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Boston Logan International Airport

Environmental Data Report (EDR)  
& Environmental Status and  
Planning Report (ESPR)

# User's Guide



PREPARED BY:



October, 2025

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# U1. Background

This User’s Guide serves as a complementing reference resource for the Boston Logan International Airport (Logan Airport or the Airport) **Environmental Data Reports (EDRs)** and **Environmental Status and Planning Reports (ESPRs)** by providing the historical context, educational materials, regulatory frameworks, modeling and analyses methodologies, and other contextual information essential to fully understanding the content within EDRs and ESPRs. While the information in this User’s Guide does not usually change from year to year, the content is routinely reviewed and updated as necessary to ensure accuracy.

## U1.1 User’s Guide Purpose and Objectives

This User’s Guide provides guidance on how to navigate the EDRs and ESPRs, as well as gives background context and supporting information to help the reader better understand the analyses and findings presented within the EDRs and ESPRs. The User’s Guide provides the audience reading the EDRs and ESPRs with essential supporting information necessary for understanding each report filing’s context, content, and findings, such as definitions, regulations, methodologies, and data analysis models, so the content in the annual EDR or ESPR filings can remain focused on reporting yearly data. Although the User’s Guide contents do not usually change often, this document is routinely reviewed during each ESPR’s publication year, which occurs on a five year cycle, and is revised where appropriate. If a notable change occurs between ESPR years, for example a modeling methodology is updated or regulations significantly change, those changes will be discussed in the relevant EDR chapter or section for that year. During the next ESPR year, that information will be incorporated into the User’s Guide for future reference.

## U1.2 Navigating the EDRs and ESPRs

Each EDR and ESPR contains the following components:

|                              |                                                                                                                                                                                                                                                               |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Table of Contents (TOC)      | <ul style="list-style-type: none"><li>• List of chapters and main chapter sections with hyperlinks included in electronic versions for ease of navigation;</li><li>• List of appendices; and</li><li>• Lists of figures and tables.</li></ul>                 |
| Acronyms and Key Terminology | <ul style="list-style-type: none"><li>• Acronyms used within the document are defined; and</li><li>• Key terms and vocabulary critical to understanding content are defined. Key terms are identified within the chapters in <b>blue bold text</b>.</li></ul> |

|                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Introduction and Executive Summary                             | <ul style="list-style-type: none"> <li>• Provides context on Logan Airport's location;</li> <li>• Describes the ESPR or EDR document's purpose;</li> <li>• Briefly summarizes document changes since the prior filing; and</li> <li>• Summarizes highlights, key findings, and status updates for each technical chapter.</li> </ul>                                                                                                                                                                                                                                                                               |
| Translated Executive Summary                                   | <ul style="list-style-type: none"> <li>• Non-English translations of the Executive Summary for non-English speakers in Logan Airport's surrounding communities, provided in electronic versions and select print copies. <ul style="list-style-type: none"> <li>◦ The reporting year's languages for translations are described within each EDR.</li> </ul> </li> </ul>                                                                                                                                                                                                                                            |
| Technical Chapters                                             | <ul style="list-style-type: none"> <li>• Outreach and <b>Environmental Justice (EJ)</b>;</li> <li>• Activity Levels;</li> <li>• Airport Planning;</li> <li>• Regional Transportation;</li> <li>• Ground Access;</li> <li>• Noise;</li> <li>• Air Quality and <b>Greenhouse Gasses (GHG)</b>;</li> <li>• Water Quality;</li> <li>• Project Mitigation; and</li> <li>• <b>Sustainability</b> and Climate Resilience.</li> </ul>                                                                                                                                                                                      |
| Certificates, Comment Letters, and Responses to Comments (RTC) | <ul style="list-style-type: none"> <li>• Certificates issued by the Massachusetts <b>Executive Office of Energy and Environmental Affairs (EEA)</b>, through the EEA Secretary (Secretary's Certificates or Certificates) since the prior ESPR are included in each filing;</li> <li>• Delineated Certificate comments issued for the prior year's filing summarizing actionable comments and Massport's responses to those comments; and</li> <li>• Delineated public comment letters received for the prior year's filing summarizing actionable comments and Massport's responses to those comments.</li> </ul> |
| Next Year's ESPR or EDR's Proposed Scope                       | <ul style="list-style-type: none"> <li>• A proposed scope for the next reporting year's EDR or ESPR filing for MEPA's consideration during their review of the current reporting year's EDR or ESPR.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                    |

|                      |                                                                                                                                                                                                                                                        |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Distribution List    | <ul style="list-style-type: none"><li>List of report recipients, including MEPA’s distribution list provided to Massport, EJ community groups, past commenters on prior filings, and other key groups or individuals identified by Massport.</li></ul> |
| Technical Appendices | <ul style="list-style-type: none"><li>Supporting data and information used to develop the findings presented within the technical chapters are available within the electronic version.</li></ul>                                                      |

U1.2.1 Iconography and Navigation Aids

Several features within the EDRs and ESRs make the documents easier for the reader to navigate and find content quickly. A color scheme is used consistently throughout the document and across each year that associates each topic with a specific color. The color scheme was chosen to be sensitive to readers with differing degrees of color vision ability. Each chapter number is also inset within its designated color box in the top corner of the page. For print versions of the document, the color boxes create a phone book effect, allowing for easier navigation. The User’s Guide has been developed to complement the EDR and ESR and uses the same color boxes that match the chapter being discussed.



Callout boxes have been added within chapters to draw the reader towards key highlights and findings for a given topic. The callout boxes look like the one to the right of this text and will correspond to the chapter’s designated color.

Key terminology within the document is identified with **blue bold text** and is defined in a table directly following the TOC. Within the EDR and ESR, bolded section **references to the User’s Guide** are provided to direct readers to where more detailed background information on a given topic can be found. Additionally, a distinctive icon for the User’s Guide has been

The use of callout boxes helps break up large text blocks and makes key information identifiable.

developed to visually notify the reader when there is further context available, and these icons have been hyperlinked to bring the reader to the relevant User's Guide section within a new window for easier side-by-side reading and comparison.<sup>1</sup>

User's Guide icons distributed within the EDRs and ESPRs are hyperlinked to the Guide for easy navigation.



For online readers, the EDRs and ESPRs include a variety of hyperlinks to assist with navigating to desired sections. The TOC has been hyperlinked as well as bookmarked so each entry within the TOC can be easily navigated to reach the desired content through the bookmarks side panel. Key terminology words have also been hyperlinked. Clicking on a blue bold word (e.g. **load factor**) will bring the reader to the definition within the Key Terminology table in the EDR and ESPR.

For desktop computer users, this functionality also allows readers to have multiple documents open at the same time, making cross-referencing between chapter content and supporting materials easier. EDR and ESPR technical chapters focus on the key results and takeaways, but readers can have supporting document files open in another window, on an adjacent monitor, tablet, or mobile device to reference definitions, background information, or deeper explanations while reading through the main document.

## U1.2.2 EDR and ESPR Chapters

To create a cohesive and consistent document, chapters are organized to have a similar and consistent layout and structure, which also facilitates navigation and makes finding desired information intuitive. Each chapter begins with a brief introduction that summarizes the chapter's purpose and contents. At the end of the introduction, key trends or findings from the environmental data analysis are summarized in short, easily parsed bullet point lists.

The introduction and key findings sections are followed by more detailed technical sections organized by topic. Each technical section begins with a brief introduction to the analysis methodology used and how the information within the section supports an overall understanding of current environmental conditions at Logan Airport. The following are relevant tables and figures showing data and analysis results for the reporting year or years with data from the previous reporting year and a reference benchmark year for comparison to show trends over time. After the data is presented visually in tables or figures follows a separate subsection for the reporting year, which summarizes the analysis results and overall trends since the prior year as well as compared to a benchmark year. These sections also discuss possible explanations or drivers for changes or trends observed, as available.

<sup>1</sup> Default browser dependent.

### U1.2.2.1 Benchmark Year

The benchmark year chosen for each chapter or metric reflects a distinguishing point in time prior to 2025, like the year with the highest or lowest recorded value for a given topic. However, the established benchmark years are not intended to necessarily be a comparison to a record-setting year, but rather are meant to fix an unchanging point in the past for future years to be compared against as a standard. Therefore, although there may be future years that “break the record”, the benchmark year will not change. **Table U1-1** lists the benchmark years and rationale for each. When needed, a supporting technical appendix may be referenced, allowing the reader to locate detailed data reporting for a given topic.

**Table U1-1      Benchmark Years Rationale**

| Topic                                                                        | Benchmark Year | Rationale                                                                                                                                                                                                                                                       |
|------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Activity Levels and Regional Transportation - <b>passenger counts</b>        | 2019           | The highest number, or count, of passengers using air transportation services in a given year as of the end of 2024                                                                                                                                             |
| Activity Levels and Regional Transportation - operations                     | 1998           | The greatest number of <b>aircraft operations</b> at Logan Airport in a given year as of the end of 2024                                                                                                                                                        |
| Ground Access – transit ridership, vehicle miles traveled (VMT), and parking | 2019           | The number of passengers accessing the airport through public transit services, the vehicle miles traveled (VMT) by passengers on Airport property, and total number of passenger vehicles parked at the Airport in a given year had the highest observed rates |
| Noise                                                                        | 1998           | <b>Noise contours</b> derived from measured noise data encompassed the largest amount of land area with highest population count residing within those contours                                                                                                 |
| Air Quality – criteria pollutants                                            | 1990           | Highest concentrations of criteria pollutants were observed                                                                                                                                                                                                     |
| Air Quality – greenhouse gas (GHG) emissions                                 | 2019           | Established baseline year for Massport's <i>Roadmap to Net Zero by 2031</i> was used for data parity                                                                                                                                                            |

### U1.2.3 EDR and ESPR Appendices

Supporting technical appendices are provided in electronic format and contain the detailed data sets used in the analyses to develop the results presented within the chapters. Additionally, the supporting appendices contain detailed content on the inputs and assumptions used in modeling analyses as well as other supporting materials necessary to supplement findings and reporting. Past technical appendices are available on Massport's website and provide a comprehensive historical record of prior environmental conditions.

## U1.3 EDR and ESPR Program Overview

EDRs and ESPRs are an annual series of environmental review documents that Massport submits to the Secretary of the **Executive Office of Energy and Environmental Affairs (EEA)**, in accordance with the **Massachusetts Environmental Policy Act (MEPA)**.<sup>2</sup> The document series continues Massport's established state-level environmental review process, which assesses the cumulative environmental impacts of activities associated with Logan Airport. The ESPRs and the EDRs serve distinct but complementary purposes. The ESPR includes updated forecasts that inform airport planning, projects, and initiatives, while the EDR serves as an annual reporting document and provides updated data for the specific reporting year or years. Following the EEA's review of an EDR or ESPR, Massport is directed to prepare the next document in the series according to a scope established by the Secretary's Certificate.

### U1.3.1 Environmental Data Reports (EDRs)

EDRs are prepared annually, and every year, the EDR provides the current and historical context for individual projects at Logan Airport that meet state and federal environmental review thresholds, as well as the cumulative environmental effects of Logan Airport's operations and activities. Massport has published these documents since 1979, establishing itself as a national leader in environmental reporting.

The current reporting year's results are also compared to the prior reporting year, as well as the benchmark reporting year's results. Differences between the current year and the previous year or the benchmark year results are explained.

### U1.3.2 Environmental Status and Planning Reports (ESPRs)

Approximately every five years, Massport prepares an ESPR, which includes the same kinds of information about the current reporting year as well as historical comparisons to the prior year and a benchmark year, but these documents also provide a prospective view of Logan Airport's activities in the future. The analyses and reporting are expanded to include forecasts of estimated operating conditions over the next 10 to 15 years, also called the **Future Planning Horizon (FPH)**, based on anticipated growth rates and changing conditions at the Airport, as well as within Boston and the New England Region.

The ESPR is developed in lieu of an airport master plan, which is a process unique to Logan Airport as master plans are considered the accepted standard for planning future airport growth to meet passenger demand within the aviation industry. Typical airport master plans are developed every 10 to 20 years. Since ESPRs are completed every five years, Massport assesses future conditions and develops appropriate planning at more frequent intervals than most U.S. airports.

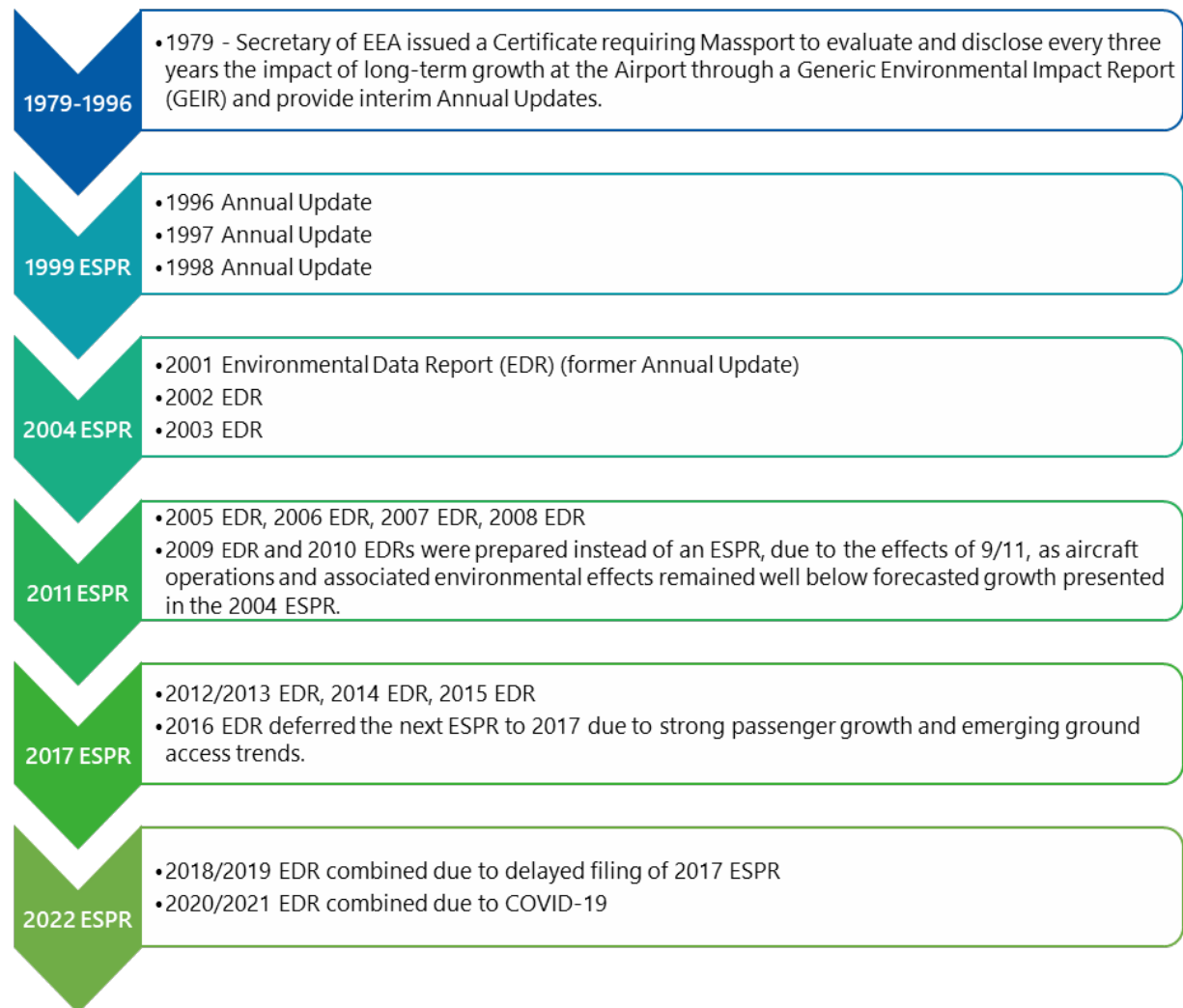
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<sup>2</sup> Massachusetts General Laws Chapter 30, Sections 61-62H. MEPA is implemented by regulations published at 301 Code of Massachusetts Regulations (CMR) 11.00 ("the MEPA Regulations").

### U1.3.3 EDRs and ESPRs versus Project Specific Filings

**Figure U1-1** shows the historical annual environmental reporting for Logan Airport, starting in 1979. These documents initially reported on the current environmental conditions and future forecasts at the Airport to the EEA and the public annually through the issuance of *Generic Environmental Impact Reports* (GEIR) every five years, and Annual Updates in the interim years. In the early 2000s, in response to guidance from EEA, these documents transitioned into an ESPR, issued every five years, with interim annual updates provided as EDRs. Over time, these reports have evolved into an effective planning tool for Massport, providing projections of environmental conditions to evaluate the overall effects of individual projects.

**Figure U1-1**      **Historic ESPR and EDR Reporting Cycles**



Massport's ESR and EDRs are unique documents within the MEPA process. Unlike other MEPA documents, ESRs and the annual EDRs are not "projects" within the typical MEPA framework. The documents do not take the place of any individual project filings subject to MEPA, nor do they serve as approval for any specific activity. Rather, as their titles indicate, the ESRs and EDRs report on Logan Airport's general operating and environmental conditions.

Airport projects undergo a project-specific, public environmental review process when state environmental review thresholds are met. When required pursuant to MEPA, Massport and Airport tenants submit **Environmental Notification Forms (ENFs)** and **Environmental Impact Reports (EIRs)**. If a project triggers a **National Environmental Policy Act (NEPA)** environmental review, the project is reviewed under the **Federal Aviation Administration (FAA)** NEPA environmental review process. A chapter within EDRs and ESRs, *Airport Planning*, discusses current and potential future projects and their respective regulatory review status under MEPA, NEPA, or both. A chapter within EDRs and ESRs, *Project Mitigation*, reports on the on-going implementation of required mitigation commitments made in project-specific MEPA filings.

## U2. Outreach and Environmental Justice

The *Outreach and Environmental Justice* chapter within an EDR or ESPR focuses on Massport's commitment to engaging with communities surrounding Logan Airport through community giving and programs, adherence with the EEA EJ office's EJ protocols, and project-specific outreach plans. The chapter outlines Massport's adherence to regulatory frameworks and highlights Massport's initiatives to improve community relations and environmental conditions, including public meetings, community programs, and charitable contributions. Additionally, this chapter reports on existing health conditions within communities neighboring the Airport using methodologies outlined by DPH. As new tools frequently become available to conduct these assessments, the most recent EDR or ESPR will present the background context and methodology on how new tools are applied for the first year in which the new tool is used.

### U2.1 Massport Community Giving

Each year, the **Massport Charitable Contribution Program** provides grants to community organizations to help fund programs in areas such as youth education, arts and culture, social service, the environment, and athletics.

The **Community Summer Jobs Program** helps civic and social service agencies by providing funds to hire youth workers in Massport's neighboring communities, including Bedford, Charlestown, Chelsea, Concord, East Boston, Lexington, Lincoln, Revere, South Boston, Winthrop, and Worcester. Without the assistance of Massport's Community Summer Jobs Program, many local organizations would not be able to offer affordable summer programs to residents. Since 1991, thousands of local students have gained valuable work experience in various jobs, such as camp counselors, office assistants, maintenance workers, and lifeguards; positions funded by Community Summer Jobs Program grants.

Massport collaborated with local and state governments, municipalities, and other charitable organizations to establish and fund the **East Boston Foundation, South Boston Foundation, and Winthrop Foundation**. Beginning with the East Boston Foundation in 1997, Massport has provided over \$16 million in funds for vital programs in these highly impacted communities.

Massport provides annual funding to the **East Boston Neighborhood Health Center** to help expand the efforts of its Pediatric Asthma and Chronic Obstructive Pulmonary Disease (COPD) Prevention and

Massport has set a goal to award at least 50 percent of the Massport Charitable Contribution Program budget to organizations serving predominately people of color.

Treatment Program in East Boston and Winthrop. The program provides services including screenings for children, distribution of asthma kits, and home visits.

Each year, high school students are selected to receive **two Diversity Science, Technology, Engineering, and Mathematics (STEM) Scholarships and the Thomas J. Butler, Deborah Hadden Gray, Donna Rauseo, and Lowell L. Richards III Memorial Scholarships** based on their academic achievements, post-secondary educational plans, and demonstrated commitment to community service. Massport also provides annual scholarship grants to local high schools for students in Charlestown, Chelsea, East Boston, South Boston, Revere, and Winthrop.

The following is a list of community organizations Massport has historically funded:

- Allied War Veterans Council of South Boston
- Apollinaire Theatre Company
- Artists for Humanity
- Babe Ruth League of South Boston
- Bedford Babe Ruth
- Boston Children's Chorus
- Boys & Girls Club of Worcester
- Casa Myrna
- Charlestown Boys & Girls Club
- Charlestown Community Center
- Charlestown Cooperative Nursery School
- Charlestown Lacrosse and Learning Center
- Chelsea Boys & Girls Club
- Chelsea Collaborative
- Chelsea Department of Public Works
- Children's Smile Coalition
- Children's Trust Fund
- City of Revere
- City of Worcester Neighborhood Summer Park Steward Program
- Codman Square Health Center
- Community Action Programs Inter-City, Inc. (CAPIC)
- Community Against Substance Abuse (CASA)
- Community Boat Building
- Condon Community Center
- Cottage Park Yacht Club
- Citizens Scholarship Foundations (CSF) of Bedford
- Curley Recreation Center
- Dorchester Boys & Girls Club
- DotHouse Health Inc
- E. Inc.
- East Boston Central Catholic School
- East Boston Chamber of Commerce
- East Boston Community Development Corporation (CDC)
- Labouré Center
- Lexington Education Foundation
- Logan Airport Association
- Martin Pino Community Center
- Maverick Landing Community Services
- McDonough Sailing Center
- Medicine Wheel Productions
- Monument Square Neighborhood Association
- North End Against Drugs, Inc.
- Paraclete Foundation
- Phoenix Academy
- Piers Park Sailing Center
- Revere Beach Partnership
- Revere High School Cheerleading Parents Club
- Revere on the Move
- Revere Parks & Recreation
- Revere Pop Warner
- Revere
- Substance User Disorder and Homeless Initiative (SUDHI) office
- Revere Youth Baseball & Softball
- Salesian Boys & Girls Club
- SeaCoast High School
- Seven Hills Foundation
- South Boston Boys & Girls Club
- South Boston Chamber of Commerce
- South Boston Community Health Center
- South Boston Neighborhood Development Corporation
- South Boston Neighborhood House
- South Boston Pop Warner Football & Cheerleading
- South Boston Youth Soccer
- Stretch Walsh Community Center
- Swift Waters After School Program
- The Cary Memorial Library Foundation

- East Boston Main Streets
- East Boston Social Centers
- East Boston Young Men Christian Association (YMCA)
- FamilyAid Boston
- For Kids Only Afterschool
- Fort Point Arts Community
- Friends of Christopher Columbus Park
- Friends of Metro Boston, Inc.
- Gate of Heaven Catholic Youth Organization (CYO)
- Gavin Foundation
- Girls Scouts of Central & Western Massachusetts
- Greendale YMCA/ YMCA of Central Massachusetts
- GreenRoots
- Hanscom Spouses Club
- HarborCOV
- Harborside Community Center
- Hull Lifesaving Museum
- Inner-City Scholarship Fund
- John F. Kennedy Family Service Center, Inc.
- Julie's Family Learning Program
- The Dimock Center
- The Fishing Academy
- The Friends of the Chelsea Public Library
- The Museum of African American History
- The North End Community Health Center
- The Sports Museum
- Tynan Community Center
- University of Massachusetts Boston/ Camp Shriver
- USS Constitution Museum
- Vinton Street Hope Initiative
- We Are Boston
- West Broadway Task Force
- Winthrop Chamber of Commerce
- Winthrop Fireworks
- Winthrop High School
- Winthrop High School Girls Softball
- Winthrop Little League
- Winthrop Parks & Recreation
- Winthrop Youth Hockey Association
- Winthrop Youth Softball
- Worcester Tree Initiative
- Youth Enrichment Services (YES)

The following provides a list of organizations, programs, and causes that have received East Boston Foundation contributions:

- A Change of Attitude
- Alliance East
- America Scores
- Atlantic Works
- The BASE Baseball Program
- Bennington Street Planter
- Boston Area Natural Networks
- Boston Creative Action
- Boston History Collaborative
- Boston Police English as a Second Language (ESL) Program
- Brooke Charter School Playground
- Chelsea Creek Action Group
- Collaboration for Active Communities
- Columbus Day Parade Committee
- Community Education Center
- Courageous Generation Seniors
- Crossroads Family Shelter
- Cultural Connections
- Curtis Guild School
- Don Orione Senior Program
- East Boston Adult Education
- East Boston Youth Hockey
- Eastie Pride Day
- Eastie Week
- Excel Academy
- Freedoms Foundation
- Friends of Belle Isle Marsh
- Friends of East Boston Court
- Friends of East Boston Library Friends of East Boston Veterans Memorial
- Friends of the Golden Stairs Park
- Golden Age Seniors Bus Trips
- Harbor Arts
- Harbor City School
- Harborside Community Center
- Heritage Apartment Seniors Bus Trips
- Italia Unita Feast
- James Otis Elementary Schoolyard Initiative
- Jeffries Point Neighborhood Association
- Kennedy Schoolyard Renovation
- Kiwanis
- Little Folks
- Martin Pino Community Center

- East Boston Area Planning Action Council (APAC)
- East Boston Artists Group
- East Boston Athletic Board
- East Boston Central Catholic School
- East Boston Chamber of Commerce
- East Boston Community Activity Day
- East Boston Cultural Exchange
- East Boston Ecumenical Community Council
- East Boston Flames Cheerleaders
- East Boston Girls Softball
- East Boston Healthy Boston Coalition
- East Boston High School
- East Boston Little League
- East Boston Main Streets
- East Boston Museum
- East Boston Pop Warner Football
- East Boston Resident Action Council
- East Boston Seniors
- East Boston Social Center
- East Boston Veterans Council
- East Boston YMCA
- East Boston Youth Group
- Metro Lacrosse
- Montmorenci Avenue Block Party
- Nantucket Lightship
- New England Gallery of Latin American Art
- New England Scores
- Neighborhood Of Affordable Housing (NOAH)
- North Shore Recreation
- North Suffolk Mental Health
- Paris Street Community Center
- Piers Park Sailing
- Sacred Heart Feast
- Sacred Heart Kids Club
- Salesians Boys and Girls Club
- Salvadorian Cultural Festival
- Savio Prep
- Senior Citizen Bus Trips
- St. Mary's Star of the Sea School
- Swift Waters Afterschool
- The Trust for Public Land/Lopresti Park
- Victory Gardens
- Zumix

## U2.2 Environmental Justice Regulatory Context

The state's Climate Roadmap Act (2021) defines EJ principles, the characteristics of EJ populations, environmental benefits and burdens experienced by EJ communities, and the potential impacts. The *Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs*<sup>3</sup> (2021 EJ Policy), originally issued in 2002 and updated on June 24, 2021, incorporates the definitions from the Climate Roadmap Act and reinforces inclusive community involvement in the environmental decision-making process. The 2021 EJ Policy builds upon federal guidelines under Executive Order 12898 and Executive Order 14008.

The EEA has developed further guidance to implement the requirements outlined in the Climate Roadmap Act and the 2021 EJ Policy. The EEA enacted the *Massachusetts Environmental Policy Act (MEPA) Public Involvement Protocol for Environmental Justice Populations*<sup>4</sup> and the *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations*<sup>5</sup> on January 1, 2022 (2022 EJ Protocols). The 2022 EJ Protocols require ENFs and expanded ENFs (EENFs) filed with the MEPA Office to identify EJ populations

3 EEA. 2021. Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs. <https://www.mass.gov/doc/environmental-justice-policy6242021-update/download>.

4 EEA. 2022. MEPA Public Involvement Protocol for Environmental Justice Populations. <https://www.mass.gov/doc/final-mepa-public-involvement-protocol-for-environmental-justice-populations-effective-date-of-january-1-2022/download>

5 EEA. 2022. MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations. <https://www.mass.gov/doc/final-mepa-interim-protocol-for-analysis-of-project-impacts-on-environmental-justice-populations-effective-date-of-january-1-2022/download>.

within a 1-mile radius and a 5-mile radius of the Project Area, using the Massachusetts 2020 Environmental Justice Populations mapping tool (EJ Maps Viewer) and associated data layers. The 2022 EJ Protocols also outline subsequent impact analysis and outreach requirements. Logan Airport is located within and adjacent to census tract **block groups** identified by the EJ Maps Viewer as EJ populations.

## U2.2.1 Environmental Justice Analysis Methodology

Massport is the only agency in the state that prepares ESPR and EDR documents, reports on environmental conditions, discloses plans to inform the public, and describes facility cumulative impacts. The ESPRs and EDRs support but do not advance specific projects subject to **MEPA review**.

To identify EJ communities in the vicinity of Logan Airport, Massport used the most recent U.S. Census American Community Survey (ACS) data<sup>6</sup> and applied the EJ criteria from the 2021 EJ Policy, where populations exhibited the following characteristics:

- The annual median household income is no more than 65 percent of the statewide annual median household income;
- The statewide median household income matching the dataset timeframe (2016-2020) in Massachusetts is \$84,385, and 65 percent of this amounts to \$54,850.25;
- Minorities comprise 40 percent or more of the population;
- English language proficiency is lacking among 25 percent or more of households; or
- Minorities comprise 25 percent or more of the population, and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 percent of the statewide annual median household income.

## U2.3 Community and Environmental Justice Outreach

The following section describes key stakeholders involved in Massport's community and environmental outreach and Massport's standards for project-related outreach efforts.

### U2.3.1 Massport Community Relations and Government Affairs

Massport's Community Relations & Government Affairs Department manages Massport's relations with community members and government officials to further Massport's goal of being a good neighbor. The department implements Massport's public engagement practices, which are tailored on a project-by-project basis per community needs, and for the annual EDRs and ESPRs. For more information, see Massport's Community website (<https://www.massport.com/community>), or to contact a member of the Community Relations & Government Affairs team, email [community@massport.com](mailto:community@massport.com).

<sup>6</sup> American Community Survey Data. United States® Census Bureau. U.S. Department of Commerce.  
<https://www.census.gov/programs-surveys/acs/data/>

### U2.3.2 Massport Community Advisory Committee (Massport CAC)

For more information on becoming involved with Massport, visit the Massport Community Advisory Committee (Massport CAC) website: <https://massportcac.org/>

The Massport Community Advisory Committee (Massport CAC) was established in 2014 to represent the interests of communities impacted by Massport's operations and functions as a government agency in the State. The Massport CAC provides a collective voice for 35 communities through advocacy, informing, liaising, and oversight.

### U2.3.3 Massport's Project-Specific Public Involvement Practices

The following measures are consistently applied to project-specific MEPA filings and constitute Massport's public involvement plan on an Authority-wide basis:

- Identify a team to coordinate and facilitate EJ and community outreach for the project, including effective communication with EJ stakeholders.
- Request an EJ Reference List from [MEPA-EJ@mass.gov](mailto:MEPA-EJ@mass.gov) for each project that falls under MEPA review.
- Circulate a link to the filing electronically to the EJ Reference List, government officials, persons or entities who previously commented on past filings for the project, and other identified stakeholders.
- Distribute hard copies of filing documents to local libraries for ease of public access.
- Post public notices to Massport's website:  
<https://www.massport.com/massport/community/public-notices/>.
- Publish project information on Massport's website:  
<https://www.massport.com/massport/community/ongoing-projects/>.
- Post the public notice and filing notification on social media sites.
- Publish the public notice in relevant local print media, including non-English and community-specific media outlets and local newspapers, such as *Boston Herald*, *East Boston Times*, *Winthrop Transcript*, and *El Mundo*.
- Translate public notices and project summaries (or Executive Summaries) into each language spoken by at least 5 percent of the census tract's population who do not speak English as their primary language.
- Include a reference, or Babel notice, to public notices and certain filing materials that project, and meeting materials are available in other languages, upon request.
- Provide language interpretation services for languages spoken by at least 10 percent of the census tract's population who do not speak English very well or at all.
- Enable public meeting participation in-person, virtually, or by phone to accommodate those with limited technology or transit access.
- Schedule public meetings outside the standard workday for accessibility.

- Identify additional methods to reach EJ communities with limited technology access, to the extent feasible, such as paper mailers instead of email communication in translated languages, alternative paper feedback forms, and one-page flyers for distribution at locations that are frequented by EJ populations.
- In addition to online repositories, identify additional traditional and non-traditional information repositories, such as houses of worship, community centers, or other appropriate options.
- Hold pre-filing meetings when feasible, including technical review meetings.
- Provide pre-meeting discussions with key stakeholders to incorporate into public meetings important topics and concerns expressed.
- Offer smaller meetings with key stakeholders and community groups prior to filings, when feasible or by request.

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## U3. Activity Levels and Forecasting

Over the past several decades, even with increases in passengers and flights, most environmental conditions have improved over time. This is primarily the result of cleaner and quieter aircraft, cars, trucks, and equipment; more efficient buildings and Airport operations; and continued efforts by Massport, the FAA, and business partners to reduce the overall impact of Airport operations. However, the EDR and ESPR reporting process enables Massport to understand the scale of the effects from operations and plan for further impact reductions and operational efficiencies.

The *Activity Levels* chapter analyzes the number of **air passengers** and aircraft operations at Logan Airport in detail, focusing on local, regional, and national economic drivers and aviation industry trends that influence the number of flight operations from Logan Airport in a given year. Other chapters use these data and results as the basis for analyses to understand environmental impacts associated with operating Logan Airport.

### U3.1 Activity Levels Overview

A diverse array of factors influence trends in passenger demand for air transportation services, such as regional and national economic conditions or international events. Understanding these factors and trends is critical for the planning process Massport uses to manage future Airport operations so environmental impacts are avoided or minimized to the extent practicable.

Each year, ESPRs and EDRs report on these drivers and trends, with discussion about the resulting changes in conditions at Logan Airport and the likely causes for those changes for the given reporting year compared to the prior year and the benchmark year.

**Passenger activity** refers to the number and frequency of air travel passengers who use an airport during a specific timeframe.

**Aircraft operations** are the flights, or takeoffs and landings by aircraft, including commercial passenger aircraft, general aviation aircraft, and cargo aircraft.

### U3.2 Commercial Service Passenger Activity Levels

**Passenger activity levels** refer to the volume and frequency of passengers moving through an airport during a specific timeframe. For example, the total number of passengers who used an airport in a given year and what the busiest times were for passengers to be in the airport during that year. This is a critical metric in the aviation industry as passenger activity levels significantly impact airport operations, infrastructure to accommodate passenger needs, and the overall passenger experience. By analyzing passenger activity levels, airports can better plan for both daily operations and long-term airport facility growth and development.

## Influence on Airport Operations

Passenger activity levels can influence airport operations and on-airport conditions, including on-airport vehicle volume, parking, flights, and environmental effects, among others.

### On-Airport Vehicle Traffic

Passenger activity levels have a direct correlation with vehicular volumes around airports. Higher volumes of passengers result in increased vehicle congestion due to greater numbers of personal vehicles, taxis, buses, and rideshare services accessing airport facilities. Airports promote **high-occupancy vehicle (HOV)** options and implement effective traffic management strategies and infrastructure improvements, such as additional roadway lanes, enhanced signage and wayfinding information, and optimized traffic signals, to reduce congestion and ensure traffic flows smoothly to and from terminals.

