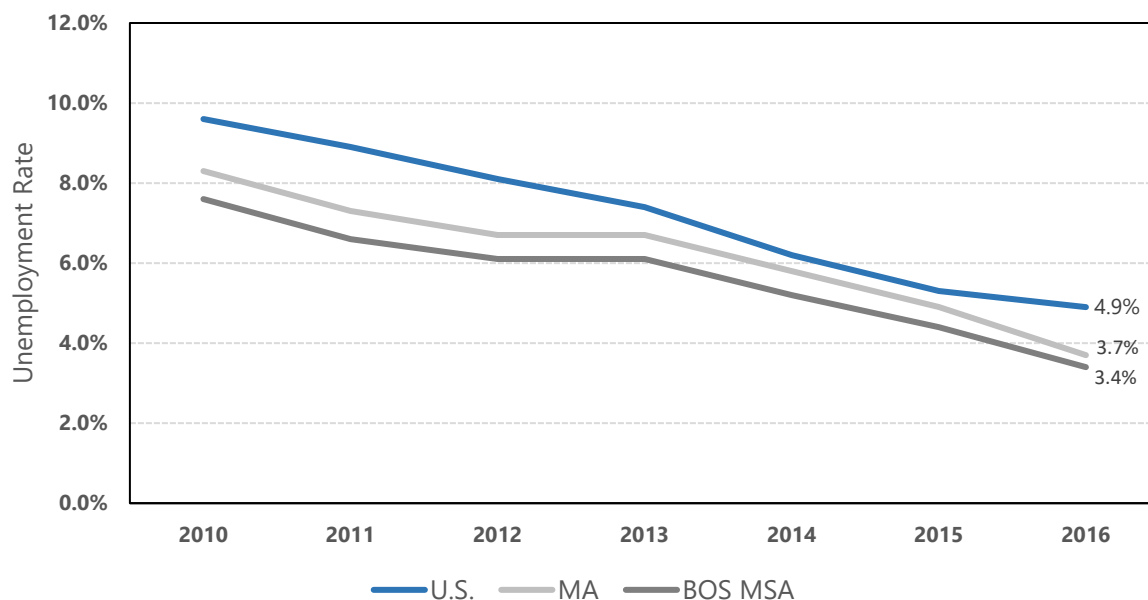
Source: Complete Economic and Demographic Data Source (CEDDS), Woods & Poole Economics, Inc., 2017.

Logan Airport’s Regional Market

The area surrounding Logan Airport has demonstrated strong economic growth over the last 10 years, reflecting the interdependent relationship between the regional economy and Logan Airport. The robust regional economy drives passenger and cargo demand, both inbound and outbound, for the Airport. Similarly, the Airport’s air service enables businesses to serve customers outside of New England as well as tourists who use services provided by local businesses.

The Boston metropolitan area is home to a broad range of industries, with healthcare and social assistance, educational services, and professional, scientific, and technology services (which include Boston’s growing biotech industry) accounting for the largest share of employees.⁵ In 2016, Boston was declared the “#1 city in the U.S. for fostering entrepreneurial growth and innovation.”⁶ The contribution of innovation and business start-ups is also evident in the latest 2017 year-to-date economic growth estimates and reflects trends in increased employment and high-tech industries. The outlook for the state is good. In the third quarter of 2017, the Commonwealth of Massachusetts avoided the dampening effect of Hurricanes Harvey and Irma that affected much of the United States, growing by 5.9 percent.⁷ Forecasts of Commonwealth gross domestic product (GDP) for the fourth quarter of 2017 indicate continued growth of approximately 3.3 percent.

Figure 1-5 Unemployment Rate Comparison: United States, Massachusetts and Boston MSA, 2010-2016



Source: U.S. Bureau of Economic Analysis, 2017.

5 U.S. Census Bureau via DataUSA. Boston-Cambridge, Newton, MA-NH Metro Area profile. www.datausa.io.

6 U.S. Chamber of Commerce Foundation and 1776. 2016. *Innovation That Matters*.

7 MassBenchmarks, The Benchmarks Bulletin, October 27, 2017. Note that MassBenchmarks is a joint program of the University of Massachusetts Donahue Institute and the Federal Reserve Bank of Boston.

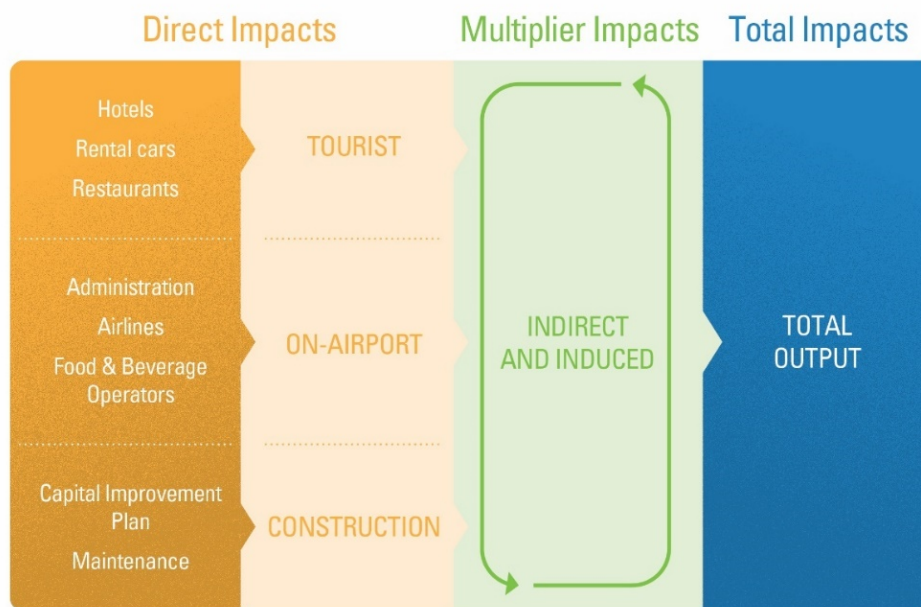
Another reflection of the strength of the Airport’s regional market is its relatively low unemployment rate. The Boston metropolitan area has consistently maintained a lower unemployment rate than that of the Commonwealth and the entire country (see **Figure 1-5**). In 2016, the Boston MSA had an unemployment rate of 3.4 percent, which is lower than the rate in the Commonwealth (3.7 percent) and the country (4.9 percent). Even during the economic downturn years of 2008-2010, Boston and the Commonwealth experienced unemployment rates below the national average.

The Airport not only serves a growing population, but a high earning one as well. Per capita income in 2016 was \$64,617 (2009 U.S. dollars) in the Airport’s primary service area, 10.9 percent higher than the Commonwealth and 44.8 percent higher than the national average.

Logan Airport’s Regional Economic Impacts

Logan Airport and the airport industry are a major economic driver in the state and region. The *Massachusetts Statewide Airport Economic Impact Study Update*, completed by MassDOT in 2014,⁸ estimates that aviation contributes \$16.6 billion in output to the Massachusetts economy annually (see **Table 1-2**); of this output, 80.7 percent of this is due to Logan Airport alone.⁹ Total output includes on-Airport businesses, construction, visitor, and multiplier effects (see **Figure 1-6**).¹⁰

Figure 1-6 Airport Economic Impacts



8 MassDOT. 2014. *Massachusetts Statewide Airport Economic Impact Study Update*. <http://www.massdot.state.ma.us/portals/7/docs/airportEconomicImpactSummary.pdf>.

9 *Ibid.*

10 Multiplier effects refer to the recirculation of money in the local economy after initially being spent by the Airport, its tenants, or tourists. This recirculation increases the overall impact of the Airport’s operation in the local economy.

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On-Airport business output includes airport administration, airlines, concessionaires, and other companies that operate at Logan Airport. Implementation of the Capital Improvement Plan (as discussed in Chapter 3, *Airport Planning*). The visitor impacts represent the expenditure on hotels, rental cars, restaurants, and attractions of tourists arriving at the Airport. Millions of people travel to Massachusetts, particularly to the City of Boston, every year to enjoy the rich historic and cultural heritage, attend cultural or sporting events, conduct business, visit recreational areas, and attend conferences at one of the City's convention centers. Over 1.8 million overseas visitors and 25 million domestic visitors¹¹ traveled to the state in 2016.¹²

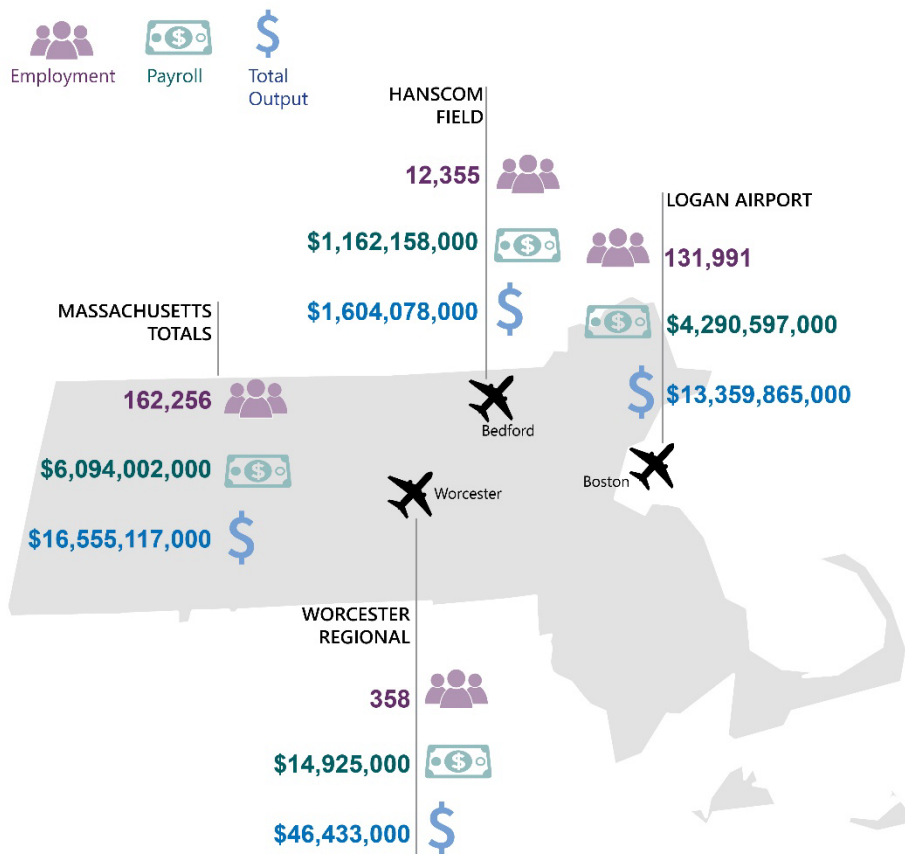
In addition to direct effects, Logan Airport generates multiplier effects in the surrounding region that consist of two categories: 1) the expenditure of Airport tenants; and 2) the re-spending of wages by Airport employees. As a result, money spent at the Airport is re-circulated in the local economy multiple times. Airport tenants or businesses operating at the Airport purchase goods and services locally (such as delivery services and food ingredients). The annual wages and benefits (approximately \$4.3 billion) of the more than 132,000 regional employees (see **Table 1-2**) supported by the Airport are re-spent in the local community as employees purchase daily necessities.

The arrival of international visitors has been aided by the growth in non-stop international service at the Airport, operated by new, foreign-based carriers using cleaner and quieter wide-body aircraft. In 2016, international visitors spent \$2.8 billion in the Commonwealth, a 3.1-percent increase from 2015, on public transportation, rental cars, food, lodging, entertainment, and retail (see **Table 1-3**). International visitors supported 19,300 jobs in 2016 with \$636.9 million in payroll and benefits.

¹¹ Includes residents and non-residents.

¹² Massachusetts Office of Travel and Tourism. <https://www.massvacation.com/travel-trade/getting-around/stats-reports/>.

Figure 1-7 Total Economic Impact of Massachusetts Airports



Source: MassDOT, Massachusetts Statewide Airport Economic Impact Study Update, 2014.

Notes: "Massachusetts Totals" refers to the total economic output of all Massachusetts airports.

Table 1-2 Economic Impact of Massachusetts Airports, 2013¹³

Per Capita Income (2009 USD)			
Airport	Employment	Payroll (thousands of dollars)	Output (thousands of dollars)
Boston Logan	131,991	\$4,290,597	\$13,359,865
Worcester Regional	358	14,925	\$46,433
Hanscom Field	12,355	\$1,162,158	\$1,604,078
<i>Massport Subtotal</i>	<i>144,704</i>	<i>5,467,680</i>	<i>\$15,010,376</i>
MA Commercial Service Airports	157,790	\$5,924,898	\$16,039,049
MA GA Airports	4,466	\$169,104	\$516,068
MA Total	162,256	\$6,094,002	\$16,555,117

Source: MassDOT, Massachusetts Statewide Airport Economic Impact Study Update, 2014

Note: Most recent data available. At the time of this study, Worcester Regional Airport did not have jetBlue Airways service for a full year. Hanscom Field figures include military activity.