### Parking Facilities

As passenger numbers fluctuate, so does the demand for on-airport parking. Airports need to appropriately size their parking facilities to accommodate varying passenger levels. Efficient parking management systems, such as real-time space availability updates and reservation capabilities, are essential to address peak time challenges and enhance the passenger experience.

### Flight Operations

Passenger activity levels are crucial in determining the scheduling and frequency of flights. Airlines and airports collaborate to make sure flight availability meets passenger demand while maintaining safety and efficiency. High passenger volumes may necessitate additional flights, larger aircraft, or changes in airline scheduling to accommodate increased demand, whereas lower levels might lead to reductions in service, fewer destinations served, or consolidation of flights.

### Environmental Effects

The environmental impact of passenger activity is multifaceted, affecting noise pollution, air quality, and resource consumption. High levels of activity typically lead to increased aircraft operations and ground vehicle emissions, necessitating stringent environmental management practices. Airports must implement measures such as noise abatement procedures, sustainable fuel initiatives, and carbon offset programs to mitigate these environmental effects.

Understanding and managing passenger activity levels is essential for optimizing airport operations and infrastructure. By analyzing these activity levels, airports can effectively adapt to changes in demand, ensuring efficient operation while minimizing adverse environmental and operational impacts. This results in enhanced service quality for passengers and improved overall sustainability for the airport and its surrounding communities.

### U3.2.1 Passenger Market Demand Drivers

In the context of aviation and commercial air travel, comprehending the factors that drive airline passenger market demand is essential not only for airlines, but also for airport operators and policymakers. Market demand drivers are the underlying forces that influence the volume of passengers choosing to travel by air, which directly correlates with passenger activity levels at airports. Historically, factors contributing to increases in demand for air travel within Massachusetts and Greater Boston include:



Economic growth and increased travel demand nationwide, particularly in leisure-oriented markets and business-related travel;



Growth by airlines in response to local and national economic conditions, along with emerging airline partnerships, which can expand service offerings and destinations;



Introduction of new international destinations served by U.S. domestic and foreign carriers, which expands their respective route networks and increases travel appeal to a wider variety of potential customers; and



Advancements in aircraft technology, including the introduction of longer-range aircraft equipped with fuel-efficient engines and new noise level reduction technologies.

However, additional challenges and potential economic obstacles may impede activity level growth at the Airport, including:



Economic slowdowns or uncertainty in economic development activity at the state, regional, national, or international level;



Airline labor supply constraints, especially for pilots, flight crew, and maintenance services, along with supply chain disruptions that could delay delivery of aircraft, goods, or materials;



Air traffic control labor shortages or other staffing and technology issues that could impact daily operations and efficiency;



Fluctuating fuel prices, limited fuel availability, or changes in fuel service providers or suppliers that could affect operations or consumer airfare costs;



Future business and corporate travel policy trends, along with the evolving nature of business travel; and



Regulatory challenges that impact airport and airline operations, growth, or airline consolidation or solvency.

Understanding these market demand drivers is critical for Massport to effectively manage and predict passenger activity levels. When airports and airlines understand what drives passenger choices, operations, marketing strategies, and infrastructure investment, plans can be tailored to align with anticipated demand patterns. This enables airline service providers to:

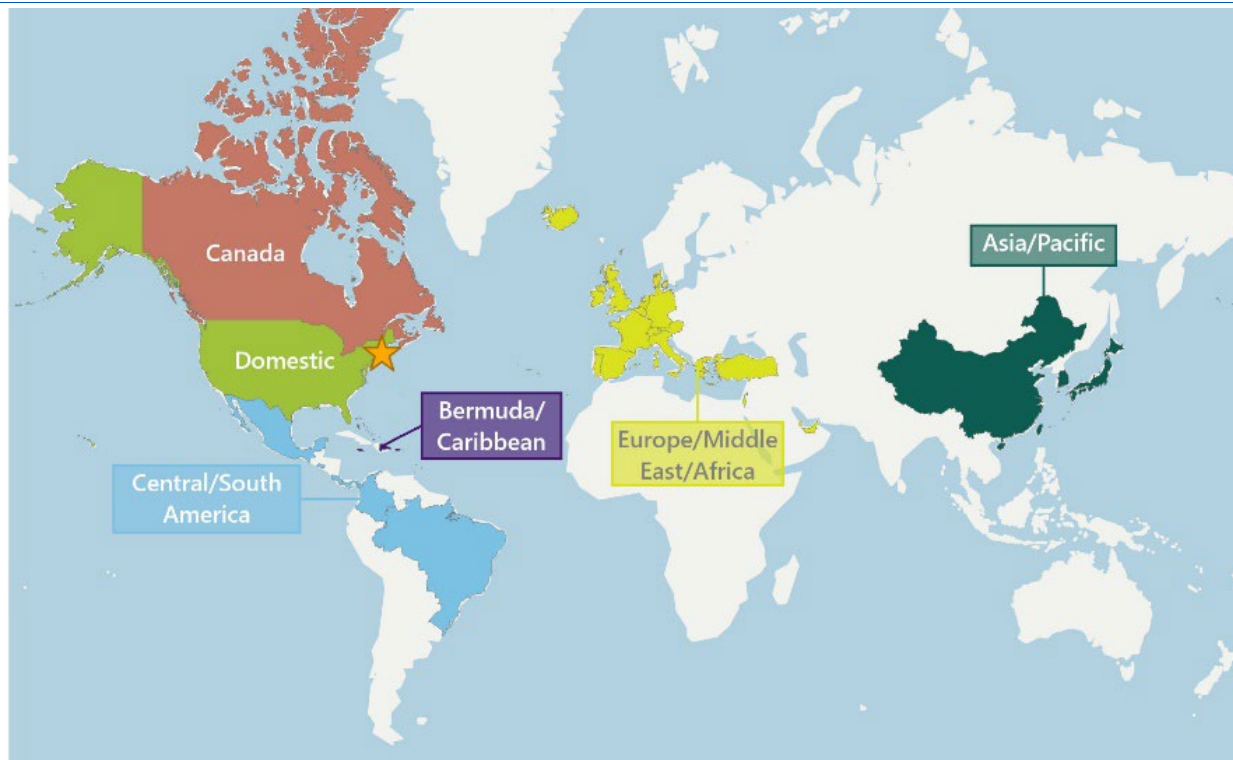
- Better match aircraft capacity, flight frequency, and destinations offered with passenger market demand;
- Optimize service offerings; and
- Improve the overall passenger experience and passenger satisfaction.

### U3.2.2 Passenger Market Share

Airline passenger market share refers to the proportion of total passengers carried by a particular airline relative to the total number of passengers across all airlines within a specific market or region. For example, the number of passengers traveling to or from international destinations on American Airlines compared to the total number of passengers traveling internationally on all the airlines combined would be American Airlines' international passenger market share. This metric is a crucial indicator of an airline's competitive positioning within the industry, reflecting its ability to attract and retain customers amidst various market players.

An airline's market share is influenced by factors such as its route network, pricing strategies, brand reputation, customer service quality, and the operational efficiency of its flights. A larger market share can signify a stronger presence in a region, enhanced bargaining power with partners, and increased revenue opportunities. Conversely, a smaller market share may prompt airline companies to reevaluate their strategies to improve competitiveness. Understanding market share dynamics helps airlines and industry analysts identify trends, assess competitive landscapes, and make informed decisions regarding growth and expansion strategies. **Figure U3-1** shows regions served by Logan Airport. Passenger demand for air service to these destinations represents the market, and each airline's share of the flights and customers to these regions is that airline's market share.

Figure U3-1 Regions Served by Logan Airport



Source: Massport (2025), ESRI, VHB

### U3.2.2.2 Domestic and International Air Travel

**Domestic air travel** refers to flights that occur within a single country, transporting passengers from one city or region to another without crossing international borders. This type of travel is often characterized by shorter flight durations, streamlined security procedures, and lower costs compared to international travel. Domestic airlines cater primarily to business commuters, leisure travelers seeking regional destinations, and individuals visiting friends and family. The convenience and efficiency of domestic air travel supports economic growth by fostering connectivity within the country, enhancing accessibility to regional hubs, and accommodating swift movement for business professionals and tourists alike.

**International air travel**, on the other hand, involves flights crossing international borders, connecting countries around the world. International travel often involves longer flight durations and more complex logistical and security arrangements, including passport controls, customs clearance, and adherence to diverse international regulations. International air travel is pivotal in promoting global tourism, facilitating trade and business expansion, and fostering cultural exchanges. Airlines offering international services typically provide higher service quality to mitigate the potential discomfort and duration of long-haul flights while also operating within a global network supporting extensive route options and alliances to offer more destination options.

### U3.2.2.3 Business and Leisure Air Travel

The relative distribution of business and leisure passengers can significantly influence airline passenger market share and airport operations. Understanding these dynamics allows airlines and airports to tailor their operations to the evolving needs of both business and leisure travelers, ensuring a balanced and responsive approach to market demands.

#### Business Air Travel

Business air travel involves flights taken for professional or employment purposes related to work obligations, business meetings, professional conferences, or corporate events. This segment typically requires flexibility in scheduling, frequent flights, and amenities that cater to productivity and comfort, such as business class seating and in-flight Wi-Fi. Business travelers often generate higher revenues, but changes in the business landscape, such as mergers, expansions, or contract awards, can alter travel patterns.

Business needs often drive demand for specific routes, and understanding these scenarios enables airlines and airports to cater to business travel segments efficiently. An increase in business travel may lead airlines to optimize their flight schedules to accommodate peak business hours, invest in premium services, and establish strategic routes in business hubs. Airports may also see enhanced demand for business-focused amenities, such as lounges and expedited security processes.

#### Leisure Air Travel

In contrast, leisure air travel encompasses flights taken for personal travel, vacations, or visits to friends and family. This segment is driven by factors such as travel affordability, destination appeal, and holiday seasons. Leisure travelers often prioritize cost-effectiveness over extras, making them more sensitive to pricing and promotional offers.

The appeal of tourist destinations and seasonal tourism patterns influence air travel. Destinations that invest in their tourism infrastructure and marketing can attract more travelers, thus elevating passenger activity levels. Understanding these trends helps airports prepare for seasonal fluctuations and allocate resources effectively.

Conversely, a surge in leisure travel could prompt airlines to offer more flights to popular tourist destinations and adjust pricing strategies to attract a cost-sensitive customer base. Consequently, airports might experience increased passenger volumes during peak holiday seasons, necessitating efficient baggage handling, expansive retail offerings, and adequate ground transportation services.

### U3.2.3 Passenger Service by Airlines

Airline industry changes over time have a significant influence on passenger activity levels and the number of flight operations at Logan Airport. EDRs and ESPRs compare the trends at Logan Airport to national trends as well as examine more general indicators of historical and future aviation activity, including airline competition, airline profitability, aircraft fleet composition changes, and effects related to nearby regional airports' activities. Airline industry trends assessment methodology includes reviewing data reported by airport and airline trade organizations, including the Airports Council International (ACI) and International Air Transport Association (IATA), and the U.S. Department of Transportation (U.S.DOT).

An **airline interline agreement** between two or more airlines allows passengers to travel on multiple flights operated by different airlines using a single ticket and checked-through baggage.

An **airline codeshare agreement** is when two or more airlines sell seats on the same flight using their own respective flight numbers, so airlines can offer more flights to more destinations without as many associated costs.

#### U3.2.3.1 Commercial Air Service Types

Passenger commercial air service is provided by **legacy carriers**, such as American Airlines, Delta Airlines, and United Airways; **Low-Cost Carriers (LCCs)**, such as jetBlue Airways and Southwest Airlines; and **Ultra-Low-Cost Carriers (ULCCs)**, like Spirit Airlines. Each offers different levels of service and connectivity. Logan Airport is primarily an **Origin and Destination (O&D)** market, and as such is an important gateway for international air traffic.

Logan Airport's strong air travel demand and market position make it a strategic airport location for international expansion by several legacy carriers and their partner airlines, LCCs, and ULCCs. Nonstop services introduced by foreign airlines cater to O&D traffic and enable connecting opportunities through airline codeshares and interline agreements. An **airline interline agreement** is a commercial agreement between two or more airlines that allows passengers to travel on multiple flights operated by different airlines using a single ticket and checked-through baggage. It enables airlines to provide seamless travel experiences to passengers by facilitating the transfer of passengers and their baggage between connecting flights. An **airline codeshare agreement** is a commercial agreement where two or more airlines sell seats on the same flight using their own respective flight numbers. This allows airlines to offer more flights to more destinations without as many associated costs and provides similar benefits to passengers as interline agreements.

**Wide-body aircraft**, also known as twin-aisle aircraft, are wide enough to have two passenger aisles, often with seven or more seats per row.

**Narrow-body aircraft** have a single aisle in the cabin, typically with three to six seats per row.

**Figure U3-2** shows examples of each aircraft type.

The Airport benefits from its O&D passenger market strengths, making Logan Airport an attractive entry point for foreign carriers. Particularly in transatlantic markets, foreign carriers' partnerships and codeshares with U.S. airlines can facilitate seamless connections to international flights. The adoption of newer aircraft technology also allows airlines to expand their fleets and utilize smaller and more fuel-efficient aircraft, like the Airbus A321LR and Boeing 737 MAX. This benefits mid-size O&D markets such as Boston. The economic viability of using longer-range **wide-body aircraft**, like the Airbus A350, Boeing 787, and upcoming Boeing 777X, also supports increased connectivity and seat capacity on fewer flights. **Figure U3-2** illustrates examples of wide-body and **narrow-body aircraft** that serve Logan Airport.

Figure U3-2 Examples of Narrow-body and Wide-body Jets Serving Logan Airport

#### Narrow-body: Airbus A321XLR



#### Wide-body: Airbus A350



Source: AeroLopa (2025), iStockPhotos (2025).

## U3.3 Aircraft Operations Levels

This section reports on factors related to aircraft operations levels for Logan Airport, including commercial passenger aircraft, **General Aviation (GA)** aircraft, and cargo aircraft operations, as well as aircraft passenger **load factors**. Trends in the types of aircraft operating at Logan Airport, including changes in the number of flights over time; the effects of airline mergers; fuel costs; impacts from shock events like the COVID-19 pandemic; and strategies airlines use to maximize passenger loads, could each affect the degree of environmental impact from overall Airport operations. Each of these factors could influence fuel consumption, emissions, and noise levels, which cumulatively contribute to the Airport's overall environmental footprint.

### U3.3.1 Commercial Passenger Operations

Passenger operations increases are attributed to positive economic activity, improved local and state **gross domestic product (GDP)**, lower unemployment rates, demand for leisure travel, expansion of business and corporate travel segments, and airline network service developments.

#### U3.3.1.1 Passenger Aircraft Types

**Large jet**, **regional jet**, and **non-jet aircraft** are distinct categories in the aviation industry, each serving different purposes and flight operations. Large jets, which are the most common aircraft at Logan Airport, produce more greenhouse gases (GHGs) than smaller aircraft due to higher fuel consumption. The size and frequency of these jets also lead to noise impacts.

Smaller regional aircraft generally have lower emissions due to their reduced fuel requirements. However, the cumulative effect of frequent flights may still lead to environmental impacts, especially if operating from busy regional airports, such as those discussed within the *Regional Transportation* chapter. Noise from these aircraft, although less intense than larger jets, can still be disruptive due to higher departure and landing frequencies.

Additionally, turboprop planes, often used for short-haul flights, have a different impact due to their distinctive engine design. They tend to be more fuel-efficient and thus emit fewer greenhouse gases per flight mile, making them more environmentally friendly in this regard. Nevertheless, they can produce a unique noise signature that may be more noticeable to airport communities.

### Large Jet Aircraft

These jets are often wide-body aircraft designed for long-distance flights, typically accommodating a larger number of passengers on aircraft, which often have several hundred available seats. They are equipped to operate on major air routes and are typically used by prominent airlines for international and cross-continental travel. Large jets often feature advanced technology, larger engines, and extensive onboard amenities to enhance passenger comfort and safety over extended periods. An example of a large jet aircraft is the Boeing 777, known for its wide-body design and long-haul capabilities.



*Boeing 777 (Source: iStockPhoto, 2025)*

### Regional Jet Aircraft

Often these jets are narrow-body aircraft catering to short to medium-haul flights, serving regional airports and linking smaller cities with more extensive aviation hubs. They are generally smaller in size, seating fewer passengers, usually between 50 to 100 seats. Regional jets are optimized for efficiency, with improved fuel usage suitable for frequent take-offs and landings in regional networks. Due to their size, they can access airports with shorter runways that are inaccessible to larger jets. An example of a regional jet aircraft is the Embraer E175, well regarded for its versatility and comfort on shorter routes.



*Embraer E175 (Source: iStockPhoto, 2025)*

### Commercial Service Non-Jet Aircraft

These aircraft are designed for shorter distance travel and operate using propeller-driven engines rather than jet engines. They are typically intended for regional services and are suitable for routes that require access to smaller airports with limited infrastructure. Non-jet aircraft usually accommodate fewer passengers, often ranging from 9 to 76 seats, depending on the model. They offer lower operating costs and are an economical choice for airlines serving less demanded routes. These aircraft are known for their ability to take off and land on shorter runways, making them versatile for various geographical conditions. An example of a commercial service non-jet aircraft is the Cessna 402, which is recognized for its efficiency and reliability in regional air services.



*Cessna 402 (Source: iStockPhoto, 2025)*

## Differences Among Aircraft Types

The primary differences between large jet aircraft and regional jet aircraft lie in their size, range, passenger capacity, and operational roles within airlines. Large jets accommodate more passengers and fly longer distances, often internationally. In contrast, regional jets are smaller, focused on shorter routes, and enable connections to larger airports. These distinctions allow airlines to tailor their fleets to meet diverse travel needs efficiently. While jet aircraft are favored for their speed and ability to fly at higher altitudes for longer distances, non-jet aircraft excel in efficiency on shorter routes, particularly where demand does not justify the use of larger, faster jets. Non-jet aircraft are integral to connecting more remote areas and smaller markets to major hubs, providing an essential link in both commercial and regional travel networks.

### U3.3.1.2 Passenger Aircraft Capacity

The rise in the average number of passengers per aircraft operation at Logan Airport reflects an increase in aircraft **seating capacity**,<sup>7</sup> a higher **load factor**, or a combination of both.

#### Aircraft Seat Capacity

Aircraft seat capacity refers to the total number of seats available on an aircraft for a given flight service. This capacity is a crucial determinant of passenger activity levels at airports, as it directly influences the number of passengers an airline can transport at any given time. The decision to select larger or smaller aircraft is typically based on anticipated passenger demand for specific routes, with the goal of optimizing operational efficiency and revenue generation.

When airlines increase aircraft seat capacity, either through larger planes or more frequent flights, airports can experience heightened levels of activity across several operational domains. Firstly, greater seat capacity can lead to increased vehicular volume as more passengers result in higher demand for transportation services, including taxis, buses, and rideshare options accessing airport facilities. Additionally, parking facilities may need to be expanded or optimized to accommodate the influx of vehicles during peak travel times, ensuring convenience and accessibility for passengers. Furthermore, higher seat capacities often necessitate adjustments in flight operations, such as reevaluating route frequencies, investing in more ground and air operations resources, and coordinating with airlines to manage peak service periods efficiently.

From an environmental perspective, increased aircraft seat capacity can escalate the environmental footprint of airport operations. More passengers equate to heightened aircraft activities and emissions,

**Seat Capacity:** the total number of seats available on an aircraft, which varies between different models and configurations.

**Load Factor:** percentage that indicates how full an aircraft is; a higher load factor means more seats are filled, which is often a key performance indicator for airlines to maximize revenue and efficiency.

<sup>7</sup> The number of onboard passengers as a percentage of total available seats operated on a flight segment at the Airport.

underscoring the need for robust environmental management practices. Airports may need to invest in noise mitigation measures, sustainable energy solutions, and pollution reduction initiatives to mitigate the impact associated with heightened aircraft activity levels. By understanding the implications of aircraft seat capacity on passenger activity levels, airports can strategically adapt their infrastructure and services to enhance operational efficiency while supporting sustainable growth and positive passenger experiences.

### Aircraft Load Factor

Aircraft load factor is a key performance indicator in the aviation industry that represents the percentage of available seating capacity that is actually filled by passengers. It reflects the efficiency with which an airline utilizes its seating capacity on a flight, providing insights into demand and operational effectiveness. In the context of passenger activity levels, a higher load factor suggests that more seats are occupied, indicating strong passenger demand, whereas a lower load factor may highlight underutilization of available capacity. If more people are flying year-over-year, while the number of flights is fewer year-over-year, this indicates increased efficiency per flight operation, including greater load factors. The load factor is the percentage of actual passengers on a flight relative to the number of seats available on the aircraft of the given flight.

The load factor can significantly influence airport operations and on-airport conditions. When airlines achieve high load factors, airports might see increased passenger traffic, which can amplify vehicular congestion around the airport as more passengers arrive and depart in approximately the same time frames as they are booked on the same flights. As a result, these passengers use personal vehicles, taxis, or rideshare services at the Airport at the same time. To accommodate increased activity, airports may need to enhance traffic management protocols, expand parking facilities to handle additional cars during peak periods, or promote HOV and shared ride options. The increased passenger activity also boosts the demand for airport amenities, including retail outlets, restaurants, and lounges, necessitating strategic space planning and resource allocation.

### U3.3.2 General Aviation (GA) Operations

GA is generally considered to encompass civilian, non-scheduled, and non-commercial aviation activities. GA usually refers to activities and aircraft like sport aviation; personal aviation with privately owned jets or piston aircraft; agricultural services like crop-dusting planes; gliders and sailplanes; and more. Activities like scheduled commercial passenger or cargo airline services and military operations are excluded from the GA category. GA encompasses a variety of aviation activities at Logan Airport, including private corporate or business aviation, private business jet charters, law enforcement flights, and emergency medical flights or air ambulance services. Operations are conducted by a diverse group of private individuals and businesses, and aircraft range from single-engine piston-driven aircraft to high-performance, long-range jets.

### U3.3.3 Cargo Operations

Cargo operations typically involve specialized cargo aircraft, which are designed to maximize payload capacity and ensure the safe transport of various shipments, ranging from perishable items to oversized machinery. Airports equipped with dedicated cargo facilities provide essential support for logistical processes, including loading, unloading, sorting, and storage of cargo. These facilities often feature advanced technology and sophisticated infrastructure to manage large volumes of goods swiftly and accurately. Effective cargo operations are vital for maintaining the flow of commerce, enabling businesses to access global markets and consumers to receive products from around the world. By prioritizing efficiency and security, airports contribute to the smooth functioning of supply chains, enhancing economic growth and connectivity across regions. Cargo carriers at Logan Airport include FedEx, United Parcel Service (UPS), DHL, and a few other carriers that operate wide-body freight aircraft.

## U3.4 Future Passenger Activity and Operations Forecast

This section summarizes how the aviation activity forecasts in ESPRs are updated every five years. The updated Logan Airport planning forecast incorporates considerations for both near-term and long-term growth trends. These trends and assumptions, and the forecasts derived from them, are important inputs for noise, ground transportation, and air quality analyses.

Massport uses these analyses to understand what environmental conditions in and around Logan Airport are likely to be in the future, given the anticipated future passenger demand for air travel and the flight operations needed to accommodate that demand. This information enables Massport to plan effectively for these conditions and make informed, data-driven decisions to mitigate or prevent environmental impacts associated with more passengers and flights at the Airport. For more information on Massport's planning process, see the **Section U4**.

To understand how Logan Airport will change over time, the future forecast applies standard industry forecasting techniques to analyze:

- Historical trends,
- Air passenger demographics;
- Disturbances, shocks, or other significant events affecting the aviation industry; and
- Outlook for future demand drivers, such as the local and national economy.

### U3.4.1 Future Forecast Process and Methods Overview

Updating the forecast begins with establishing a base year, which reflects the aviation industry's current status and emerging trends expected to influence how many passengers will use Logan Airport for air travel in the near future. For airport planning and forecasting, the term **Planning Activity Level (PAL)** might be used instead of passenger activity levels. The PAL refers to aviation demand levels, or passenger numbers, that would make airport facility expansion or improvements necessary based on factors like peak hour passenger counts or aircraft operations.

Given the substantial changes over the past five years and the uncertainty in predicting future aviation activity levels, a specific future forecast year is not used. Instead, Massport considers a Future Planning Horizon, or FPH, for a 10- to 15-year timeframe.

The ESPR forecast methodology is consistent with the industry best practices published in the FAA's *Forecasting Aviation Activity by Airport*.<sup>8,9</sup> This forecast guidance document identifies reliable data sources and accepted statistical analysis techniques, such as econometric analyses of the relationship between airport passengers and socioeconomic demand drivers.

The FAA issues a **Terminal Area Forecast (TAF)** each year, which the FAA uses for regional planning, budgeting, and managing staffing levels. The TAF forecasts are prepared at the individual airport level and based on local and national trends, but are not reconciled directly to the FAA's national Aerospace Forecast. As a result, the TAF does not contain the local nuances and market-specific conditions that the ESPR site-specific forecasts provide. Massport also uses the following additional, widely accepted aviation industry guidance for aviation demand forecasting:

- Annual editions of *FAA Aerospace Forecast*<sup>10</sup>
- Annual editions of *FAA Forecast Process for Terminal Area Forecast*<sup>11</sup>
- Annual editions of Boeing - *Commercial Market Outlook*<sup>12</sup>
- Quarterly editions of Airports Council International (ACI) – *Impact of COVID-19 on Airports and The Path to Recovery*<sup>13</sup>
- Semi-annual editions of IATA – *Global Outlook for Air Transport*<sup>14</sup>
- Airport Cooperative Research Program (ACRP) *Report 25 - Airport Passenger Terminal Planning and Design*<sup>15</sup>
- ACRP Report 82 - *Preparing Peak Period and Operational Profiles*<sup>16</sup>

8 FAA, 2001. *Forecasting Aviation Activity by Airport*. Federal Aviation Administration Office of Aviation Policy and Plans Statistics and Forecast Branch (APO-110). U.S. Department of Transportation. [https://www.faa.gov/sites/faa.gov/files/data\\_research/aviation\\_data\\_statistics/AF1.doc](https://www.faa.gov/sites/faa.gov/files/data_research/aviation_data_statistics/AF1.doc)

9 FAA, 2025. Data and research: Aviation. U.S. Department of Transportation. [https://www.faa.gov/data\\_research/aviation](https://www.faa.gov/data_research/aviation)

10 FAA, 2023. *FAA Aerospace Forecasts*. Federal Aviation Administration, U.S. Department of Transportation. Website. Last updated June 6, 2025. [https://www.faa.gov/data\\_research/aviation/aerospace\\_forecasts](https://www.faa.gov/data_research/aviation/aerospace_forecasts).

11 FAA, 2024. *Terminal Area Forecast (TAF)*. Federal Aviation Administration, U.S. Department of Transportation. Website. Last updated January 21, 2025. [https://www.faa.gov/data\\_research/aviation/taf](https://www.faa.gov/data_research/aviation/taf).

12 Boeing, 2025. *Commercial Market Outlook 2024-2043*, Boeing. Website. Last updated 2025. <https://www.boeing.com/commercial/market/commercial-market-outlook>.

13 ACI, 2023. *Advisory Bulletin, The Impact of COVID-19 on Airports – And the Path to Recovery*, Airports Council International (ACI). Website. Last updated 2025. <https://aci.aero/2023/02/22/the-impact-of-covid-19-on-airportsand-the-path-to-recovery-industry-outlook-for-2023/>.

14 IATA, 2025. *Publications: Sustainability and Economics*, International Air Transport Association (IATA). Website. Last updated 2025. <https://www.iata.org/en/publications/economics/>.

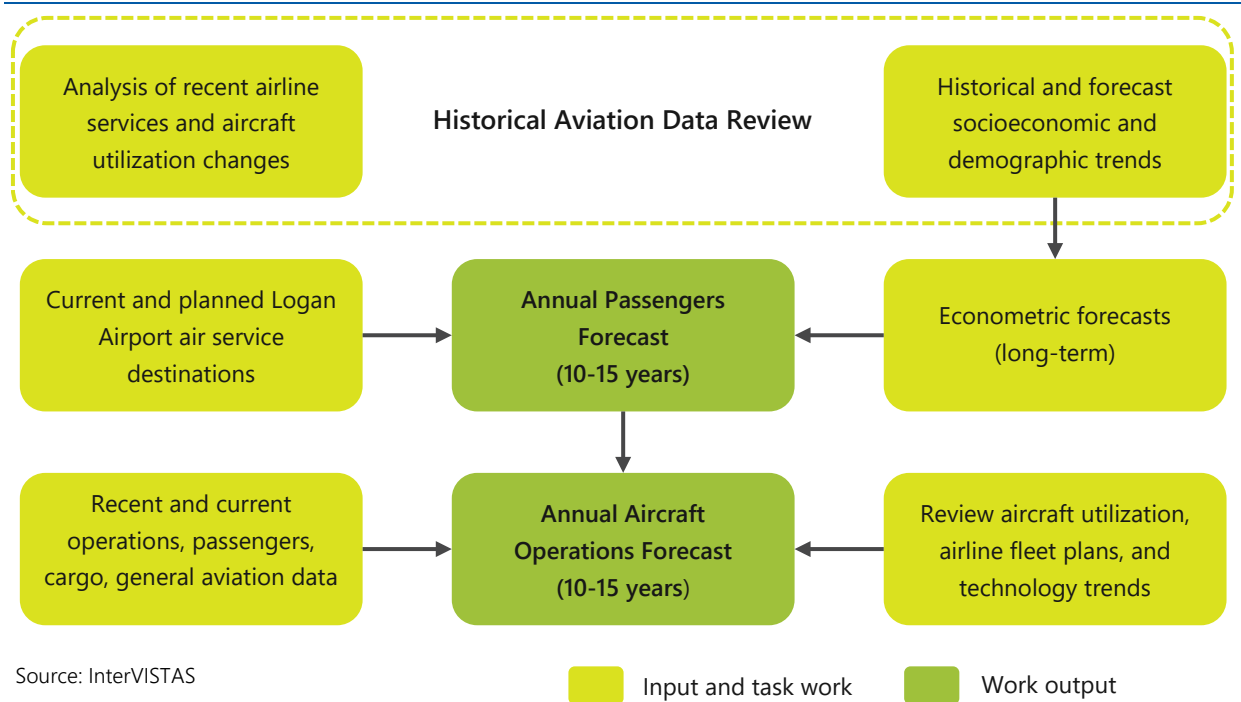
15 ACRP, 2010. *ACRP Report 25: Airport Passenger Terminal Planning and Design, Volume 1: Guidebook*, Airport Cooperative Research Program (ACRP). Website. Last updated 2025. <https://crp.trb.org/acrpwebresource2/acrp-report-25-airport-passenger-terminal-planning-and-design-volume-1-guidebook/>.

16 ACRP, 2013. *ACRP Report 82: Preparing Peak Period and Operational Profiles – Guidebook*, ACRP. Website. Last updated 2025. <https://crp.trb.org/acrpwebresource2/acrp-report-82-preparing-peak-period-and-operational-profiles-guidebook/>.

- The IATA *Airport Development Reference Manual (ADRM) 12th edition*, Chapter 2<sup>17</sup>
- FAA's Office of Aviation Policy and Plans (APO) Advisory Circular (AC) 150/5070-6B Change 2, *Airport Master Plans*, Chapter 7<sup>18</sup>
- FAA APO Report - *Forecasting Aviation Activity by Airport*
- ACRP Synthesis 2 - *Airport Aviation Activity Forecasting*<sup>19</sup>

The strategic planning forecasts include projections of both domestic and international air passengers; commercial passenger, cargo, and GA aircraft operations; and cargo volumes. The following list provides more detailed descriptions of the methodology's key elements as shown in **Figure U3-3** and **Figure U3-4**.

**Figure U3-3 Forecast Methodology**



17 IATA, 2022. Airport Development Reference Manual, IATA. Website. Last updated 2025. [https://www.iata.org/en/store/publications/manuals-standards-and-regulations/airport-development-reference-manual-adrm\\_adrm/?code=9346-12](https://www.iata.org/en/store/publications/manuals-standards-and-regulations/airport-development-reference-manual-adrm_adrm/?code=9346-12).

18 FAA, 2015. FAA Series 150 Advisory Circulars (Acs) for Airport Projects, AC 150/5070-6B – Airport Master Plans, FAA. Website. Last updated 2025. [https://www.faa.gov/airports/resources/advisory\\_circulars/index.cfm/go/document.current/documentnumber/150\\_5070-6](https://www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.current/documentnumber/150_5070-6).

19 ACRP, 2007. Airport Aviation Activity Forecasting, ACRP. Website. Last updated 2025. <https://nap.nationalacademies.org/catalog/23192/airport-aviation-activity-forecasting>.

Figure U3-4 Forecast Methodology Process



### U3.4.2 Key Airline Industry Trends Assessment

The updated long-range planning forecasts consider the following key trends:

- **National and Regional Economy:** Historical and forecasted economic growth in the Boston MSA, with comparisons made to national economic trends.
- **Airline Industry:** Airline industry trends that could influence future aviation activity at Logan Airport are considered, including:
  - **Airline competition:** business competition between commercial airlines will affect each airline's business strategies in the future; for example, the impact of the growth of LLCs on legacy air carriers.
  - **Airline finances:** each airline's financial performance and profitability will affect future business models, service offerings, and destinations served.
  - **Aircraft fleets:** changes in aircraft fleet composition in recent years for each airline, including aircraft retirements and transition to newer-generation aircraft, reflect service offering trends and future strategies.

The **econometric analysis** does not develop a single "best" statistical equation to predict future conditions.

Rather, the analysis results inform assumptions regarding potential and **reasonable growth** of Logan Airport **over the Future Planning Horizon**.

### U3.4.3 Passenger Forecast Methodology

Passenger forecasts are prepared using accepted industry standard forecasting techniques, which analyze historical passenger traffic patterns at Logan Airport; recent trends among Logan Airport airlines and within the airline industry; and estimated future demand for air travel based on economic factors. The passenger planning forecast also considers both near-term and long-term growth trends in analyses.

The passenger traffic levels analysis methodology for the near-term is based on assessing absolute traffic levels, with the following factors considered:

- The growth or decline of market segment demand for domestic and international air travel in the recent past;
- Recent changes in passenger behavior, such as increased demand for business versus leisure travel; and
- Airline responses to these changes in demand or behavior patterns.

Econometric analysis is used to examine statistical correlations between underlying drivers (referred to as explanatory variables), and the ability to predict annual changes and levels in the dependent variable, in this case, Logan Airport passengers.

The underlying economic drivers are used in different combinations and for different historical time periods to assess the statistical relationships between these drivers and annual growth in Logan Airport

passenger levels. They are also used to produce ranges of statistical coefficients for forecasting future passenger levels. Various reasonable arguments typically arise in support of using different underlying drivers or combinations of variables, as well as how different historical time periods are represented. The objective of the econometric analysis is not to develop a single “best” statistical equation to predict future conditions, but instead to use the results of the analysis to inform opinions and assumptions regarding potential and reasonable long-term growth of Logan Airport passenger levels.

#### U3.4.4 Aircraft Operations Forecast Methodology

The aircraft operations forecast for Logan Airport is developed based on the forecast of annual passenger levels, expected trends in aircraft fleet composition, and key metrics such as average seats per aircraft and load factors.<sup>20</sup> For example, an increase in the average number of passengers per operation and an associated decrease in aircraft operations relative to passenger levels would indicate an increase in the average number of seats per aircraft per operation, as well as an increase in the average load factor value.

Data analysis methodology includes evaluating annual aircraft operations by airline and aircraft type. This methodology considers aircraft utilization by aircraft type and historical trends, used in developing the assumptions regarding future aircraft operations. Other information used in this methodology include industry forecasts of airline aircraft fleets and aircraft orders by airlines serving Logan Airport.

#### U3.4.5 Derivative Forecast Methodology

Using the top-level passenger and aircraft operations numbers, a series of derivative forecasts are derived to provide details for the noise, air quality, and transportation forecast analyses. These derivative forecasts based on the FPH are important for supporting the technical analyses, as shown in **Table U3-1** below. The derivative forecasts include:

- Annual aircraft operations by aircraft type, which support air quality modeling;
- Average daily arriving and departing operations by aircraft type and stage length used to support noise modeling; and
- Peak month, average day arriving and departing **O&D Passengers** by time of day, which supports **Vehicle Miles Traveled (VMT)** modeling.<sup>21</sup>

The methodology for preparing derivative forecasts of activity at Logan Airport is based on industry standard practices. Detailed analysis of historical data is used to develop assumptions regarding the relationship of annual activity data to the more detailed derivative activity, such as daily and hourly activity. These data sources include Massport airline activity reports, the U.S.DOT airline activity data reports; FAA aircraft operations reports; and airline schedule filings. Additional sources include analysis of

<sup>20</sup> Load Factor refers to the percentage of seats on an aircraft occupied by passengers.

<sup>21</sup> Vehicle miles traveled (VMT) measures the amount of travel for all vehicles in a specific geographic area over a specific period of time, typically a one-year period. See User's Guide Section U6.1 for more details.

activity metrics such as annual and daily aircraft fleet share, domestic and international airline service by season, and airline use of terminals.

Based on these data inputs, assumptions were developed regarding future ratios of derivative activity in relation to annual activity. One key assumption includes the industry standard practice of **peak demand flattening**. Peak demand flattening refers to when airlines plan operations so that demand growth occurs during less busy times of the day. This allows for increased service to markets as well as better utilization of terminal and **airside** facilities. As such, passenger demand over the course of the peak month average day planning period grows faster than the peak period.

Additionally, the airlines are anticipated to use terminal facilities in the FPH, in a similar way as they use them today. Thus, as international demand increases and new airlines initiate service, the utilization of Terminal E, Logan's international arrivals and departures terminal, is expected to increase relative to the other terminals.

**Table U3-1 Forecasting Inputs, Assumptions, Models, and Outputs**

|                             | Ground Transportation                                                                                                                                                                                                                                                                | Noise                                                                                                                                                                                                           | Air Quality and Emissions Reductions                                                                                                                                                                                                                                                                                                     |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Historical Inputs</b>    | <ul style="list-style-type: none"> <li>Passenger levels</li> <li>Mode choice</li> <li>Terminal usage</li> <li><b>Automated Traffic Monitoring System (ATMS)</b></li> <li>Roadway configuration and mileage</li> <li>Parking garage and lot usage</li> <li>Curb dwell time</li> </ul> | <ul style="list-style-type: none"> <li>Total aircraft operations</li> <li>Aircraft fleet mix</li> <li>Runway use</li> <li>Radar flight lengths</li> <li>Stage length</li> <li>Night / day operations</li> </ul> | <ul style="list-style-type: none"> <li>Aircraft operations by aircraft and engine type</li> <li>Aircraft taxi and delay</li> <li><b>Ground service equipment (GSE)</b></li> <li>Motor vehicle volumes, Vehicle Miles Traveled (VMT), and terminal curb use</li> <li>Energy use</li> <li>Stationary and other source emissions</li> </ul> |
| <b>Inputs from Forecast</b> | <ul style="list-style-type: none"> <li>Average day of peak month (ADPM) – arriving and departing local passengers by terminal and time of day</li> </ul>                                                                                                                             | <ul style="list-style-type: none"> <li><b>Annual average day (AAD)</b></li> <li>Aircraft type</li> <li><b>O&amp;D</b></li> <li>Day / Night schedule</li> </ul>                                                  | <ul style="list-style-type: none"> <li>AAD</li> <li>Motor vehicle volumes, VMT and terminal curb use</li> </ul>                                                                                                                                                                                                                          |

Table U3-1 Forecasting Inputs, Assumptions, Models, and Outputs

|                           | Ground Transportation                                                                                                                                                                                                                                      | Noise                                                                                                                                                                                                                                                                                                | Air Quality and Emissions Reductions                                                                                            |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b>Future Assumptions</b> | <ul style="list-style-type: none"> <li>• Future mode choice</li> <li>• Future traffic volumes (based on millions of annual passengers [MAP])</li> <li>• Future roadway configuration and mileage</li> <li>• Future parking garage and lot usage</li> </ul> | <ul style="list-style-type: none"> <li>• Runway use</li> </ul>                                                                                                                                                                                                                                       | <ul style="list-style-type: none"> <li>• Future GSE use</li> <li>• Energy use</li> <li>• Stationary source emissions</li> </ul> |
| <b>Model</b>              | <ul style="list-style-type: none"> <li>• VISSIM modeling</li> </ul>                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>• Federal Aviation Administration (FAA) <a href="#">Aviation Environmental Design Tool (AEDT)</a></li> </ul>                                                                                                                                                  | <ul style="list-style-type: none"> <li>• AEDT</li> <li>• <a href="#">Motor Vehicle Emissions Simulator (MOVES)</a></li> </ul>   |
| <b>Outputs</b>            | <ul style="list-style-type: none"> <li>• Total traffic circulation by mode</li> <li>• On-Airport VMT</li> </ul>                                                                                                                                            | <ul style="list-style-type: none"> <li>• Current day-night noise contours</li> <li>• Future day-night noise contours</li> <li>• Population impact assessment for current and future conditions</li> <li>• Comparison of measured and modeled noise levels</li> <li>• Supplemental metrics</li> </ul> | <ul style="list-style-type: none"> <li>• Emissions Inventory</li> </ul>                                                         |

## U4. Airport Planning

The *Airport Planning* chapter focuses on how Logan Airport continues to adapt to changing aviation transportation needs by modernizing aging buildings and infrastructure, enhancing safety, improving operational efficiency, and reducing environmental and community impacts. The *Airport Planning* chapter describes the status of recently completed projects, ongoing initiatives, and Airport-wide planning and development efforts within the EDR or ESPR reporting year. Projects and initiatives are organized by Airport location, including terminal facilities, landside service areas supporting aviation activities, ground transportation access and parking, and the airfield with airside facilities. Where appropriate, Airport-wide initiatives are also discussed to provide a broader context.

### U4.1 Airport Planning Process

Massport conducts airport planning through a structured, data-driven process that integrates forecasting, environmental review, and regulatory compliance. Approximately every five years, the ESPR is developed in lieu of an airport master plan, which is typically developed every 10 to 20 years by other U.S. airports. Therefore, Massport assesses future conditions and develops appropriate planning at more frequent intervals than most airports, updating forecasts to inform airport planning, projects, and initiatives which will direct future Airport growth to meet future customer demand.

The ESPR documents both near-term and long-term growth trends for passenger activity levels and aircraft operations over a 10- to 15-year **Forecast Planning Horizon (FPH)**. These trends and assumptions, and the forecasts derived from them, inform noise, ground transportation, and air and water quality modeling for future conditions at Logan Airport. Massport will use these analyses to understand what environmental conditions in and around Logan Airport are likely to be in the future, given the anticipated future commercial, cargo, and GA levels and associated flight operations. The anticipated demand shapes airport planning projects and initiatives across Logan Airport's key functional areas, which are categorized into ground access, terminal, airside, and service. For additional detail on Massport's forecast methodology for passenger activity and aircraft operations, see the **Section U3**.

Projects undertaken by Massport or its tenants that meet applicable state thresholds undergo review in accordance with MEPA and, when federal actions or funding are involved, NEPA. These reviews evaluate potential environmental and community impacts on noise, air quality, water quality, and ground access and identify appropriate measures to avoid, minimize, or mitigate those impacts. For detailed information on the development of project-specific mitigation, see the **Section U10**.

**Community input** received during the public-comment period informs Massport's planning initiatives, **shapes proposed projects, and guides the development of project-specific mitigation measures.**

Community outreach is an important part of the planning and environmental review process. Following the filing of an ESPR or EDR under MEPA, a public review and comment period is initiated, where Massport utilizes a range of engagement methods designed to reach communities. Community input received during the public-comment period informs Massport's planning initiatives, shapes proposed projects, and guides the development of project-specific mitigation measures. This approach promotes transparency, encourages meaningful stakeholder input, and supports environmental stewardship in the near- and long-term planning of the Airport. Additional information on Community Outreach related to ESPRs and EDRs is provided in the **Section U2. Figure U4-1** illustrates the key elements that inform Massport's Airport Planning Process.

**Figure U4-1** Airport Planning Process



Source: VHB

## U4.2 Logan Airport Planning Areas

The following sections describe Logan Airport's four key planning areas: ground access, terminal areas, airside, and service areas. Each planning area performs a distinct role in supporting the Airport's transportation mission. **Figure U4-2** identifies Logan Airport's main planning areas.



Figure U4-2 Logan Airport Planning Areas

EDR and ESPR User's Guide

- Ground Access Areas
- Airside
- Terminal Area
- Service Areas



## U4.2.2 Ground Access Areas

Key planning priorities and goals for ground access and parking capacity focus on improving on Airport roadway operations, safety and traffic congestion and the promotion of more sustainable transit options. Ground transportation and parking planning projects often involve strategic expansions and renovations to accommodate increased demand, improve infrastructure, and alleviate congestion. Key objectives are optimizing vehicle and pedestrian circulation, enhancing public transport options, coordinating **Ride App**, and reducing emissions by integrating sustainable practices, for more information on Ground Access Initiatives see **Section U6**.

## U4.2.3 Terminal Areas

The terminal area accommodates most of the passenger functions at Logan Airport, including the passenger terminals, terminal area roadways, central parking facilities, and the Hilton™ Hotel. **Terminal area planning** projects are designed to modernize and enhance airport facilities to improve passenger experience, operational efficiency, and safety while integrating sustainable and resilient practices. Terminal area projects often involve infrastructure upgrades, new construction, and reconfigurations to optimize terminal access, circulation, and amenities for existing passenger activity levels. Key goals include enhancing connectivity between terminals, upgrading roadways and curbsides, and incorporating environmental initiatives to support sustainability targets.

## U4.2.4 Airside Areas

Airside planning projects focus on enhancing the operational efficiency, safety, and sustainability of the airside. These projects often involve runway and taxiway rehabilitations as well as lighting and signage upgrades conducted to comply with FAA standards. Key goals include improving infrastructure to accommodate current aviation demands and ensuring safe and efficient aircraft movements.

## U4.2.5 Service Areas

Logan Airport has six service areas that contain airline support operations and businesses. Land use in these service areas continues to evolve in response to changing airline business, customer, and tenant needs, as well as public works projects. Massport continues to explore ways to efficiently use the limited land resources in these service areas.

### U4.2.5.1 North Cargo Area

The North Cargo Area (NCA) is located in Logan Airport's northwest corner. It is bounded by the main Logan Airport outbound roadway to the south, Route 1A to the west, Prescott Street to the north, and Terminal E to the east. The NCA is the Airport's primary airline support area, and accommodates essential airline support businesses. These include hangars, **ground service equipment (GSE)**, maintenance facilities, air cargo, and aircraft parking.

### U4.2.5.2 North Service Area

Located north of Prescott Street, the North Service Area (NSA) extends to the Green Bus Depot Site, the Massachusetts Bay Transit Authority (MBTA) Wood Island Station, and the Runway 15R End. The NSA includes two flight kitchens; weather and navigation equipment; the Green Bus Depot; Massport Facilities 2 and 3; Hangar 5; the BOSFuel Fuel Farm; water tanks; Signature Flight Support; and a **Fixed-Base Operator (FBO)**. The Greenway Connector and Narrow-Gauge Connector pathway both run parallel to the MBTA Blue Line corridor in this section of the Airport.

### U4.2.5.3 Southwest Service Area

Southwest Service Area (SWSA) is south of Logan Airport's main access roadway and is bounded by Harborside Drive to the east. Because of its proximity to the terminals and the regional highway system, the SWSA functions as Logan Airport's primary ground transportation hub. It includes the Rental Car Center (RCC) as well as taxi, Ride App, bus, and limousine pool lots.

### U4.2.5.4 Bird Island Flats

Bird Island Flats (BIF) is located south of the SWSA. BIF has landside access via Harborside Drive and water access through the water taxi system which shuttles passengers to Logan Airport from downtown Boston, and the South Shore. BIF facilities include the Hyatt™ Hotel and Conference Center; the Logan Office Center and adjoining garage; Lot B employee parking; the Logan Taxi Pool Lot; the Water Shuttle Dock; the Logan Airport Rescue and Fire Fighting (ARFF) Facility Marine Dock; and the Harborwalk, a publicly-accessible promenade along the harbor's edge.

### U4.2.5.5 South Cargo Area

South Cargo Area (SCA) is located southeast of the SWSA and is generally bounded by Harborside Drive to the south and by Logan Airport's airside area to the east and north. The SCA provides landside access and secured airside access for Logan Airport. It is the primary cargo area for domestic and international cargo operations.

### U4.2.5.6 Governors Island

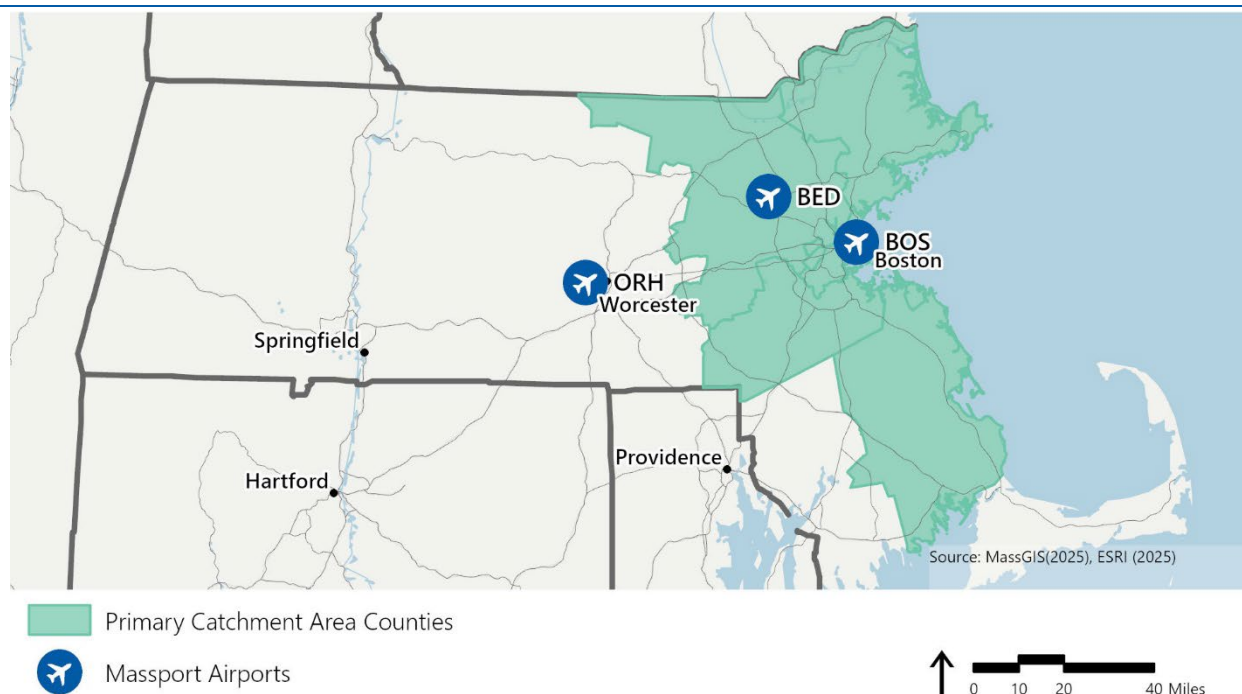
Governors Island is at Logan Airport's southern tip and is bounded by Runway 14-32 to the south, Boston Harbor to the east, Runway 4R to the west, and Runway 9 to the north. Governors Island has functioned as a storage site for the Central Artery Tunnel (CAT) / Ted Williams Tunnel dredged material and for Airport construction stockpiles. The area also contains an ARFF Facility training area, snow removal equipment parking, a biocell remediation area, and FAA aircraft navigation equipment.



## U5.Regional Transportation

The *Regional Transportation* chapter provides a comprehensive overview of transportation infrastructure and planning efforts in the New England Region (the Region), focusing on Logan Airport and its role as the Region's primary international and domestic gateway. **Figure U5-1** illustrates the primary catchment area for Logan Airport. This catchment area is supported by the regional transportation system surrounding the Airport. The Region's interconnected network of airports, rail, and roadways is highlighted, emphasizing the importance of a balanced intermodal transportation system to diversify travel options and reduce reliance on Logan Airport.

**Figure U5-1** Logan Airport's Primary Catchment Area



Passenger activity trends, capital improvement projects, and collaborative planning initiatives to enhance transportation efficiency and support economic growth are also discussed. The *Regional Transportation* chapter also summarizes aviation activity across other New England regional commercial passenger airports for the given reporting year, including passenger and flight activity, on-going projects to upgrade those facilities, and their long-range plans. Year-over-year comparisons of passenger counts and aircraft operations are provided for the current reporting year and the previous reporting year to show relative changes over the reporting timeframe, with benchmark reference years.

## U5.1 Regional Airports' Airline Passenger Services

Airlines continually adjust their service levels by increasing or reducing flight frequencies, changing aircraft size, or a combination of both strategies with respect to operational constraints, for example, labor staff, equipment, and other factors. These adjustments directly affect the total number of seats available to passengers, known as seat capacity, and influence each airport's overall number of departures, or flights available. To fully understand how the airline service industry is evolving, both the number of departures and the available seat capacity are considered together in the *Regional Transportation* chapter. Airline departure changes, seat capacity trends, and notable new or discontinued routes at regional airports are reviewed for the given reporting year, prior reporting year, and a benchmark year. Where available, insights from the most recently published Official Airline Guide (OAG), advanced schedules are also included to highlight expected future changes.<sup>22</sup>

## U5.2 New England Regional Airports

Logan Airport is New England's largest airport and the Region's primary international and domestic gateway, but 10 other New England regional airports also provide commercial air service. These airports are discussed further in **Section U5.2.2**.

**Tertiary airports** in New England serve isolated communities by offering air taxi, seasonal, or niche commercial air services and frequent commercial flights to Logan Airport and Rhode Island T.F. Green International Airport.

In addition to the regional airports, tertiary airports in New England also serve isolated communities where air operators offer **air taxi**, seasonal, or niche commercial air services. Tertiary airports support commercial flights to Logan Airport and Rhode Island T.F. Green International Airport, including popular Cape Cod and island service during the summer.

Most of these tertiary airports are either geographically isolated, sufficiently distant from Logan Airport, or both. Therefore, these airports are unlikely to reduce passenger usage of Logan Airport; rather, many of these airports depend on Logan Airport for connecting services. These airports, however, are primarily for GA purposes and are listed in **Table U5-1**.

22 OAG. 2025. Global Airline Schedules Data. OAG Aviation Worldwide Limited. <https://www.oag.com/airline-schedules-data>

Table U5-1 The New England Region's Tertiary Airports

| State         | Airports                                                                                                                                                                                                                                                                |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Massachusetts | <ul style="list-style-type: none"> <li>• Cape Cod Gateway Airport (HYA)</li> <li>• Martha's Vineyard Airport (MVY)</li> <li>• Nantucket Memorial Airport (ACK)</li> <li>• New Bedford Regional Airport (EWB)</li> <li>• Provincetown Municipal Airport (PVC)</li> </ul> |
| Maine         | <ul style="list-style-type: none"> <li>• Augusta State Airport (AUG)</li> <li>• Hancock County–Bar Harbor Airport (BHB)</li> <li>• Knox County Regional Airport (RKD)</li> <li>• Presque Isle International Airport (PQI)</li> </ul>                                    |
| New Hampshire | <ul style="list-style-type: none"> <li>• Lebanon Municipal Airport (LEB)</li> </ul>                                                                                                                                                                                     |
| Rhode Island  | <ul style="list-style-type: none"> <li>• Block Island State Airport (BID)</li> <li>• Westerly State Airport (WST)</li> </ul>                                                                                                                                            |
| Vermont       | <ul style="list-style-type: none"> <li>• Rutland-Southern Vermont Regional Airport (RUT)</li> </ul>                                                                                                                                                                     |

### U5.2.1 New England Regional Airports Overview

The following provides general background information on the airports reported on within the EDRs and ESRs, shown in **Figure U5-2**. Significant developments, activity level or operational changes, or other notable events with the potential to affect passengers or operations at Logan Airport over the reporting years of a given EDR or ESR are highlighted within the *Regional Transportation* Chapter and are organized by airport. For more information on the FAA National Plan of Integrated Airport Systems (NPIAS) airport categories, see **Figure U5-3**.



Source: US DOT BTS (2025), ESRI (2025)

Figure U5-2 New England Regional Transportation System

EDR and ESPR User's Guide

-  Large Hub
-  Medium Hub
-  Small Hub
-  Nonhub
-  General Aviation
-  Acela/Northeast Regional
-  Downeaster
-  Lake Shore Limited



Figure U5-3     FAA Airport Size Categories

| General Aviation                                                                                                                       | Non-hub                                                                                                                                                                  | Small Hub                                                                                                         | Medium Hub                                                                                                                   | Large Hub                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| • Public-use airports that do not have scheduled passenger service or has scheduled service with fewer than 2,500 annual enplanements. | • Commercial service airports that account for less than 0.05 percent of all commercial passenger enplanements but have more than 10,000 annual commercial enplanements. | • Commercial service airports that account for 0.05 percent to 0.25 percent of total U.S. passenger enplanements. | • Commercial service airports that each account for between 0.25 percent and 1 percent of total U.S. passenger enplanements. | • Commercial service airports that each account for 1 percent or more of total U.S. passenger enplanements. |

Source: National Plan of Integrated Airport Systems (NPIAS), Federal Aviation Administration.  
[https://www.faa.gov/sites/faa.gov/files/airports/planning\\_capacity/npias/current/ARP-NPIAS-2025-2029-Narrative.pdf](https://www.faa.gov/sites/faa.gov/files/airports/planning_capacity/npias/current/ARP-NPIAS-2025-2029-Narrative.pdf)

U5.2.1.2     Massachusetts Airports

Worcester Regional Airport (ORH) offers commercial service and provides GA facilities. Laurence G. Hanscom Field (BED) is both a GA and military joint-use facility. These airports are owned and operated by Massport, in addition to Logan Airport.

Worcester Regional Airport (ORH)

Worcester Regional Airport (ORH) is strategically located in Worcester and Leicester, Massachusetts, about 50 miles west of Logan Airport. Massport owns and manages ORH, a critical transportation hub connecting Central Massachusetts to the world and supports the region’s economy. Covering approximately 1,000 acres, the FAA categorizes ORH as a **non-hub** airport in the NPIAS.<sup>23</sup> Several commercial airlines provide scheduled commercial services from the airport. ORH features two runways that support both commercial and general aviation operations, with Runway 11-29 measuring 7,001 feet and Runway 15-33 at 5,000 feet.

Laurence G. Hanscom Field (BED)

Located in Bedford, Concord, Lincoln, and Lexington, Massachusetts, Laurence G. Hanscom Field (BED) is around 20 miles northwest of Logan Airport. BED, encompassing 1,125 acres, is a critical facility for

23     National Plan of Integrated Airport Systems (NPIAS). Federal Aviation Administration. U.S. Department of Transportation. Website. Last updated November 6, 2024. [https://www.faa.gov/airports/planning\\_capacity/npias/current](https://www.faa.gov/airports/planning_capacity/npias/current)

ESPRs are periodically prepared for Hanscom Field and can be found on Massport's website at <https://www.massport.com/environment/project-environmental-filings/hanscom-field>.

business and corporate aviation in New England. Functioning as a GA reliever for Logan Airport, BED accommodates a range of activities, including corporate aviation, private flights, pilot training, commuter air services, air charters, and light cargo operations. More than 98 percent of the air traffic at Hanscom Field is civilian. BED features two runways with Runway 05-23 measuring 5,107 feet and Runway 11-29 at 7,011 feet. The Airport also serves as a joint commercial-military facility, hosting the Hanscom Air Force Base and the 66th Air Base Group.

### U5.2.1.3 New Hampshire Airports

#### Manchester-Boston Regional Airport (MHT)

Located in Manchester, New Hampshire, approximately 50 miles north of Boston, Manchester-Boston Regional Airport (MHT) is owned and operated by the City of Manchester and serves as a key commercial service facility for southern New Hampshire. MHT is located on 1,500 acres and is classified as a **small hub** airport supporting scheduled passenger service, GA, air cargo operations. MHT features two runways, with Runway 17-35 at 9,250 feet and Runway 06-24 measuring 7,651 feet.

#### Portsmouth International Airport (PSM)

Portsmouth International Airport (PSM), in the city of Portsmouth, New Hampshire, located about 55 miles from Boston, is managed by Pease Development Authority. This non-hub, commercial service airport facility spans 900 acres and supports scheduled passenger flights, cargo operations, GA, and New Hampshire Air National Guard operations. PSM features Runway 16-34, which is 11,322 feet long. A significant portion of the airport's operations includes refueling for the Air National Guard, customs clearance for cargo freighters, and fractional ownership and charter company services along the East Coast.

### U5.2.1.4 Maine Airports

#### Portland International Jetport (PWM)

Located approximately 110 miles north of Boston, Portland International Jetport (PWM) is owned by the City of Portland and is the largest commercial service airport in the state. Covering 726 acres, the Jetport features Runway 11-29 at 7,200 feet and Runway 18-36 at 6,100 feet. PWM is a small hub airport offering year-round scheduled passenger service to domestic destinations while supporting GA activities.

#### Bangor International Airport (BGR)

Bangor International Airport (BGR), situated 240 miles north of Boston in the City of Bangor, serves as a critical joint civil-military public facility in New England. BGR, located on 2,079 acres, is a non-hub airport that is owned and operated by the City of Bangor. The Airport features Runway 15-33, measuring 11,440

feet long that can accommodate a range of aircraft sizes. BGR offers scheduled passenger service on major airlines to both domestic locations while also accommodating GA and cargo services.

### U5.2.1.5 Connecticut Airports

#### Bradley International Airport (BDL)

Bradley International Airport (BDL), located in the town of Windsor Locks, is owned and operated by the Connecticut Airport Authority. BDL, located approximately 110 miles west of Boston, ranks as the second busiest commercial-service airport in New England. The airport spans 2,432 acres and has two runways, Runway 06-24 at 9,510 feet and Runway 15-33 at 6,847 feet. Classified as a **medium hub** airport, it provides extensive domestic and limited international commercial locations, while also supporting cargo GA and cargo activities. Passenger amenities include a Ground Transportation Center and a **consolidated rental car (CONRAC)** facility.

#### Tweed-New Haven Regional Airport (HVN)

Tweed-New Haven Regional Airport (HVN) is a commercial service airport located in the city of New Haven, which is around 140 miles southwest of Boston. The FAA classifies HVN as a small hub airport. Managed by the Tweed-New Haven Airport Authority, HVN operates under a public-private partnership (P3) with Avports, LLC (Avports) an airport management and operations firm, which secured a 43-year lease agreement in 2022 and is investing in infrastructure improvements. Avports' subsidiary, The New HVN LLC, handles daily operations. The airport spans 394 acres and features one main runway, Runway 02-20, which measures 5,600 feet in length, along with a helipad. Avelo Airlines and Breeze Airways serve HVN as LCCs, providing flights to multiple domestic destinations. HVN also accommodates GA activities and hosts operations for the Connecticut Wing Civil Air Patrol's 73rd Minuteman Squadron.

### U5.2.1.6 Rhode Island Airports

#### Rhode Island T.F. Green International Airport (PVD)

Owned and operated by the Rhode Island Airport Corporation, Rhode Island T.F. Green International Airport (PVD) is located in the city of Warwick, which is approximately 60 miles south of Boston. As the state's primary commercial-service airport, PVD covers 1,111 acres and features two active runways: Runway 05-23 measuring 8,700 feet and Runway 16-34 at 6,081 feet. Classified as a small hub airport, PVD offers both domestic and limited international service, along with supporting GA and cargo operations.

### U5.2.1.7 Vermont Airports

#### Patrick Leahy Burlington International Airport (BTV)

Patrick Leahy Burlington International Airport (BTV), located about 215 miles northwest of Boston, serves as a medium hub airport owned and operated by the City of Burlington. As the state's largest commercial

service airport, BTV operates as a joint-use airport with the Vermont Air National Guard. Covering 942 acres, the Airport features two runways, Runway 15-33 at 8,319 feet and Runway 01-19 at 4,112 in length. BTV provides domestic scheduled passenger flights, GA activities, and support for cargo activities.

## U5.3 Regional Rail Transportation Services

As a part of the regional transportation system, Massport supports the growth and development of alternative means of travel to markets served by Logan Airport. The following sections describe the different rail offerings from the Boston area, the markets served and the annual ridership trends.

### U5.3.1 Boston Amtrak™ Service

The National Railroad Passenger Corporation, Amtrak™, runs regional rail service from 13 stations in Massachusetts, three of which are in the City of Boston and four additional stations outside of Boston, serving the Greater Boston metro area. Amtrak operates the following four routes from stations around Boston, as shown in **Figure U5-1**:

- The **Lake Shore Limited** route provides daily service between Chicago's Union Station and Boston's South Station. This route splits into two lines in Albany, NY, with one end terminating at Penn Station in New York City and the other end terminating at Boston's South Station. The Lake Shore Limited route stops in several notable locations along the 22-hour journey, including South Bend, IN, Cleveland, OH, Erie, PA, Buffalo, NY, Rochester, NY, Syracuse, NY, Albany, NY, and Worcester, MA.
- The **Downeaster** route provides five daily trips between Brunswick, Maine to Boston's North Station with additional operations for major events and concerts at TD Garden in Boston. The route travels through New Hampshire, making stops in Exeter and Dover, and along the coast of Maine with notable stops in Portland, Freeport, and Brunswick.
- The **Northeast Regional** routes provide daily service along the Northeast Corridor with stops in major cities, including Providence, RI, New Haven, CT, New York City, NY, Newark, NJ, Philadelphia, PA, and Washington D.C. Additionally, some operations offer service to Roanoke, VA or Richmond, VA.
- **Acela** also services the Northeast Corridor from Boston's South Station to Union Station in Washington D.C. The Acela is a high-speed train covering less stops than the Northeast Regional. The trip from Boston to New York City is approximately an hour shorter than the Northeast Regional and travel to Washington D.C. is two hours less.

## U6. Ground Access

The *Ground Access* chapter of the User's Guide complements the ground transportation access content presented in the Logan Airport EDRs and ESPRs. The chapter contains relevant historical context, regulations and policies, modeling and analysis methodologies, key terminology and acronym definitions, and other information, as applicable, to better understand the content within EDRs and ESPRs. This content is routinely reviewed and refreshed as necessary to maintain its usefulness and accuracy.

### U6.1 On-Airport Vehicle Traffic: Volumes and Vehicle Miles Traveled (VMT)

The environmental impact of ground transportation activity associated with Logan Airport is measured in two ways: the number of vehicles that enter the airport and the VMT by those vehicles while on-Airport roadways. Through the EDR and ESPR documents, Massport annually reports on Logan Airport's traffic-related activity, specifically:

- **Gateway traffic volumes** (at Airport roadway access points), and
- Estimated on-Airport VMT.

#### U6.1.1 Traffic and Annual Average Daily Calculation Methodology

Logan Airport's **gateway roadways** are equipped with permanent vehicle count stations, which are part of the Airport-wide **Automated Traffic Monitoring System (ATMS)**. The system is designed to capture all entering and exiting vehicular volumes to and from the Airport, including the major highways (Route 1A, I-90) and the North Service area roads that connect to East Boston. Massport operates other count stations on the Airport, at selected terminal areas and service area roadways.

These vehicle count stations provide the vehicle volume data used to calculate:

- **Annual average daily traffic (AADT)**
- **Annual average weekday daily traffic (AWDT)**
- **Annual average weekend daily traffic (AWEDT)**

Because these data are automatically collected continuously throughout the year, seasonal adjustment factors are only necessary when significant gaps in the data occur; typically due to equipment failure or malfunction, or due to construction activity that disrupts traffic patterns. Seasonal adjustment factors, when used, are generally estimated from a combination of the monthly variation of counts from other ATMS stations, or from data collected from the same station in the previous year, at a similar period.

## U6.1.2 On-Airport VMT

On-Airport VMT is an estimate of the total number of miles traveled by vehicles on Logan Airport's roadways. VMT reflects the level of vehicle congestion on roadways in specific areas and at specific times. VMT is an important metric that is used to calculate on-Airport motor vehicle emissions to assess air quality impacts. A microsimulation model, Verkehr In Städten Simulationsmodell (VISSIM)<sup>24</sup>, is used to develop both existing and future VMT estimates.

From 2018 to 2021, Massport migrated from the previous VISSIM microsimulation model to a new spreadsheet-based volumetric model to estimate on-Airport VMT. The spreadsheet-based volumetric model used data available through Massport's various transportation and transaction-based data collection systems. To comply with requirements contained in the Secretary's Certificate from the 2022 *ESPR*, which include modeling and reporting future forecast conditions that the spreadsheet-based volumetric model could support, Massport returned to using a VISSIM model. This model was appropriately updated to reflect changes in on-Airport ground transportation and infrastructure that have occurred since 2017.

VMT estimates are calculated for four time periods, representing activity from an average weekday:

- Morning peak hour;
- Evening peak hour;
- Highest consecutive 8-hour (High 8-Hour); and
- Daily (Average Weekday).

Absent a major shift in vehicular volumes entering the gateways, the change in VMT is expected to generally mirror the change in vehicle congestion. A decrease in VMT, when compared to passenger volume over the same period, may suggest passengers are using high-occupancy vehicle (HOV) modes in greater numbers, but no direct correlations can be made.

## U6.2 Ground Access Transportation Options

Logan Airport passengers, employees and workers, and other users have many transportation service options to travel to and from the Airport. In the EDRs and ESPRs, Massport reports on ridership levels and recent activity associated with these modes, to track progress in meeting its ground access goals, including progress toward achieving a higher share of the use of HOV modes by air passengers. Understanding use and trends informs Massport's planning and coordination with other transportation agencies in Massachusetts.

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24 PTV America. 2021. Verkehr In Städten Simulationsmodell – VISSIM version 2021 [computer software].

### U6.2.1 Logan Express Bus Service

Massport's **Logan Express** bus service consists of four suburban park-and-ride locations (Braintree, Framingham, Woburn, and Danvers) and the Back Bay Boston service. Frequent scheduled service and a nearly 24-hour service span give travelers (air passengers, employees, and workers) a convenient and inexpensive option to travel or commute, avoiding the need to drive to the Airport. Logan Express buses directly serve each Airport terminal at a priority curbside location.

The Logan Express bus system was designed to capture travelers from broader geographic areas at key points in their travel to the Airport, so that their trip can be completed in a shared-ride or HOV mode. The suburban locations are generally near the Route 128 corridor around inner metropolitan Boston, capturing travelers coming in from Route 3, Route 24, I-93, I-95, I-90, and Route 128 (North Shore). The Back Bay location is intended to capture travelers within Boston's Back Bay and transfers from the MBTA Green Line, Orange Line, and some Commuter Rail services, providing many MBTA travelers a two-seat ride to the Airport terminals.