Table 1-3 International Travel Impact on Massachusetts

Impact Type	2015	2016	Annual Growth
Direct Travel Expenditure (millions USD)	\$2,748.5	\$2,833.7	3.1%
Travel Generated Payroll (millions USD)	\$609.2	\$636.9	4.5%
Direct Travel Generated Employment (thousands of jobs)	18.9	19.3	1.8%
Travel Generated Tax Revenue (millions USD)	\$435.2	\$463.1	6.4%

Source: US Travel Association for Massachusetts Office of Travel and Tourism, Economic Impact of Travel on Massachusetts Counties 2016, October 2017.

Massport Partnerships

Massport has a long-standing commitment to being a good neighbor. Working in concert with government, community, and civic leaders throughout Massachusetts and New England, Massport is an active participant in efforts that improve the quality of life for residents living near Massport’s facilities.

Massport employees participate in a number of community activities. In the spring, Massport employees participate in the City of Boston’s annual neighborhood Boston Shines clean-up. At Thanksgiving, Massport employees provide food donations to three community programs, which serve more than 500 families and individuals each month. In the fall, children ages 4 to 17 are provided with a new backpack filled with school supplies and new clothes at the start of the school year. In 2016, Massport provided financial support to over 60 community organizations including: Boys & Girls Clubs, the Codman Square and South Boston Health Centers, and several youth and recreational organizations. Massport offers

¹³ Latest available published information.

several scholarship opportunities for graduating high school seniors. For a full list of Massport's partnership efforts go to: <http://www.massport.com/massport/community/community-partners/>.

East Boston Foundation

Created by Massport in 1997 at the request of the community, the East Boston Foundation has provided nearly \$10 million in financial support for 85 community programs that benefit children, adults, and seniors, from sports and recreation to education, training, and child care. The East Boston Foundation Board of Trustees are committed to financial stewardship, recognizing the evolving needs of the community, and enhancing the quality of life for all East Boston residents.

Massport Means Business

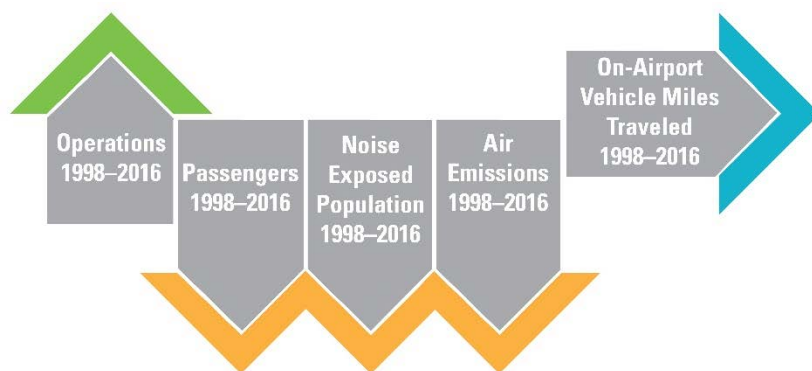
Massport is taking steps to create more business opportunities at Logan Airport for East Boston companies. In 2016, Massport, the East Boston Chamber of Commerce, and East Boston Main Streets co-hosted the *MASSPORT MEANS BUSINESS* initiative to learn more about doing business with Massport. Massport's mission is to ensure that East Boston businesses have every opportunity to thrive by partnering with us to serve our passengers, airlines, security, and maintenance needs.



2016 Highlights and Key Findings

This section provides a brief overview of key findings, by chapter, at Logan Airport in 2016 (see **Figure 1-8**). Additional information concerning Airport activities is provided in subsequent chapters. This section will also highlight Massport's efforts to further sustainability through specific projects and initiatives with a sustainability leaf and summarizes Massport's sustainability program.

Figure 1-8 Summary of 2016 EDR Key Findings



Activity Levels

Logan Airport continues to be an important origin and destination (O&D)¹⁴ airport both nationally and internationally. The Airport is also one of the fastest growing major U.S. airports, in terms of number of passengers, over the past several years.¹⁵ There has been growth in both domestic and international passenger numbers. Additional trends in new aircraft technology, allowing for smaller and more fuel-efficient aircraft on international routes, are also expected to continue to benefit mid-size O&D markets like Boston. Notable 2016 highlights and key findings on passenger activities, aircraft operations, and cargo volumes include:

- In 2016, U.S. passenger traffic grew by 3.8 percent, whereas Logan Airport experienced a passenger growth of 8.5 percent, more than double during the same period.¹⁶
- Overall, Logan Airport served 55 non-stop international destinations in 2016, compared to 47 in 2015.¹⁷
- From 2000 to 2016, the annual number of passengers at Logan Airport increased by 30.9 percent, while the annual number of aircraft operations decreased by 19.8 percent (see **Figure 1-9**).
- The total number of air passengers increased by 8.5 percent to 36.3 million in 2016, compared to 33.4 million in 2015 (see **Figure 1-10**). The 2016 passenger level represents a new record high for Logan Airport.

14 "Origin and destination" traffic refers to the passenger traffic that either originates or ends at a particular airport or market. A strong O&D market like Boston generates significant local passenger demand, with many passengers starting their journey and ending their journey in that market. O&D traffic is distinct from connecting traffic, which refers to the passenger traffic that does not originate or end at the airport but merely connects through the airport en route to another destination.

15 Between 2010 and 2016, Logan Airport was the eighth fastest growing airport in the U.S. in terms of domestic O&D traffic (U.S. DOT O&D Survey).

16 ACI North American Airport Traffic Summary. 2016. <http://www.aci-na.org/content/airport-traffic-reports>.

17 IATA Innovata Schedules. <http://www.iata.org/publications/srs/Pages/innovata.aspx>.

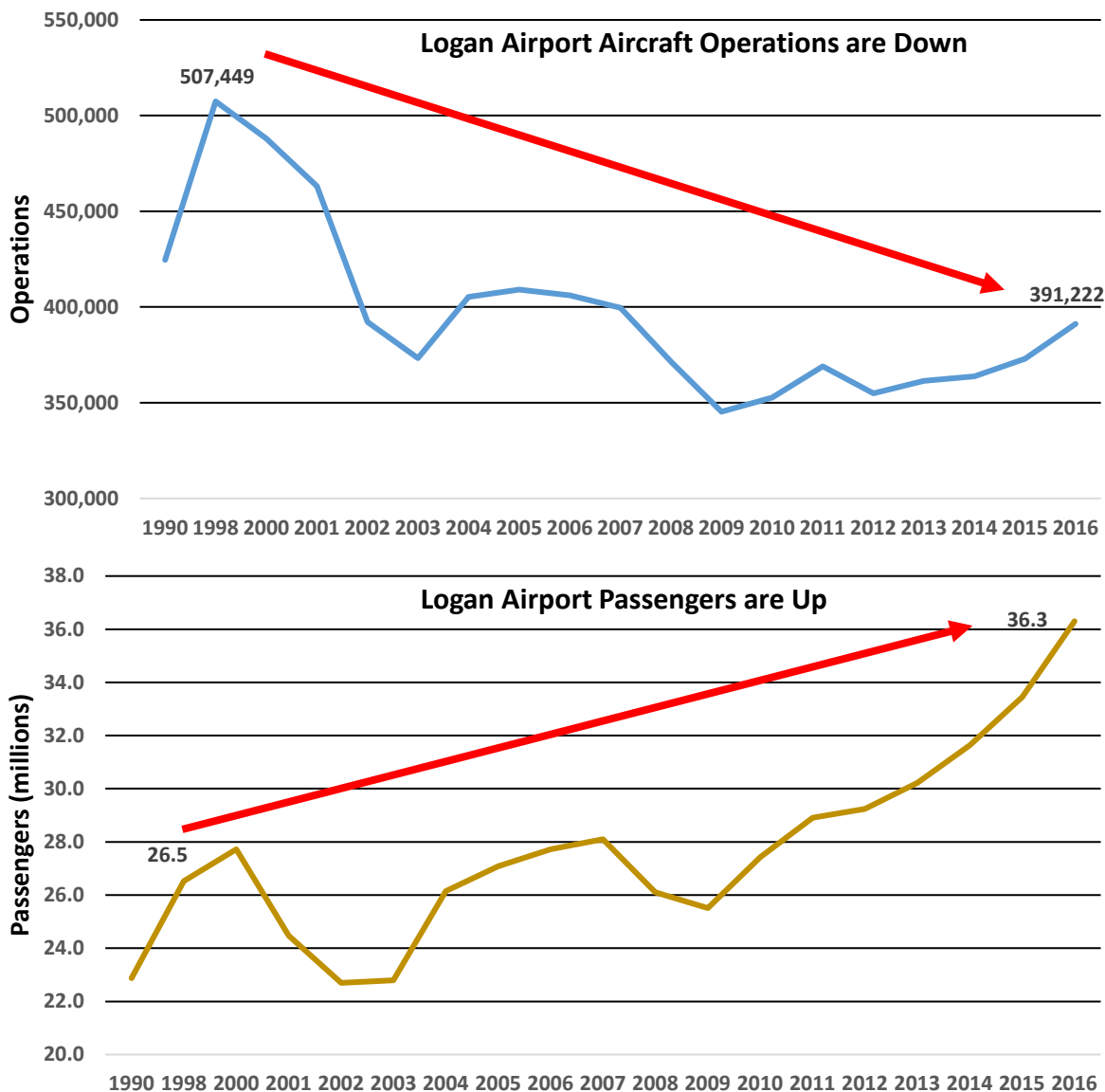
Figure 1-9 Logan Airport Annual Passenger and Operations, 1990, 1998, 2000, 2015, 2016



- While the numbers of both domestic and international passengers are increasing, international passenger demand continues to increase at a faster rate than domestic passenger demand. Total international passengers at Logan Airport increased from 5.5 million in 2015 to 6.6 million in 2016, a 19-percent increase. Annual domestic passengers' activity levels increased from 27.8 million in 2015 to 29.6 million in 2016,¹⁸ a 6.4-percent increase. The strong international passenger growth was driven by the economic attractiveness of the metropolitan Boston region and the strength of Boston as an O&D market.

¹⁸ Excluding GA passengers.

Figure 1-10 Logan Airport Annual Passenger Activity Levels and Operations, 1990, 1998, 2000-2016



Source: Massport

Note: 1998 represents the historic peak in terms of aircraft operations for Logan Airport.

- In response to regional demand for international service, new non-stop services were introduced by a number of foreign airlines including Air Berlin, Norwegian Air Shuttle, Qatar Airways, Scandinavian Airlines, and TAP Air Portugal. New international destinations from Logan Airport in 2016 included Dusseldorf, London Gatwick, Doha, Copenhagen, and Lisbon.

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- The total number of aircraft operations at Logan Airport increased from 372,930 in 2015 to 391,222 in 2016, a 4.9-percent increase. Despite the increase, aircraft operations at Logan Airport remained well below the 487,996 operations in 2000 and the historical peak of 507,449 achieved in 1998. In 1998, Logan Airport served 26.5 million air passengers, compared to 36.3 million air passengers in 2016, which saw 116,227 fewer operations.
- Passenger aircraft operations accounted for 90.4 percent of total aircraft operations in 2016. While domestic operations remain the largest share of commercial operations,¹⁹ international operations have grown steadily at Logan Airport. In 2016, scheduled domestic operations increased by 2.6 percent while scheduled international operations increased by 17.9 percent.
- International passengers made up approximately 18 percent of total Airport passengers in 2016.
- JetBlue Airways and Delta Air Lines continued to expand services at Logan Airport, increasing their total operations by 6.9 percent and 6.4 percent respectively in 2016. As Logan Airport's largest carrier, JetBlue Airways accounted for 23.4 percent of total passenger aircraft operations and 26.8 percent of total passengers in 2016.
- General Aviation (GA) operations, which accounted for 7.9 percent of total operations in 2016, increased by 9.3 percent from 2015.²⁰ The 30,780 GA operations in 2016 remain below the 35,233 GA operations that Logan Airport handled in 2000. Hanscom Field, Logan Airport's reliever airport, handled 120,891 GA operations in 2016.²¹
- Air carrier efficiency continued to increase, with the average number of passengers per aircraft operation at Logan Airport increasing from 89.7 in 2015 to 92.8 in 2016. The increasing number of passengers per flight reflects a shift away from smaller aircraft and rising load factors as airlines continue to focus on capacity control and improvements in efficiency.
- Total air cargo volume²² at Logan Airport totaled 640 million pounds in 2016, compared to 606 million pounds in 2015. Approximately 44 percent of Logan Airport's cargo was carried by passenger airlines as belly cargo, while 56 percent was carried by all-cargo carriers such as FedEx and UPS. Dedicated air cargo operations increased from 6,059 in 2015 to 6,680 in 2016, a 10.2-percent increase.

19 Commercial operations include passenger aircraft operations and a small number of all-cargo aircraft operations.

20 General Aviation (GA) is defined as all aviation activity other than commercial airline and military operations.

21 Hanscom Field, a full-service GA airport, plays a critical role as a corporate reliever for Logan Airport.

22 Air cargo includes express/small packages, freight, and mail.

While this annual report was originally scheduled to be a 2016 *ESPR*, and with prior approval of the Secretary of EEA, Massport has prepared an EDR for 2016. In the past few years, passenger demand trends for air travel have been rapidly increasing and the air carrier landscape is changing. Additionally, ground transportation at Logan Airport has also changed rapidly with the introduction of TNCs, such as Uber and Lyft.²³ Due to these rapid changes, 2016 does not serve as a reasonable baseline for prediction of longer-range impacts.