### U6.2.2 Public Transit

Passengers with trip origins in Boston, Brookline, Cambridge, Somerville, Everett, Chelsea, and Revere can use MBTA public transit to travel to the Airport. MBTA's Silver Line SL1 service directly serves the Airport terminals. The Blue Line subway, Silver Line SL3 bus rapid transit, and Route 104 bus services connect at Airport Station, to which Massport provides shuttle service for terminal area connections, giving these riders a two-seat rider to the terminals.

These transit services are important for providing an alternative to automobile travel to the Airport. Past air passenger surveys have shown that over three-quarters of users of the Blue Line and SL1 indicated their alternative mode of travel to Logan Airport, or mode choice if they did not take public transit, would have been a taxi, Ride App service, or private vehicle for being dropped off at the Airport.

The MBTA provides data to Massport for tracking use of these services. The Airport Station fare gate data does not distinguish between Airport-related riders and riders traveling to and from the neighborhood of East Boston, nor does it distinguish between Logan Airport air passengers, employees, and workers. Therefore, air passenger ridership levels on the Blue Line cannot be directly identified. Silver Line activity is captured through automated passenger counters on the buses.

### U6.2.3 Water Transportation

Depending on the location, passengers can use private, on-demand, water taxi services or the scheduled MBTA passenger ferry service to connect to the Logan Airport dock. Water transportation to Logan Airport's passenger dock on Harborside Drive is available from several locations:

- Long Wharf, Rowes Wharf, and Central Wharf in downtown Boston;
- Lovejoy Wharf near Boston's North Station;
- The World Trade Center and the Moakley Courthouse in South Boston;
- Other inner harbor docks in the North End, Charlestown, Chelsea, and East Boston;
- Hingham and Hull via the MBTA Hingham-Hull ferry services;
- Quincy, Aquarium-Long Wharf, and Seaport via the MBTA Winthrop ferry services; and
- Winthrop, Aquarium-Long Wharf, and Seaport via the MBTA Winthrop ferry services.

Massport provides a free shuttle bus service to the Airport terminals from the Airport dock, with a loop route with a return stop via the MBTA Airport Station. Massport collects annual ridership of water transportation data from the MBTA and through coordination with other operators.

### U6.2.4 Other HOV and Shared-Ride Modes

In addition to Massport's Logan Express and MBTA public transit, various private transportation providers offer shared-ride services for Logan Airport ground access, including scheduled buses, shared-ride vans, courtesy vehicles, and black car limousines. These services include:

- Scheduled express bus service is offered by several privately operated carriers from outlying areas of the Boston metropolitan area and neighboring states.
  - Most scheduled shared-ride carriers use a combination of 15- to 40-passenger vehicles and 50+ passenger coach buses.
- Courtesy vehicle services include routes between Logan Airport and many hotels in the greater Boston area.
- Pre-arranged, shared-ride van services are also available from various points in the region.

Massport provides priority, designated curb areas at all Airport Terminals to support the use of HOV and shared-ride modes, including privately operated scheduled buses, charter buses, and other passenger bus or van shuttles.

### U6.2.5 Pedestrian Facilities and Bicycle Parking

Massport provides a substantial Airport-wide pedestrian network that links the terminals, landside airport facilities, and the neighboring community. Sidewalks along Harborside Drive and Hotel Drive connect to the terminals, where a series of overhead, enclosed walkways provide pedestrian access to the Central and West Parking garages, and to and from the Hilton™ Hotel. The sidewalks along Harborside Drive, Transportation Way, North Service Road, and the Harborwalk facilitate pedestrian access to the Airport water transportation dock, MBTA Blue Line Airport Station, and the pedestrian and bicycle pathways at Memorial Stadium Park, Bremen Street Park, and the East Boston Greenway. Customers can reach Airport Station by bike using the East Boston-Mary Ellen Welch Greenway, which connects Maverick Square to the south and Orient Heights to the north.

Bicycle parking racks are provided at many landside facilities.<sup>25</sup> Generally, these racks are expected to primarily serve employees, but can be used by air passengers and visitors. Terminal A, Terminal E, the Logan Office Center, Signature General Aviation Terminal, the Economy Parking Garage, the Green Bus Depot, and the Airport MBTA Blue Line Station have bicycle racks. Covered shelter bike parking is provided at Terminal A, the Rental Car Center, and the Economy Parking Garage. Massport also provides showers and changing facilities at the Logan Office Center for its employees.

### U6.2.6 Automobile Access

Logan Airport passengers also access the Airport via automobile modes, including private automobiles, taxis, Ride App services, and rental cars. Since 2018, taxis, Ride App, and limousine services are classified as HOV or non-HOV for mode share tracking purposes, depending on the number of passengers carried. Private automobile access to the Airport is classified as either (a) curbside drop-off or (b) parked on-Airport via the terminal area or remote economy parking areas.

## U6.3 Parking Conditions

Massport has a comprehensive parking monitoring and management program that tracks on-Airport parking use relative to the supply at Logan Airport's parking facilities. Massport sets parking rates, administers parking programs, and designates preferred parking for hybrid and **electric vehicle (EV)** charging stations.

### U6.3.1 Commercial Parking

Logan Airport's commercial parking facilities include the Central/West Parking Garage, the Terminal B Garage, the Economy Garage, and Terminal E lots. The Economy Garage is not connected to the terminals, and thus Massport provides a free, 24-hour shuttle bus service between the garage and terminals. Parking directly at Terminal E is allowed on a short-term basis and requires a driver to remain with the vehicle.

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<sup>25</sup> [www.massport.com/logan-airport/getting-to-logan/biking](http://www.massport.com/logan-airport/getting-to-logan/biking)

Massport manages the on-Airport parking supply at Logan Airport to:

- Promote long-term, rather than short-term parking to reduce the number of daily trips to Logan Airport relative to a passenger pick-up or drop-off trip via a vehicle that does not remain on-Airport;
- Support efficient use of parking facilities;
- Provide good customer service; and
- Comply with the provisions of the **Logan Airport Parking Freeze**.

Massport periodically assesses its parking-rate structure to support its ground access strategy. Rates include short-term and daily duration and vary depending on the terminal area garage and the Economy Parking garage.

### U6.3.2 Logan Airport Parking Freeze

The number of commercial and employee parking spaces permitted at Logan Airport is regulated by the Logan Airport Parking Freeze (310 Code of Massachusetts Regulations 7.30), which is an element of the *Massachusetts State Implementation Plan* (SIP) under the Federal Clean Air Act (42 U.S.C. §7401 et seq. [1970]). Massport submits semi-annual report filings to the **Massachusetts Department of Environmental Protection (MassDEP)** demonstrating Massport's compliance with the Logan Airport Parking Freeze. Massport provides the recent reports in the appendix of the ESPR while providing both recent and past reports on its website at: [www.massport.com/massport/about-massport/project-environmental-filings/logan-airport/](http://www.massport.com/massport/about-massport/project-environmental-filings/logan-airport/).

Under the Logan Airport Parking Freeze regulation, Massport must monitor the number of commercial and employee vehicles parked on-Airport and verify the total number of parked commercial and employee vehicles does not exceed the Parking Freeze limits. The Parking Freeze currently limits the total inventory of parking spaces at the Airport to 26,088 spaces, of which the Commercial parking space inventory totals 23,640 spaces and the Employee parking space inventory totals 2,448 spaces. These freeze limits have been unchanged since 2017, when the Parking Freeze was last amended. Construction at the Airport and the shifting of total spaces among facilities account for the fluctuation of in-service spaces from year to year.

In-service commercial spaces include those in the Terminal area garages and lots, the Economy parking garage, the lots associated with the on-Airport hotels, and the lot at the Signature General Aviation Terminal. If the number of commercially parked vehicles exceeds the allocated commercial parking limit under the Parking Freeze on any day, those additional vehicles are considered using "Restricted Use Parking Spaces." Use of Restricted Use Parking Spaces is allowed under the regulation when Logan Airport experiences "extreme peaks of air travel and corresponding demand for parking spaces" and may be made available for use only at such times, with a limit of up to ten days in any calendar year. These spaces must be provided free of charge when demand exceeds the limit.

## U6.4 Logan Airport Air Passenger Ground Access Survey

Approximately every three years, Massport administers an extensive survey of air passengers to better understand the ground access choices and characteristics of air passengers traveling to and from Logan Airport. Since the late 1970s, the *Logan Airport Air Passenger Ground Access Survey* has been Massport's primary tool for understanding the changes in air passenger travel behavior, including ground access mode choices, travel patterns, and market characteristics.<sup>26</sup> This survey tool assists Massport in evaluating the effectiveness of its transportation policies and services, the impacts on the regional transportation system, and tracking historical trends of these attributes. The survey also informs Massport's planning efforts to encourage Logan Airport travelers to use HOV and shared-ride modes instead of single-occupancy vehicle (SOV) modes.

The survey is also the principal means of measuring air passenger ground access HOV-mode share. In addition to the ground-access mode choice question, the survey is used to identify average occupancy of vehicle modes, ground access trip origins, and market segments.

### U6.4.1 Average Vehicle Passenger Occupancy by Vehicle Access Modes

The survey data helps to determine how many air passengers are traveling together in the same ground-access vehicle among the automobile modes. This helps with understanding travel characteristics for arriving via private vehicles, rental vehicles, taxis, and Ride App services, and other car services, like limousines, for example.

### U6.4.2 Ground Access Origins of Air Passengers

The origin of an air passenger ground access trip has an important influence on mode choice. Simply stated, transportation systems and services vary by geographic area, and thus affect the availability and attributes of an air passenger's ground access options of a passenger traveling to Logan Airport. It's often useful to consider these geographic areas relative to the availability and attractiveness of various ground access modes:

- **Urban Core:** About a third of air passenger trip origins are in the metropolitan Urban Core, defined as Boston, Brookline, Cambridge, and Somerville.<sup>27</sup> Transit use is highest in the Urban Core as this area is generally served by the MBTA's rapid transit system. Ride App and taxi use is also highest in this area, approximately half of all trips, due in part to the Airport's proximity and the wide availability of service.
- **Between Urban Core and Route 128:** The area outside of the Urban Core cities but within Route 128 has limited transit and HOV or shared-ride options; thus, automobile mode shares are greatest for trips originating in this region.

<sup>26</sup> Since 2004, a passenger survey has been administered every three years to assess ground-access transportation choices.

<sup>27</sup> 2024 Logan Airport Air Passenger Ground Access Survey.

- **Between Route 128 and I-495:** In this geography, scheduled express bus services, such as Logan Express, provide most of the HOV services. Many communities also have MBTA Commuter Rail service, although many stations have limited or no long-term parking.
- **Outside I-495:** Due in large part to the prevalence of private scheduled bus options, overall HOV and shared-ride mode use is high among ground trips originating outside of Massachusetts. Otherwise, private vehicles are the dominant mode of access for passengers originating in areas outside of the Urban Core.

### U6.4.3 Market Segment: Trip Purpose and Residency

Massport characterizes air passengers into four distinct market segments:

- **Resident Business:** passengers living within the region served by Logan Airport and traveling for business reasons;
- **Resident Non-Business:** passengers living within the region served by Logan Airport and conducting personal travel (e.g., leisure trips);
- **Non-Resident Business:** passengers living outside the region served by Logan Airport and traveling to conduct business; and
- **Non-Resident Non-Business:** passengers living outside the region served by Logan Airport and traveling for personal reasons (e.g., leisure or vacation travelers).

Residents are defined as passengers who use Logan Airport as their “home” airport, regardless of the proximity of the respondent’s place of residence or work to other airports. It is important to study the passenger market in this manner because sensitivity to key factors that influence travel behavior, such as convenience, time reliability, and pricing, varies among these passenger market segments. This information assists Massport in developing appropriate ground access services for passengers.

Implications for ground access are numerous due to the changing mix of Logan Airport air passengers. Overall, HOV-mode share is typically lower in the business-market segments; business travelers typically have a high sensitivity to time, require flexibility and schedule reliability, and often make decisions related more to convenience than to cost, which is often covered by their employer and not by the passenger.

Public transit and scheduled-HOV services, including Logan Express, have a higher share among the non-business market segments, particularly for residents who have greater familiarity with the systems. Non-business market segments are more sensitive to ground transportation costs, travel less frequently but for longer time periods, and tend to travel at off-peak flight times and days.

## U6.5 Ground Access Initiatives

Massport promotes ridership on HOV, including transit and shared-ride modes, and maintains efficient transportation access and parking options in and around Logan Airport to reduce the reliance on SOV

modes. Implemented measures include a blend of strategies related to pricing, including incentives and disincentives, service availability, service quality, marketing, and traveler information. However, no single measure alone will accomplish the goal as Logan Airport passengers include various demographic groups in diverse locations.

### U6.5.1 Ride App Management Program

Massport officially commenced Ride App pick-up operations in February 2017. Elements of the Ride App Management Program are included in **Table U6-1**.

**Table U6-1** Massport Ride App Management Program Overview

| Policy                                  | Goal                                                                                                                                                                                                                               |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ride App Rematch and Shared Ride        | Implement Ride App rematch so drivers dropping off a passenger at the airport can more easily leave the airport with a passenger.                                                                                                  |
|                                         | Implement changes such that Ride App passengers will be dropped off or picked up at new dedicated areas in the Central Garage through climate-controlled walkways to and from the Terminals, facilitating rematch and shared ride. |
| Ride App Fee Structure                  | Introduce Ride App shared-ride incentives to reduce Ride App vehicles through gateways by increasing vehicle occupancies.                                                                                                          |
|                                         | Adopt a new Ride App fee structure to support HOV strategies, encourage shared rides, and reduce gateway congestion.                                                                                                               |
| Optimize Ride App Operations On-Airport | Introduce Ride App data reporting, new emerging Ride App products, and new enforcement tools.                                                                                                                                      |

Source: Massport.

### U6.5.2 Massport Parking Programs and Initiatives

Massport has established the programs and initiatives listed in **Table U6-2** to support all Logan Airport users, including those arriving to pick-up travelers, those traveling to Logan Airport frequently, and those who drive environmentally friendly vehicles.

**Table U6-2** Parking Programs and Initiatives at Logan Airport

| Program/Initiatives                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The <b>Cell Phone Waiting Lot</b> reduces vehicle emissions by minimizing idling and on-Airport VMT associated with private vehicle pick-up activity. Parking at the lot is free, with a maximum wait time of 30 minutes. Users of the Cell Phone Waiting Lot are required to adhere to the State's no idling law. |
| <b>Parking PASSport Gold</b> eliminates the need for a motorist to circle the garage looking for available spaces. Massport reserves about 12 percent of spaces in the Central/West Garage and 38 percent of spaces in the                                                                                         |

**Table U6-2      Parking Programs and Initiatives at Logan Airport**

| Program/Initiatives                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Terminal B Garage for customers enrolled in the program. <b>Parking PASSport</b> allows users to enter and exit Logan Airport's parking garages and lots with an access card linked to an established credit account. Parking fees are automatically charged to a registered credit card and the receipt is emailed to the account holder.                                                                                                                                                                                                                  |
| Since May 2021, Massport has implemented a service that allows customers to <b>reserve parking</b> in advance of arriving at the Airport. This service offers a limited number of parking spaces but allows the user to guarantee a parking space up to twelve months in advance. Parking cost is based on the lot chosen and duration of the customer's trip.                                                                                                                                                                                              |
| Massport provides more than 100 preferred parking spaces for <b>hybrid, EV, and Alternative Fuel Vehicle (AFV)</b> within the Terminal area and Economy garages. Twenty-seven of these spaces provide EV charging at locations convenient to the terminals. While normal parking rates apply, there is currently no cost for electricity use. Real-time availability of spaces can be found on Massport's website ( <a href="http://www.massport.com/logan-airport/getting-to-logan/parking">www.massport.com/logan-airport/getting-to-logan/parking</a> ). |

Source: Massport.

### U6.5.3 Long-Term Parking Management Plan

In addition to supporting HOV, Massport actively manages parking supply as another strategy to reduce drop-off and pick-up modes. Massport manages the on-Airport parking supply at Logan Airport to:

1. Promote long-term rather than short-term parking, thus reducing the number of daily trips to Logan Airport;
2. Support efficient utilization of parking facilities;
3. Provide good customer service;
4. Comply with the provisions of the Logan Airport Parking Freeze.

Parking management plans to manage the supply, pricing, and operation are described in **Table U6-3**.

**Table U6-3      Long-Term Parking Management Plan**

| Parking Plan Element | Initiative                                                                                                                                                                                                   |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parking Supply       | Add revenue-controlled parking spaces in the terminal area to bring supply up to the maximum number of spaces allowed under the Logan Airport Parking Freeze.                                                |
|                      | Increase the supply of Massport-controlled, off-Airport parking at Logan Express sites. Massport is adding approximately 1,000 additional spaces to the parking garage at the Framingham Logan Express site. |

Table U6-3 Long-Term Parking Management Plan

| Parking Plan Element                                                             | Initiative                                                                                                                                                                                 |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Parking Pricing                                                                  | Discourage air passengers from driving and parking at Logan Airport by ensuring that the Massport-controlled parking provided at remote Logan Express sites is the least expensive.        |
|                                                                                  | Encourage more efficient use of available on-Airport parking by maintaining a meaningful price differential between rates at the Economy Parking Garage and terminal-area parking garages. |
|                                                                                  | Evaluate parking prices for Terminal-area parking to encourage Airport passengers and visitors to consider transit and shared-ride alternatives.                                           |
| Reduce Parking Demand through the frequency and availability of HOV mode options | Massport continuously evaluates opportunities to improve Logan Express service to increase ridership.                                                                                      |
|                                                                                  | Massport offers promotional discounted fares at Logan Express at key times of the year.                                                                                                    |
|                                                                                  | Massport sponsors free outbound (from Logan Airport) Silver Line bus service and Back Bay Logan Express service.                                                                           |
|                                                                                  | Massport continues to work with private carriers to provide HOV options to and from Logan Airport.                                                                                         |

Source: Massport.

### U6.5.4 Employee Ground Transportation Initiatives

Airport employee ground access needs are different from passenger transportation needs. Airport employees often have non-traditional, and sometimes unpredictable, working hours that are difficult to match to the typical MBTA transit service hours of 5:00 AM to 1:00 AM. Due to the time-sensitive nature of airline operations, on-time reliability is important for employee transportation, as is flexibility during severe weather or other delays that may extend a typical employee's workday or work shift.

Massport strives to reduce the number of employees commuting to the Airport by automobile by providing off-Airport parking (both near Logan Airport and at Logan Express sites) and implementing measures to enhance employee commuting options. Key initiatives are noted in **Table U6-4**.

**Table U6-4 Employee Ground Transportation Initiatives**

| Initiative                                                                                                                                                                                                                                                                                                                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Massport provides employee parking in Chelsea with free shuttle bus transportation to the Airport. The shuttle bus to the Terminals (Route 77) operates 24 hours a day, seven days a week.                                                                                                                                 |
| Logan Express sites operate early-morning and late-night bus service to encourage use and better serve Logan Airport employees. Massport offers reduced employee rates to encourage the use of Logan Express facilities.                                                                                                   |
| Massport supports the Sunrise Shuttle, which provides early-morning bus service for employees from East Boston and parts of Winthrop and Revere prior to the start of MBTA service.                                                                                                                                        |
| Massport operates free shuttle buses between Airport Station and employment areas in the Southwest Service Area and the South Cargo Area locations (Routes 44, 66, and Logan Office Center). Free shuttle buses operate between the MBTA Airport Station and the Terminals (Routes 22, 33, 55 and 88).                     |
| Massport maintains a comprehensive sidewalk and walkway system at Logan Airport to facilitate pedestrian access and circulation.                                                                                                                                                                                           |
| Bicycle racks are available at Terminal A, Terminal E, the Logan Office Center, Signature General Aviation Terminal, the Economy Parking Garage, the Green Bus Depot, and the Airport MBTA Blue Line Station. Covered (shelter) bike parking is provided at Terminal A, the Rental Car Center, and Economy Parking Garage. |
| Massport advises Airport employers on transit benefits, including transit subsidies, and provides information on available commuting alternatives, ride-matching services, and reduced-rate HOV and transit fare options. Massport provides its employees with subsidies for water transportation and transit use.         |

Source: Massport.

## U6.6 Ground Access Forecasting

Massport analyzes current conditions and strains placed on the Airport's roadway infrastructure at current traffic levels and the current trends observed on Airport roadways to forecast, or estimate, future conditions at the Airport 10 to 15 years into the future, or within the FPH. This forecast informs Massport's planning efforts for policy and infrastructure changes to reduce congestion on Airport roadways. The importance of alleviating congestion is twofold: it allows for continued safe and efficient operation of the Airport's landside operations and it is necessary to reduce environmental impacts. Enhancing multimodal transportation options and providing modern, flexible infrastructure is one way an airport can reduce GHG emissions and improve its environmental footprint.

Potential emissions reductions are one reason Massport is committed to a long-term goal to promote and support public and private HOV and shared-ride services aimed at serving air passengers, Airport users, and employees. Other benefits include:

- Improving operations on the terminal-area roadways and at curbside drop-off and pickup areas;
- Alleviating constraints on parking facilities; and
- Improving customer service (providing a range of transportation options for different travelers).

### U6.6.1 Future Planning Horizon (FPH) VMT Estimates

The VMT analysis of the FPH is based on a forecasted increase in air passenger activity, associated increases in cargo, and planned policy changes anticipated over the next 10 to 15 years. The passenger level evaluated represents the reporting year's air passengers who start or end their trip at Logan Airport and are expected to use ground transportation to and from the Airport.

The Future Forecast peak summer, average day passenger forecast described in **Section U3, Activity Levels** is used as the basis for the VMT and parking estimates. Hourly passenger forecasts at terminal gates are translated to reflect the time the passenger would arrive or depart the terminal curbside. Once the hourly curbside passengers are calculated, they are converted into the appropriate vehicle trip and route based on estimates of future mode share and average vehicle occupancy for different vehicle types (passenger cars, Ride App, taxis, etc.).

Massport has a standing policy to maintain ground access operations and minimize traffic congestion to accommodate passengers arriving and departing the airport. This policy has resulted in several infrastructure and operational modifications that complement broader policy changes and allow terminal-area roadways and curbsides to continue functioning adequately and minimize vehicle idling and associated emissions. Some modifications, such as the Terminal B/C Roadway project, the Terminal C Curbside Optimization, and changes to Terminal B curbsides and Ride App operations are already complete. These modifications appear to have a lasting benefit on future airport ground access conditions and are projected to reduce terminal roadway congestion through Future Forecast peak summer, average day forecast levels. Other infrastructure modifications implemented in the next 10 to 15 years may include:

- Construction of a new parking garage near Terminal E;
- Reconstruction of the terminal area roadways between Terminals C and E (arrivals and departures);
- Ride App Lot relocations, pickup and drop-off modifications, and routing changes;
- Terminal A curbside optimization;
- Some combination of these improvements.

A VMT analysis is conducted for the Future Planning Horizon using a VISSIM model of Logan Airport. On-Airport vehicle trips are estimated based on available flight forecast information and anticipated mode shares. Mode share development is based on policy changes anticipated to be in place over the next decade. Additionally, roadway improvements currently underway are also considered in the analyses.

## U6.6.2 Future Parking Demand

Prior to the pandemic, on-Airport roadway diversions between on-Airport locations, in addition to valet operations, were regular occurrences. Inadequate supply of parking causes air passengers to circulate on Airport roadways to find parking. These diversions decrease operational efficiency and compromise customer service; as well as increase on-Airport VMT and emissions by generating additional on-Airport trips that would otherwise be unnecessary under less congested conditions. Massport actively manages its current parking operations and supply as well as future parking plan through the *Long-Term Parking Management Plan*, as described in **Section U6.5.3**.

The 2017 Parking Freeze amendment and the Logan Airport Parking Project facilitate the addition of up to 5,000 new commercial parking spaces, which will increase the parking supply and allow drive-and-park to become a more reliable mode choice to the Airport, reducing on- and off-Airport VMT by reducing the number of passengers who are dropped-off or picked-up at the Airport. Construction of new parking facilities to achieve the total permitted under Parking Freeze would:

- Shift “would-be parkers” from drop-off and pickup modes to parking;
- Reduce the number of trips associated with “would-be parkers” traveling to and from Logan Airport;
- Improve on-Airport roadway and terminal curbside congestion associated with drop-off and pickup activity;
- Reduce air quality effects associated with drop-off and pickup activity by increasing the parking supply and decreasing the number of passengers choosing drop-off and pickup modes; and
- Enhance passenger experience by reducing the need to divert parkers to off-Airport satellite parking locations, which increases the time it takes for air passengers to drop off their cars and access the terminal area and leads to additional VMT per vehicle.

The FPH Forecast estimate, however, does not consider how parking might change on-Airport given the factors discussed above, including parking capacity. Massport will continue to analyze future parking demand and increased passenger activity levels in the context of changes in parking supply, on-Airport access, and new technologies that may emerge, such as electric and autonomous vehicles.

## U7. Noise

The *Noise* chapter provides an in-depth analysis of aircraft noise levels at Logan Airport and the surrounding areas. The chapter discusses the metrics used to evaluate noise exposure and highlights the importance of understanding noise trends for future planning. It outlines Massport's initiatives such as the **Residential Sound Insulation Program (RSIP)** and the implementation of noise abatement programs, as well as summarizing noise regulatory frameworks designed to reduce aircraft noise levels. The chapter discusses the role of technological advancements in aircraft design and operational procedures in achieving quieter airport environments. Additionally, for ESPRs, the Noise chapter presents forecasts for future noise conditions, considering projected passenger and aircraft operation levels.

### U7.1 Acoustics and Environmental Noise Fundamentals

This section introduces the fundamentals of acoustics and noise terminology as well as describing community annoyance and noise effects on human activity.

#### U7.1.1 Acoustics and Noise Terminology Introduction

The Noise chapters of the EDRs and ESPRs rely largely on the **Day-Night Average Sound Level (DNL)** metric, which is a measure of cumulative noise exposure for an average day, considering actual operations over an entire calendar year. However, DNL does not always provide a sufficient description of noise for many purposes. This section introduces the following acoustic metrics, which are related to one another, and together provide the means for evaluating a broad range of noise situations. These metrics include:



### U7.1.1.1 The Decibel (dB)

Sounds come from a source like a musical instrument, a person speaking, or an airplane passing overhead. It takes energy to produce sound. The sound energy produced by a source is transmitted through the air in the form of sound waves, which are tiny, quick oscillations of pressure just above and just below atmospheric pressure. These oscillations, or sound pressures, are detected by the ear, creating the sound we hear.

**Sound pressure level (SPL)** is a measure of the sound pressure of a given noise source relative to a standard reference value (typically the quietest sound that a young person with good hearing can detect). SPLs are measured in decibels.

Human ears are sensitive to a wide range of sound pressures. The loudest sounds that we hear without pain have about one million times more energy than the quietest sounds we hear. However, our ears are incapable of detecting small differences in these pressures. Thus, to match how we hear this sound energy, humans compress the total range of sound pressures to a more meaningful range through the concept of **sound pressure level (SPL)**.

**Decibels (dB)** are logarithmic quantities – logarithms of the squared ratio of two pressures, the numerator being the pressure of the sound source, and the denominator being the reference pressure (the quietest sound we can hear). The logarithmic conversion of sound pressure to SPL means the quietest sound we can hear (the reference pressure) has a SPL of about 0.0 dB, while the loudest sounds we hear without pain have SPLs of about 120 dB. Most sounds in our day-to-day environment have SPLs from 30 to 100 dB.

Because decibels are logarithmic quantities, they do not behave like regular numbers with which we are more familiar. For example, if two sound sources each produce 100 dB and they are operated together, they produce only 103 dB, not 200 dB as we might expect. Four equal sources operating simultaneously result in a total SPL of 106 dB. In fact, for every doubling of the number of equal sources, the SPL increases by another three decibels. A tenfold increase in the number of sources makes the SPL go up 10 dB. A hundredfold increase makes the level go up 20 dB, and it takes a thousand equal sources to increase the level 30 dB.

If one source is much louder than another (by 10 dB or more), the two sources together will produce the same SPL (and sound to our ears) as if the louder source were operating alone. For example, a 100-dB source plus an 80-dB source produces 100 dB when operating together. The louder source “masks” the quieter one, but if the quieter source gets louder, it will have an increasing effect on the total SPL. When the two sources are equal, as described above, they produce a level 3 dB above the sound of either one by itself.

From these basic concepts, note that 100 dB to 80 dB sources will produce a combined level of 100 dB; if another single 100-dB source is added, the group will produce a total SPL of 103 dB. In summary, the loudest source has the greatest effect on the total decibel level.

### U7.1.1.2A-Weighted Decibel (dBA)

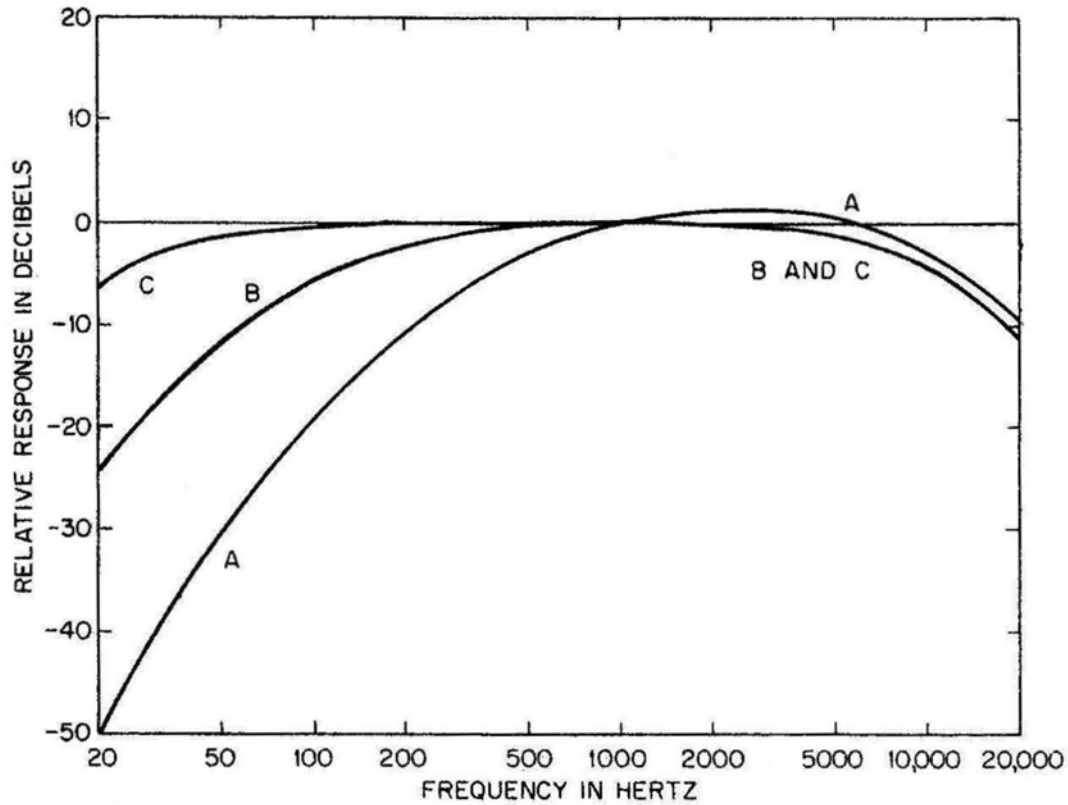
Another important characteristic of sound is its frequency, or "pitch." This is the rate of repetition of the sound pressure oscillations as they reach our ear. Formerly expressed in cycles per second, frequency is now expressed in units known as Hertz (Hz).

Most people hear sounds from about 20 Hz to about 10,000 to 15,000 Hz. People respond to sound most readily when the predominant frequency is in the range of normal conversation, around 1,000 to 2,000 Hz. Acousticians have developed "filters" to match our ears' sensitivity and help us to judge the relative loudness of sounds made up of different frequencies. The so-called "A" filter does the best job of matching the sensitivity of our ears to most environmental noises. SPLs measured through this filter are referred to as **A-weighted decibels (dBA)**, also referred to as A-weighted sound levels. A-weighting significantly de-emphasizes noise at low and very high frequencies (below about 500 Hz and above about 10,000 Hz), where we do not hear as well. Because this filter generally matches our ears' sensitivity, sounds having higher A-weighted sound levels are usually judged louder than those with lower A-weighted sound levels, a relationship which does not always hold true for unweighted levels. It is for these reasons that A-weighted sound levels are normally used to evaluate environmental noise.

Other weighting networks include the B and C filters, which correspond to different level ranges of the ear. The rarely used B-weighting also attenuates low frequencies (those less than 500 Hz), but to a lesser degree than A-weighting. C-weighting is nearly flat throughout the audible frequency range, hardly de-emphasizing low frequency noise. C-weighted levels can be preferable in evaluating sounds for which low-frequency components are responsible for secondary noise impacts, such as the shaking of a building, window rattle, or perceptible vibrations. C-weighting uses include the evaluation of blasting noise, artillery fire, and, in some cases, aircraft noise inside buildings. **Figure U7-1** compares these various weighting networks.

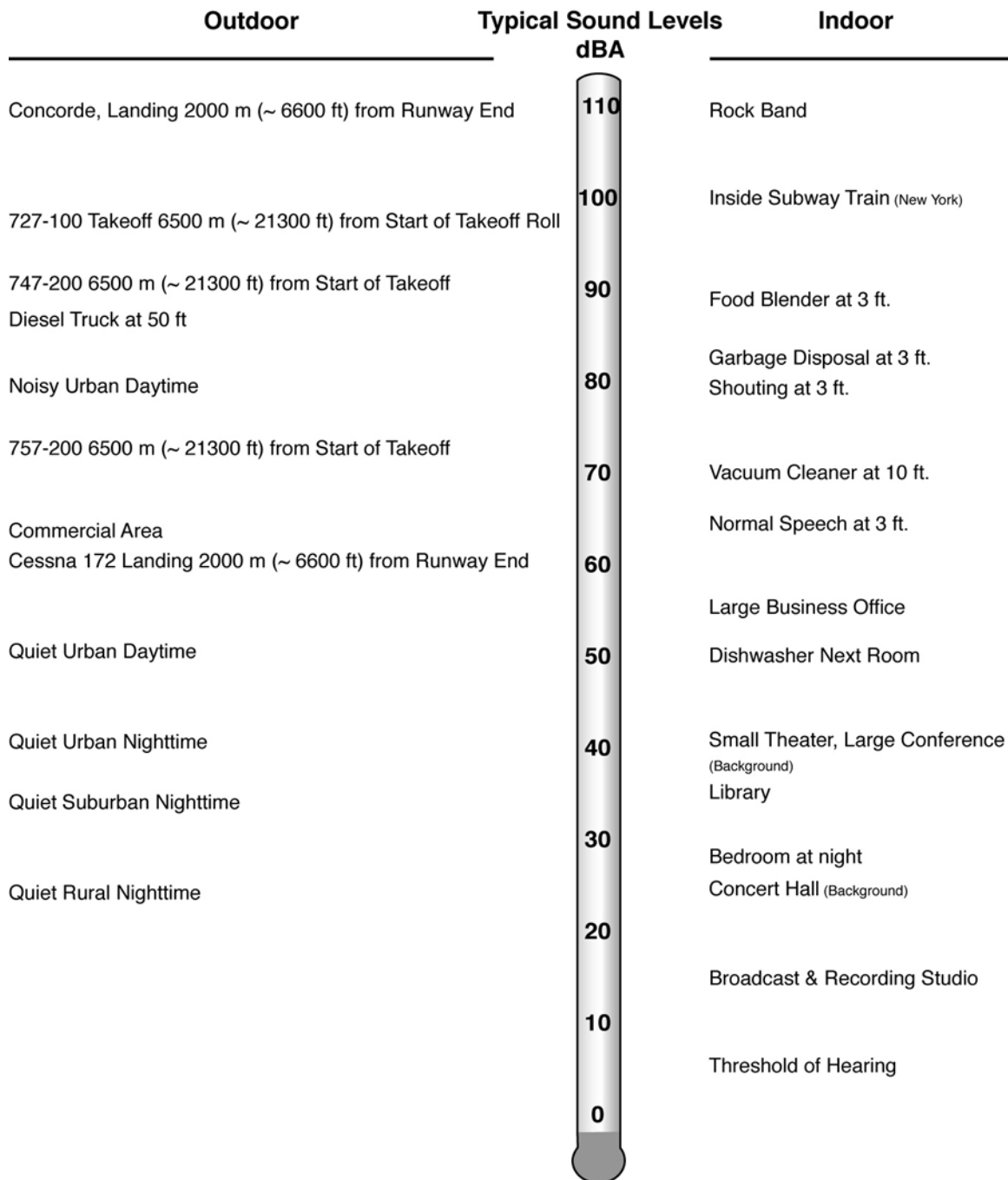
Because of the correlation with human hearing, the A-weighted level has been adopted as the basic measure of environmental noise by the **U.S. Environmental Protection Agency (U.S.EPA)** and by nearly every other federal and state agency concerned with community noise. **Figure U7-2** presents typical A-weighted sound levels of several common environmental sources.

Figure U7-1 Frequency-Response Characteristics of Various Weighting Networks



Source: Harris, Cyril M., editor, *Handbook of Acoustical Measurements and Noise Control*, Chapter 5, "Acoustical Measurement Instruments"; Johnson, Daniel L.; Marsh, Alan H.; and Harris, Cyril M., New York: McGraw-Hill, Inc., 1991, pg. 5.13.

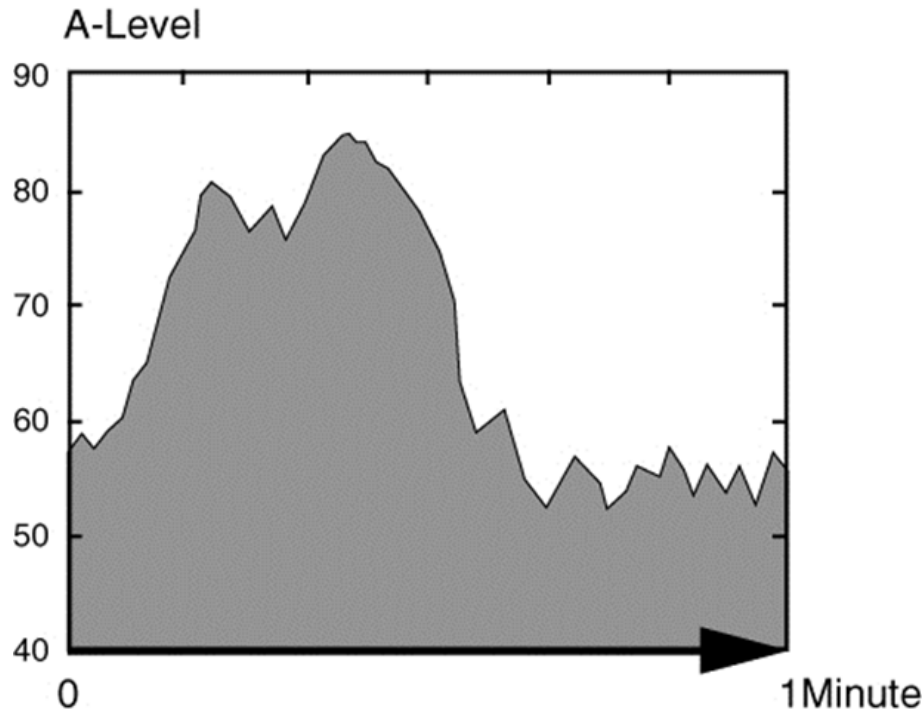
Figure U7-2 Common Environmental Sound Levels, in dBA



Source: Harris Miller Miller & Hanson Inc. (HMMH); Aircraft noise levels from FAA Advisory Circular 36-3H, *Estimated Airplane Noise Levels in A-Weighted Decibels*, May 25, 2012, [https://www.faa.gov/documentLibrary/media/Advisory\\_Circular/AC36-3H%20Chg%201.pdf](https://www.faa.gov/documentLibrary/media/Advisory_Circular/AC36-3H%20Chg%201.pdf).

Note: dBA is A-weighted decibel.

Figure U7-3 Variations in the A-Weighted Sound Level Over Time



Source: HMMH.

An additional dimension to environmental noise assessment is the A-weighted levels vary with time. For example, the sound level increases as an aircraft approaches, then falls and blends into the background as the aircraft recedes into the distance, even though the background varies as birds chirp or the wind blows, or a vehicle passes by. **Figure U7-3** illustrates this concept.

### U7.1.1.3 Maximum A-Weighted Noise Level ( $L_{max}$ )

The variation in noise level over time often makes it convenient to describe a particular noise "event" by its maximum sound level, abbreviated as  $L_{max}$ . In **Figure U7-3**, the  $L_{max}$  is approximately 85 dBA. The maximum level describes only one dimension of an event; it provides no information on the cumulative noise exposure. In fact, two events with identical maximum levels may produce very different total exposures. One event may be of very short duration, while the other may continue for an extended period and thus be judged much more annoying. This deficiency is corrected by incorporating a time component into the analysis.

### U7.1.1.4 Sound Exposure Level (SEL)

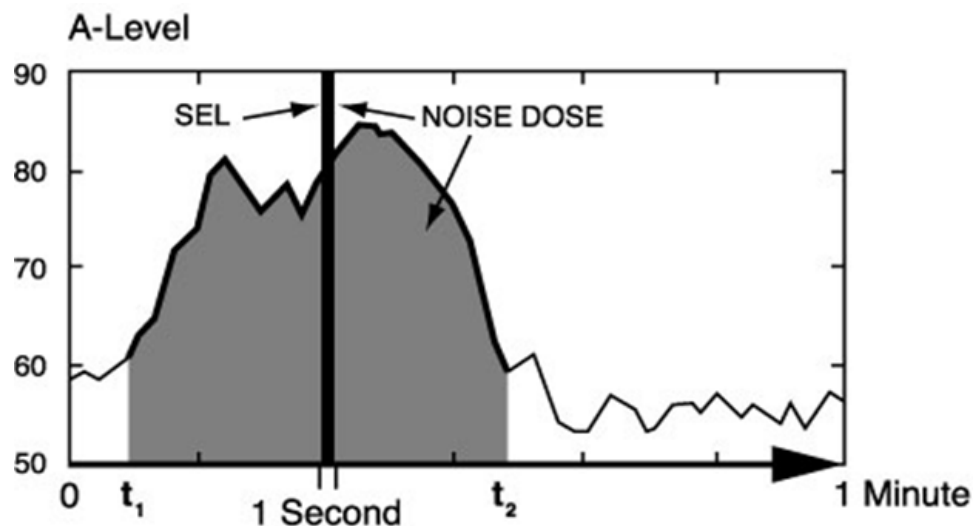
The **Sound Exposure Level (SEL)** is the most frequently used measure of noise exposure for an individual aircraft noise event, and is the measure specified by Federal Aviation Regulations (FAR) Part 150 for this

purpose.<sup>28</sup> SEL is a measure of the total noise energy produced during an event, from the time when the A-weighted sound level first exceeds a threshold level, normally just above the background or ambient noise, to the time the sound level drops back down below the threshold. To allow comparison of noise events with very different durations, SEL expresses each noise event as the steady noise level with a one-second duration that includes the same amount of noise energy as the actual longer-duration, time-varying noise event. In short, SEL “squeezes” the entire noise event into one second.

**Figure U7-4** depicts the process described above. The shaded area represents the energy included in an SEL measurement for the noise event, where the threshold is set to 60 dBA. The dark shaded vertical bar, which is 90 dBA high and just one-second-long (wide), contains the same sound energy as the full event.

Because the SEL is normalized to one second, it will always be a larger number than the  $L_{\max}$  for an event lasting longer than one second. In this case, the SEL is 90 dB and the  $L_{\max}$  is approximately 85 dBA. For most aircraft overflights, the SEL is normally 7 to 12 dB higher than the  $L_{\max}$ . Because SEL considers duration, longer sound exposure due to relatively slow, quiet aircraft, such as propeller models, can have the same or higher SEL than shorter sound exposure due to faster, louder planes, such as corporate jets. Both the  $L_{\max}$  and SEL quantify the noise associated with individual events. The remaining metrics discussed in **Sections U7.1.2.4** through **U7.1.2.6** describe many other, longer-term cumulative noise exposure events.

**Figure U7-4** Sound Exposure Level (SEL)



Source: HMMH.

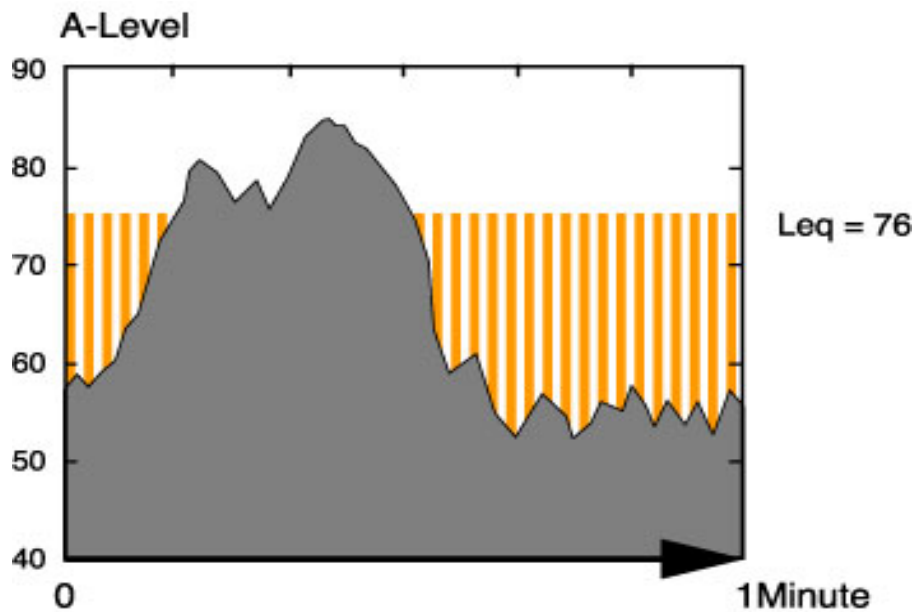
28 Federal Aviation Regulations (FAR) Part 150 is discussed in detail in the Regulatory Framework Section of this User's Guide.

### U7.1.1.5 Equivalent Sound Level ( $L_{eq}$ )

The **Equivalent Sound Level ( $L_{eq}$ )** is a measure of noise exposure resulting from the accumulation of A-weighted sound levels over a particular period of interest (e.g., an hour, an eight-hour school day, or a full 24-hour day). Because the length of the period can differ, the applicable period is often identified through a subscript when discussing the metric, for example  $L_{eq(8)}$  or  $L_{eq(24)}$ .

$L_{eq}$  is equivalent to the constant sound level over the period of interest that contains as much sound energy as the actual time-varying level. This is illustrated in **Figure U7-5**. Both the solid and striped shaded areas have a one-minute  $L_{eq}$  value of 76 dB. It is important to recognize, however, that the two sound signals (the constant one and the time-varying one) would sound very different in real life. It is also important to note the "average" sound level suggested by  $L_{eq}$  is not an arithmetic value, but a logarithmic, or "energy-averaged" sound level. Thus, loud events dominate  $L_{eq}$  measurements. In airport noise studies,  $L_{eq}$  is often presented for consecutive one-hour periods to illustrate how the noise exposure rises and falls throughout a 24-hour period, and how individual hours can be affected by unusual activity, such as rush hour traffic or a few loud aircraft.

Figure U7-5 Example of a One-Minute Equivalent Sound Level ( $L_{eq}$ )



Source: HMMH.

### U7.1.1.6 Time Above (TA) and Time Above Night (TAN)

**Time Above (TA)** is a metric that gives the duration, in minutes, for which aircraft-related noise exceeds a specified A-weighted sound level during a given period. The measure is referred to generally as TA. Three threshold sound levels are used in Massport's TA analysis: 65, 75, and 85 dBA. The times are computed

using the FAA **Aviation Environmental Design Tool (AEDT)**, as discussed in subsequent sections. **Time Above Night (TAN)** is identical to TA, except it is computed for only the 9-hour period between 10:00 PM and 7:00 AM. The TAN calculations are also developed using three threshold levels: 65, 75, and 85 dBA.

### U7.1.1.7 Day-Night Average Sound Level (DNL)

Most aircraft noise studies rely on a slightly more complicated measure of noise exposure that describes cumulative noise exposure during an average annual day: the DNL. The U.S. EPA identified the DNL as the most appropriate means of evaluating airport noise based on the following considerations:<sup>29</sup>

- The measure should be applicable to the evaluation of pervasive long-term noise in various defined areas and under various conditions over long periods;
- The measure should correlate well with known effects of the noise environment and on individuals and the public;
- The measure should be simple, practical, and accurate. In principle, it should be useful for planning as well as for enforcement or monitoring purposes;
- The required measurement equipment, with standard characteristics, should be commercially available;
- The measure should be closely related to existing methods currently in use;
- The single measure of noise at a given location should be predictable, within an acceptable tolerance, from knowledge of the physical events producing the noise; and
- The measure should lend itself to small, simple monitors, which can be left unattended in public areas for long periods.

Most federal agencies dealing with noise have formally adopted DNL. The Federal Interagency Committee on Noise (FICON) reaffirmed the appropriateness of DNL in 1992, and DNL was reaffirmed again by the Federal Interagency Committee on Aircraft Noise (FICAN) in 2018. The FICON summary report stated, "There are no new descriptors or metrics of sufficient scientific standing to substitute for the present DNL cumulative noise exposure metric."

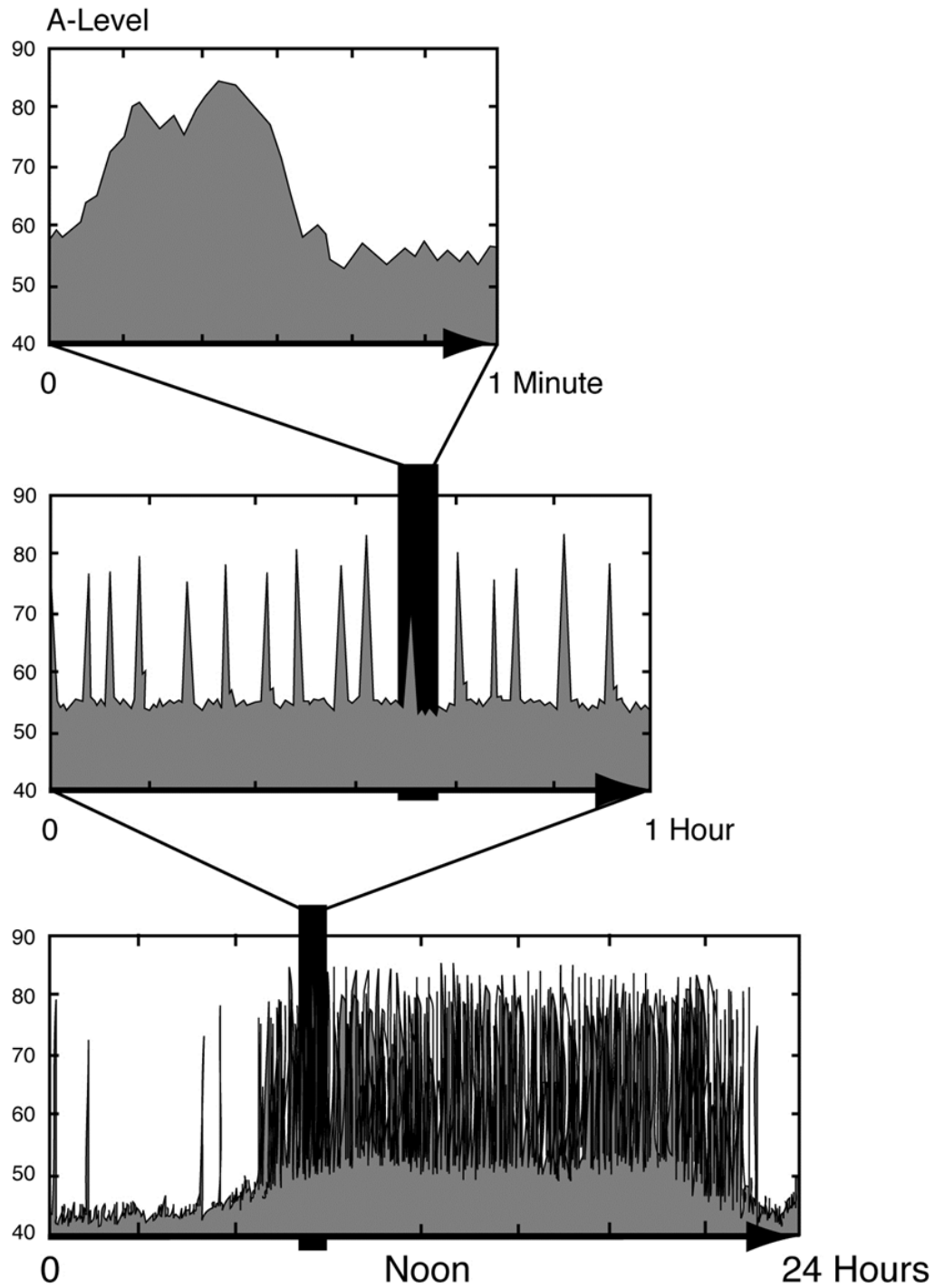
The DNL represents noise as it occurs over a 24-hour period, with one important exception: DNL treats nighttime noise differently from daytime noise. In determining DNL, it is assumed that the A-weighted levels occurring at night, defined as 10:00 PM to 7:00 AM, are 10 dB louder than they really are. This 10-dB weighting is applied to account for people's greater sensitivity to nighttime noise, and the fact that events at night are often perceived to be more intrusive because nighttime ambient noise is less than daytime ambient noise.

29 U.S. EPA, "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," U. S. EPA Report No. 550/9-74-004, March 1974. Retrieved from the National Service Center for Environmental Publications (NSCEP), <https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockkey=2000L3LN.txt>.

**Figure U7-4** illustrates the A-weighted sound level due to an aircraft fly-over as it changes with time. The top frame of **Figure U7-6** repeats this figure. The shaded area reflects the noise dose that a listener receives during the one-minute period of the sample. The center frame of **Figure U7-6** includes this one-minute sample within a full hour. The shaded area represents the noise during that hour with 16 noise events, each producing an SEL. Similarly, the bottom frame includes the one-hour interval within a full 24 hours. Here the shaded area represents the listener's noise dose over a complete day. Note that several overflights occur at a time when the background noise drops some 10 dB, to approximately 45 dBA.

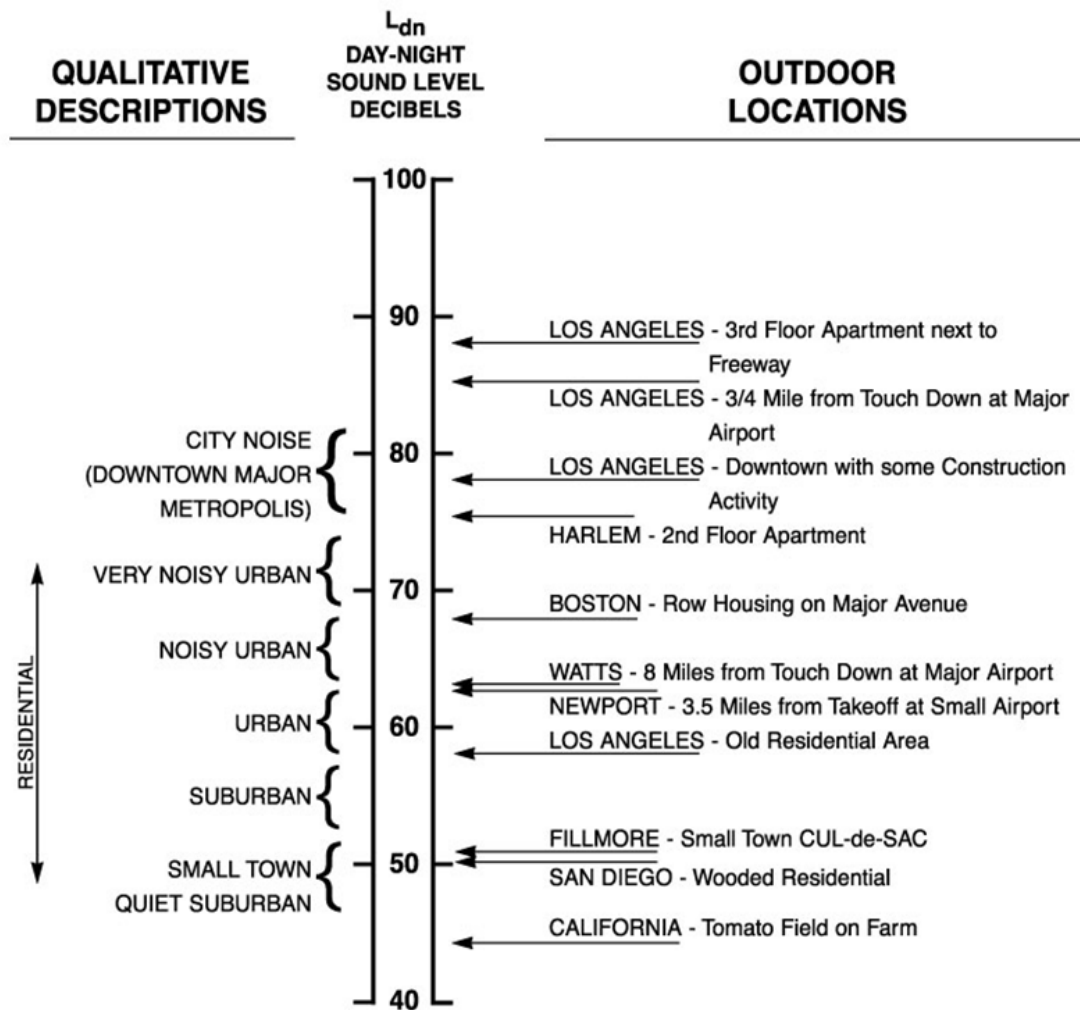
DNL can be measured or estimated. Measurements are practical only for obtaining DNL values for a relatively limited number of points, and, in the absence of a permanently installed monitoring system, only for relatively short time periods. Most airport noise studies are based on computer-generated DNL estimates, determined by accounting for all the SELs from individual events, which comprise the total noise dose at a given location. Computed DNL values are often depicted in terms of equal-exposure **noise contours**, similar to how topographic maps have contours of equal elevation. **Figure U7-7** depicts typical DNL values for a variety of noise environments.

Figure U7-6 Daily Noise Dose



Source: HMMH.

Figure U7-7 Examples of Day-Night Average Sound Levels (DNL)



Source: U.S. EPA, Report No. 550/9-74-004, pg. 14.

The FAA Reauthorization Act of 2018 required the FAA to complete an evaluation of alternative metrics to the DNL standard within one year. In its April 2020 report to Congress, the FAA concluded that while no single noise metric can cover all situations, DNL provides the most comprehensive way to consider the range of factors influencing exposure to aircraft noise.<sup>30</sup> The use of supplemental metrics is both encouraged and supported to further disclose and support the public's understanding of community noise impacts. In keeping with the FAA's conclusions and guidance, Massport provides DNL noise results

30 FAA, Report to Congress: FAA Reauthorization Act of 2018 (Pub. L. 115-254) Section 188 and Section 173, April 14, 2020, [https://www.faa.gov/sites/faa.gov/files/about/plans\\_reports/congress/Day-Night Average Sound Levels COMPLETED report w letters.pdf](https://www.faa.gov/sites/faa.gov/files/about/plans_reports/congress/Day-Night%20Average%20Sound%20Levels%20COMPLETED%20report%20w%20letters.pdf).

along with various supplemental metrics, such as **Cumulative Noise Index (CNI)**, TA, and TAN in Logan Airport EDRs and ESPRs.

## U7.1.2 Aircraft Noise Effects on People

To residents around airports, aircraft noise can be an annoyance and a nuisance. It can interfere with conversation and listening to television, disrupt classroom activities, and disrupt sleep. Relating these effects to specific noise metrics helps with understanding how and why people react to noise in their environment.

The FAA continues to review its Noise Policy and aircraft noise effects on people. In 2023, the FAA requested public comment on its Noise Policy collecting almost 5,000 comments over the five-month comment period. Information on the Noise Policy Review, summaries of the comments, and information related to requirements in the FAA Reauthorization Act of 2024 such as a national Aircraft Noise Advisory Committee can be found on the Noise Policy website.<sup>31</sup>

### U7.1.2.1 Speech Interference

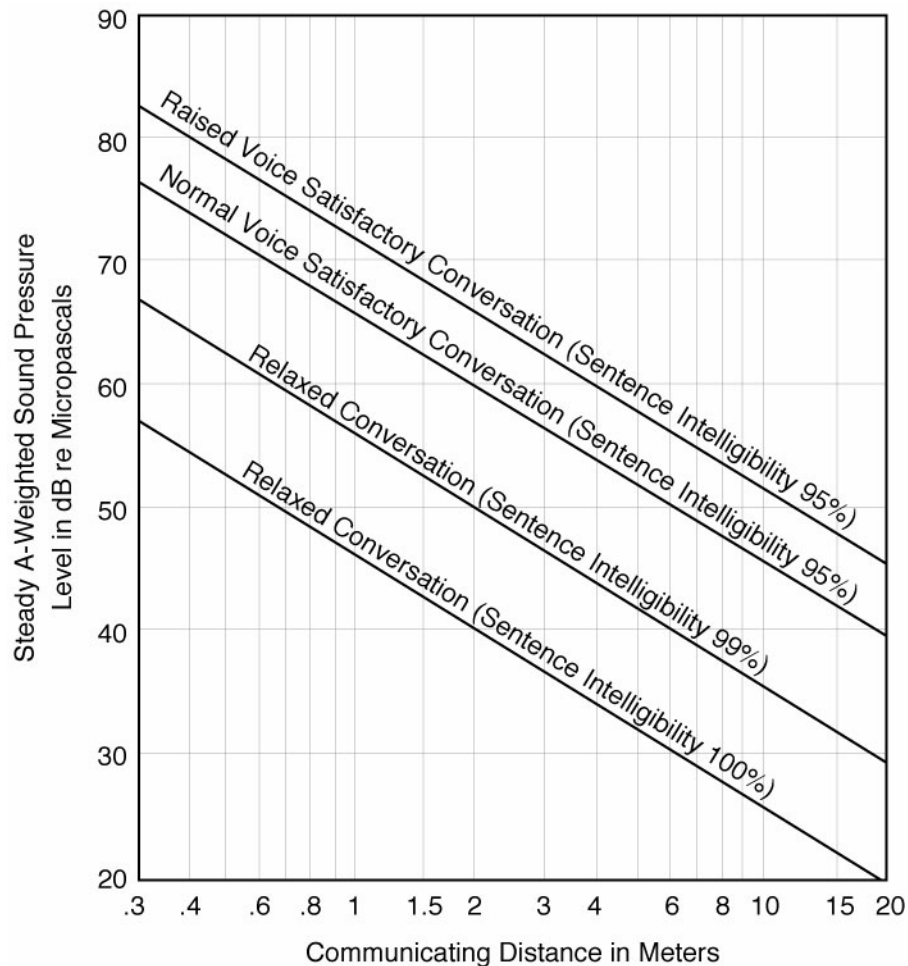
A primary effect of aircraft noise is its tendency to drown out or "mask" speech, making it difficult to carry out a normal conversation. As the distance between a talker and listener increases, the sound level of speech decreases. As the background sound level increases, it becomes harder to hear speech.

**Figure U7-8** presents typical distances between talker and listener for satisfactory outdoor conversations, in the presence of different steady A-weighted background noise levels for raised, normal, and relaxed voice effort. As the background level increases, the talker must raise their voice, or the individuals must get closer together to continue talking.

As indicated in **Figure U7-8**, "satisfactory conversation" does not always require hearing every word; 95 percent intelligibility is acceptable for many conversations. Listeners can infer a few unheard words when they occur in a familiar context. However, in relaxed conversation, we have higher expectations of hearing speech and generally require closer to 100 percent intelligibility. Any combination of talker-listener distances and background noise that falls below the bottom line in **Figure U7-8** (thus assuring 100 percent intelligibility) represents an ideal environment for outdoor speech communication and is considered necessary for acceptable indoor conversation as well.

31 FAA, Noise Policy Review, Federal Aviation Administration, <https://www.faa.gov/noisepolicyreview>

Figure U7-8 Outdoor Speech Intelligibility



Source: U.S. Environmental Protection Agency (EPA), Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974. EPA, Report No. 550/9-74-004, pg. D-5.

One implication of the relationships in **Figure U7-8** is that for typical communication at distances of 3 or 4 feet (1 to 1.5 meters), acceptable outdoor conversations can be carried on in a normal voice as long as the background noise outdoors is less than about 65 dBA. If the noise exceeds this level, as might occur when an aircraft passes overhead, intelligibility would be lost unless vocal effort were increased or communication distance were decreased.

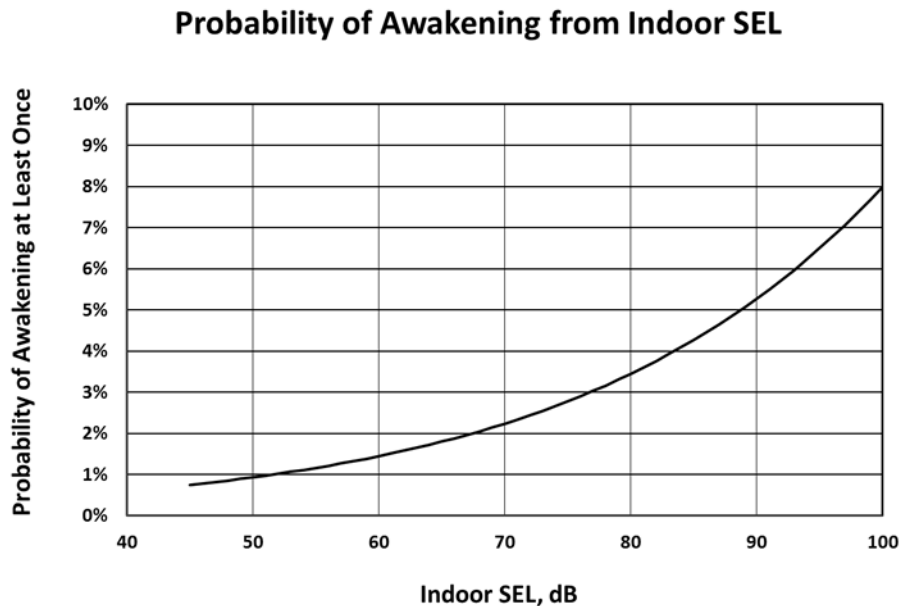
Indoors, typical distances, voice levels, and intelligibility expectations generally require a background level less than 45 dBA. With windows partly open, housing generally provides about 12 dBA of interior-to-exterior noise level reduction. Thus, if the outdoor sound level is 60 dBA or less, there is a

reasonable chance that the resulting indoor sound level will afford acceptable conversation inside. With windows closed, 24 dB of attenuation is typical.

### U7.1.2.2 Sleep Interference

Research on sleep disruption from noise has led to widely varying observations. In part, this is because (1) sleep can be disturbed without awakening, (2) the deeper the sleep, the more noise it takes to cause arousal, and (3) the tendency to awaken increases with age and other factors. **Figure U7-9** shows the probability that a group of people will be awakened at least once when exposed to a given indoor SEL.

Figure U7-9 Probability of Awakening at Least Once from Indoor Noise Event



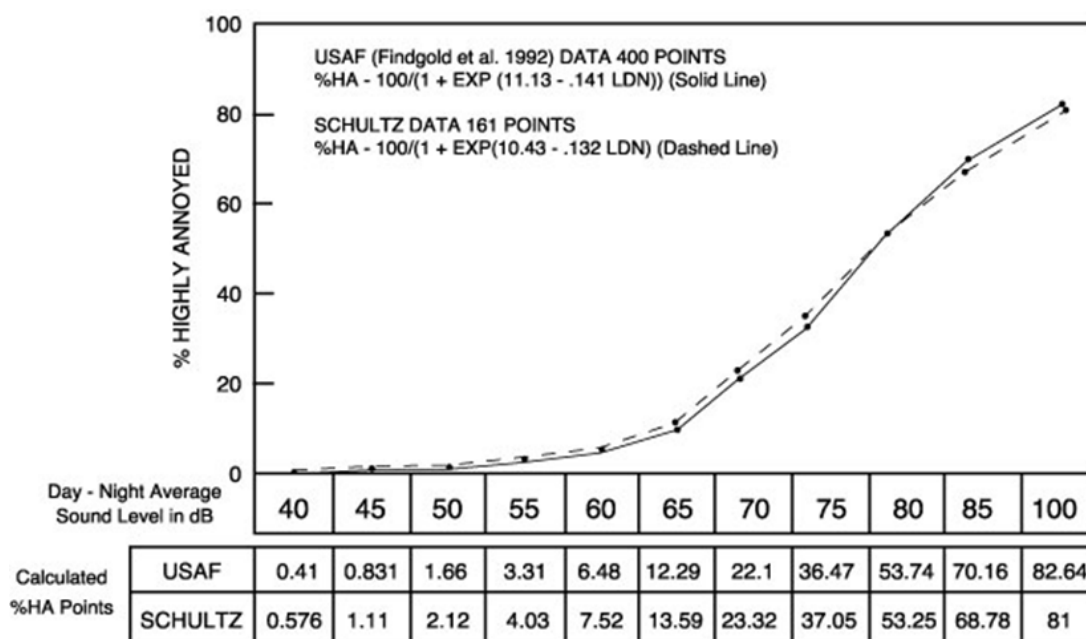
Source: American National Standards Institute (ANSI) S12.9-2008/Part 6, Quantities and Procedures for Description and Measurement of Environmental Sound — Part 6: Methods for Estimation of Awakenings Associated with Outdoor Noise Events Heard in Homes; Equation 1.

For example, an indoor SEL of 80 dB results in approximately 3.5 percent of the exposed population being awakened. If windows are open in the bedroom on a warm evening, providing a typical outside-to-inside noise level reduction of around 15 dB, it takes an SEL of about 95 dB outdoors to awaken 3.5 percent of the population. The American National Standards Institute (ANSI) has extended this concept further and developed a standard (ANSI S12.9-2008/Part 6) for computing the percentage of the population likely to be awakened by multiple noise events occurring throughout the night. The FICAN subsequently endorsed the standard as the best available means of estimating behavioral awakenings from aircraft noise.

### U7.1.2.3 Community Annoyance

Social survey data make it clear that individual reactions to noise vary widely for a given noise level. Nevertheless, as a group, people's overall response is predictable and relates well to measures of cumulative noise exposure such as DNL. **Figure U7-10** shows a widely recognized relationship between environmental noise and annoyance. Based on data from 18 surveys conducted worldwide, the curve indicates that at levels as low as DNL 55, approximately 5.0 percent of the people will still be highly annoyed, with the percentage increasing more rapidly as exposure increases above DNL 65 dB.