As part of the *ESPR* process, Massport typically prepares passenger, operations, and cargo activity forecasts. It is expected that Logan Airport will reach 40 million annual passengers by 2019. Given this continued faster than expected passenger growth, Massport will be updating the Logan Airport long-term passenger forecast in the 2017 *ESPR* to reflect recent growth at Logan Airport, revised expectations for the local/national/international economy, and latest industry trends. Preliminary review suggests that future Logan Airport passenger levels could reach about 46 million annual passengers. The 2017 *ESPR* will provide more detailed information and updated forecast numbers to 2030/2035. Additional information is provided in Chapter 2, *Activity Levels*.

Airport Planning

Logan Airport facilities have been accommodating recent increases in activity and operations on the airside, but the terminal, roadways, and parking facilities are strained by the increase in passengers. The 2016 reporting year was marked by construction of several projects focused on enhancing the passenger experience, accommodating increases in passenger activity levels, and improving ground access. Recent progress on planning initiatives and individual projects at Logan Airport are described below.

Chapter 3, *Airport Planning*, describes the status of all planning projects.

Terminal and Airside Projects

- **Terminal E Renovation and Enhancements Project.** To accommodate regular service by wider and longer Group VI aircraft at Terminal E, this project included interior and exterior improvements. The project reconfigured three existing gates to accommodate Group VI aircraft (including the Airbus A380 and Boeing 747-8 primarily used by international air carriers). An addition to the west side of Terminal E allowed passenger holdrooms to accommodate the larger passenger loads associated with larger aircraft. The project also included modifications to the airfield to meet required FAA safety and design standards to accommodate the larger aircraft. An Environmental Assessment (EA) was filed, and FAA issued a Finding of No Significant Impact (FONSI) on July 29, 2016. Construction was completed in early 2017.
- **Terminal E Modernization Project.** The Terminal E Modernization Project will add the three gates approved in 1996 as part of the International Gateway West Concourse project (EEA #9791), but never constructed, and an additional four gates to Terminal E. The building will be aligned to

²³ Drop-off/pick-up modes can include private vehicles, taxis, and black car services. For example, if an air passenger is dropped off when s/he departs on an air trip and is picked-up upon their return, that single air passenger generates a total of four ground-access trips: two for the drop-off trip (one inbound to Logan Airport, one outbound from Logan Airport) and two for the pick-up trip (one inbound to Logan Airport, one outbound from Logan Airport). The air passenger may be dropped off and picked up in a private vehicle or in a taxi, TNCs, or black car that may not carry a passenger during all segments of travel to and from Logan Airport.

function as a noise barrier between the airside operations and the community. New passenger handling and passenger holdrooms are being planned, as well as possible additional Federal Inspection Services (FIS) and Customs and Border Protection facilities to supplement the existing FIS areas in Terminal E. A connection between Terminal E and the Massachusetts Bay Transportation Authority (MBTA) Blue Line Airport Station will be constructed to improve passenger convenience. This connection is currently being studied, and various approaches are under consideration. Consideration is given to constructing an Automated People Mover (APM), which ultimately would connect the MBTA Blue Line Station to all the terminals. The APM concept is in the very early stages of feasibility assessment, and will be more definitive as the Terminal E Modernization Project design progresses.

The Terminal E Modernization Project will occupy a portion of the North Cargo Area (NCA) and will include terminal gates, aircraft parking, hangars, and cargo facilities. Massport filed an Environmental Notification Form (ENF) in October 2015 and a joint federal Draft Environmental Assessment (EA)/state Draft Environmental Impact Report (EIR) in July 2016. Massport filed the Final EA/EIR on September 30, 2016. On November 10, 2016, FAA issued a FONSI. On November 14, 2016, FAA issued a Record of Decision (ROD) on the project, stating that Massport can now update the Airport Layout Plan (ALP) with the proposed Terminal E Modernization Project. (For convenience, Massport has provided the Secretary's Certificates on the ENF and Draft EA/EIR, with responses to those comments, in Appendix A, *MEPA Certificates and Responses to Comments*, of this 2016 EDR.) The project, including the MBTA connection, is in the design phase and initial construction will likely begin in 2018. Future ESPRs and EDRs will provide updates as final design and construction proceed.

- **Terminal C to E Airside Connector.** The Terminal C to E Airside Connector provides a greater post-security connectivity between terminals and to improve flexibility for airlines. In addition, the Terminal C to E Connector provides a post-security connection between Terminals C and E on the Departures level. The Connector provides improved passenger circulation within the post-security concourse(s), additional holdroom space at Terminal E, reconfigured office space, concessions and concessions support, and a new consolidated location for escalators and stairs. The project was completed in May 2016.
- **Terminal B Optimization Project.** Similar to the recent renovations and improvements at Terminal B, Pier A, Massport is upgrading its facilities on the Pier B side to meet airlines' needs and to enhance the passenger traveling experience. Improvements include an enlarged ticketing hall, improved outbound bag area and claim hall, expanded concession areas, and expanded holdroom capacity at the gate. The project will consolidate American Airlines' operations to one pier of the terminal (now operating on two different sides of the terminal). All Pier B gates will be connected post security, the project will also consolidate checkpoint operations for better passenger throughput and improved passenger experience. Massport prepared a Draft EA in May 2017 and a Final EA in June 2017. On June 29, 2017, FAA issued a FONSI. Final design is now complete and construction is underway. Construction is expected to be complete in early 2019.
- **Terminal C Building, Roadway, and Curb Enhancements.** Massport is currently evaluating multifaceted enhancements that would enhance Terminal C facilities and provide a post-security connector between Terminal B and C; replace aging roadways serving the terminal; and improve the operation of the Terminal C curb. The enhancements also include replacement of the existing

canopy on the Departures level. The project would enhance Logan Airport's ability to efficiently accommodate current and future passenger volumes by bringing the terminal facilities up-to-date and improving access, egress, and drop-off/pick-up operations.

- **Hangar Projects.** Architectural design commenced in December 2010 for two hangar upgrades in the North Cargo Area (NCA). The renovated JetBlue Airways hangar opened in 2012. The American Airlines hangar, formerly occupied by Northwest Airlines, was refurbished in 2013. Demolition of the former American Airlines hangar (Hangar 16) commenced in 2014 and was completed in August 2016.

Enhanced Ground Access



A series of recent ground access improvement projects have been designed to yield substantial environmental benefits, particularly in the areas of ground access efficiencies and associated air quality emissions reductions on-Airport and in East Boston, as documented below:

- **The Rental Car Center (RCC) Southwest Service Area (SWSA) Redevelopment Program (EEA 14137).** The RCC is fully operational and the full benefits of the project began to be realized in 2014. Consolidation of rental car operations and associated shuttle bus service into a single coordinated shuttle bus fleet operation resulted in customer service improvements, reduced on-Airport vehicle miles traveled (VMT), with associated emission reductions, and stormwater system enhancements. Rental car and bus operations began in the centralized facility in September 2013. The remaining quick-turnaround areas, permanent taxi pool, bus, limousine pools, and the SWSA edge buffers were completed in 2014. Consolidated bus operations continue to reduce on-Airport VMT and associated emissions. The RCC was awarded Logan Airport's first Gold Certification in Leadership in Energy and Environmental Design (LEED®) in 2016. The status of mitigation efforts for the RCC is provided in Chapter 9, *Project Mitigation Tracking*.
- **Logan Airport's new bus fleet**, comprising 22 compressed natural gas (CNG) buses and 32 clean diesel/electric buses, has fully replaced the entire fleet of diesel rental car shuttle buses now that the RCC is fully operational. One additional new CNG bus was put into service in 2016, increasing the total from 21 to 22 buses. The new consolidated bus fleet has improved operational efficiency and reduced shuttle frequency from 100 to 30 buses per hour.
- **The LEED-Silver Green Bus Depot** serves as Logan Airport's on-Airport maintenance facility for Massport's new clean-fuel bus fleet. By shifting the bus maintenance operations out of the community, Massport is reducing bus traffic in East Boston and Chelsea.
- **The Martin A. Coughlin Bypass** reduces commercial traffic through East Boston by providing a direct link, along a former rail corridor, from Logan Airport's North Service Area (NSA) to Chelsea for Airport-related vehicle trips.
- **The Economy Parking Garage** simplified and reduced on-Airport circulation by consolidating multiple overflow parking lots throughout the Airport into a single location served by a single shuttle route. Overall traffic circulating throughout the Airport has decreased, resulting in significant operational and environmental benefits.

- **West Garage Parking Consolidation Project.** Massport consolidated 2,050 temporary parking spaces as an addition to the West Garage and at the existing surface lot between the Logan Office Center and the Harborside Hyatt. The West Garage addition is located on the site of the existing Hilton Hotel parking lot. Construction of these spaces constituted all the remaining spaces permitted under the Logan Airport Parking Freeze.²⁴ The project commenced in the spring of 2016 and was completed in late 2016.
- **Logan Airport Parking Project.** As one element of its comprehensive ground transportation strategy, Massport proposed the phased construction of 5,000 new on-Airport commercial parking spaces at Logan Airport in two locations. The goal of the Logan Airport Parking Project is to reduce the number of air passengers choosing more environmentally harmful drop-off/pick-up modes, which generate up to four vehicle trips instead of two (see below for a detailed description). The construction of additional commercial parking spaces at Logan Airport was predicated on a regulatory change, that has been adopted by the Massachusetts Department of Environmental Protection (MassDEP) to amend the existing Logan Airport Parking Freeze. In response to Massport's 2016 request to consider an amendment to the Logan Airport Parking Freeze (to increase the commercial parking freeze limit by 5,000 spaces), MassDEP conducted a stakeholder process, which was followed by a public process to amend the Parking Freeze regulation. MassDEP issued the amended regulation on June 30, 2017, approving the requested parking increase. On December 5, 2017, the U.S. Environmental Protection Agency (EPA) proposed a rule approving the revision of the Massachusetts State Implementation Plan (SIP) incorporating the amended Logan Airport Parking Freeze Cap. EPA approved the proposed rule on March 6, 2018, and the rule went into effect April 5, 2018. For additional information, see Chapter 5, *Ground Access to and from Logan Airport*. Massport initiated a parallel process with EEA by filing an ENF for new parking facilities on March 31, 2017. On May 5, 2017, EEA issued its Certificate on the ENF, establishing the Scope for the required Draft EIR. Initiation of concept design for the parking facilities and preparation of a Draft EIR commenced in late 2017. The Draft EIR will provide additional details on the number of spaces per location and planned construction phasing. As outlined in the ENF, Massport has identified two potential sites for the new parking: Economy Garage (shown as 7a in **Figure 3-1**) and Terminal E Surface Lot (shown as 7b in **Figure 3-1**).
- **Convenience and Filling Station/Taxi Pool/TNC Lot Relocations.** Construction of the Terminal E Modernization Project includes the relocation of the existing on-airport gas station to the intersection of Tomahawk Drive and Jeffries Street on Massport property (Southwest Service area). Chosen by the community-based Logan Impact Advisory Group, it provides community benefits such as a convenience space for a local vendor, landscaping and beatification enhancements, and traffic-congestion reductions. Another part of the design phase involved Massport further evaluating transportation and land-uses in this area in an effort to mitigate vehicular congestion along Tomahawk Drive associated with the growing TNC mode. As a result, it was determined that the TNC Pool Lot would be relocated to the existing taxi pool at Porter Street because this would minimize Tomahawk Drive traffic and congestion. Similarly, the existing taxi pool lot will be returned to the Blue Lot between the Logan Office Center and the Hyatt Hotel. By relocating the TNC Pool Lot and the number of TNCs servicing the Airport, greater

24 310 Code of Massachusetts Regulations and 40 CFR 52.1120

operational flexibility and additional routing options are available that will allow Massport to reduce TNC impacts along Tomahawk Drive.

- **Braintree Logan Express Acquisition.** In 2015, Massport acquired the property on which the Braintree Logan Express site is located, furthering its commitment to providing high-occupancy vehicle (HOV) access from key regional nodes. The Braintree Logan Express service had a ridership of 655,158 annual passenger trips in 2016, representing 36 percent of the entire Logan Express system ridership. Approximately half of the Braintree Logan Express riders are Logan Airport employees. The Braintree site is approximately 20 acres (14 acres of usable land area) and has approximately 1,800 lined spaces.
- **Mid-life Rebuild of Eight Silver Line Buses.** Eight Silver Line buses, connecting the Airport to South Station, are owned by Massport and are operated by the MBTA with Massport paying operating costs for the SL1 route. In 2016, Massport funded an approximate \$6 million mid-life rebuild of these eight buses. The mid-life rebuild will extend the useful life of each vehicle by approximately eight years. This will allow the MBTA to maintain reliability and quality of operations along the Silver Line today while starting the procurement process to acquire new vehicles in the future.