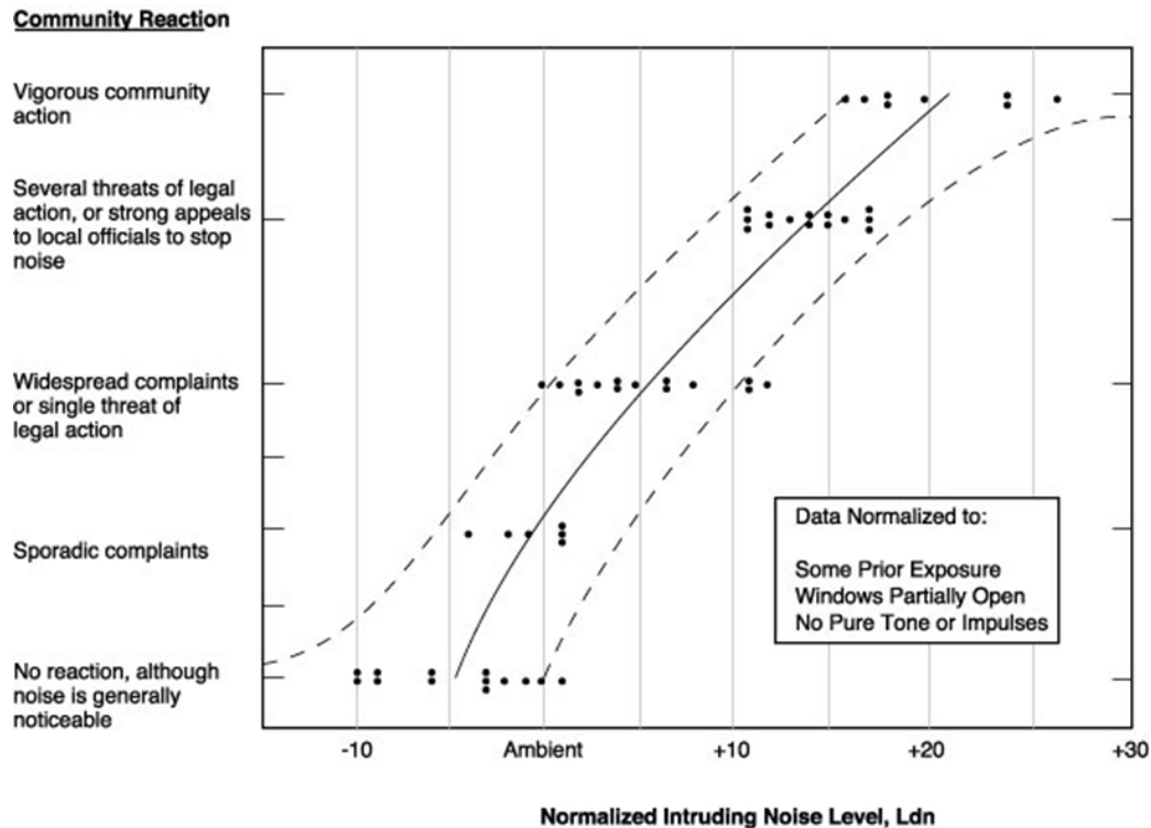
**Figure U7-10 FICAN-Schultz Curve: Percent Highly Annoyed as a Function of DNL**



Source: Federal Interagency Committee on Aviation Noise (FICAN), "Federal Agency Review of Selected Airport Noise Analysis Issues." August 1992. From data provided by United States Air Force (USAF) Armstrong Laboratory. pg. 3-6.

Research conducted by the U.S. EPA has shown that community reaction to a noise environment can also be related to DNL. This relationship is shown in **Figure U7-11**. Levels have been normalized to the same set of exposure conditions to permit valid comparisons between ambient noise environments. Data summarized in **Figure U7-11** suggest little reaction would be expected for intrusive noise levels five decibels below ambient noise levels, while widespread complaints can be expected as intruding noise exceeds background levels by about 5 dB. Intense reaction is likely when ambient levels are exceeded by 20 dB.

Figure U7-11 Community Reaction as a Function of Outdoor DNL



Source: Wyle Laboratories, "Community Noise," prepared for the U.S. EPA, Office of Noise Abatement and Control, Washington, D.C., December 1971, pg. 63.

Note: DNL - Day-Night Average Sound Level.

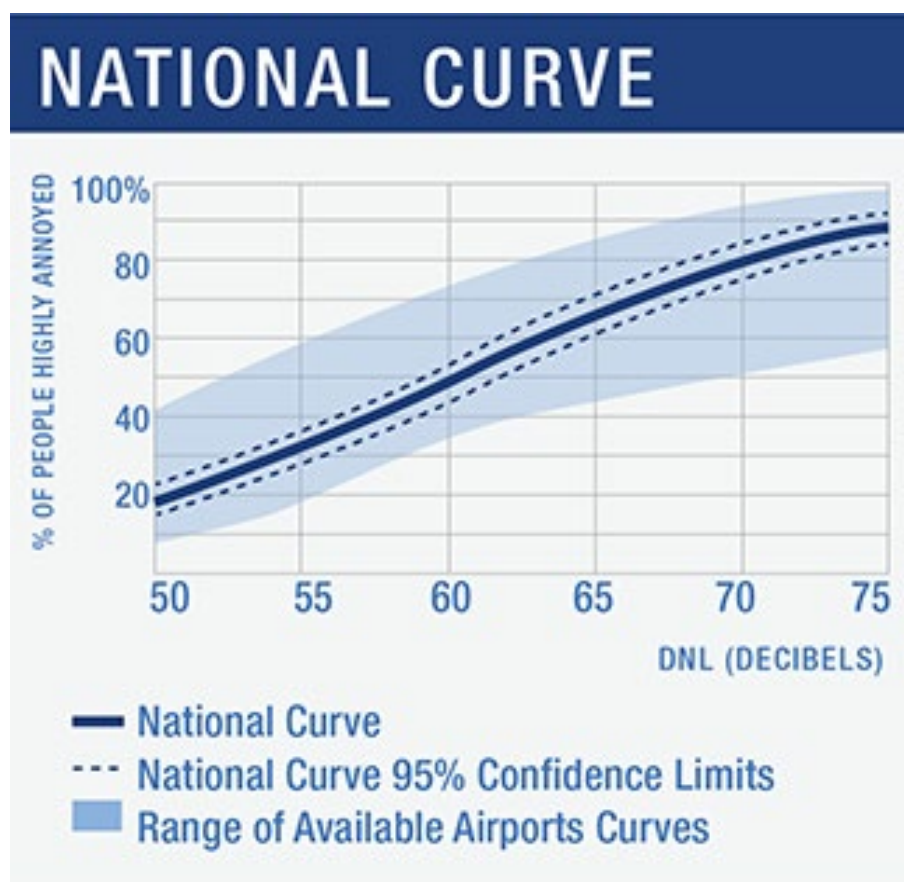
While the Schultz Curve remains the accepted standard for describing transportation noise exposure-annoyance relationships, its supporting scientific evidence and social survey data were based on information originally from the 1970s. The last in-depth review and revalidation of the Schultz Curve was conducted in 1992. More recent analyses have shown that aviation noise results in higher annoyance than other modes of transportation. Further, recent international social surveys have also generally shown higher annoyance than what is described in the Schultz Curve. These analyses and survey data indicate the Schultz Curve may not reflect the most accurate, current U.S. public perception of aviation noise.

In 2015, the FAA began a multi-year effort to update the scientific evidence on the relationship between aircraft noise exposure and its effects on communities around airports, and this effort represented the most comprehensive study using a single noise survey ever undertaken in the United States. This study, called the *Neighborhood Environmental Survey* (NES), was developed to measure the relationship between aircraft noise exposure and community annoyance, and the study's results would confirm accurate

information would be used as the basis for efforts to reduce aircraft noise-related impacts on communities. For detailed information on the survey, refer to the survey introduction and the NES final report.<sup>32</sup> The NES webpage also contains a summary of the report and the survey results as well as additional information on aircraft noise.<sup>33</sup>

Using best practices in terms of noise analysis and data collection, the NES collected information from communities surrounding 20 airports across the country. Through the NES, the FAA captured community response to the noise impacts of modern aircraft fleets as they are being flown today. The survey responses were used to create a new National Curve, shown in **Figure U7-12**.

Figure U7-12 National Curve: Percent Highly Annoyed as a Function of DNL



Source: Kirsch, Peter, "Aircraft Noise and Emissions Legislation in the Next Congress: Priorities, Perspectives, and Predictions", presented at the Aviation Noise and Emission Symposium, February 26, 2021, [https://anesymposium.aqrc.ucdavis.edu/sites/g/files/dqvnsk3916/files/inline-files/SESSIO~1\\_2.PDF](https://anesymposium.aqrc.ucdavis.edu/sites/g/files/dqvnsk3916/files/inline-files/SESSIO~1_2.PDF)

32 FAA. Analysis of the Neighborhood Environmental Survey. <https://www.airporttech.tc.faa.gov/Products/Airport-Safety-Papers-Publications/Airport-Safety-Detail/ArtMID/3682/ArticleID/2845/Analysis-of-NES>

33 [https://www.faa.gov/regulations\\_policies/policy\\_guidance/noise/survey](https://www.faa.gov/regulations_policies/policy_guidance/noise/survey)

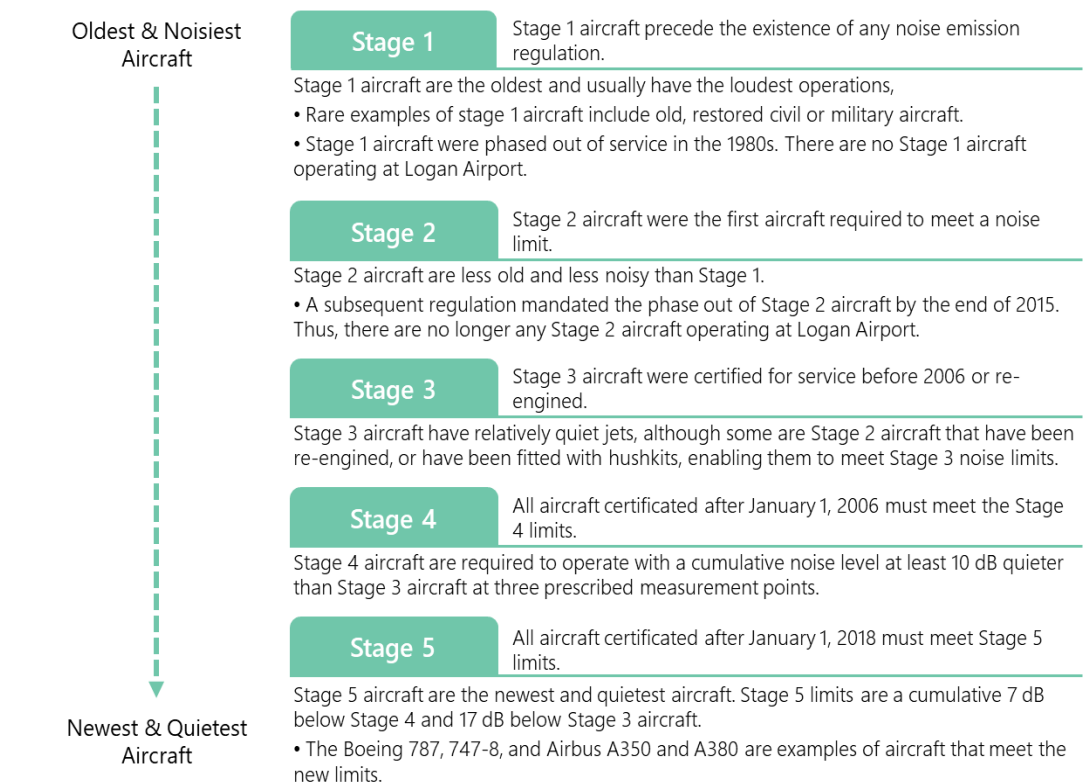
The NES results show the public's perception of aviation noise has substantially changed relative to the Schultz Curve. Compared with the existing Schultz Curve, the new National Curve shows a substantial increase in the percentage of people who are highly annoyed by aircraft noise over the entire range of aircraft noise levels considered, including at lower noise levels. This will ultimately inform future FAA noise initiatives.<sup>34</sup>

## U7.2 Aviation Noise Regulatory Framework

The following sections outline aircraft noise laws and regulations applicable to Logan Airport.

### U7.2.1 Noise Standards: 14 CFR Part 36

Aircraft noise standards for jet aircraft in the U.S. are defined in the Code of Federal Regulations (CFR) Title 14 Part 36, *Noise Standards: Aircraft Type and Airworthiness Certification* (14 CFR Part 36 or "Part 36").<sup>35</sup> Under Part 36, jet aircraft are categorized according to their noise emission levels into **Aircraft Certification Noise Categories**, referred to as stages, in FAA Advisory Circular 36-1H, *Noise Levels for U.S. Certificated and Foreign Aircraft*, and these categories are:



34 FAA, "Policy and Guidance: Neighborhood Environmental Survey", [https://www.faa.gov/regulations\\_policies/policy\\_guidance/noise/survey](https://www.faa.gov/regulations_policies/policy_guidance/noise/survey), last updated August 31, 2023.

35 CFR Title 14 Part 36, *Noise Standards: Aircraft Type and Airworthiness Certification*, as amended, <https://www.ecfr.gov/current/title-14/chapter-I/subchapter-C/part-36>.

The regulation defines noise emission limits for turbojets, turboprops, and helicopters based on noise levels at each of three locations: takeoff, landing, and to the side of the runway during takeoff (sideline). Examples of Stage 3, Stage 4, and Stage 5 aircraft types operating at Logan Airport are shown in **Table U7-1**. The noise levels decrease with each successive stage of aircraft design. In addition, regulations mandate a Stage 3 noise limit for each aircraft, depending on the aircraft's weight. The cumulative noise level is determined by summing the certification lateral, flyover, and approach values, in comparison with the permissible limit. **Table U7-1** shows the cumulative level sum, the aircraft's noise limit, and the dB difference. The Stage 5 aircraft example shows the greatest difference, at over 25 dB below the Stage 3 limit.

**Table U7-1** Example Stage 3, Stage 4, and Stage 5 Aircraft Operating at Logan Airport

| Aircraft Name  | Aircraft/Engine Model | Aircraft Noise Stage Equivalent | Cumulative Noise Level (dB) <sup>1</sup> | Stage 3 Noise Limit (dB) | Difference (dB) | Percent Below Limit |
|----------------|-----------------------|---------------------------------|------------------------------------------|--------------------------|-----------------|---------------------|
| Embraer 175    | EMB175                | 3                               | 272.8                                    | 282.0                    | 9.2             | 3.3%                |
| Boeing 737-700 | CFM56-7B22            | 4                               | 274.1                                    | 288.1                    | 14.0            | 4.9%                |
| Airbus 220-300 | PW1524G-3             | 5                               | 262.9                                    | 288.2                    | 25.3            | 8.8%                |

Source: European Union Aviation Safety Agency (EASA), EASA Certification Noise Levels, MAdB Jets (200213) Certification data, <https://www.easa.europa.eu/domains/environment/easa-certification-noise-levels>

1: Cumulative Noise Levels include lateral, overflight, and approach noise.

## U7.2.2 Airport Noise Compatibility: 14 CFR Part 150

First implemented in February 1981, Title 14 Part 150, *Airport Noise Compatibility Planning* (14 CFR Part 150 or "Part 150") defines procedures that an airport operator must follow if it chooses to conduct and implement an airport noise and land use compatibility plan.<sup>36</sup> Part 150 Noise Compatibility Studies require the use of DNL to evaluate the airport noise environment, and the regulation identifies noise compatibility guidelines for different land uses depending on their sensitivity. Key values include a DNL of 75 dB, above which no residences, schools, hospitals, or churches are considered compatible, and a DNL of 65 dB, above which those land uses are considered compatible only if they are sound insulated.

Noise abatement or mitigation measures that an airport operator must consider in Part 150 Noise Compatibility Studies include acquisition of incompatible land, construction of noise barriers, sound insulation of buildings, implementation of a preferential runway program, use of noise abatement flight tracks, implementation of airport use restrictions, and any other actions that would have a beneficial effect on the public.

<sup>36</sup> 14 CFR Part 150, *Airport Noise Compatibility Planning*, <https://www.ecfr.gov/current/title-14/part-150>.

While Massport has implemented variations of these and additional measures at Logan Airport, an official Part 150 Noise Compatibility Study has not been filed with the FAA because Logan Airport's program elements, while regularly reviewed and updated, preceded 14 CFR Part 150 and are effectively grandfathered under the regulation. In 2021, Massport submitted a 2020 **Noise Exposure Map** prepared in accordance with Part 150 to the FAA in order to update the RSIP. The Noise Exposure Map (NEM) was accepted by the FAA in December 2021 and Massport was subsequently able to re-start the sound insulation program. Massport submitted a 2021 NEM to the FAA in December, 2022, and a 2022 NEM in May, 2024 for use in the subsequent phases of the RSIP.

### U7.2.3 Aircraft Noise Rules and Restrictions: FAR Parts 91 and 161

The *Airport Noise and Capacity Act of 1990* (ANCA) directed the U.S. Secretary of Transportation to undertake three key noise-related actions:

1. Establish a schedule for a phase-out of Part 36 Stage 2 aircraft by the year 2000;
2. Establish a program for FAA review of all new airport noise and access restrictions limiting operations of Stage 2 aircraft; and
3. Establish a program for FAA review and approval of any restriction that limits operations of Stage 3 aircraft, including public notice requirements.<sup>37</sup>

The FAA addressed these requirements through amendment to an existing federal regulation, Title 14 Part 91, *General Operating and Flight Rules* (14 CFR Part 91 or "Part 91") and established a new regulation, Title 14 Part 161, *Notice and Approval of Airport Noise and Access Restrictions* (14 CFR Part 161 or "Part 161").<sup>38,39</sup> ANCA effectively ended Massport's pursuit of additional operational restrictions outside of this program.

#### U7.2.3.1 Amendment to FAR Part 91

Under Part 91, the FAA establishes and regulates operating noise limits for civil aircraft operation. The noise limits are based on aircraft noise certification criteria set forth in Part 36, described in Section U7.2.1.

In 1976, the FAA ordered a phase-out of all Stage 1 aircraft with a maximum gross takeoff weight (MGTOG) over 75,000 pounds, to be completed on January 1, 1985. After that date, Stage 1 civil aircraft over 75,000 pounds MGTOG were banned from operating in the U.S. Until 1988, the ban included limited exemptions related to commercial service at "small communities". The ANCA required a similar phase-out of Stage 2 aircraft over 75,000 pounds by December 31, 1999. The Stage 2 limit exempted most business (or corporate) jets and a very small number of the very smallest "air carrier" type jets until December 31, 2015, when a full ban took effect.<sup>40</sup> Aircraft operators responded to the Stage 1 and 2 phase-outs by

37 Pub. L. No. 101-508, 104 Stat. 1388, as recodified at 49 United States Code 47521- 47533.

38 14 CFR Part 91, *General Operating and Flight Rules*, <https://www.ecfr.gov/current/title-14/part-91>

39 14 CFR Part 161, *Notice and Approval of Airport Noise and Access Restrictions*, <https://www.ecfr.gov/current/title-14/part-161>

40 FAA Modernization and Reform Act of 2012 sets a January 1, 2016, ban of Stage 2 aircraft less than 75,000 lbs.

retiring their non-compliant aircraft or modifying some of their aircraft to meet the more stringent standards. These modifications include installing quieter engines, noise-reducing physical modifications to the airframe and/or existing engines, and limiting operating weights and procedures to meet the applicable Part 36 limits. Some former Stage 2 aircraft that were “recertificated” as Stage 3 with these modifications may still operate at Logan Airport, but only on an occasional basis as GA aircraft. Aircraft with these modifications are no longer operating as part of the commercial fleet at Logan Airport.

From 2006 to 2017, airlines added Stage 4 aircraft as they expanded their fleets. The Stage 4 noise standard applies to any new jet aircraft type designs over 12,500 pounds requiring FAA approval after January 1, 2006. The **International Civil Aviation Organization (ICAO)** has also adopted the same regulation for international operators, but neither the FAA nor ICAO has indicated whether there will be restrictions on the remaining recertificated Stage 3 aircraft from carrier fleets.

In 2017, ICAO and the FAA adopted a higher standard of noise classification called Stage 5 (Chapter 14 for ICAO and Part 36 for the FAA), which was effective for new aircraft type certification after December 31, 2017, and December 31, 2020, depending on the weight of the aircraft. Many aircraft currently operating at Logan Airport meet Stage 5 noise standards.

### U7.2.3.2 FAR Part 161

The FAA implemented the ANCA requirements related to notice, analysis, and approval of use restrictions affecting Stage 2 and 3 aircraft through the establishment of Part 161. Part 161 requires an airport operator that proposes to implement a restriction on Stage 2 or 3 aircraft operations to undertake, document, and publicize certain benefit-cost analyses, comparing the noise benefits of the restriction to its economic costs. Operators must obtain specific FAA approvals of the analysis, documentation, and notice processes. To implement a Stage 3 restriction, formal FAA approval is required.

Part 161 and the ANCA define more demanding requirements and explicit guidance for Stage 2 restrictions. The FAA's role for Stage 2 restrictions is limited to commenting on compliance with Part 161 notice and analysis procedural requirements. Part 161 provides guidance regarding appropriate information to provide in support of these findings. While Part 161 does not require this information for a Stage 2 restriction, Part 161 states that it would be “useful.” Moreover, the FAA has required airports to provide this same information for Stage 2 restrictions (and even for Stage 1 restrictions pursued under FAR Part 150), on the grounds that they are required for airports to comply with grant assurance 22(a), “Economic Nondiscrimination,” which states an airport operator “will make its airport available as an airport for public use on reasonable terms and without unjust discrimination to all types, kinds, and classes of aeronautical activities, including commercial aeronautical activities offering services to the public at the Airport.”<sup>41</sup>

41 FAA Order 5190.6(b), “Airport Compliance Manual” Chapter 13, Section 14, paragraph (a). To be approved, restrictions must meet the following six statutory criteria: 1) The proposed restriction is reasonable, nonarbitrary, and nondiscriminatory. 2) The proposed

Although several (on the order of a dozen) airports have embarked on efforts to adopt both Stage 2 and 3 restrictions in the past two decades, the FAA has found that only one, Naples Municipal Airport, a GA airport in Naples, Florida, has fully complied with the Part 161 analysis, notice, and documentation requirements for a ban on Stage 2 jet operations.

The ANCA and Part 161 specifically exempt Stage 3 use restrictions that were effective on or before October 1, 1990, and Stage 2 restrictions that were proposed before that date. The *Logan International Airport Noise Abatement Rules and Regulations* (the "Logan Airport Noise Rules") were promulgated in 1986; therefore, ANCA and Part 161 have no bearing on their continued implementation in their current form. The Logan Airport Noise Rules are discussed in Section U7.5.1.

Future proposals to make the rules more stringent regarding Stage 2 operations or to restrict Stage 3 operations further could require Massport to complete Part 161 notice, analysis, and approval processes for Stage 3 restrictions. In 2006, Massport requested an opinion from the FAA regarding the pursuit of a Part 161 waiver or exemption to allow Massport to implement a curfew of nighttime operations of hush-kitted Stage 3 aircraft. The FAA informed Massport that a waiver or exemption from the requirements of Part 161 is not authorized under, or consistent with, federal statutory and regulatory requirements. A copy of the FAA's letter to Massport was provided in Appendix H, *Noise Abatement* in the 2005 ESPR.

## U7.3 Logan Airport Noise Modeling

The FAA requires aircraft operators to use the AEDT modeling software to assess aircraft noise and emissions. Massport develops its annual Logan Airport noise analyses using the latest version of the FAA's AEDT in conjunction with a proprietary AEDT pre-processor software program. The pre-processor software takes radar data from individual flights occurring throughout the year, and structures these data into a form usable as input to the AEDT. The AEDT serves as the computational "engine" for calculating noise. Prior to 2016, Massport used the FAA's Integrated Noise Model (INM) with a pre-processor called RealContours™ which operated in a similar manner.

In contrast, the standard AEDT modeling methodology involves the developing operational inputs and calculating the DNL for a typical average annual day.<sup>42</sup> This approach requires manually collecting, refining, and entering enormous amounts of airport activity data averaged over a full year. Typically, the model inputs may include an aircraft fleet mix with several dozen representative aircraft types, on the order of 100 to 300 representative flight tracks, which is common for a facility of Logan Airport's size.

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restriction does not create an undue burden on interstate or foreign commerce. 3) The proposed restriction maintains safe and efficient use of the navigable airspace. 4) The proposed restriction does not conflict with any existing federal statute or regulation. 5) The applicant has provided adequate opportunity for public comment on the proposed restriction. 6) The proposed restriction does not create an undue burden on the national aviation system.

42 FAA, "Guidance on Using the Aviation Environmental Design Tool (AEDT) to Conduct Environmental Modeling for FAA Actions Subject to NEPA," October 27, 2017, Section 3.2, p. 13, [https://aedt.faa.gov/Documents/guidance\\_aedt\\_nepa.pdf](https://aedt.faa.gov/Documents/guidance_aedt_nepa.pdf).

Model inputs also include runway use and flight track use percentages for three or four categories of aircraft types with similar performance characteristics. This normal approach to noise modeling meets accepted professional standards and reduces the effort and cost normally associated with manually entering the parameters for every actual operation. However, it represents a significant simplification of the extraordinary diversity of actual aircraft operations over a year.

### U7.3.1 Noise and Operations Management System (NOMS)

Instead of relying on consolidated data summaries, Massport takes maximum advantage of both AEDT's capabilities and the investment that Massport has made in its **Noise and Operations Management System (NOMS)**. The AEDT pre-processor improves the precision of modeling by utilizing operations monitoring results in these key areas:

- Directly converts the flight track for every identified aircraft operation to an AEDT track, rather than assigning multiple operations to a limited number of prototypical tracks;
- Models each operation on the specific runway that it actually used, rather than applying a generalized distribution to broad ranges of aircraft types;
- Models each operation in the time period that it occurred, which realistically represents delays that occur during the year, rather than relying on scheduled flight times; and
- Selects the specific airframe and engine combination to model, on an operation-by-operation basis, based on the registration data for each flight, wherever possible; otherwise, based on the published compositions of the fleets of the specific airlines operating at Logan Airport.

Massport installed its first automated monitoring system in 1973, which consisted of 12 fixed remote noise monitors, data acquisition and reporting software, a teletype-style printer, a public display panel consisting of lights on a map representing the locations of the noise monitors and analog displays indicating the real-time noise level at each noise monitor, and a separate system to monitor and record Automated Terminal Information Service (ATIS) transmissions and radio communications between the pilots and Air Traffic Control Tower (ATCT) staff with a time-search capability to research aircraft reported to cause community annoyance. In 1989, Massport installed a fully integrated NOMS for Logan Airport, which included:

- 30 fixed remote noise monitors;
- 18 wind speed and direction sensors at select noise monitoring sites;
- 2 humidity and temperature sensors at select noise monitoring sites;
- 2 portable noise monitoring kits;
- Hourly airport weather data;
- Runway operating configuration data;
- Flight track and aircraft identification data;

- Software running on servers; and
- An independent public web portal providing 10-minute-delayed flight tracks.

Massport evaluated the current system in early 2018 and went out to bid for an upgraded NOMS in late 2018. The prior vendor (L3Harris) was selected and in 2019, the vendor began upgrading the system, including additional reports and the option for Virtual Noise Monitors (VNM). Massport has replaced the equipment for all permanent noise monitors. The monitor at Site 1 was removed in May 2017 and relocated in April 2023 to the Union Park Street Playground in collaboration with the South End community. In 2024, Massport went out to bid for upgrades to the system and continued support. The existing vendor was selected to update the NOMS and maintain the system.

### U7.3.1.1 Noise Modeling Using NOMS and Radar Data

Logan Airport's NOMS data are the basis for Massport's annual noise calculations, and the NOMS dataset includes flight data from Airport radar systems as well as several other data sources to create a more accurate representation of Airport noise conditions. Prior to 2015, Massport used a single radar data feed as input to the NOMS.

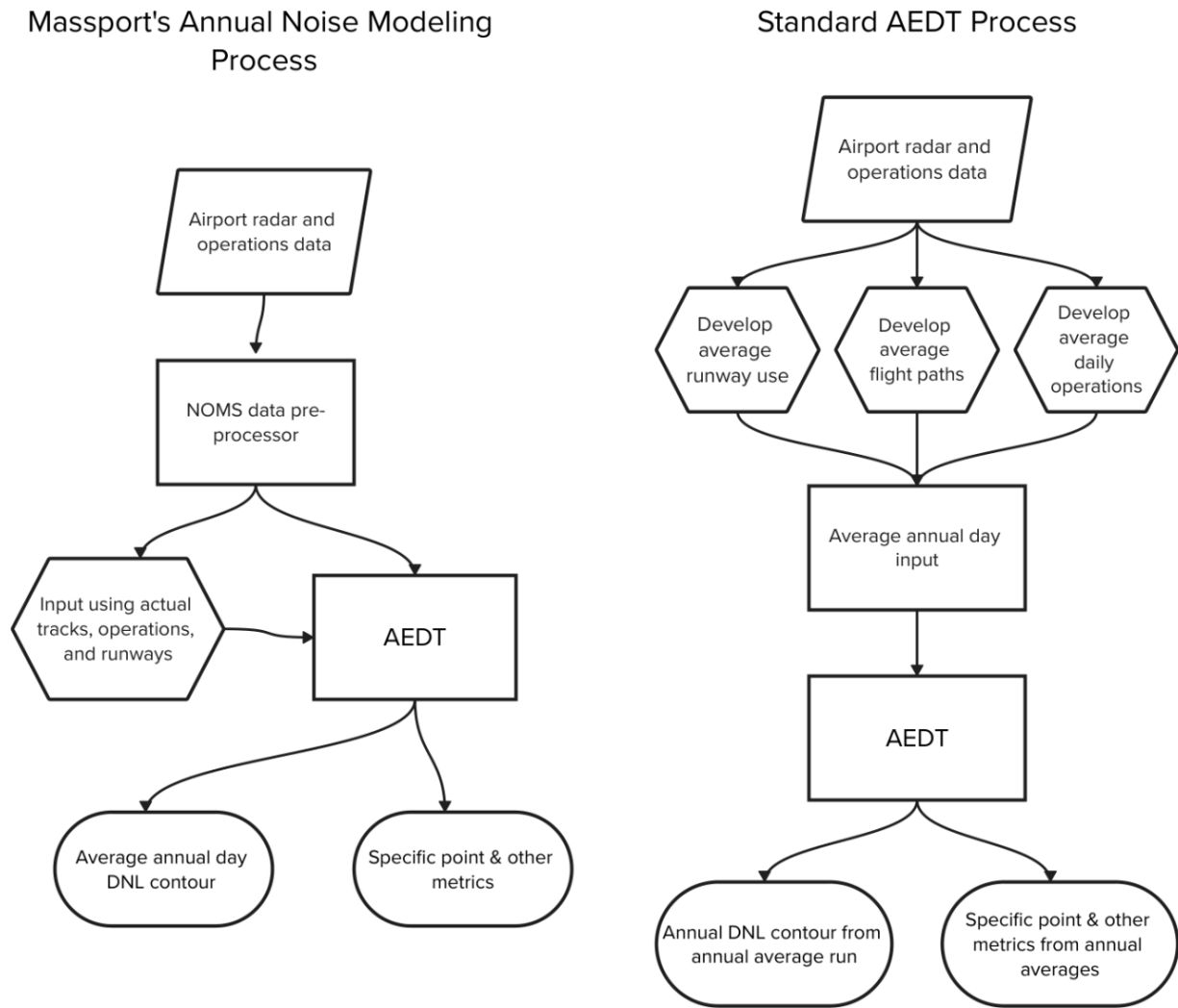
In 2015, the Massport system upgraded to the FAA's NextGen data feed, which integrates the Automatic Dependent Surveillance Broadcast (ADS-B) feed with multiple redundant real-time FAA surveillance sources into a single fused data feed. The NextGen data is a "multisensory-based" subscription data source that aggregates available surveillance sources, including:

- FAA En Route Radars;
- FAA Terminal Radars;
- FAA Airport Surface Detection Equipment X Band (ASDE-X) Systems;
- FAA Aircraft Situational Display to Industry (ASDI) Oceanic and Canadian Tracks only; and
- Harris ADS-B Data Feed.

Logan Airport is supported by an FAA ASDE-X system, which provides highly accurate one-second data points for aircraft situational awareness on the Airport and within at least five miles of the Airport. These data are fused with the other sources and provided to the Massport NOMS system in a georeferenced data format. The georeferenced radar data are imported into the AEDT model, which is built on a georeferenced platform to retain the accuracy of the data for modeling. The NOMS contains suitable data for modeling, capturing over 99 percent of the recorded flights which are then scaled slightly by category and airline to match the annual flights in Massport records.

**Figure U7-13** provides a schematic representation of Massport's annual noise modeling process compared to the standard AEDT process. The flow chart on the left depicts data from the NOMS system being used as noise model inputs, while the flow chart on the right illustrates the development of a simplified average annual day that would be otherwise necessary. The following sections describe the sources of data inputs and methodology behind the noise models presented in the EDRs and ESPRs.

Figure U7-13 Schematic Noise Modeling Comparison: Massport's NOMS Process vs. Standard AEDT Process



Source: FAA and HMMH, Inc.

### U7.3.2 Runway Use and Fleet Mix

Using NOMS and radar data, the AEDT pre-processor determines which runway was used, the specific aircraft type, and time classification, either daytime or nighttime, for each flight. Massport compares annual runway use to previous years using a variety of summary tables with different perspectives. Some data tables break the fleet into six representative aircraft groups with similar runway requirements and operational patterns. Below are example aircraft types from each group:

#### Heavy Jet A

- Boeing 747
- Airbus 340
- Airbus 380



#### Heavy Jet B

- Boeing 767, 777, & 787
- Airbus 300, 310, 330, & 350
- McDonnell Douglas (MD) 11



#### Light Jet A

- Boeing 717
- MD-90



#### Light Jet B

- Boeing 737 & 757
- Airbus 319, 320, & 220
- MD-80
- Embraer 190



#### Regional Jet (RJ)

- Embraer 135, 145, 170, & 175
- Canadair Regional Jet (CRJ) 200, 700, & 900
- Corporate Jets



#### Turboprop and Piston Aircraft (Non-jets)

- Cessna 208 Caravan
- DHC-3 Twin Otter
- Helicopters



The EDR and ESPR noise and appendices present runway use data in the form of operations counts, percentage distributions, daytime vs nighttime patterns, and number of flights overflying neighborhoods at each runway end. Massport reports annual operations data in a variety of ways for understanding year-to-year changes that affect the noise environment. Since Massport began categorizing aircraft this way, the proportions of aircraft in the Heavy Jet A and Light Jet A categories have diminished due to changing fleets. Light Jet A and Light Jet B categories are primarily narrow-body aircraft, which have approximately 100 to 200 seats per aircraft. Heavy Jet A and Heavy Jet B categories are often wide-body aircraft with over 200 seats, and sometimes as many as 800 seats per aircraft.