Community Park and Open Space Projects

Massport has committed up to \$15 million for the planning, construction, and maintenance of four Airport edge buffer areas and two parks along Logan Airport's perimeter. These buffers have now been completed and include the Bayswater Buffer, Navy Fuel Pier Buffer, SWSA Buffer Phase 1, and the SWSA Buffer Phase 2. These areas are located on Massport-owned property along Logan Airport's perimeter boundary and are intended to provide attractive landscape buffers between Airport operations and adjacent East Boston neighborhoods. The buffer design occurs in consultation with Logan Airport's neighbors and other interested parties in an open community planning process. In addition to the Airport edge buffers, Massport has been working with community leaders to provide more recreation opportunities to local residents, such as the 3.3 miles of the East Boston Greenway Connector and Piers Park with community boating facilities and views of downtown Boston. Over the past 10 years, Massport has invested \$50 million to develop, maintain, and secure 33 acres of green space in East Boston for walking, playing, biking, and other forms of passive recreation.

- **Piers Park Phase II.** A Request for Proposals for design of Piers Park Phase II was issued in June 2017. Piers Park Phase II will add 4.2 acres of green space to the existing Piers Park on the East Boston waterfront. The Phase II site is located adjacent to the Phase I site, along Marginal Street in East Boston. The conceptual design of the Phase II site envisions a fully accessible park with a central lawn area, basketball and volleyball courts, and bicycle and rollerblade tracks. The park is expected to offer landscape features similar to those in the Phase I Park, including brick paved walkways, site furniture, lighting, and plantings. A new 1,200-square foot community/sailing center, located on the waterfront, is designed to replace the existing Sailing Center building while providing additional meeting spaces for the community.

- **Piers Park Phase III.** Piers Park Phase III is conceived as a 3.8-acre addition of greenspace to the existing Piers Park on the East Boston waterfront. The site is located adjacent to the Phase II site, along Marginal Street in East Boston. Piers Park Phase III is an early-stage planning concept that Massport has proposed to external developers. Massport issued a Request for Proposals for design of Piers Park Phase III in February 2018. Depending on responses to Massport's Request for Proposals, the project may be advanced by another entity.
- **Bremen Street Park and Dog Park.** In September 2016, Massport officially opened the Bremen Street Dog Park (and Bremen Street Park in 2008) on the corner of Bremen and Porter Streets in East Boston. This recreational area allows for all types and sizes of dogs to use the 22,655-square foot space located on the corner of Bremen and Porter Streets in East Boston.
- **The Narrow-Gauge Connector.** The spring 2016 completion of the 1/3-mile long Narrow-Gauge Connector project represents the final portion of the East Boston Greenway, which joins the East Boston Greenway Connector, that Massport completed in 2014, with the Massachusetts Department of Conservation and Recreation's Constitution Beach. This project makes it possible for pedestrians and bicyclists to travel from Jefferies Point, through Bremen Street Park and the new East Boston Library, to Wood Island Marsh, and finally to Constitution Beach with only two roadway crossings. There are pedestrian and bike counters along the Greenway Connector, and in 2016, there were 43,787 trips recorded.

Planning Initiatives



- **Sustainability and Resiliency Planning.** See section below titled *Sustainability and Resiliency at Logan Airport* for detailed information.
- **Runway Incursion Mitigation and Comprehensive Airfield Geometry Analysis.** As FAA began to close out its comprehensive nationwide runway safety area improvements program in 2016, its safety focus shifted to analysis of the airfield geometry. The multi-year Runway Incursion Mitigation (RIM) program identifies, prioritizes, and develops strategies to help airports across the U.S. enhance airfield safety. In January 2016, Massport issued a Request for Proposals to study airfield geometry at Logan Airport. The study commenced in December 2016 and is expected to be completed by December 2018. As of this filing, the study has conducted an airfield geometry and design standards analysis, aviation activity forecast, baseline safety risk assessment, and developed a simulation model of airfield operations for baseline existing conditions. Future EDRs and ESPRs will provide updates on this initiative and those efforts are likely to require permitting under state or federal regulations.
- **Automated People Mover Concept.** Massport is considering several potential options for an Automated People Mover (APM). This APM could provide a robust connection between the MBTA Airport Station and all terminals, the Southwest Service Area facilities, and other areas on-Airport. The feasibility of constructing such a system and the operating parameters that would be required are currently being evaluated.

Regional Transportation

Logan Airport and a system of 10 other commercial service, reliever, and GA airports²⁵ (regional airports) anchor the New England region. Together, these 11 airports accommodate nearly all of New England’s commercial²⁶ air travel demand (see **Figure 1-11**). Logan Airport serves as a major domestic O&D market and acts as the primary international gateway for the region. Amtrak rail service, which connects Boston to the New York/Washington D.C. metropolitan areas to the south and Portland, ME to the north, also serves the region.

- For the second year, the total number of annual air passengers using New England’s commercial service airports (Logan Airport plus the regional airports) represented a record high; the total number of annual air passengers increased by 6.4 percent, from 48.8 million air passengers in 2015 to 51.9 million air passengers in 2016.
- In 2015, the previous historical peak from 2005 (48 million regional air passengers) was exceeded with 48.8 million air passengers. Nationally, U.S. passenger traffic exceeded pre-recession levels in 2014. It continued to show strong growth and reached a new peak in 2016.
- The increase in the region’s passenger traffic is driven by continued growth at Logan Airport and other regional airports. Bradley International Airport, T.F. Green Airport, Burlington International Airport, Portland International Jetport, Bangor International Airport, and Portsmouth International Airport also experienced increases in passenger traffic.
- Of the 51.9 million passengers using New England’s commercial service airports in 2016, 69.9 percent of passengers (36.3 million) used Logan Airport compared to 68.6 percent (33.5 million) in 2015.²⁷

Figure 1-11 New England Regional Transportation System



25 Commercial Service Airports are publicly owned airports that have at least 2,500 passenger boardings each calendar year and receive scheduled passenger service. Reliever Airports are airports designated by FAA to relieve congestion at Commercial Service Airports and to provide improved GA access to the overall community. GA Airports are public-use airports that do not have scheduled service or have less than 2,500 annual passenger boardings.

26 Commercial airline service is defined as air transportation offered by air carriers for compensation or hire. In contrast, GA refers to all aviation activity other than commercial airline and military operations.

27 Based on airport passenger statistics from 1985 to 2016.

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- The number of passengers at T.F. Green Airport increased by 2.4 percent in 2016 compared to 2015. In 2017, with the addition of service from Frontier Airlines and Norwegian Air Shuttle, passenger counts increased by nearly 8 percent or approximately 285,000 passengers.
- The number of passengers at Bradley International Airport increased by 2.1 percent in 2016 compared to 2015. In 2017, the number of passengers increased by over 6 percent. This growth marks the fifth straight year of passenger traffic growth between 2012 and 2017 (see **Table 4-2**).
- In effect, Logan Airport, T.F. Green Airport, and Manchester-Boston Regional Airport act as a system, with significant numbers of passengers choosing the most convenient airport in terms of access, fares, and available air services depending on their individual air travel needs.²⁸
- Worcester Regional Airport is an important aviation resource that accommodates corporate GA activity and commercial airline service. Massport has continued to invest in Worcester Regional Airport by modernizing the airport to serve better the commercial airline travel demands of the central Massachusetts region.
 - Together with the City of Worcester, Massport is investing \$100 million over the next 10 years to revitalize and grow commercial operations at Worcester Regional Airport. As a result of this collaboration, Worcester Regional Airport has experienced consecutive growth since 2013 as JetBlue Airways has served nearly 500,000 passengers.
 - Massport completed Worcester's Category III Instrument Landing System improvements to elevate operational and safety conditions to a level equal to that of all other commercial airports in New England. This project significantly improves Worcester Regional Airport's all-weather reliability, a long-standing impediment to greater utilization of this airport.
- Located in Bedford, MA, approximately 20 miles northwest of Logan Airport, Hanscom Field is New England's premier facility for business/corporate aviation and serves a critical role as a GA reliever airport for Logan Airport. Hanscom Field is a full-service GA airport that accommodates a wide variety of GA activities, including corporate aviation, private flying, commuter air services, charters, and light cargo.
- While the overall regional passenger activity levels have increased, aircraft operations activity levels have declined significantly since 2000, as part of ongoing trends of larger aircraft size, higher aircraft load factors, and reduced service in less profitable markets. Total aircraft operations in the region declined from 1.6 million in 2000 to approximately one million in 2016.
- The region is also served by rail service (provided by Amtrak) that connects Boston to the New York and Washington D.C. metropolitan areas to the south and Portland, ME to the north, as well as by an extensive highway system. In 2016, the total number of rail passengers traveling on the Northeast Corridor was 2.6 million²⁹ compared to air passengers of 36.3 million at Logan Airport.

²⁸ Federal Aviation Administration. 2006. *New England Regional Airport System Plan (NERASP)*.

²⁹ FY 2016 Boston rail passengers consist of South Station, Back Bay, Route 128, Mass. Amtrak. *National Fact Sheet FY 2016*.

- System-wide Amtrak ridership was 31.3 million one-way trips in fiscal year (FY) 2016, an increase of 400,000 over the previous year.³⁰ In FY 2016, the Northeast Corridor (NEC) carried 11.9 million passengers on its Acela Express and Northeast Regional services, up 2 percent from the prior year. Acela Express accounted for nearly 3.5 million passengers, while the Northeast Regional accounted for 8.4 million passengers. Overall NEC ridership reached a new record in 2016, surpassing 2015 record levels. Amtrak's share of the Northeast total passenger market has increased substantially since the introduction of Acela Express service in 2000.
- Massport has continued to engage in a number of interagency planning efforts at both local and regional levels.

Additional information is provided in Chapter 4, *Regional Transportation*.

Ground Access to and from Logan Airport

Massport has a comprehensive strategy to diversify and enhance ground transportation options for passengers and employees. The ground transportation strategy is designed to provide a broad range of HOV, transit, and shared-ride options for travel to and from Logan Airport and to minimize vehicle trips, by providing convenient transit, shuttle, bicycle, and pedestrian connections to the Airport. The strategy also aims to provide parking on-Airport for passengers choosing to drive or with limited HOV options. Massport's strategy aims to limit impacts to the environment and community, while providing air passengers and employees with many alternatives for convenient travel to and from Logan Airport.

Massport is implementing a multi-pronged trip reduction strategy to limit impacts to the environment and to reduce the number of private vehicles that access Logan Airport and, in particular, the associated environmentally undesirable drop-off/pick-up modes, which generate up to four vehicle trips instead of two.³¹ Massport continues to invest in and operate Logan Airport with a goal of maintaining and increasing the HOV mode share – the number of passengers and Airport employees arriving by transit or other HOV/shared-ride modes. Logan Airport continues to rank at the top of U.S. airports in terms of HOV/transit mode share, with current HOV mode share just over 30 percent.³² Measures implemented by Massport to increase HOV use include a blend of initiatives related to pricing (incentives and disincentives), service availability, service quality, marketing, and traveler information. Because of the different demographics of Logan Airport air passenger travelers, no single measure alone will accomplish the goal to increase the HOV mode share.

30 Amtrak. November 2016. Amtrak Media Center. <https://media.amtrak.com/2016/11/amtrak-delivers-strong-fy-2016-financial-results/>.

31 Drop-off/pick-up modes can include private vehicles, taxis, and black car services. For example, if an air passenger is dropped off when s/he departs on an air trip and is picked-up upon their return, that single air passenger generates a total of four ground-access trips: two for the drop-off trip (one inbound to Logan Airport, one outbound from Logan Airport) and two for the pick-up trip (one inbound to Logan Airport, one outbound from Logan Airport). The air passenger may be dropped off and picked up in a private vehicle or in a taxi, TNCs, or black car that may not carry a passenger during all segments of travel to and from Logan Airport.

32 According to the 2016 *Logan Airport Air Passenger Ground-Access Survey*, 30.5 percent of air passengers accessing Logan Airport used HOV modes of travel.

Key findings on ground access conditions and activity levels include:

- Since 2000, the highest average weekday vehicle miles traveled (VMT) estimated at Logan Airport was in 2007. Although 2007 air passenger levels have grown by 29.1 percent, the 2016 daily VMT estimates remain about 4.4 percent lower than 2007 levels.
- Current annual average daily traffic (AADT) and annual average weekday daily traffic (AWDT) values are approximately 5.4 percent higher than in 2015, which was lower than the approximately 8.5 percent growth in air passenger levels. VMT increased by approximately 4.8 percent from 2015 to 2016. Although daily traffic volumes on the airport roadway system have been increasing, it is important to contrast this increase with historical air passenger growth. Airport gateway³³ traffic volume is growing at a significantly lower rate than air passenger growth, reflecting Massport's decade long commitment to improving and supporting HOV access to the Airport.
- Pursuant to Massachusetts state law, *An Act Regulating Transportation Network Companies* (Bill H.4570), and Massport Rules for Safe and Efficient operation of TNCs at Logan Airport, beginning in February 2017, in cooperation with state regulators, Massport began allowing TNCs to pick-up arriving passengers via a TNC Pool Lot.³⁴ This is a service that is being tracked for reporting in 2017.
- Beginning with the *2017 ESPR*, Massport will introduce a new definition for HOV that takes into account vehicle occupancies of taxi, livery (black car limousine), and TNC modes.³⁵ Under the current system, Massport counts all taxis as non-HOV and all black car limousines as HOV, regardless of the number of passengers transported. Massport is currently also classifying TNCs as non-HOV, regardless of the number of passengers transported. Beginning with the *2017 ESPR*, Massport will use a new HOV definition, where vehicle occupancies of taxis, livery services, and TNCs that exceed one air passenger per vehicle will be defined as HOV. With this new definition, Massport has committed to a goal of 35.5 percent HOV by 2022 and 40 percent by 2027.
- Massport continues to offer a pilot program, Back Bay Logan Express, which provides frequent, direct, express bus service from the City of Boston. This service has been valuable in providing an alternative to air passengers and employees who were impacted by the temporary, two-year Government Center Station closure (a key connection to the Blue Line and Logan Airport), and it provides a new transit alternative from the Back Bay/Hynes Convention Center area to the Airport. Ridership in 2016 for the Back Bay Logan Express totaled 216,329 passengers (compared to 290,796 passengers in 2015), an average of about 600 riders per day. The ridership decreased by about 33 percent for the second half of the year (July through December), which may be attributed to the reopening of the MBTA Government Center Station.
- Eight Silver Line buses, connecting the Airport to South Station, are owned by Massport and are operated by the MBTA with Massport paying operating costs for the Silver Line SL1 route. In 2016, Massport funded an approximate \$6 million mid-life rebuild of these eight buses. The mid-life

33 Airport gateways are defined as access points to/from Logan Airport, which primarily include the Route 1A roadway ramps, the Interstate-90 Ted Williams Tunnel ramps, and Frankfort Street/Neptune Road.

34 An Act Regulating Transportation Network Companies. <https://malegislature.gov/Bills/189/House/H4570>.

35 A transportation network company (TNC) is a company that uses an online-enabled platform to connect paying passengers with drivers who provide transportation from their own non-commercial vehicles. TNCs have emerged as a new option mode of transportation with automobile drop-off and pick-up at Logan terminals. The *2016 Logan Airport Air Passenger Ground-Access Survey* and future documents will analyze trends associated with TNCs.

rebuild will extend the useful life of each vehicle by approximately eight years. This will allow the MBTA to maintain reliability and quality of operations along the Silver Line today while starting the procurement process to acquire new vehicles in the future.

- Total on-Airport commercial parking exits declined by 0.2 percent in 2016. Slower growth in overall parking may be a result of customers choosing alternate modes due to the known issue of constrained parking on the Airport and, especially for residents originating within Route 128, the emergence of TNCs as a reliable and cost-effective alternative.
- The inadequate supply of parking causes air passengers to circulate on Airport roadways to find parking. In overflow conditions, cars are diverted or moved to non-garage parking areas, including overflow lots, some of which are located off-Airport. Not only does parking demand activity above capacity lower customer service levels, it also increases on-Airport roadway vehicle emissions related to circulating traffic. Diversions³⁶ and valeting³⁷ have become a regular occurrence at Logan Airport. Massport continued to be in full compliance with the Logan Airport Parking Freeze in 2016.
- Massport continues to manage parking supply, pricing, and operations to promote the use of transit/HOV/shared-ride options and to reduce the amount of diversions/valeting. Massport strives to meet these goals without increasing the number of drop-off/pick-up trips experienced due to a constrained parking supply. These policies supported growth since 2015 in transit and shared-ride alternatives, especially for Logan Express park-and-ride and private bus services.

Additional information is provided in Chapter 5, *Ground Access to and from Logan Airport*.

Noise Abatement

Massport strives to minimize the noise effects of Logan Airport operations on its neighbors through a variety of noise abatement programs, procedures, and other tools. At Logan Airport, Massport implements one of the oldest and most extensive noise abatement programs of any airport in the nation. Massport's comprehensive noise abatement program includes a dedicated Noise Abatement Office; a state-of-the-art Noise and Operations Monitoring system; residential and school sound insulation programs; time and runway restrictions for noisier aircraft; ground run-up procedures; and flight tracks designed to optimize over-water operations (especially during nighttime hours³⁸).

Since Logan Airport's peak operations year in 1998, the number of daily aircraft operations have declined by 23 percent (from 1,390 operations per day in 1998 to 1,069 operations per day in 2016³⁹) due to the industry-wide trend of increasing passenger loads. In 2016, jet operations made up 86 percent of operations compared to 55 percent in 1998, reflecting a change in the aircraft fleet mix. Passenger volumes continue to increase at a higher rate than aircraft operations. In 2016, the overall number of air passengers was up by 36.7 percent compared to 1998, and 8.5 percent since 2015. This trend reflects an

36 Diversions are the operational practice of sending vehicles desiring to park at a specific facility to another facility (on- or off-Airport) due to the initial facility being full.

37 Valeting is an operational practice where attendants park vehicles for travelers, typically due to the desire of maximizing the number of vehicles parked at a facility or on-Airport.

38 Nighttime hours are defined as 10:00 PM to 7:00 AM.


39 Note that 2016 was a leap year and has 366 days.

increase in the use of larger aircraft in the fleet, airline consolidation, and increased aircraft load factors⁴⁰ on the part of airlines.

Noise conditions for 2016 were assessed primarily through computer modeling, supplemented by the analysis of measured noise levels from Logan Airport's noise monitoring system. This 2016 EDR marks the transition from FAA's legacy analysis software, the Integrated Noise Model (INM), to its next-generation software, the Aviation Environmental Design Tool (AEDT). Massport developed a suite of customized adjustments for use with INM, necessary for accurate modeling of the unique Logan Airport environment, and has been working with FAA since 2015 to implement equivalent methods in AEDT. FAA has responded to Massport's request. FAA did not approve two adjustments: over-water noise propagation and hill effects. FAA did approve the use of 2016 weather data and Logan Airport-specific aircraft stage length adjustments. Consistent with previous practice, Massport presents AEDT modeling results as the primary model in this 2016 EDR. INM results are provided for comparison only for 2016 and future filings will present only AEDT results.

Research efforts that address potential improvements in AEDT modeling are underway for terrain improvements and were recently concluded for acoustically reflective surfaces. The results of these studies, if and when they are implemented in AEDT, will add capabilities previously addressed by Logan Airport's over-water and hill effect adjustments.

Operations, Fleet Mix, and Runway Use

- Annual aircraft operations in 2016 increased from 372,930 operations in 2015 to 391,222 in 2016 (a 4.9-percent increase). Compared with the 1998 peak of 507,449 operations, 2016 had 22.9 percent fewer operations. At the same time, passenger volumes are at their highest, increasing from 33,449,580 passengers in 2015 to 36,288,042 in 2016 (an increase of 8.5 percent).
- Overall commercial traffic increased from 344,764 to 360,400 (a 4.2-percent increase) compared to 2015. In 2016 there was a continued shift of operations away from the smaller Regional Jet (RJ) aircraft to larger air carrier aircraft on many routes, increasing the number of passengers carried per operation.
-  Among commercial jet operations at Logan Airport, 18 percent were by aircraft that already satisfy the newly enacted Stage 5 limits.⁴¹ When considering all types of aircraft, 97 percent met the Stage 4 noise limits. Of the remaining 3 percent, only three operations in 2016 were performed by aircraft retrofitted to satisfy Stage 3 standards; all other commercial jet operations were performed by aircraft originally certificated to Stage 3 or better.⁴² As of January 1, 2016, all Stage 2 aircraft are prohibited by FAA from operating within the contiguous United States, and there were no Stage 2 operations at Logan Airport for 2016.

⁴⁰ Load Factor refers to the number of passengers as a percentage of total seats operated at the airport.

⁴¹ In October 2017, FAA established deadlines for Stage 5 certification for new aircraft. Large aircraft (over 121,000 lbs maximum takeoff weight) must satisfy Stage 5 limits if entering service after December 31, 2017, and smaller aircraft entering service after December 31, 2020 must satisfy these limits.

⁴² Jet aircraft currently operating at Logan Airport are categorized by FAA into the two groups: Stage 3 and Stage 4. The designation refers to a noise classification specified in Federal Aviation Regulation (FAR) Part 36 that sets noise emission standards based on an aircraft's maximum certificated weight. Generally, the heavier the aircraft, the more noise it is permitted to make within the limits established by FAR Part 36.

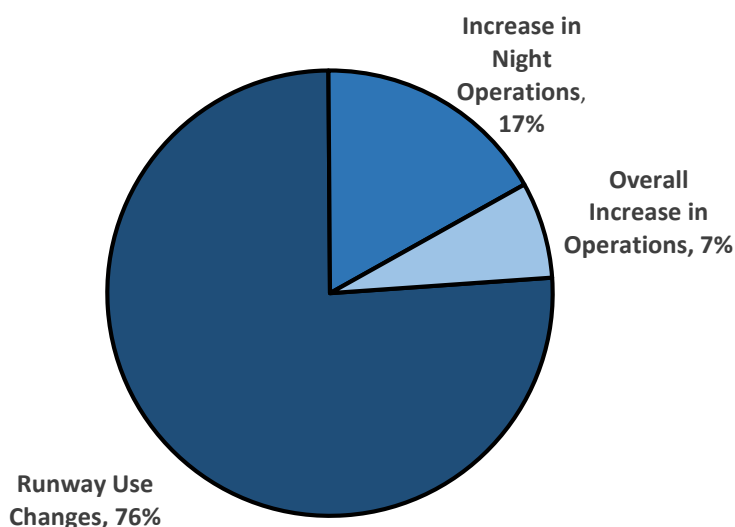
- The 2016 Flight Track Monitoring reports in Appendix H, *Noise Abatement*, show that 99 percent of shoreline crossings (locations where aircraft which have departed over the water pass back over land) were by aircraft flying above 6,000 feet, the same percentage as 2015. This results in lower day-night average sound level (DNL) exposure levels to communities under those flight paths.

Noise Levels and Population

- Differences between measured and modeled values have narrowed in recent years as both the noise monitoring and modeling processes have been refined. For 2016, these differences have increased moderately with the change to AEDT for modeling.
- The 2016 contours are smaller in area coverage than the 2000 contours in most areas as a result of quieter engines and fewer flights, although the contour has expanded in portions of Eagle Hill in East Boston.

Changes in operations at Logan Airport influencing noise exposure for 2016 versus 2015 are discussed below and shown in **Figure 1-12**.

Figure 1-12 Reason for increase in Number of People Exposed to DNL Values Greater than or Equal to 65 dB (2015 INM to 2016 INM)



Note: When comparing the 2015 INM contour to the 2016 INM contour, there is an increase in noise exposed population. However, when comparing 2015 INM (the official 2015 model) and 2016 AEDT (the official 2016 model) there is a decrease in the noise exposed population.

- Runway use changes from 2015 to 2016 were the largest factor influencing noise exposure in 2016. The one-month closure of Runway 4L-22R for resurfacing caused air traffic to shift to Runway 15R-33L and Runway 9-27, and these changes in runway use are reflected in the contour changes.

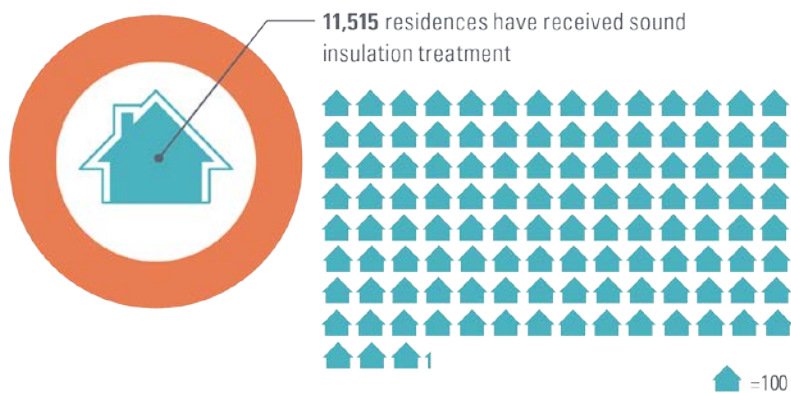
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- East Boston is affected by start-of-takeoff roll (SOTR) noise from Runway 15R and departure overflights from Runway 33L, both of which had increases in departures;
 - Increases in departures from Runway 9 and Runway 27 had the effect of expanding the noise contour over Winthrop near Deer Island; and
 - Other changes in the contour were in nonresidential or offshore areas, but these were similarly affected by runway use changes.
- An additional factor influencing noise contour changes in 2016 was an increase in nighttime operations, from 50,786 in 2015 to 55,499 in 2016. Due to the 10-dB penalty applied to modeled nighttime operations, these operations have a disproportionate effect on the contour.
 - Noise exposed population in 2016 was below the peak levels reached in 1990 and was less than in the year 2000 when 17,745 people were exposed to DNL levels greater than or equal to DNL 65 dB. Population exposed to these noise levels for 2016 was calculated to be 16,985 using the legacy INM model, and 7,450 using the next-generation AEDT model.



- Massport is a national leader in sound insulation mitigation. To date, in the vicinity of Logan Airport, Massport has provided sound insulation for a total of 11,515 residential units, and will continue to seek funding for sound insulation for properties that are eligible and whose owners have chosen to participate.

- Almost all residences exposed to levels greater than or equal to DNL 65 dB in 2016 have been eligible in the past to participate in Massport's residential sound insulation program (RSIP).



- In 2016, Massport received 38,045 noise complaints from 83 communities, compared to 17,685 in 2015 from 84 communities. It is important to note that the number of individual complainants rose from 1,903 in 2015 to 2,260 in 2016. The increase in complaints continues to be primarily related to the FAA's RNAV departure procedures, which concentrate flight tracks along narrower corridors. As has been Massport's practice, all complaints were forwarded to FAA.