Regional Jet (RJ) Aircraft are defined as those aircraft with 90 or fewer seats, consistent with the categorization throughout the EDRs and ESPRs.<sup>43</sup> For years prior to 2010, the RJs in this report were classified as aircraft with fewer than 100 seats. When RJs first started gaining popularity, the aircraft types available were typically 50 seats or less, while the traditional air carrier jet has over 100 seats. As newer aircraft types have become available, the smaller 35- to 50-seat types have been replaced by 70- to 99-seat types, with those having 90 or more seats flying many of the traditional air carrier routes.

<sup>43</sup> U.S. Code, 2006 Edition, Supplement 3, Title 49 – Transportation Subtitle VII – Aviation Programs Part A – Air Commerce and Safety, Subpart II, Economic Regulation, Chapter 417 – Operations or Carriers, Subchapter III – Regional Air Service Incentive Program, Sec. 41762 – Definitions – defines RJ air carrier service to be aircraft with a maximum of 75 seats. Therefore, this report categorizes aircraft with 70-75 seats and below as RJ and aircraft with 90 seats and higher aircraft as air carrier (Note: there are no types with 75 to 90 seats).

The majority of the newer types fall into two categories: the 70- to 75-seat category, which remains categorized as RJs, and the 91- to 99-seat category, which are categorized as air carrier jets. The Embraer 190 falls into this second category and is now classified within the Light Jet B group.

### U7.3.3 Flight Tracks

The AEDT pre-processor converts each flight's radar track to an AEDT model track and then models the scaled aircraft operation on that track. This method keeps the modeled lateral and vertical dispersion of the aircraft types consistent with the radar data and ensures that anomalies in the departure paths are captured in the noise modeling process. The NOMS data input directly into the noise modeling allows Massport to account for runway closures and temporary or permanent airspace changes which may occur during the year. These changes and the resulting fluctuations in the number of flights would be much more difficult to accurately capture with conventional modeling methods.

### U7.3.4 Meteorological Data

AEDT has several settings that reflect aircraft performance profiles and sound propagation based on meteorological data. Meteorological settings include average temperature, dew point, barometric pressure, and relative humidity at the Airport. Massport obtains weather data for the reporting years from the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information and uses the applicable annual averages to model the operations for the given reporting years.

In AEDT, atmospheric absorption is the calculation of the absorption of sound by the atmosphere due to weather conditions, including temperature, relative humidity, and barometric pressure. The model uses the input average weather conditions to calculate atmospheric absorption adjustments to standard Noise-Power-Distance (NPD) curves, based on the methodology from the Society of Automotive Engineers' (SAE) Aerospace Recommended Practice (ARP) Report 5534, *Application of Pure-Tone Atmospheric Absorption Losses to One-Third Octave-Band Data*<sup>44</sup>, taking into account changes in atmospheric absorption due to airport-specific weather conditions.<sup>45</sup>

## U7.4 Noise Model Results and Interpretation

The primary focus of Massport's annual noise modeling efforts are the DNL contours, presented over a map in five-decibel increments. The contours provide a visual summary of the noise environment and its year-to-year changes. While the AEDT model is capable of producing coarse, approximate population

44 SAE ARP5534:2013(R2021), "Application of Pure-Tone Atmospheric Absorption Losses to One-Third Octave-Band Data," SAE International, 2013.

45 SAE International, Aerospace Recommended Practice (ARP) Report 5534, *Application of Pure-Tone Atmospheric Absorption Losses to One-Third Octave-Band Data*, 2013 updated 2021, <https://www.sae.org/standards/content/arp5534/>.

estimates within contours, Massport uses a more refined GIS-based methodology to produce more accurate results to describe the noise environment.

Specific point DNL calculations are compared to the yearly measured DNL values at Massport's 30 permanent noise monitor locations. Massport also calculates annual DNL at census block group centroid points and presents results by community in the associated appendix. Massport also calculates supplemental noise metrics annually, as discussed in the following sections.

### U7.4.1 Population within Noise Contours

U.S. Census data forms the basis of the population counts for given reporting years in the ESPRs and EDRs. Massport prepares population counts using the most recent applicable U.S. Census data available. The population-counting process determines the fraction of the area of the U.S. Census block within the contour and multiplies the block population by this fraction to determine the population exposed to DNL 65 dB or greater for that block.

### U7.4.2 Cumulative Noise Index (CNI)

The *Logan Airport Noise Rules* discussed in **Section U7.5.2** define a noise metric referred to as CNI, which is a single number representing the sum of the noise energy from each commercial jet aircraft operation, either a takeoff or landing, at Logan Airport over a full year. The CNI is weighted similarly to DNL, meaning an extra 10 dB is added to each event occurring at night. This weighting is equivalent to multiplying the number of nighttime operations by each aircraft by a factor of ten.

The *Logan Airport Noise Rules* define CNI in units of Effective Perceived Noise Decibels (EPNdB) and require the index to be computed for the fleet of commercial aircraft operating at Logan Airport throughout the year, and established a limit of 156.5 EPNdB.<sup>46</sup> In addition, in EDRs and ESPRs, Massport reports partial CNI values of noise at Logan Airport throughout the year. For more information on the *Logan Airport Noise Rules* and Massport's abatement strategies, refer to **Section 7.5.1**.

The *Logan Airport Noise Rules* established a CNI limit of 156.5 EPNdB and describe a process for further investigation if that limit is exceeded. In addition, in EDRs and ESPRs, Massport reports partial CNI values so that contributions from various subsets of the fleet are identified, including cargo and passenger jets; daytime and nighttime operations; and arrivals and departures. Airline and aircraft registration information from the NOMS allows the proper noise certification levels to be selected from the latest aircraft noise registration database.<sup>47</sup>

The index also provides a decibel level per seat, computed by using the number of operations, the number of seats per aircraft, and the certificated noise levels for takeoffs and landings for each aircraft

<sup>46</sup> Effective Perceived Noise Level in decibels (EPNdB) is the noise metric used to certify aircraft under CFR Part 36.

<sup>47</sup> Type-certificate data sheet for noise database available from the European Aviation Safety Agency; <http://www.easa.europa.eu/document-library/noise-type-certificates-approved-noise-levels>.

type. For comparison purposes, using this same method, Massport continues to compute and report the Noise Per Seat Index (NPSI) value for commercial jet operations in each ESPR.

### U7.4.3 Dwell and Persistence

Another supplemental measure of noise impact relates to the length of time for which noise impacts occur, known as **dwell and persistence**. Dwell and persistence are measured by the number of hours a given location or area is subject to jet aircraft overflights.

In the 1980's, Massport's Preferential Runway Advisory System (PRAS) Advisory Committee designated eight runway end combinations as shown in **Table U7-2** for computing the number of hours for which a given location or area is subject to continuous jet aircraft overflights. The PRAS committee defined dwell exceedance as more than seven hours of operations over a given area during any day between the hours of 7:00 AM and midnight. The committee defined persistence exceedance as more than 23 hours of operations over an area between 7:00 AM and midnight during a period of three consecutive days. The PRAS program is discussed further in **Section U7.5.1.2**.

**Table U7-2 Representative Neighborhoods Near Logan Airport Subject to Overflights**

| Runway                             | Representative Neighborhoods                                                                                                                |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| 4L and 4R Arrivals                 | South Boston (Farragut St.), Dorchester, Quincy, Milton, Weymouth, and Braintree                                                            |
| 32 and 33L Arrivals                | Boston Harbor, Hull, Cohasset, Hingham, Scituate, and other South Shore locations                                                           |
| 14 and 15R Departures              | Boston Harbor, Hull, Cohasset, Hingham, Scituate, and other South Shore locations                                                           |
| 22L and 22R Departures             | South Boston (Farragut Street), Boston Harbor, Hull, Cohasset, Hingham, Scituate, and other South Shore locations                           |
| 27 Departures                      | South Boston (Fan Pier), Roxbury, Jamaica Plain, South End, West Roxbury, Roslindale, Brookline, Hyde Park, and other points South and West |
| 4L/4R Departures, 22L/22R Arrivals | East Boston (Bayswater, Orient Heights), Winthrop (Court Road), Revere, and Nahant                                                          |
| 9 Departures and 27 Arrivals       | Winthrop (Point Shirley), Boston Harbor, and other points North                                                                             |
| 33L Departures and 15R Arrivals    | East Boston (Eagle Hill), Chelsea, Everett, Medford, Somerville, Arlington, Cambridge, Belmont, and other points South and West             |

Source: Massport.

### U7.4.4 Time Above (TA)

Massport annually reports the amount of time that aircraft noise is above each of three predefined threshold sound levels for each of the thirty community noise monitor locations, referred to as TA. These times are computed using the AEDT model for an annual average 24-hour day, and separately for the average nine-hour nighttime period (10:00 PM to 7:00 AM). The threshold sound levels of 65, 75, and 85 dBA correlate to levels that may cause speech interference, as discussed in **Section U7.1.2.1**.

## U7.5 Logan Airport Noise Abatement

Massport is dedicated to minimizing noise impacts from airport operations on the surrounding community, as demonstrated by a long history of noise abatement programs, policies, and resources for the community. **Table U7-3** lists different noise abatement goals as established within the *Noise Abatement Management Plan*. Subsequent sections discuss different noise abatement activities conducted by Massport as part of implementing this plan.

**Table U7-3 Noise Abatement Management Plan**

| Noise Abatement Goal                                                | Plan Elements                                                                       |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Limit total aircraft noise                                          | Cumulative Noise Index (CNI) limits                                                 |
|                                                                     | Stage 3 percentage requirement in Noise Rules                                       |
| Mitigate noise impacts                                              | Residential Sound Insulation Program (RSIP)                                         |
|                                                                     | School Sound Insulation Program                                                     |
|                                                                     | Noise abatement arrival and departure procedures                                    |
|                                                                     | Preferential Runway Advisory System (PRAS) Runway End Use goals implementation      |
|                                                                     | Runway use restrictions                                                             |
|                                                                     | Reduced engine taxiing                                                              |
| Continue Noise Operations and Monitoring System (NOMS) improvements | Evaluate the current system and update the system as needed                         |
| Minimize nighttime noise                                            | Nighttime Stage 2 aircraft prohibition                                              |
|                                                                     | Nighttime runway use restrictions                                                   |
|                                                                     | Late-night over-water operations prioritization                                     |
|                                                                     | Nighttime engine run-up and <a href="#">auxiliary power unit (APU)</a> restrictions |
| Address and respond to noise issues and complaints                  | Noise Office                                                                        |
|                                                                     | Noise Complaint Line and website                                                    |
|                                                                     | Special studies, including RNAV development and flight procedure research           |

### U7.5.1 Logan Airport Noise Abatement Rules and Regulations

Since 1986, Massport's primary mechanism for reducing noise impacts from Logan Airport's operations has been the *Logan Airport Noise Rules* (Noise Rules).<sup>48</sup> The Rules were designed to reduce noise impacts by encouraging the use of quieter aircraft by requiring decreased use of louder aircraft and by limiting

<sup>48</sup> The *Logan International Airport Noise Abatement Rules and Regulations*, effective July 1, 1986, are codified at 740 Code of Massachusetts Regulations (CMR) 24.01 et seq.

nighttime activity by louder Stage 2 types. Many secondary goals aimed at limiting noise in specific areas were also included.

Specific provisions of the *Logan Airport Noise Rules*, which continue to serve these goals, include:

- Limiting cumulative noise exposure at Logan Airport (as measured by Massport's CNI) to a maximum of 156.5 EPNdB;
- Maximizing use of Stage 3 aircraft, which was the quietest aircraft type at the time the Noise Rules were established;
- Restricting nighttime operations by Stage 2 aircraft;
- Placing limitations on times and locations of engine run-ups and use of Auxiliary Power Units (APU); and
- Restricting use of certain runways by more noisy aircraft at specific times of day.

These restrictions and limitations are subject to FAA implementation and the safe operation of the Airport and airspace. While the specific language applying to Stage 2 and Stage 3 aircraft is no longer applicable, due to aircraft fleet modernizations, and Massport continues to calculate and report on the CNI annually.

### U7.5.1.1 Runway Use Limitations

Runway use refers to the frequency with which aircraft use each of these runways during the year, as dictated or permitted by availability, wind, weather, aircraft performance, demand, and air traffic control. Runway 15R-33L and Runway 4R-22L are Logan Airport's longest runways; each of these is just over 10,000 feet in length.

For noise abatement reasons, Runway 15R-33L is the preferred runway to use at night, with arrivals to Runway 33L and departures from Runway 15R (known as head-to-head procedures). This keeps flights over Boston Harbor as much as possible and away from noise-sensitive land uses. Many of these flights do fly over the North Shore or South Shore communities, but not until after reaching altitudes of over one mile high on departure.

During other periods of the day, Runway 9 and 22R are used primarily for departures, and Runways 4R and 22L are used primarily for arrivals. Typically, Runway 27 and 33L are used for both arrivals and departures. Runway 14-32 is unidirectional, meaning there are no arrivals to Runway 14 and no departures from Runway 32. Additionally, Runway 14-32 can be used only during northwest or southeast wind conditions when winds are ten knots or more. Under certain northwest wind conditions, Runway 32 provides the FAA with a second arrival runway, thereby reducing delays at Logan Airport. Runway 14 is available for departures but is rarely used. Runway 15L-33R is Logan Airport's shortest runway, at under 3,000 feet long. This runway is primarily used for small, non-jet aircraft arrivals.

### Preferential Runway Advisory System (PRAS)

In 1982, Massport developed the PRAS to provide an equitable distribution of Logan Airport's noise impacts on surrounding communities. The two primary objectives of PRAS were to equitably distribute noise on an annual basis and to provide short-term relief from continuous operations over the same neighborhoods near the Airport. PRAS consisted of two parts:

- Set of specific runway use goals to address the PRAS objectives; and
- Computer program that provides runway configuration recommendations to air traffic controllers based on weather, traffic, and PRAS goals.

The PRAS Advisory Committee, also formed in 1982, established two short-term goals for the system beyond its annual goals:

- Provide relief from excessive dwell. Exceedance is defined as more than seven hours of operations over a given area during any day between the hours of 7:00 AM and midnight.
- Provide relief from excessive persistence. Exceedance is defined as more than 23 hours of operations over an area between 7:00 AM and midnight during a period of three consecutive days.

Massport enhanced the PRAS in 1990 as well as in subsequent years. In February 2004, the PRAS system was suspended due to an upgrade of the FAA radar system during the consolidation of the Boston Terminal Control Center at the new facility in Merrimack, New Hampshire.

During Phase 2 of the Boston Logan Airport Noise Study (BLANS), the Massport Community Advisory Committee (Massport CAC) voted to abandon PRAS because it had not achieved the intended noise abatement objectives. Phase 3 of the BLANS focused on updating the Runway Use Program and operational tests of a new runway use program began in November 2014 and continued through September 2016. The BLANS project ended in 2016 without the Massport CAC agreeing on a new runway use program. A final BLANS project report was issued in April 2017.

Although PRAS is not in effect at Logan Airport, Massport also continues to collect and report data pertaining to PRAS's second objective: relief from continuous operations over the same neighborhoods near the Airport.

### U7.5.2 Residential Sound Insulation Program (RSIP)

In addition to meeting FAA requirements, Massport has gone beyond regulatory standards to establish one of the nation's most extensive residential and school sound insulation programs. Eligibility for sound insulation must follow FAA guidelines, which state that the residence must be located within the latest DNL 65 dB contour submitted to the FAA, and a non-compatible structure must be experiencing existing

45 dB or greater interior noise levels within habitable rooms with the windows closed to be considered eligible.<sup>49</sup>

Additionally, structures constructed after October 1, 1998 are not eligible, and structures that do not meet building codes are not eligible until the building's deficiencies have been addressed. The FAA will allow a residence to be treated under the RSIP only once. Homes treated previously after 1993 are not eligible for additional consideration.<sup>50</sup>

Historically, the percentage of eligible homeowners who have responded to Massport's outreach under the RSIP and whose dwellings are treated varies significantly by community, from a high of approximately 90 percent in Revere to a low of approximately 50 percent in South Boston. Historically, approximately 80 to 85 percent of homeowners in East Boston and Winthrop have participated. Approximately eight percent of applicants also choose the Room of Preference option that allows the owner to identify a room, usually a bedroom or living room, for extra acoustical treatment.

In January 2020, Massport sent a letter to the FAA Associate Administrator requesting that Massport and the FAA work together to address re-treatment of homes that were sound insulated during the early years of the program, potentially upgrading treatments in eligible homes with newer, more effective, and more durable materials. The FAA responded that the agency was exploring limited circumstances under which Massport might be able to reassess homes previously mitigated before the FAA first issued sound insulation standards in 1993. The first step in this process was for Massport to submit an updated RSIP NEM.

### U7.5.2.1 Recent RSIP Status Updates

Massport submitted an AEDT-derived 2019 NEM to the FAA in 2020 for review and discussion. At that time, the FAA requested that the updated RSIP contour represent 2019 operational conditions due to the significant reduction in aircraft operations in 2020 resulting from the COVID-19 pandemic. It was subsequently determined by the FAA that a 2020 NEM would be more appropriate. It is recognized that as air traffic activity rebounds, the DNL contours will grow and Massport will update subsequent NEMs so that the RSIP will continue to be based on the latest Logan Airport noise environment.

The FAA accepted the 2020 NEM on December 20, 2021, and Massport restarted its RSIP in 2022. Massport selected a consulting team that will survey eligible program areas to identify potentially eligible properties that meet the FAA's new criteria for a pilot program. In 2022, Massport applied for and was approved for an initial grant by the FAA to fund the beginning of the RSIP's first phase. Massport has submitted a 2021 NEM

49 FAA, *Airport Improvement Program (AIP) Handbook*, Appendix R: Noise Compatibility Planning/Projects, [https://www.faa.gov/airports/aip/aip\\_handbook/appendix#PR00](https://www.faa.gov/airports/aip/aip_handbook/appendix#PR00).

50 FAA, *AIP Handbook*, Appendix C: Prohibited Projects and Unallowable Costs, Table C-5 "Examples of Prohibited Projects/Costs for Noise Mitigation" Item (8), page C-19, [https://www.faa.gov/airports/aip/aip\\_handbook/appendix#TC05](https://www.faa.gov/airports/aip/aip_handbook/appendix#TC05).

and a 2022 NEM in subsequent years, and will submit a 2024 NEM based on the DNL contours prepared for the 2022 *ESPR*.

### U7.5.2.2 School Sound Insulation Program

In addition to efforts made to mitigate noise impacts among residences, Massport has also implemented programs to reduce overall noise impacts to surrounding schools. Under the RSIP, Massport has also provided sound insulation to 36 schools at a cost of over \$8 million between 1982 and 2004, as shown in **Table U 7-4**.

**Table U7-4 Schools Treated Under Massport Sound Insulation Program**

| School                   | Cost      | School                        | Cost               |
|--------------------------|-----------|-------------------------------|--------------------|
| <b>Boston</b>            |           |                               |                    |
| Samuel Mason             | \$192,401 | East Boston High              | \$381,948          |
| Dearborn Middle          | \$248,238 | St. Mary's Star of the Sea    | \$80,901           |
| Ralph Waldo Emerson      | \$155,851 | St. Dominic Savio High        | \$127,879          |
| Lewis Middle             | \$202,092 | St. Lazarus                   | \$46,092           |
| Nathan Hale Elem.        | \$92,302  | James Otis                    | \$46,092           |
| Phillis Wheatley Elem.   | \$290,794 | Samuel Adams                  | \$120,650          |
| Davis Ellis Elem.        | \$253,663 | Curtis Guild                  | \$180,572          |
| Henry L. Higginson       | \$119,543 | Dante Alighieri               | \$97,750           |
| St. Augustine            | \$92,855  | P.J. Kennedy                  | \$127,637          |
| Cardinal Cushing         | \$47,276  | Donald McKay                  | \$231,754          |
| Patrick Gavin            | \$217,077 | Hugh Roe O'Donnell            | \$113,564          |
| St. Bridgid's            | \$112,100 | E Boston Central Catholic     | \$391,768          |
| Oliver Hazard Perry      | \$337,538 | Manassah Bradley              | \$237,500          |
| Condon School            | \$294,481 | <b>Total Boston Schools</b>   | <b>\$4,840,318</b> |
| <b>Winthrop</b>          |           |                               |                    |
| Winthrop Jr. High School | \$63,756  | A. T. Cummings (Ctr.) School  | \$800,000          |
| E. B. Newton             | \$184,674 | <b>Total Winthrop Schools</b> | <b>\$1,048,430</b> |
| <b>Revere</b>            |           |                               |                    |
| Beachmont School         | \$854,864 | <b>Total Revere Schools</b>   | <b>\$854,864</b>   |
| <b>Chelsea</b>           |           |                               |                    |
| Shurtleff School         | \$292,207 | St. Rose Elementary           | \$46,396           |
| Williams School          | \$486,258 | St. Stanislaus                | \$66,298           |
| Chelsea High School      | \$524,249 | <b>Total Chelsea Schools</b>  | <b>\$1,415,408</b> |
| <b>Total Schools</b>     |           |                               | <b>\$8,159,020</b> |

Source: Massport, 2015.

### U7.5.3 Massport Noise Complaint Line

Continued technological advances in both Massport's noise complaint phone system and online complaint tracking system, as well as the incorporation of third-party complaint applications, have made it easier for community members to file a complaint and to receive information about particular noise events. The following different methods are used by Massport to collect noise complaints regarding Logan Airport:

- In late 2018, Massport's complaint tracking system began identifying complaints submitted through the new Airnoise Button™.<sup>51</sup> The ability to easily submit a complaint has dramatically increased the number of complaints logged in the system.
- The FAA launched its nationwide Noise Complaint Initiative (NCI) in 2020 to better engage with communities on noise complaints. The NCI allows the public to submit a noise complaint or inquiry through the FAA Noise Portal, enabling the FAA to direct or respond to noise complaints more efficiently and effectively. Massport is a Partnering Airport with the FAA's Noise Portal, and has a link to that portal on the noise complaint section of the Massport website.<sup>52,53</sup>
- The Noise Complaint Line provides individuals the opportunity to express their concerns about aviation noise activity or ask questions regarding noise at Logan Airport.

**Noise Complaint Line** provides individuals the opportunity to ask a range of questions, such as:

- "Why is this runway being used?";
- "What time do the planes stop flying?"; and
- Was that aircraft off-course?"

Noise Abatement Office (NAO) staff document noise line complaints by obtaining information from the caller about the nature of the complaint, time of the occurrence, location of the caller's residence, and the activity that was disturbed. The NAO uses the collected information to determine the probable activity responsible for the complaint and writes a letter report to the complainant. The letter includes the original complaint; a response that identifies the activity responsible for the call, such as arrivals, departures, run-up, etc.; meteorological information at the time of the call, which is a major factor in aviation activities; the runways in use at the time of the call; and a notice confirming the FAA will receive a copy of the report.

#### U7.5.3.1 Airbus A320 Vortex Generators

Massport encourages operators to use idle or reduced reserve thrust during landing and to retrofit the Airbus A319/320/321 family of aircraft with vortex generators, which reduce tonal noise on approach. A vortex generator is a small device that disrupts wind over ports on the wing, pictured in **Figure U7-14**.

<sup>51</sup> Airnoise is a subscription service that allows the user to file a noise complaint by clicking an online button. The system finds the aircraft closest to the complainer and then files a detailed noise complaint directly with Massport. <https://www.airnoise.io/>

<sup>52</sup> FAA, "FAA Aviation Noise Complain and Inquiry Response (FAA Noise Portal)", <https://ancir.faa.gov/ancir>.

<sup>53</sup> Massport, "Noise Abatement: Noise Complaints", <https://www.massport.com/environment/noise-abatement/logan-airport/complaints>.

Without the device, the wind can produce a “whistling” tone during the aircraft’s approach into an airport. Airbus A319/320/321 aircraft built after 2014 already come equipped with the Vortex Generator. These changes reflect the partnership between Massport and the airlines to reduce aircraft noise to benefit surrounding communities. As airlines retrofit aircraft and transition to the newer models of the A320 family, the number of aircraft operating at Logan Airport without the vortex generators is expected to decrease.

Figure U7-14 Airbus Vortex Generator



Source: Simple Flying 2021

#### U7.5.4 FAA and Massport Area Navigation (RNAV) Pilot Project

Over the last several years, the FAA’s implementation of **Performance-Based Navigation (PBN)** procedures, including **Area Navigation (RNAV)**, has resulted in a concentration of flights along specific corridors. On October 7, 2016, the FAA signed a Memorandum of Understanding (MOU) with Massport to frame the process for analyzing opportunities to reduce noise through changes or amendments to PBN. Massport worked with the FAA and other stakeholders to develop test projects designed to help address the concentration of noise from PBN. Massport proposed several ideas for a test program with the FAA to

better define the implications of flight concentration on the community. The RNAV Pilot Project, the first such project in the nation between the FAA and an airport operator, studied possible strategies to address neighborhood noise-related concerns. As part of the RNAV Pilot Project, the FAA and Massport committed to:

- Analyze the feasibility of changes to some RNAV approaches and departures from Logan Airport;
- Measure and model the benefits and impacts of changing some RNAV approaches; and
- Test and develop an implementation plan, which will include environmental analysis and community/public outreach.

The RNAV Pilot Project was structured in two phases, or “blocks”. Block 1 recommendations included those that would not result in shifting noise from one area to another and that would not have significant operational or technical implications. A report on Block 1 recommendations was completed in December 2017. Block 2 recommendations included those that could result in noise increases in some areas or face technical barriers that would require further review. The RNAV technical team, led by the Massachusetts Institute of Technology (MIT), released the Block 2 report in December 2021.

#### U7.5.4.1 FAA and Massport RNAV Pilot Project Block 1

Following the completion of the Block 1 report, the Massport CAC voted to approve and recommend implementation of the four Block 1 procedures. On December 20, 2017, Massport sent a request to the FAA for review and implementation of the Block 1 recommendations. Massport provided a copy of the letter in the *2017 ESR*.

As of 2025, two of the recommendations have not moved forward: Restricting climb speed to 220 knots due to flyability issues, and modifications to Runway 22 RNAV Standard Instrument Departures (SID) due to airspace conflicts. The other two recommendations have progressed, including the development of an RNAV visual approach to Runway 33L and the modification of the Runway 15R RNAV SID, which would shift departures further away from Hull. The Runway 33L RNAV approach is similar to the jetBlue Airways RNAV visual Special to Runway 33L already in place, but would be a published procedure for other airlines to use.

Since the Block 1 recommendations were submitted, the FAA and Massport have further refined the procedures. In January 2020, the FAA and Massport presented the FAA's recommended options to the Massport CAC. On November 12, 2020, Massport submitted a request to the FAA for review and implementation of two procedures at Logan Airport. These include modifying the existing RNAV SID from Runway 15R to move tracks over water, and a new over-water Required Navigational Performance (RNP) approach for users with the capability to utilize this more precise PBN procedure. A copy of the Block 1

letter has been included in prior EDR and ESRP filings.<sup>54</sup> The FAA completed development of these procedures and published the procedures in December 2021.

#### U7.5.4.2 FAA and Massport RNAV Pilot Project Block 2

In June 2021, the RNAV study team completed the evaluation of the Block 2 options. Block 2 procedures were more complex due to potential operational and technical barriers as well as potential equity issues. Procedures considered as part of the *Block 2 Procedure Recommendations for Boston Logan Airport Community Noise Reduction* report included:

- RNAV or RNP approaches to Runway 22L and Runway 4R;
- Continuous descent RNAV profiles;
- Heading-based departures from Runway 22L and Runway 22R;
- Dispersed headings from Runway 33L and 27.<sup>55</sup>

The Runway 33L, Runway 22L, and Runway 22R departure concepts were presented to major airline representatives and the FAA in May 2020. At the request of the Massport CAC, the FAA agreed to take an initial look at the feasibility of these options by August 2020. The FAA assembled a panel of stakeholders consisting of representatives from the airline industry; the FAA Air Traffic Organization (Mission Support Services, Air Traffic Services, System Operations, and the National Air Traffic Controllers Association); the FAA Office of Environment and Energy; and the FAA Flight Standards Service. The FAA and industry stakeholders completed their initial review of the proposed procedures and determined that none of the procedures would be recommended for further evaluation.

Following this determination, the RNAV study team and the FAA worked to revise several of the procedures for possible implementation and also developed several additional procedures. Massport presented these during a public meeting in September 2021 and to the Massport CAC for review. Massport and MIT completed the RNAV study at the end of 2021, and the Massport CAC considered each measure during its December 2021 meeting. In January 2022, the Massport CAC put forth two of the procedures for further study and implementation by the FAA.

The Massachusetts Institute of Technology (MIT) developed the ***Block 2 Procedure Recommendations for Boston Logan Airport Community Noise Reduction***.

This report is available for download on the MIT website:  
<https://hdl.handle.net/1721.1/131242>.

On January 19, 2022, Massport submitted a request to the FAA for review and implementation of two Block 2 procedures at Logan Airport. These include modifying the existing RNAV SID from Runways 22R and 22L to enable an earlier turn to the east and adding a new over-water RNAV approach for Runway

<sup>54</sup> Required Navigational Performance (RNP) procedures provide a precise flight path both laterally and vertically for aircraft on approach.

<sup>55</sup> Hansman, R. J., Salgueiro, S., & Thomas, J. (n.d.). Block 2 Procedure Recommendations for Boston Logan Airport Community Noise Reduction. DSpace @ MIT. <https://dspace.mit.edu/handle/1721.1/131242>.

22L. A copy of the Block 2 letter has been included in prior EDR and ESPRs. Massport continues to coordinate with the Massport CAC, the FAA, and MIT on targeted, follow-on technical questions and reviews. In 2022, Massport completed the study.

The two new Block 2 procedures were published by FAA on 11/20/2023. The Runway 22L/R RNAV SID was implemented after publication while the Runway 22L RNAV approach underwent additional testing and noise monitoring in 2024.

### U7.5.5 Other Noise-Related Initiatives

The next sections discuss various initiatives and studies conducted by the FAA and Massport to improve airport operations and reduce noise impact. The use of single-engine or reduced-engine taxiing was explored as a potential noise reduction method, although this strategy was not widely adopted due to safety and practical reasons. The FAA, academic partners, and other stakeholders are also conducting on-going noise studies with support from Massport to understand the impact of aircraft noise on communities and explore alternative noise metrics. Massport is also keeping abreast of international research on the effects of aircraft noise to identify opportunities to improve Logan Airport operations and reduce noise impacts on surrounding communities.

#### U7.5.5.1 FAA Runway 4L RNAV Approach Environmental Assessment

A federal **Environmental Assessment (EA)** prepared by the FAA evaluated a permanent RNAV Runway 4L approach procedure to improve landing during reduced weather conditions. Massport requested the FAA review and implement two procedures at Logan Airport to shift departures away from populated areas. The FAA proposed an improved approach procedure to Runway 4L, which previously was only available during visual weather conditions. The goal of implementing the RNAV was to allow Runway 4L to be available for arrivals during some reduced-visibility weather conditions. The procedure was originally evaluated in 2015 during a temporary test, and the FAA committed at that time to conduct a federal EA report.

The FAA EA evaluated a permanent RNAV Runway 4L approach procedure to provide a de-conflicted stabilized approach procedure that provides vertical and lateral guidance when weather or winds require aircraft to land on Runway 4L. The FAA began this process in October 2019 and provided a status presentation to the Massport CAC during its January 2020 meeting. The Draft EA was available for public review and the FAA held public workshops in October 2020. A **Finding of No Significant Impact (FONSI)**

was issued in May 2022 along with the Final EA report.<sup>56,57</sup> The procedure now in use was published in November 2022.

### U7.5.5.2 MOU Pilot Study Procedures

As an outcome from Block 1 of the RNAV Pilot Project, Massport submitted a request to the FAA for review and implementation of two procedures at Logan Airport. These include modifying the existing RNAV SID from Runway 15R to shift departures further north over water away from Hull, and a new over-water RNP approach to Runway 33L.<sup>58</sup> The FAA completed and published the procedures in December 2021, and 2022 was the first full year when the procedures were used.

FAA's new RNP approach to Runway 33L is also designed to keep traffic out over the water and away from densely populated areas. The initial RNAV Pilot Project Block 1 recommendation was for the FAA to convert the jetBlue Special RNAV Visual Approach to a published RNAV Visual Approach for other airlines to use. After further review and analysis, it was decided that an RNP approach would be better, and it could be used day or night. The procedure is referred to as RNAV (RNP) X RWY 33L Approach.

An outcome of Block 2 of the RNAV project is a new RNAV/RNP approach to Runway 22L and modifications to the Runway 22L/R RNAV SID to shift departures further north away from Hull. Both of these procedures were implemented in November 2023.

### U7.5.5.3 Reduced-Engine Taxiing

Single-engine or reduced-engine taxiing has the potential to reduce noise at Logan Airport. When used, the largest noise benefit is achieved by reducing the use of the engines on the side of the aircraft closest to the community. However, this is not always practicable due to airline procedures, taxiway routings, and safety considerations. Massport has reached out to airlines and encouraged the use of this procedure whenever practicable. A copy of Massport's letter to pilots, reminding them of the single-engine taxi recommendation, is included in previous EDR and ESPRs.

In 2009, MIT conducted a survey of pilots at Logan Airport in cooperation with Massport and the FAA, which found that the single-engine taxi procedure was widely used on arrivals but not frequently used on departures.<sup>59</sup> Key reasons cited for not using the procedure were safety or feasibility related, such as a short taxi time. The survey indicated that for the procedure to be considered for arrivals, the taxi-in time

56 U.S. DOT, *Final Environmental Assessment: Boston Logan RNAV (GPS) RWY 4L*, prepared by RoVolus, Environmental Science Associates, and Jacobsen Daniels, May 2022, [https://www.faa.gov/sites/faa.gov/files/air\\_traffic/community\\_engagement/bos/Final-EA-with-Appendices.pdf](https://www.faa.gov/sites/faa.gov/files/air_traffic/community_engagement/bos/Final-EA-with-Appendices.pdf)

57 U.S. DOT, FAA, *Finding of No Significant Impact and Record of Decision: Boston Logan RNAV (GPS) RWY 4L Environmental Assessment*, May 2022, [https://www.faa.gov/sites/faa.gov/files/air\\_traffic/community\\_engagement/bos/Final-EA-with-Appendices.pdf](https://www.faa.gov/sites/faa.gov/files/air_traffic/community_engagement/bos/Final-EA-with-Appendices.pdf)

58 RNP is a family of navigation specifications which allow aircraft to operate along a precise flight path.

59 The full report was published in the 2009 EDR in Appendix L, Survey of Airline Pilots Regarding Fuel Conservation Procedures for Taxi Operations.

would have to exceed 10 minutes and exceed 20 minutes for departures. Mandatory single-engine taxiing was also one of the proposed measures in the BLANS but the FAA rejected them due to safety concerns.

### U7.5.6 Related Noise Studies

Massport stays up to date with noise-related studies and requirements undertaken by the FAA, academia, and other entities. As part of the FAA Reauthorization Act of 2024, the FAA was directed to address issues related to aviation noise research, including:<sup>60</sup>

- **Sec. 786. Part 150 noise standards update:** Directs FAA to update the Airport Noise Compatibility Program regulations (14 C.F.R. part 150) to reflect all relevant laws and regulations. These regulations identify those land uses which are normally compatible with various levels of exposure to aviation noise by individuals as well as prescribing a system for measuring noise at airports and surrounding areas. The FAA is required to seek feedback from airports, users, and individuals living near airports.
- **Sec. 787 Reducing Community Aircraft Noise Exposure:** Requires FAA to take certain actions to reduce undesirable aircraft noise when implementing or revising a flight procedure, including implementing flight procedures that mitigate the impact of aircraft noise
- **Sec. 792. Aircraft Noise Advisory Committee (ANAC):** Requires the FAA to form an Aircraft Noise Advisory Committee (ANAC). The ANAC is to be comprised of representatives from stakeholders across the aviation industry, institutions of higher education, and community representatives. The ANAC will advise the FAA on issues facing the aviation community that are related to aircraft noise exposure and existing FAA noise policies and regulations.