FAA Reporting and Update

- In 2015, FAA required the use of its AEDT as a replacement for its legacy tool, the INM, for noise analyses requiring FAA approval. Prior to this, FAA had approved adjustments specific to Logan Airport to be used with INM, and Massport has been working with FAA to develop analogous adjustments to implement in AEDT. Massport chose to continue use of the INM for the 2015 EDR while these discussions progressed, since FAA approval is not required for the EDR. In August 2017, FAA provided formal concurrence for some proposed adjustments but declined to concur with others. The memoranda related to this decision are included at the end of this chapter and in

Appendix H, *Noise Abatement*. Further details are provided below in the section on AEDT modeling.

- On October 7, 2016, Massport and FAA signed a Memorandum of Understanding (MOU)⁴³ to frame the process for analyzing opportunities to reduce noise through changes or amendments to Performance Based Navigation (PBN), including RNAV. Massport has been working with the FAA and others to develop test projects that are designed to help address the concentration of noise from PBN. This cooperation is a first-in-the-nation project between FAA and an airport operator to better understand the implications of PBN and evaluate strategies to address community concerns.
- The FAA's ROD (August 2002) approving construction of the unidirectional Runway 14-32 required that FAA, Massport, and the Logan Airport Community Advisory Committee (CAC) to jointly undertake a study to enhance existing and/or develop new noise abatement measures to further reduce noise impacts. The primary focus of the Boston-Logan Airport Noise Study (BLANS) was to determine viable ways to reduce noise from aircraft operations to and from Logan Airport without diminishing airport safety and efficiency.⁴⁴ The RNAV departure portions of Phase 1 of the project, first implemented in 2010, continued to be used in 2016.
 - During Phase 2 of the BLANS, the Logan Airport CAC voted to abandon the Preferential Runway Advisory System (PRAS) because it had not achieved the intended noise abatement. Although PRAS is not an active program, Massport continues to report on runway use relative to PRAS goals.
 - Phase 3 of BLANS is a series of tests of a potential Runway Use Program, which began in November 2014 and ended in November 2015.
 - The BLANS project ended in 2016 without the development of a new Runway Use Program. A final report for the program was issued in March 2017.⁴⁵
- In May 2015, FAA announced that it had begun a nationwide study to re-evaluate the method for measuring effects of aircraft noise (DNL).⁴⁶ This is a multi-year study to update the scientific evidence on the relationship between aircraft noise exposure and its effects on communities around airports. FAA has been evaluating survey and noise data from 20 airports across the country and will then analyze the results to determine whether to update its methods for determining exposure to noise. Results of this study are expected by summer 2018. Future EDRs and ESPRs will provide updates, as available.

As shown in **Figure 1-13**, the 2016 DNL 65 dB contour is smaller than previous years including the 1998 DNL contour and 1990 DNL contour. Additional information is provided in Chapter 6, *Noise Abatement*.

43 Massport. October 7, 2016. *Massport and FAA Work to Reduce Overflight Noise*. <https://www.massport.com/news-room/news/massport-and-faa-work-to-reduce-overflight-noise/>.

44 For more information, visit the BLANS website at www.bostonoverflightnoisestudy.com/index.aspx.

45 For more information, see the BLANS final report at <http://bostonoverflight.com/docs/blans-phase-3-final-report.pdf>

46 Federal Aviation Administration. Press Release – FAA to Re-Evaluate Method for Measuring Effects of Aircraft Noise. https://www.faa.gov/news/press_releases/news_story.cfm?newsId=18774.

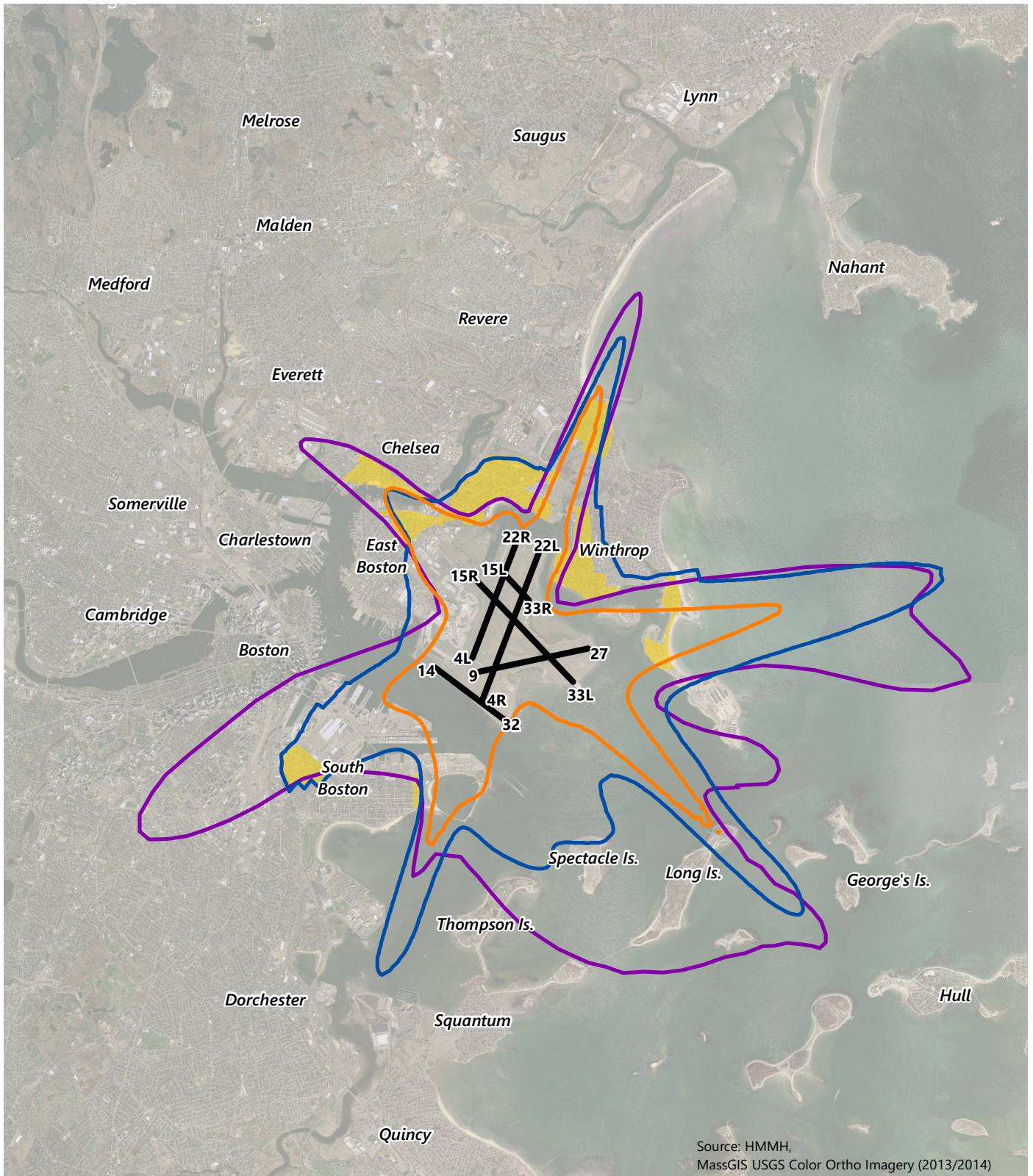


FIGURE 1-13 DNL 65 dB Contour Comparison with Historical Contour

- 2016 DNL Contour (AEDT 2c)
- 1998 DNL Contour
- 1990 DNL Contour
- Sound Insulation Areas



Air Quality/Emissions Reduction

As reported in previous EDRs, total air emissions from all sources associated with Logan Airport are considerably less than they were a decade ago. This long-term downward trend is consistent with Massport's longstanding objective to accommodate the demands of increasing passenger and cargo activity levels with reduced emissions. When compared to 2015, the changes in air emissions in 2016 are slightly up. The changes are associated with the upturn in aircraft operations. Massport is also committed to reducing VMT and associated emissions on Massport-controlled ground transport facilities (such as roadways and curbsides, parking facilities, and vehicle staging areas), as well as reducing VMT by airport users traveling to and from the Airport. Chapter 5, *Ground Access to and from Logan Airport* provides detailed information on Massport's ground access and parking management strategy.

Each year, Massport models the changes in air emissions for Airport-related activities. For the purposes of this assessment, the air quality modeled results are also a function of other important model input parameters including:

- Aircraft fleet mix characteristics;
- Airfield taxi/delay times;
- Ground service equipment (GSE) usage, including aircraft auxiliary power units (APUs);
- Motor vehicle traffic volumes; and
- Stationary source operations such as the Central Heating and Cooling Plant, snow melters, and emergency generators.

The following is a synopsis of these model inputs and updates for this 2016 EDR:

- As of 2015, FAA requires aircraft-related assessments to be conducted using its new simulation tool for noise and air emissions, AEDT, for National Environmental Policy Act (NEPA) projects and soundproofing eligibility. For 2016, air quality modeling was performed with the latest version of FAA's AEDT to compute emissions from Logan Airport specific aircraft, APUs, and GSE. Modeling was also completed using the legacy model, FAA's Emissions and Dispersion Modeling System (EDMS), for comparison purposes. Massport will use AEDT for upcoming EDRs and ESPRs.
- Key inputs into the air emissions inventory include aircraft operations and average aircraft taxi/delay times. Aircraft operations increased 4.9 percent in 2016, from 195,611 landing and take offs (LTOs)⁴⁷ in 2016 compared to 186,465 LTOs in 2015. Average aircraft taxi/delay times decreased by about 30 seconds (25.3 minutes in 2016 versus 25.9 minutes in 2015). Although there was an increase in LTOs in 2016, aircraft operations and taxi times remained well below 2000 historic peak levels.⁴⁸ There were 243,998 LTOs in 2000 and the corresponding aircraft taxi times were about 27 minutes.

47 An LTO is defined as one landing/take-off cycle; it includes both the arrival and the departure. In Chapter 2, *Activity Levels*, the operation count is defined differently and counts one operation as either an arrival (landing) or a departure (take-off). Thus, there are 391,222 operations in 2016 (195,611 LTOs) and 372,930 operations in 2015 (186,465 LTOs).

48 See Chapter 2, *Activity Levels* for additional information on aircraft operations in 2016 and long-term trends.

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- GSE emission factors in the AEDT database (derived from EPA's OFFROAD model) decreased in 2016 when compared to 2015 as this model also takes into account fleet modernization from year to year. Model input data are based on an updated on-site GSE time-in-mode survey conducted in June 2017 at the Airport. These data are combined with the most recent information regarding GSE fuel use (e.g., gasoline, diesel, CNG, liquid petroleum gas [LPG], and electric) from the Logan Airport Vehicle Aerodrome Permit Application documentation.⁴⁹ Compared to 2015, 2016 APU operating times increased by approximately 7.7 and 5.8 minutes for narrow body air carriers and large commuter aircraft, respectively. This change is primarily attributed to the updated 2017 time-in-mode survey, which provides a representation of actual APU operating times. The 2017 GSE time-in-mode survey can be found in Appendix I, *Air Quality/Emissions Reduction*.
- Motor vehicle emission factors were obtained from the newest version of the EPA's Motor Vehicle Emission Simulator model (MOVES2014a) and were combined with the MassDEP-recommended motor vehicle fleet mix data, operating conditions, and other Massachusetts-specific input parameters.
- Another important model input parameter is on-Airport VMT, which increased by approximately 4.8 percent in 2016 compared to 2015. The increase in VMT is largely associated with the 8.5-percent increase in passengers from 33.4 million in 2015 to 36.3 million in 2016 (see Chapter 5, *Ground Access to and from Logan Airport* for additional information).
- Natural gas usage by stationary sources (such as boilers and snow melters) decreased by 7.3 percent in 2016, when compared to 2015 (from 463 million cubic feet in 2015 to 429 million cubic feet in 2016). Diesel fuel usage by other snow melters also decreased in 2016 (from 381,581 gallons in 2015 to 90,850 gallons in 2016). These changes were largely attributable to a milder winter in 2016 compared to 2015.
- Fuel throughput of Jet A and gasoline increased by 21.6 percent and 4.9 percent, respectively, in 2016, when compared to 2015. These changes were mostly due to the increase in the number of aircraft operations and motor vehicles trips/VMT in 2016.

Based upon these model input parameters, the modeling results of the 2016 air emissions inventory for Logan Airport are summarized below. As shown in **Table 1-4**, AEDT computes somewhat higher aircraft-related emissions of volatile organic compounds (VOCs), oxides of nitrogen (NO_x), and carbon monoxide (CO) in comparison to EDMS model results. However, for particulate matter (PM)_{10/2.5} estimates, the results are reversed with EDMS producing more modeled emissions than AEDT.

⁴⁹ All vehicles and equipment (including GSE) that operate on the airfield must obtain a Logan Airport Vehicle Aerodrome Permit. The application form for this permit was modified in 2007 to request the fuel-type information (e.g., gasoline, diesel, CNG, LPG, and electric).

Table 1-4 AEDT/EDMS Total Emissions Inventory Comparison

Model	Pollutant (kg/day)			
	VOC	NO _x	CO	PM ₁₀ /PM _{2.5}
2015 EDMS	1,188	4,262	7,243	98
2016 EDMS	1,242	4,696	7,328	106
2016 AEDT	1,280	5,300	7,350	96
% Difference between 2016 EDMS and 2016 AEDT	3.0%	12.9%	0.3%	(9.4%)
% Difference between 2015 EDMS and 2016 AEDT	7.7%	24.4%	1.5%	(2.0%)

Source: Massport, KBE.

Note: Negative numbers are shown in ()

- Total modeled emissions of VOCs increased by 7.7 percent in 2016 to 1,280 kilograms (kg)/day, compared to 1,188 kg/day in 2015, which is still well below 1990 and 2000 levels. The increase in VOC emissions is primarily influenced by the increase in emissions from other sources, which include stationary and fueling sources and an increase in aircraft-related VOC emissions due to modeling differences between EDMS and AEDT.
- Total modeled NO_x emissions increased by 24.4 percent in 2016 to 5,300 kg/day, compared to 4,262 kg/day in 2015. The increase in 2016 is still well below 1990 and 2000 levels. The increase in NO_x emissions is influenced by the increase in aircraft operations in 2016 and largely due to modeling differences between EDMS and AEDT.
- Total modeled CO emissions increased by 1.5 percent in 2016 to 7,350 kg/day, compared to 7,243 kg/day in 2015; emissions in 2016 were still well below 1990 and 2000 levels. The change in CO emissions is influenced by the increase in aircraft operations; however, this was offset by a decrease in motor vehicle emissions factors in 2016.
- Total modeled PM₁₀/PM_{2.5} emissions decreased by 2.0 percent in 2016 to 96 kg/day, compared to 98 kg/day in 2015. The decrease in PM₁₀/PM_{2.5} emissions is primarily influenced by model differences for aircraft emissions in AEDT.
- For nine consecutive years, Massport has voluntarily prepared a greenhouse gas (GHG) emissions inventory for the Logan Airport EDR. In 2016, total GHG emissions grew by approximately 2.8 percent. As reported in past year's EDRs, Logan Airport-related GHG emissions in 2016 comprised less than 1 percent of statewide totals.
- In response to the March 9, 2018 Secretary's Certificate on the *2016 EDR Notice of Project Change*, Massport has augmented its GHG reporting to show normalized GHG emissions and building energy use data (see Chapter 7, *Air Quality/Emissions Reduction*). Normalizing the data shows that Logan Airport is operating more efficiently over time, serving more passengers in larger building footprint with less energy.

- GHG emissions per passenger (Scopes 1 and 2) have decreased by over 34 percent from 2007 to 2016.
- Logan Airport's energy use intensity, which is a measure of building-only energy consumption per square foot, has decreased by over 23 percent from 2007 to 2016.
- Building GHG emissions per square foot has decreased by over 43 percent from 2007 to 2016.

Additional information is provided in Chapter 7, *Air Quality/Emissions Reduction*.

Water Quality/Environmental Compliance and Management

Massport's approach to environmental management and compliance is a key component of its commitment to sustainability and responsible stewardship at Logan Airport (refer to the following section of this chapter for details). Through monitoring and documentation, environmental performance is assessed, allowing policies and programs to be developed, implemented, evaluated, and continuously improved.

Massport is responsible for ensuring compliance with applicable state and federal environmental laws and regulations. Massport promotes appropriate environmental practices through pollution prevention and remediation measures. Massport also works closely with Airport tenants and Airport operations staff in an effort to improve compliance. The following summarizes the key water quality and compliance findings for 2016.



- The most recent International Organization for Standardization (ISO) 14001 Environmental Management System certification audit took place in June 2014, and a certificate was issued in July 2014. This certificate is valid through July 2017. Massport holds regular meetings to adhere to regulatory requirements and improve environmental performance beyond compliance.
- Massport's Stormwater Pollution Prevention Plan (SWPPP) addresses general stormwater pollutants and also addresses deicing and anti-icing chemicals, potential bacteria, fuel and oil, and other potential sources of stormwater pollutants.⁵⁰
- In 2016, approximately 98.6 percent of stormwater samples were in compliance with standards (see **Table J-15** in Appendix J, *Water Quality/Environmental Compliance and Management* for more details). Due to the large size of the drainage areas and relatively low concentration of pollutants, it is not always possible to trace exceedances to specific events. Where a known event such as a spill is reported, Massport routinely checks the drainage system for impacts from the event and takes corrective actions if necessary.
- Out of 204 samples (including: oil and grease, total suspended solids (TSS), and pH at North, West, Porter Street, and Maverick Street Outfalls), 201 were at or below National Pollutant Discharge Elimination System (NPDES) permit limits.

⁵⁰ The 2016 Annual Certificates of Compliance were submitted to EPA and MassDEP on December 21, 2016, for Massport and the co-permittees.

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- One outfall sample, out of a total of 23 samples, at the Maverick Street Outfall exceeded the regulatory limit of the NPDES Permit for TSS. The TSS exceedance at the Maverick Street Outfall was reported in November 2016.
- One outfall sample, out of a total of 11 samples, at the Maverick Street Outfall and one sample, out of a total of 11 samples, at the North Outfall was measured outside of the regulatory limits of the NPDES permit for pH. The pH exceedance at the Maverick Street Outfall was reported in March 2016 and the pH exceedance at the North Outfall was reported in April 2016, as required.
- In 2016, there were 14 oil and hazardous material spills that required reporting to MassDEP, five of which involved the storm drainage system.⁵¹ All spills were adequately addressed with no adverse impacts to water quality.
- In accordance with the Massachusetts Contingency Plan (MCP), Massport continues to assess, remediate, and bring to regulatory closure areas of subsurface contamination. Massport is working towards achieving regulatory closure of the remaining Logan Airport MCP sites associated with known releases, as well as addressing sites encountered during construction. (see **Table 8-4** in Chapter 8, *Water Quality/Environmental Compliance and Management* for more information about updates and progress made for all MCP sites.)

Chapter 8, *Water Quality/Environmental Compliance and Management* provides additional information.

⁵¹ State environmental regulations require that oil spills of 10 gallons or more in volume be reported to MassDEP.

Sustainability and Resiliency at Logan Airport

Massport is committed to a robust sustainability program.

Sustainability has redefined the values and criteria for measuring organizational success by using a "triple bottom line" approach that considers economic, ecological, and social well-being. Applying this approach to decision-making is a practical way to optimize economic, environmental, and social capital. Massport is taking a broad view of sustainability that builds upon the triple bottom line concept, and considers the airport-specific context.

Figure 1-14 EONS Approach to Sustainability



Consistent with the Airports Council International - North America's (ACI-NA) definition of Airport Sustainability⁵² (see **Figure 1-14**), Massport is focused on a holistic approach to managing Logan Airport to ensure Economic viability, Operational efficiency, Natural resource conservation, and Social responsibility (EONS). Massport is committed to implementing environmentally sustainable practices Airport- and Authority-wide, and continues to make progress on a range of initiatives. The following sections summarize many of the long-term and multifaceted sustainability initiatives undertaken by Massport, which individual chapters of this 2016 EDR more fully describe, where appropriate. **Figure 1-15** highlights some of Massport's recent sustainability initiatives.

Figure 1-15 Recent Sustainability Highlights



52 Airports Council International (ACI). Airport Sustainability: A Holistic Approach to Effective Airport Management. Undated. <http://www.aci-na.org/static/entransit/Sustainability%20White%20Paper.pdf>.



Logan Airport Sustainability Management Plan (SMP)

Massport is committed to reducing local environmental impacts without sacrificing service level; Massport's robust sustainability program is indicative of this commitment. In 2013, Massport was awarded a grant by FAA to prepare a SMP for Logan Airport. The Logan Airport SMP planning effort began in May 2013 and was completed in April 2015. The Logan Airport SMP takes a broad view of sustainability including economic vitality, operational efficiency, natural resource conservation, and social responsibility considerations. The Logan Airport SMP is intended to promote and integrate sustainability Airport-wide and to coordinate on-going sustainability efforts across Massport. The Logan Airport SMP developed a framework and implementation plan, with metrics and targets, designed to track progress over time. Massport is currently advancing a series of short-term initiatives to help reach its goals (see **Table 1-5**) in the areas of energy and greenhouse gas emissions; community, employee, and passenger well-being; resiliency; materials, waste management, and recycling; and water conservation. The Logan Airport SMP is available online at: <https://www.massport.com/massport/business/capital-improvements/sustainability/sustainability-management/>.











The Logan Airport Annual Sustainability Report, first published in April 2016, provides a progress summary of sustainability efforts at Logan Airport based on Massport's sustainability goals and targets established in the Logan Airport SMP. A copy of the Annual Sustainability Report can be found at: <http://www.massport.com/media/2363/logan-annual-sustainability-report-2016.pdf>.



Logan Airport Sustainability Goals

As part of the Logan Airport SMP, Massport set goals to improve Logan Airport's performance in ten sustainability categories: (1) energy and GHG emissions; (2) water conservation; (3) community, employee, and passenger well-being; (4) materials, waste management, and recycling; (5) resiliency; (6) noise abatement; (7) air quality improvement; (8) ground access and connectivity; (9) water quality/stormwater; and (10) natural resources. **Table 1-5** describes each goal, as the *Logan Airport SMP* defines them. Massport reports its progress towards achieving each goal, including changes in related performance, in sustainability reports. Massport released its first sustainability report in 2016. Since the publication of the *2015 Logan Airport SMP*, Massport has continued expanding its sustainability initiatives, which an increased focus on implementing resiliency measures to protect Maritime and Logan Airport operations, critical infrastructure, and workforce. The latest Annual Sustainability and Resiliency Report highlights Massport's progress towards improving sustainability and enhancing resiliency at its facilities and is available on Massport's website at: <http://www.massport.com/massport/business/capital-improvements/sustainability/sustainability-management/>.

Table 1-5 Logan Airport Sustainability Goals and Descriptions

Sustainability Category	Goal	Sustainability Category	Goal
Energy and Greenhouse Gas (GHG) Emissions 	Reduce energy intensity and GHG emissions while increasing portion of Logan Airport’s energy generated from renewable sources.	Water Conservation 	Conserve regional water resources through reduced potable water consumption.
Community, Employee, and Passenger Well-being 	Promote economically prosperous and healthy communities and passenger and employee well-being.	Materials, Waste Management, and Recycling 	Reduce waste generation, increase the recycling rate, and utilize environmentally sound materials.
Resiliency 	Become an innovative model for resiliency planning and implementation among port authorities.	Noise Abatement 	Minimize noise impacts from Logan Airport’s operation.
Air Quality Improvement 	Decrease emissions of air quality criteria pollutants from Logan Airport sources.	Ground Access and Connectivity 	Provide superior ground access to Logan Airport through alternative and HOV travel modes.
Water Quality/Stormwater 	Protect water quality and minimize pollutant discharges.	Natural Resources 	Protect and restore natural resources near Logan Airport.

Sustainability in Planning, Design, and Construction

The following sections outline Massport’s sustainability achievements in the planning, design, and construction of its projects.



Leadership in Energy and Environmental Design (LEED®)-Certified Facilities at Logan Airport

The United States Green Building Council’s (USGBC) LEED rating system is the most widely recognized third-party green building certification system in North America. Massport is striving to achieve LEED certification for all new and substantial renovation building projects over 20,000 square feet. Most recently, in 2017, the Terminal E New Large Aircraft Wing (Terminal E Renovation and Enhancements Project) received LEED Gold certification for Commercial Interiors. Other recent examples of LEED-certified buildings at Logan Airport are the new RCC and the Green Bus Depot (see **Figure 1-16** and **Table 1-6**). The new RCC in the SWSA began construction in 2010 and was completed in 2013. Massport is very proud that the RCC obtained Logan Airport’s first LEED Gold certification in 2015. The LEED-Silver Green Bus Depot shifted bus maintenance operations on-Airport from an off-Airport location, which reduced bus trips and unnecessary emissions on congested neighborhood roadways. Further details are available in Chapter 3, *Airport Planning*.

Figure 1-16 LEED-Certified Facilities at Logan Airport



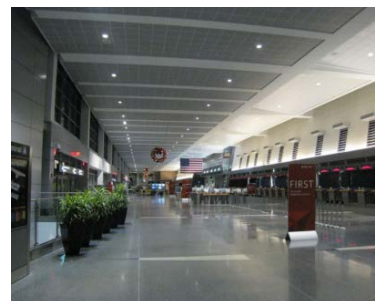
Sustainable Design Standards and Guidelines and LEED Certification

For smaller building projects and non-building projects, Massport uses its *Sustainable Design Standards and Guidelines* (SDSG) to incorporate sustainability. The SDSG, revised and reissued in March 2011, provides a framework for sustainable design and construction for both new construction and rehabilitation projects. The SDSG applies to a wide range of project-specific criteria, such as site design, project materials, energy management and efficiency, air emissions, water management quality and efficiency, indoor air quality, and occupant comfort. Massport has used the new standards to guide over \$200 million in capital projects Authority-wide between fiscal years 2010 to 2013, including over \$30 million for maritime projects. In addition to SDSG, Massport strives to attain LEED certification for eligible projects. In 2014, the Green Bus Depot was certified as LEED Silver, and in 2015, the RCC was certified as LEED Gold.

Table 1-6 Leadership in Energy and Environmental Design (LEED)-Certified Facilities at Logan Airport

Terminal A (LEED Certified) Completed 2005/2006

- First airport terminal in the world to be LEED Certified
- Priority curb locations for high occupancy vehicles (HOV) and bicycles
- Retrofitting with solar panels on the Terminal A roof
- Stormwater filtration
- Reflective roof
- Water use reduction features
- Natural daylighting paired with advanced lighting technologies for energy efficiency
- Use of recycled and regionally sourced materials
- Measures to enhance indoor air quality



Signature Flight Support General Aviation Facility (LEED Certified) Completed 2007/2008

- Mechanisms to reduce water use
- Natural day lighting with advanced lighting technologies for energy efficiency
- Window glazing and sunshades to maximize daylight and minimize heat build-up
- Recycled and regionally sourced materials
- Measures to enhance indoor air quality



Green Bus Depot (LEED Silver) Completed 2014

- Rooftop solar panels
- Water and energy saving features
- Vehicle miles traveled (VMT) reduction
- New shuttle fleet including 50 clean diesel/electric hybrid buses and CNG buses
- Sustainably grown, harvested, produced, and transported building materials



Rental Car Center (RCC) (LEED Gold) Completed 2013

- Green building materials
- Rooftop solar panels
- Bike and pedestrian access and connections
- Natural day lighting and advanced lighting technologies for energy efficiency
- Use of recycled and regionally sourced materials
- Enhanced indoor air quality
- Plug-in stations for electric vehicles and other alternative fuel sources such as E-85 (ethanol)
- Rental car fleets which include hybrid/alternative fuel/low emitting vehicles
- Pedestrian connections
- Bicycle facilities and employee showers/changing
- Water reclamation for vehicle wash water, and use of stormwater for non-potable uses such as vehicle washing and landscaping irrigation
- VMT reduction

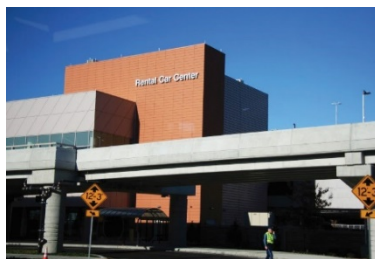
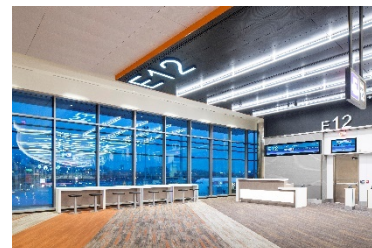


Table 1-6 Leadership in Energy and Environmental Design (LEED)-Certified Facilities at Logan Airport (Continued)

Terminal E New Large Aircraft Wing (LEED Gold - Commercial Interiors) Completed 2017

- Reduces heat island effect by providing a reflective white roof and a light color concrete tarmac
- Low-flow water fixtures and water closets
- Efficient light fixtures and efficient heating, ventilation, and air conditioning (HVAC) system
- Use or renewable energy sources
- Recycled and regionally sourced materials
- Enhanced indoor air quality
- Solar-thermal domestic hot water system to heat 100 percent of the wing's domestic water needs



Climate Change and Resiliency Planning

As the Boston area will continue to experience increased temperatures, more frequent extreme weather events, and higher sea level due to climate change,⁵³ Massport understands the importance of preparing for impacts in order to protect and enhance its critical infrastructure, operational assets, and workforce. Through robust planning and regional collaboration, Massport strives to continue its leadership role in resiliency planning among port authorities, the airport industry, and the Boston region.

At the end of 2013, Massport initiated a Disaster and Infrastructure Resiliency Planning (DIRP) Study for Logan Airport, the Port of Boston, and Massport's waterfront assets in South and East Boston. The DIRP Study includes a hazard analysis, modeling sea-level rise and storm surge, and projections of temperature, precipitation, and anticipated increases in extreme weather events. The DIRP Study provides recommendations regarding short-term strategies to make Massport's facilities more resilient to the likely effects of climate change. In 2014, the study was completed and implementation of adaptation initiatives began in late 2014.

In addition to the DIRP Study and its related initiatives, Massport has completed an Authority-wide risk assessment, as part of its strategic planning initiative; issued a Floodproofing Design Guide; and has developed a resilience framework to provide consistent metrics for short- and long-term planning and protection of its critical facilities and infrastructure. Beyond physical resiliency, Massport is also focused on incorporating social and economic resilience into its long-term operational and capital planning. Massport's Floodproofing Design Guide was published in November 2014 and updated in April 2016.

Operational aspects of resiliency strategy include the development of Flood Operations Plans for Logan Airport and Massport maritime facilities. These plans were introduced in 2015 and included the planned deployment of temporary flood barriers to protect up to 12 locations of critical infrastructure in the event of severe weather. Additional locations have been permanently enhanced to prevent flooding. The flood operations plans are evaluated annually to enhance their effectiveness and to adapt to evolving requirements and past experiences.

53 City of Boston. 2016. *Climate Ready Boston*.
https://www.boston.gov/sites/default/files/climatereadyeastbostoncharlestown_finalreport_web.pdf.

Tabletop planning exercises simulating a hurricane scenario and cross-functional workshops have been conducted to further refine plans and train staff. Finally, the design flood elevation that resulted from the original DIRP study in 2015 was updated as a result of enhanced storm modeling that was made available to Massport through MassDOT. Adjustments to the prioritized resiliency recommendations were made to accommodate the revised flood elevation.

Massport reports on progress towards resiliency goals in its Logan Airport Annual Sustainability Reports. Additional information about Massport's resiliency initiative is available at:

<http://www.massport.com/massport/business/capital-improvements/sustainability/climate-change-adaptation-and-resiliency/resiliency-and-climate-change/>.

Logan Airport Environmental Review Process

This 2016 EDR is part of a well-established, state-level environmental review process that assesses Logan Airport's cumulative environmental impacts. The process provides a context against which individual projects at Logan Airport meeting state and federal environmental review thresholds are evaluated on a project-specific basis. The Airport-wide and project-specific environmental review processes are described below.

Historical Context for the Logan Airport EDR/ESPR

In 1979, the Secretary of EEA issued a Certificate requiring Massport to define, evaluate, and disclose every three years the impact of long-term growth at the Airport through a Generic Environmental Impact Report (GEIR). The Certificate also required interim Annual Updates to provide data on conditions for the years between GEIRs. The GEIR evolved into an effective planning tool for Massport and provided projections of environmental conditions so that the cumulative effects of individual projects could be evaluated within a broader context.

EEA eliminated GEIRs following the 1998 revisions to its MEPA regulations. However, the Secretary's Certificate on the 1997 Annual Update⁵⁴ proposed a revised environmental review process for Logan Airport resulting in Massport's preparation of subsequent EDRs/ESPRs. The more comprehensive ESPRs provide a long-range analysis of projected operations, passengers, and cumulative impacts, while EDRs are prepared annually to provide a review of environmental conditions for the reporting year compared to the previous year. The EDR/ESPR process was developed to allow individual projects at Logan Airport to be considered and analyzed in the broader, Airport-wide context. As stated in the introduction to the 1999 ESPR, "while the Logan ESPR and EDRs provide the broad planning context for projects proposed for Logan Airport and future planning concepts under consideration by Massport, no specific projects can be built solely on the basis of inclusion and discussion in the 1999 ESPR." It continues to state that projects that meet MEPA or NEPA review thresholds must undergo those processes, as needed. In short, the EDRs/ESPRs provide a planning context which complements the individual project-specific filings.

54 Certificate of the Secretary of the Executive Office of Environmental Affairs on the Logan Airport 1997 Annual Update, issued on October 16, 1998.

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In the last several years, aircraft operations and passenger activity levels and associated environmental effects have remained well below levels previously analyzed for Logan Airport. Thus, the forecasted aviation growth presented in the *2004 ESPR*, the predicate upon which the ESPR schedule was initially established, has not occurred. Accordingly, with the approval of the Secretary, Massport prepared *2009* and *2010 EDRs* in lieu of the ESPR originally planned for 2009. The *2011 ESPR*, filed in early 2013, reported on calendar year 2011 and updated passenger activity level and aircraft operations forecasts. The *2012/2013 EDR* presented conditions for both calendar years 2012 and 2013. The *2014 EDR and 2015 EDR* presented conditions for calendar years 2014 and 2015.

This *2016 EDR* provides a comprehensive, cumulative analysis of the effects of all Logan Airport activities based on actual passenger activity and aircraft operation levels in 2016, and presents environmental management plans for addressing areas of environmental concern. Massport proposes to prepare a *2017 ESPR* to report on activity levels and environmental conditions for that year and projections through 2035, and anticipates publishing this report by early 2019. Where appropriate, Massport will continue to identify and address any longer-term aviation and environmental trends in both EDRs and ESPRs. As directed in the Secretary's Certificate on the Terminal E Modernization Project ENF, the EDR/ESPR will continue to be the forum to address cumulative, Airport-wide impacts.

Project-Specific Review

While this Airport-wide review provides the broad planning context for proposed projects and future planning concepts, certain Airport projects are also subject to a project-specific, public environmental review process when they meet state environmental review thresholds. When required, Massport and Airport tenants submit ENFs and EIRs pursuant to MEPA. Similarly, where NEPA⁵⁵ environmental review is triggered, projects are reviewed under the NEPA environmental review process.

Organization of the 2016 EDR

The remainder of this *2016 EDR* includes:

- **Spanish Executive Summary**, provides a translated version of the Executive Summary included after the English-version of Chapter 1, *Introduction/Executive Summary*.
- **Chapter 2, Activity Levels**, presents aviation activity statistics for Logan Airport in 2016 and compares activity levels to the prior year. The specific activity measures discussed include air passengers, aircraft operations, fleet mix, and cargo/mail volumes.
- **Chapter 3, Airport Planning**, provides an overview of planning, construction, and permitting activities that occurred at Logan Airport in 2016. It also describes known future planning, construction, and permitting activities and initiatives.
- **Chapter 4, Regional Transportation**, describes activity levels at New England's regional airports in 2016 and updates recent regional planning activities.

55 42 USC Section 4321 et seq. The Federal Aviation Administration (FAA) implements NEPA through FAA Order 1050.1E, Environmental Impacts: Policies and Procedures, Federal Aviation Administration, United States Department of Transportation, Effective Date: March 20, 2006.

- **Chapter 5, Ground Access to and from Logan Airport**, reports on transit ridership, roadways, traffic volumes, and parking for 2016.
- **Chapter 6, Noise Abatement**, updates the status of the noise environment at Logan Airport in 2016 and describes Massport's efforts to reduce noise levels.
- **Chapter 7, Air Quality/Emissions Reduction**, provides an overview of Airport-related air quality in 2016 and efforts to reduce emissions.
- **Chapter 8, Water Quality/Environmental Compliance and Management**, describes Massport's ongoing environmental management activities including National Pollutant Discharge Elimination System (NPDES) compliance, stormwater, fuel spills, activities under the Massachusetts Contingency Plan (MCP), and tank management.
- **Chapter 9, Project Mitigation Tracking**, reports on Massport's progress in meeting its MEPA Section 61⁵⁶ mitigation commitments for specific Airport projects.

MEPA Appendices: These include the Secretary of EEA's Certificate on the *2015 EDR*, comment letters received on the *2015 EDR* and responses to those comments, Secretary Certificates on the annual reports issued for reporting years 2011 through 2015, a list of reviewers to whom this *2016 EDR* was distributed, and a proposed scope for the *2017 ESPR*. Also included in this section are the Secretary's Certificates on the Terminal E Modernization Project ENF, Draft EA/EIR, Final EA/EIR, and the Secretary's Certificate on the Logan Airport Parking Project ENF.

*Appendix A – MEPA Certificates and Responses to Comments*⁵⁷

Appendix B – Comment Letters and Responses

Appendix C – Proposed Scope for the 2017 ESPR

Appendix D – Distribution List

Technical Appendices:⁵⁸ These include detailed analytical data and methodological documentation for the various environmental analyses presented in and conducted for this *2016 EDR*.

Appendix E – Activity Levels

Appendix F – Regional Transportation

Appendix G – Ground Access

Appendix H – Noise Abatement

Appendix I – Air Quality/Emissions Reduction

Appendix J – Water Quality/Environmental Compliance and Management

Appendix K – 2016 and 2017 Peak Period Pricing Monitoring Report

Appendix L – Reduced/Single Engine Taxiing at Logan Airport Memoranda

56 Massachusetts General Law, Chapter 30, Section 61 (M.G.L. c. 30, § 61) states that all agencies must review, evaluate, and determine environmental impacts of all projects or activities and shall use all practicable means and measures to minimize damage to the environment. For projects requiring an Environmental Impact Report, Section 61 Findings will specify all feasible measures to be taken to avoid or mitigate environmental impacts, the party responsible for funding the mitigation measures, and the anticipated implementation schedule for mitigation measures.

57 The Secretary's Certificates on the Terminal E Modernization Project Environmental Notification Form, Draft EA/EIR and Final EA/EIR are included in Appendix A. For convenience, Massport has responded to comments that relate to the EDR and ESPR.

58 Technical appendices are available on Massport's website at www.massport.com.