The FAA has a number of on-going research studies aimed to support policymaking around aviation noise:

- **ASCENT research on sleep disturbance:** The long-term goal of this project is to understand the relationship between aircraft noise, sleep disturbance, and human health among U.S. populations. Through ASCENT, the FAA explores ways to reduce noise exposure from aircraft, helicopters, and new entrants such as supersonic civil aircraft, unmanned aircraft systems, and urban air mobility vehicles. ASCENT research also provides data used to inform the development of noise policies and standards.<sup>61</sup>
  - The FAA initiated a study on cardiovascular disease and aircraft noise exposure through its ASCENT Center of Excellence for Alternative Jet Fuels and Environment, and Boston University is continuing this on-going research.

60 Public Law 118-63, FAA Reauthorization Act of 2024. <https://www.govinfo.gov/content/pkg/BILLS-118hr3935enr/pdf/BILLS-118hr3935enr.pdf>

61 FAA, ASCENT, *Pilot Study on Aircraft Noise and Sleep Disturbance*, <https://ascent.aero/project/noise-exposure-response-sleep-disturbance/>.

- **Review of the Civilian Aviation Noise Policy:** Massport responded to the FAA's request for comments seeking input on the FAA's review of four key considerations of its civil aviation noise policy, in the context of noise metrics and noise thresholds.<sup>62</sup>

In addition to tracking FAA-related studies, Massport is also closely following international research on the state of the science around effects of aircraft noise. For example, Massport is supporting the ICAO Committee on Aviation Environmental Protection (CAEP) by reviewing on-going research and information as part of each CAEP cycle, such as the ICAO Guidance Document *Operational Opportunities to Reduce Aircraft Noise*. Massport also regularly reviews publications by the United Kingdom Civil Aviation Authority, which provide updates about on-going research into aircraft noise and key research findings.

## U7.6 Flight Track Monitoring Reports

As part of its on-going commitment to mitigate noise at Logan Airport, Massport evaluates the flight tracks of turbojet aircraft adhering to established FAA noise abatement procedures. However, as is true for any airport operator, Massport has no authority to control where individual aircraft fly. That remains the responsibility of the FAA, while the individual pilots are responsible for safely executing the FAA's instructions. The flight procedures, which are used by the Air Traffic Control (ATC) staff at Boston Tower to achieve desired noise abatement tracks, are contained in the FAA's Tower Order BOS TWR 7040.1 discussed in **Section U7.6.1**.

Since 2002, Massport has prepared annual reports for flight track monitoring. Prior to 2002, Massport issued semi-annual reports, an outgrowth of the Flight Track Monitoring Program study. That study was contained in the *Generic Environmental Impact Report* filed with MEPA in July 1996 and was the subject of two Community Working Group workshops in September and October 1996. The purpose of the on-going monitoring program is to identify any systematic changes in flight tracks that may occur and to reduce flight track dispersion, where appropriate.

### U7.6.1 FAA Air Traffic Control (ATC) Procedures

The FAA Tower Order BOS TWR 7040.1 entitled "Noise Abatement" describes the series of noise abatement policies, rules, regulations, and the procedures to be followed by FAA air traffic controllers in meeting their designated responsibilities. Section 7.a.3 of the Order, subtitled "Turbojet Departure Noise Abatement Procedures," mandates turbojet departures must be issued the SID procedure appropriate for the departure runway. Logan Airport has ten published SIDs; nine area navigation (RNAV) SIDs and one conventional SID.

<sup>62</sup> The comment period to the request for comments published on May 1, 2023, was extended to September 29, 2023. <https://www.faa.gov/noisepolicyreview>

**Figure U7-15** presents the gates used in the analysis for the *Flight Track Monitoring Report*. These “gates” are not the same as the gates in the terminal where passengers board and deplane from aircraft. Rather, these gates are virtual representations of airspace areas that aircraft fly through as part of the aircraft’s flight path when departing from or arriving at Logan Airport. The gates are defined using a geographic coordinate for each end of the gate, the floor altitude that aircraft cannot fly below, and the ceiling altitude that aircraft cannot fly above. Each gate’s edge in **Figure U7-15** points in the direction the aircraft came from.

The analysis identifies the direction of flights passing into or out of the gate and is used to evaluate the performance of flight procedures at each runway end. Air traffic over North Shore passes through the Revere, Swampscott and Marblehead Gates, and traffic over South Shore passes through the Hull 2, Hull 3, and Cohasset Gates. Turbojets departing Runway 27 on the SIDs should pass through the Runway 27 gates, and the Runway 33L RNAV flight tracks pass between, rather than through, the Somerville and Everett gates. The EDRs and ESPRs present the jet aircraft gate crossing data by departure runway.

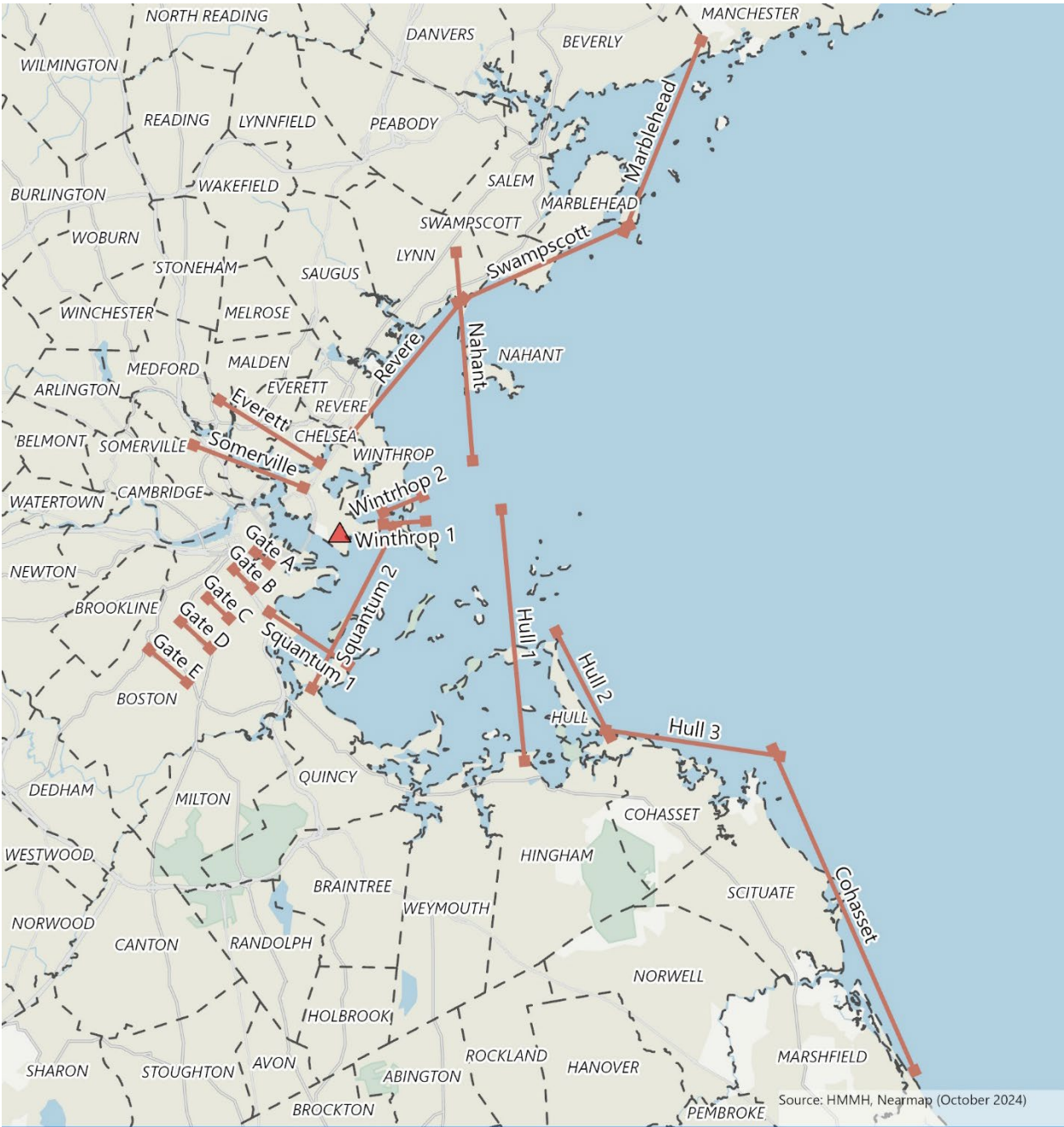


Figure U7-15 Logan Airport Flight Track Monitor Gates

EDR and ESPR User's Guide

- Municipal Boundary
- Gates
- ▲ Airport Reference Point



The conventional SID is for aircraft unequipped to fly RNAV procedures. The conventional SID uses terms such as "BOS 2 DME" to indicate where aircraft should turn. Here, BOS refers to an aid to navigation known as the BOSTON Very High Frequency Omnidirectional Range Tactical Air Navigation (VORTAC), a radio beacon physically located on Logan Airport near the eastern shoreline between the ends of Runways 27 and 33L (see **Figure U7-15**).

Distance Measuring Equipment (DME) refers to a co-located aid to navigation that provides pilots with a cockpit display of the number of nautical miles that the aircraft is from the designated radio beacon. Thus, BOS 2 DME means an aircraft should be two nautical miles away from the BOS. Pilots are then "vectored" or assigned to fly a magnetic heading given by and at the discretion of FAA air traffic controllers to maintain the safe separation of aircraft. Unless otherwise noted, the statistical analyses of flight tracks in each EDR and ESPR describe altitude in feet above mean sea level (MSL), which is used both by the pilot in the cockpit and the air traffic controller on the ground.

During 2010, several of the conventional-only, or radar vector, and RNAV procedures from the *Boston Logan Airport Noise Study* **Categorical Exclusion (CATEX)** were implemented.<sup>63</sup> There are eight RNAV procedures for departures from Logan Airport. These eight procedures are used by aircraft departing Runways 4R, 9, 15R, 22L, 22R, 27, and 33L (Runways 27 and 33L were added in 2014). These procedures primarily affected departures flying over the North and South shores and were designed to increase the amount of jet traffic crossing back over land above 6,000 feet to minimize noise impacts to communities. The RNAV procedures are periodically reviewed and modified as standards change.

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63 Federal Aviation Administration (FAA) *Boston Logan Airport Noise Study Categorical Exclusion Record of Decision (CATEX ROD)*, Issued October 16, 2007.

# U8. Air Quality and Greenhouse Gas Emissions

The *Air Quality and GHG Emissions* chapter within the EDRs and ESPRs provides a comprehensive analysis of air emissions associated with Logan Airport operations. Specifically, the chapter reports on current annual air quality conditions at Logan Airport for the current reporting year and compares those conditions to the prior reporting year and historic benchmark years. The ESPRs, prepared every five years, also estimate future emissions based on forecasts of passenger activity and operations 10 to 15 years in the future in addition to the annual reporting elements normally included within EDRs. The chapter includes **criteria air pollutants** as well as **greenhouse gas (GHG)** emissions inventories and also outlines emissions reduction strategies. These reduction strategies are also discussed in the context of Massport's commitment to achieving Net Zero GHG emissions by 2031 through various initiatives and collaborations.

## U8.1 Air Quality Fundamentals

This section contains a summary of air quality and air emissions with a particular emphasis on airport-related emissions where appropriate. This material is intended to supplement and provide background information for the materials contained in the *Air Quality and Greenhouse Gas Emissions* chapter of the EDRs and ESPRs. Air pollutant types, characteristics, and applicable regulatory standards are detailed in the following sections.

### U8.1.1 Air Pollutant Emissions Types

Pollutant types generally emitted from airport-related sources include criteria air pollutants and GHGs. Criteria air pollutants are associated with local air quality and have regulatory standards meant to protect human health and the environment. GHGs, once emitted, remain in the atmosphere for long periods of time, decades or more. In the atmosphere, GHGs trap heat that would normally pass through the atmosphere into space, and the atmospheric warming that results can affect the global climate. While efforts to reduce GHG emissions are on-going, standards limiting emissions from airports do not exist at this time.

#### U8.1.1.1 Criteria Air Pollutants

The U.S. Environmental Protection Agency (U.S. EPA) has established **National Ambient Air Quality Standards (NAAQS)** for a select group of criteria air pollutants designed to protect public health, the environment, and quality of life from the detrimental effects of air pollution. Listed alphabetically, these pollutants are briefly described below. The NAAQS are listed in **Section U8.2.1**.

### Carbon Monoxide (CO)

Carbon monoxide (CO) is a colorless, odorless, tasteless gas. It may temporarily accumulate, especially in cool, calm weather conditions, when fuel use reaches a peak and CO is the most stable, chemically, due to the low temperatures. CO from natural sources usually dissipates quickly, posing no threat to human health. Transportation sources, like motor vehicles, energy generation, and open burning are among the predominant anthropogenic, or man-made sources of CO to the atmosphere.

### Lead (Pb)

Lead (Pb) in the atmosphere is generated from industrial sources, including waste oil and solid waste incineration, iron and steel production, lead smelting, and battery and lead manufacturing. Historically, motor vehicles were the primary source of lead emissions due to the lead content in gasoline. However, following the ban on leaded gasoline in 1996 by the U.S. EPA, lead emissions from motor vehicles were essentially eliminated. However, at airports, low-lead fuel used in some GA aircraft is still a source of airport-related lead emissions.

### Nitrogen dioxide (NO<sub>2</sub>) and Nitrogen Oxides (NO<sub>x</sub>)

Nitrogen dioxide (NO<sub>2</sub>), nitric oxide (NO), and the nitrate radical (NO<sub>3</sub>) are collectively called oxides of nitrogen (NO<sub>x</sub>). These three compounds are interrelated, often changing from one form to another in chemical reactions, and NO<sub>2</sub> is the compound commonly measured for comparison to the NAAQS. NO<sub>x</sub> is generally emitted as NO, which is oxidized to NO<sub>2</sub>. The principal man-made source of NO<sub>x</sub> is fuel combustion in motor vehicles and power plants, but aircraft engines are also a source. Reactions of NO<sub>x</sub> with other atmospheric chemicals can lead to the formation of ozone (O<sub>3</sub>) and acidic precipitation.

### Ozone (O<sub>3</sub>)

Ozone (O<sub>3</sub>) is a secondary pollutant, formed from daytime reactions of NO<sub>x</sub> and **volatile organic compounds (VOCs)** in the presence of sunlight. VOCs, which are a subset of hydrocarbons (HC) and have no NAAQS, are released in industrial processes and from evaporation of gasoline and solvents. NO<sub>x</sub> and VOCs are referred to as precursor pollutants to O<sub>3</sub>.

### Particulate matter (PM<sub>10</sub>/PM<sub>2.5</sub>)

Particulate matter (PM<sub>10</sub>/PM<sub>2.5</sub>) comprises very small particles of dirt, dust, soot, or liquid droplets called aerosols. The NAAQS for PM<sub>10</sub>/PM<sub>2.5</sub> is segregated by sizes; equal to or less than 10 and equal to or less than 2.5 microns as PM<sub>10</sub> and PM<sub>2.5</sub>, respectively. PM<sub>10</sub>/PM<sub>2.5</sub> are formed as an exhaust products in the internal combustion engine or can be generated from the breakdown and dispersion of other solid materials, like fugitive dust, for example.

### Sulfur Dioxide (SO<sub>2</sub>)

Sulfur Dioxide (SO<sub>2</sub>) is the primary component of sulfur oxides (SO<sub>x</sub>), which are emitted in natural processes and by man-made sources such as combustion of sulfur-containing fuels and sulfuric acid manufacturing.

The criteria air pollutants and their precursors associated with operations at Logan Airport include VOCs, NO<sub>x</sub>, CO, and PM<sub>10</sub>/PM<sub>2.5</sub> and are inventoried in the EDRs and ESPRs. O<sub>3</sub> is not inventoried because it does not have a direct source emission rate; instead, it forms in the atmosphere through chemical reactions between VOCs and NO<sub>x</sub> in the presence of sunlight. Emissions of Pb and SO<sub>2</sub> are also not calculated in the EDRs and ESPRs, as airport sources contribute minimally to these pollutants relative to other non-Airport sources. Leaded aviation fuel use at Logan Airport is limited and SO<sub>2</sub> is primarily produced by fuel combustion at power plants and industrial facilities unaffiliated with Logan Airport.

### U8.1.1.2 Greenhouse Gases (GHGs)

GHGs are gases that trap heat in the atmosphere, and their emissions are associated with airport activities. Aviation related GHG emissions are principally in the form of CO<sub>2</sub> generated by aircraft, **Auxiliary Power Units (APUs)**, **Ground Service Equipment (GSE)**, motor vehicles, and an assortment of stationary sources. For the most part, CO<sub>2</sub> emissions from these sources arise from fossil fuel combustion of jet fuel, **aviation gasoline (avgas)**, diesel, gasoline, **compressed natural gas (CNG)**, and are emitted as by-products contained in the engine exhaust. Currently, there are no specific national laws or regulations in the U.S. that directly restrict GHG emissions from airports. The primary GHGs that are associated with Logan Airport operations are listed and described below.

### Carbon dioxide (CO<sub>2</sub>)

Carbon dioxide (CO<sub>2</sub>) enters the atmosphere through burning fossil fuels (i.e., coal, natural gas, and oil), solid waste, trees, and other biological materials, and also as a result of certain chemical reactions (e.g., cement production). CO<sub>2</sub> is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.

### Methane (CH<sub>4</sub>)

Methane (CH<sub>4</sub>) is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices, land use, and the decay of organic waste in municipal solid waste landfills.

### Nitrous oxide (N<sub>2</sub>O)

Nitrous oxide (N<sub>2</sub>O) is emitted during agricultural, land use, and industrial activities; combustion of fossil fuels and solid waste; as well as during the treatment of wastewater.

### Other GHGs

Other GHGs associated with airport operations, including fluorinated gases such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>), are emitted by airports to a far lesser extent and are not included in the EDRs or ESPRs.

## U8.1.2 Airport Air Emissions Sources

Large metropolitan airports generate air emissions from several general source categories. **Table U8-1** provides a summary listing of Logan Airport-related sources of air emissions, the associated pollutants, and their characteristics.

**Table U8-1** Airport-Related Air Emissions Sources

| Sources                   | Emissions                                                                                         | Characteristics                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Aircraft                  | CO, NO <sub>2</sub> ,<br>PM <sub>10</sub> /PM <sub>2.5</sub> , SO <sub>2</sub> ,<br>VOCs and GHGs | Exhaust products of fuel combustion vary depending on aircraft engine type, number of engines, power setting, and period of operation. Emissions are generally assessed based on a typical landing and takeoffs (LTO) cycle (i.e., taxi and delay, take-off, climb-out, approach, landing, and taxi to gate).                                                                                                                       |
| APU                       | CO, NO <sub>2</sub> ,<br>PM <sub>10</sub> /PM <sub>2.5</sub> , SO <sub>2</sub> ,<br>VOCs and GHGs | Exhaust products of fuel combustion of the turbine engine. The quantities and types can vary based on engine load and duration of operation.                                                                                                                                                                                                                                                                                        |
| GSE                       | CO, NO <sub>2</sub> ,<br>PM <sub>10</sub> /PM <sub>2.5</sub> , SO <sub>2</sub> ,<br>VOCs and GHGs | Exhaust products of fuel combustion from service trucks, tow tugs, belt loaders, and other portable equipment.                                                                                                                                                                                                                                                                                                                      |
| Motor vehicles            | CO, NO <sub>2</sub> ,<br>PM <sub>10</sub> /PM <sub>2.5</sub> , SO <sub>2</sub> ,<br>VOCs and GHGs | Exhaust products of fuel combustion from patron and employee traffic approaching, departing, and moving about the airport site. Emissions vary depending on vehicle type, distance traveled, operating speed, and ambient conditions.                                                                                                                                                                                               |
| Fuel storage and handling | VOCs                                                                                              | Formed from the evaporation and vapor displacement of fuel from storage tanks and fuel handling facilities. Emissions vary with fuel usage, type of storage tank, refueling method, fuel type, vapor recovery, climate, and ambient temperature.                                                                                                                                                                                    |
| Stationary sources        | CO, NO <sub>2</sub> ,<br>PM <sub>10</sub> /PM <sub>2.5</sub> , SO <sub>2</sub> ,<br>VOCs and GHGs | Exhaust products of fossil fuel combustion from boilers dedicated to indoor heating requirements and emissions from incinerators used for waste reduction. Emissions are generally well controlled with operational techniques and post-burn collection methods. Sources include boilers and hot water generators, emergency generators, incinerators, surface coating operations, welding operations, and firefighting facilities. |

Source: CMT, 2025.

Logan Airport emissions sources may include aircraft operations; APUs; GSE; motor vehicles traveling to, from, and within the airport; fuel storage and handling facilities; and various stationary sources such as steam boilers or backup generators. Additional airport-related sources include aircraft maintenance activities; routine airfield, roadway, and building maintenance (e.g., painting, cleaning, repairs); and periodic construction activities associated with new projects or facility improvements. Maintenance and construction sources occur infrequently and are temporary, so are typically not included in EDRs or ESPRs.

In the EDRs and ESPRs, air and GHG emissions sources are modeled for aircraft-related sources, or aircraft engines; GSE, including APUs; motor vehicles; and an “other” category including a variety of stationary sources as well as fuel storage and handling facilities owned and operated by Massport.

### U8.1.2.1 Effect of Aircraft Engine Technology on NO<sub>x</sub>

Aircraft engine manufacturers are continually advancing combustion technology designed to mitigate and reverse the trade-offs between lower emissions, reduced noise, and increased NO<sub>x</sub>. When comparing representative aircraft, advancements in engine technology that reduce noise, progressing from Stage 3 to Stage 5, often coincide with improved thermal efficiency. This can lead to higher emissions of NO<sub>x</sub> due to elevated combustion temperatures. Emissions of PM<sub>10</sub>/PM<sub>2.5</sub> may also vary depending on engine design and fuel characteristics, though trends are not universally upward. In contrast, CO emissions generally decrease with improved combustion efficiency, while VOC emissions tend to fluctuate across noise certification stages due to differences in operating conditions and engine configurations.

As a means of reducing the amount and cost of fuel use, aircraft engine designers and manufacturers are producing more fuel-efficient engines that burn less fuel. This is achieved by enhancing engine performance through improved fuel combustion technologies, increased thrust-generating power, and reduced engine wear. Aircraft are also being designed to reduce fuel burn through advancements in aircraft wing and body aerodynamics, lightweight alloy materials, and improved navigation systems. These emerging technologies and reduced fuel burn are expected to reduce emissions, decrease noise, and moderate the growth in NO<sub>x</sub> emissions in the future.

Changes in the fleet mix, such as the increased use of quieter but higher NO<sub>x</sub>-emitting aircraft, are likely to continue in the future. Most NO<sub>x</sub> emissions from aircraft originate from high-temperature, high-pressure reactions of atmospheric nitrogen in aircraft engines. Over time, aircraft engine technology has evolved to be more fuel-efficient, less polluting, and quieter, in large part, due to improved fuel combustion under these higher temperature and pressure conditions. This interdependency (or trade-off) between increased NO<sub>x</sub>, less noise, better fuel efficiency, and generally lower emission factors for other pollutants is an outcome of the modernization of the commercial air carrier fleet.

## U8.2 Air Quality Regulatory Framework

The federal **Clean Air Act (CAA)**, NAAQS, and similar state laws govern air quality issues in Massachusetts. The NAAQS, along with *Massachusetts State Implementation Plans*, collectively referred to as *MassSIP*, describe measures to attain and maintain compliance with the NAAQS and regulate air quality in the Boston Metropolitan Area and other areas of the state. These regulations, as well as those associated with GHGs, are discussed in the following sections.

### U8.2.1 National Ambient Air Quality Standards (NAAQS)

The NAAQS for the criteria air pollutants described in **Section U.8.1.1.1** are subdivided into Primary Standards, designed to protect human health, and Secondary Standards, designed to protect the environment and human welfare. If the amount of emissions of a criteria air pollutant exceeds the amount prescribed in the NAAQS, the exceedance constitutes an air quality regulatory violation. The NAAQS for these pollutants are listed below in **Table U8-2**.

**Table U8-2 National Ambient Air Quality Standards (NAAQS) for Criteria Air Pollutants**

| Pollutant                                                      | Standard Category     | Averaging Time          | Level                  | Form                                                                            |
|----------------------------------------------------------------|-----------------------|-------------------------|------------------------|---------------------------------------------------------------------------------|
| Carbon Monoxide (CO)                                           | Primary               | 8 hours                 | 9 ppm                  | Not to be exceeded more than once per year                                      |
|                                                                |                       | 1 hour                  | 35 ppm                 | Not to be exceeded more than once per year                                      |
| Lead (Pb)                                                      | Primary and Secondary | Rolling 3-Month Average | 0.15 µg/m <sup>3</sup> | Not to exceed this level                                                        |
| Nitrogen Dioxide (NO <sub>2</sub> )                            | Primary               | 1 hour                  | 100 ppb                | 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years   |
| Nitrogen Dioxide (NO <sub>2</sub> )                            | Primary and Secondary | 1 year                  | 53 ppb                 | Annual mean                                                                     |
| Ozone (O <sub>3</sub> )                                        | Primary and Secondary | 8 hours                 | 0.070 ppm              | Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years |
| Particulate Matter with a diameter ≤10µm (PM <sub>10</sub> )   | Primary and Secondary | 24 hours                | 150 µg/m <sup>3</sup>  | Not to be exceeded more than once per year on average over 3 years              |
| Particulate Matter with a diameter ≤2.5µm (PM <sub>2.5</sub> ) | Primary               | 1 year                  | 9 µg/m <sup>3</sup>    | Annual mean, averaged over 3 years                                              |
|                                                                | Secondary             | 1 year                  | 15 µg/m <sup>3</sup>   | Annual mean, averaged over 3 years                                              |
|                                                                | Primary and Secondary | 24 hours                | 35 µg/m <sup>3</sup>   | 98th percentile, averaged over 3 years                                          |

**Table U8-2 National Ambient Air Quality Standards (NAAQS) for Criteria Air Pollutants**

| Pollutant                         | Standard Category | Averaging Time | Level  | Form                                                                          |
|-----------------------------------|-------------------|----------------|--------|-------------------------------------------------------------------------------|
| Sulfur Dioxide (SO <sub>2</sub> ) | Primary           | 1 hour         | 75 ppb | 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years |
|                                   | Secondary         | 1 year         | 10 ppb | Annual mean, averaged over 3 years                                            |

Source: U.S. EPA, "NAAQS Table." <https://www.epa.gov/criteria-air-pollutants/naaqs-table>. Website updated December 16, 2024.

Note: Parts per million (ppm); micrograms per cubic meter (µg/m<sup>3</sup>); parts per billion (ppb).

## U8.2.2 Air Quality Designation Status

The U.S. EPA, state, and local air quality agencies maintain outdoor air monitoring networks to measure air quality conditions and gauge compliance with the NAAQS. All areas nationwide have an air quality designation with respect to their compliance with the NAAQS based on these datasets and as determined by the U.S. EPA. **Table U8-3** provides the definitions of each of these designations.

**Table U8-3 U.S.EPA Air Quality Designations**

| Designation        | Definition                                                                                                                                                                                               |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Attainment         | Any area that meets the NAAQS set by the U.S. EPA for a specific air pollutant.                                                                                                                          |
| Maintenance        | Any area that was previously designated as a nonattainment area for a specific air pollutant but has since demonstrated compliance with the NAAQS and has a U.S. EPA-approved maintenance plan in place. |
| Nonattainment Area | Any area that does not meet one or more of the NAAQS set by the U.S. EPA for specific air pollutants.                                                                                                    |
| Unclassifiable     | Any area where the U.S. EPA cannot determine—based on available air quality data—whether the area meets or does not meet the NAAQS for a specific pollutant.                                             |

Source: U.S. EPA, 2025.

For O<sub>3</sub>, CO, PM<sub>10</sub>, and PM<sub>2.5</sub>, the nonattainment designations are further classified by the degree of exceedance above the NAAQS limits. For example, in the case of O<sub>3</sub>, these classifications range from highest to lowest as extreme, severe, serious, marginal, and moderate.

Within Massachusetts, Logan Airport is in the Boston Metropolitan Area. The regulatory air quality designation statuses for the Boston Metropolitan Area are listed in **Table U8-4**, and the area is in attainment for all pollutants except for CO, which is designated to be in maintenance. Notably, there has not been a measured exceedance of the CO standards since 1995, and the MassDEP published a Second

Ten-Year Limited Maintenance Plan for CO in 2018 that details the agency's plans to maintain levels of CO below the standards.<sup>64</sup>

**Table U8-4 Air Quality Designation Status for the Boston Metropolitan Area**

| Pollutant                               |               | Designation              |
|-----------------------------------------|---------------|--------------------------|
| Ozone (O <sub>3</sub> )                 | 2008 Standard | Attainment               |
|                                         | 2015 Standard | Attainment               |
| Carbon Monoxide (CO)                    |               | Maintenance <sup>1</sup> |
| Nitrogen Dioxides (NO <sub>2</sub> )    |               | Attainment               |
| Particulate Matter (PM <sub>10</sub> )  |               | Attainment               |
| Particulate Matter (PM <sub>2.5</sub> ) |               | Attainment               |
| Sulfur Dioxide (SO <sub>2</sub> )       |               | Attainment               |
| Lead (Pb)                               |               | Attainment               |

Source: U.S. EPA, "Nonattainment Areas for Criteria Pollutants (Green Book)." <https://www.epa.gov/green-book>. Website was last updated on June 2, 2025.

1 The Boston Metropolitan Area was redesignated to a maintenance area for CO on April 1, 1996. Although the 20-year maintenance period has lapsed, the details and requirements of the maintenance plan that are in the SIP continue to be in the SIP until the State/Area makes a SIP revision requesting removal of such a maintenance plan.

The nonattainment area boundaries are generally determined as Core Based Statistical Areas (CBSA), which are defined by U.S. census data. Air monitoring station locations and contributing emission sources also play a role in determining these boundaries. Regional pollutants such as O<sub>3</sub> can encompass multiple CBSAs and can extend across state lines. Nonattainment areas for localized pollutants, such as Pb and CO, typically comprise a partial CBSA, or a local "hot-spot."

Historically, the Boston Metropolitan Area was designated nonattainment for O<sub>3</sub> standards that were promulgated in 1979 and 1997. These standards were subsequently revoked in 2005 and 2015, respectively.<sup>65,66</sup> The current O<sub>3</sub> standard for an area designated attainment was promulgated in 2015 and is a revision to the 2008 O<sub>3</sub> NAAQS. The 2015 revision strengthened the standard by which areas would

64 MassDEP, Revision to the Massachusetts State Implementation Plan for Carbon Monoxide, Second 10-Year Limited Maintenance Plan for the Boston Metropolitan Area, Lowell, Springfield, Waltham, and Worcester. February 9, 2018. <https://www.mass.gov/doc/second-10-year-limited-maintenance-plan-for-carbon-monoxide-for-the-boston-metropolitan-area/download>.

65 U.S. EPA. "Designation and NAAQS Information related to the 1-Hours Ozone (1979 Standard) – NAAQS Revoked." <https://www.epa.gov/green-book/designation-and-naaqs-information-related-1-hour-ozone-1979-standard-naaqs-revoked>. Website was last updated on March 7, 2025.

66 U.S. EPA. "Designation and NAAQS Information Related to 8-Hour Ozone (1997 Standard) – NAAQS Revoked." <https://www.epa.gov/green-book/designation-and-naaqs-information-related-8-hour-ozone-1997-standard-naaqs-revoked>. Website was last updated on December 11, 2024.

be designated attainment or nonattainment, making these standards stricter overall. Since the 2008 NAAQS was promulgated, there have been no exceedances of either the 2008 or the 2015 O<sub>3</sub> NAAQS.<sup>67</sup>

### U8.2.3 State Implementation Plans (SIPs)

For the purposes of this summary explanation of SIPs, it is sufficient to characterize SIPs as the principal instrument by which a state formulates and implements its strategies for bringing Nonattainment or Maintenance areas into compliance with the NAAQS. In equally broad terms, the SIP contains the necessary emission limitations, control measures, and timetables for achieving this objective. Therefore, the SIP development process is delegated to state air quality agencies that may, in turn, rely on regional, county, and local agencies to help prepare emission inventories that include airport-related emissions.

The SIPs prepared for Massachusetts detail the state's regulatory plans for maintaining levels of CO and O<sub>3</sub> below the NAAQS. A given area's nonattainment designation has a bearing on the emission control measures required and the time periods allotted for a SIP to demonstrate NAAQS attainment. The degree of nonattainment also determines the "*de minimis*" thresholds, or levels below which a formal SIP General Conformity Determination is not required for a federal action. Due to the requirements of the CAA, MassDEP remains obligated to enforce SIP elements to address O<sub>3</sub>.

The ***Massachusetts State Implementation Plans***, or ***MassSIP***, are the principal tool used by the state and U.S. EPA to bring nonattainment and maintenance areas into NAAQS compliance, including areas like Boston, which are in attainment, but within a regulated OTR.

While the Boston Metropolitan Area is designated attainment for O<sub>3</sub>, the entire state of Massachusetts, along with ten other states and a Consolidated Metropolitan Statistical Area that includes the District of Columbia and northern Virginia, comprise an Ozone Transport Region (OTR).<sup>68</sup> Because Massachusetts is in the OTR, the state is required to submit a SIP to the U.S. EPA and provide a certain level of controls on the sources that emit the precursor pollutants that form O<sub>3</sub>, even though the area is designated attainment for the pollutant. Within the Boston Metropolitan Area, major new or modified sources of O<sub>3</sub> must comply with Reasonably Available Control Technology (RACT) requirements of the SIP to lower emissions of the O<sub>3</sub>-forming pollutants including, NO<sub>x</sub> and VOCs. The SIPs applicable to the Boston Metropolitan Area are listed in **Table U8-5**.

Included in the SIPs is a measure to control the growth of parking spaces, which was meant to decrease the number of VMT in the South Boston neighborhood of Boston. The number of commercial and

<sup>67</sup> The 2008 O<sub>3</sub> NAAQS was promulgated by the U.S. EPA on May 12, 2012. See: Federal Register, Vol 77, No. 98, Page 30160.

<sup>68</sup> Ozone can travel with the wind over long distances, creating air quality problems far downwind of pollution sources and can be transported across state borders. Therefore, the Ozone Transport Commission (OTC), which is a multi-state organization, was created under the CAA. The OTC is responsible for advising U.S. EPA on transport issues and for developing and implementing regional solutions to the ground-level ozone problem in the Northeast and Mid-Atlantic regions known as the OTR. The OTR encompasses 11 states, including Massachusetts. The CAA sets out specific requirements for the OTR states. These requirements entail submitting a SIP and installing a certain level of controls for the pollutants that form ozone (VOC and NO<sub>x</sub>), even if they meet the ozone standards.

employee parking spaces allowed at Logan Airport is regulated by the Logan Airport Parking Freeze (310 Code of Massachusetts Regulations 7.30), which is an element of the *MassSIP*.

**Table U8-5 State Implementation Plans (SIPs) for the Boston Metropolitan Area**

| Standard                | Title             | Status                   | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------|-------------------|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Carbon Monoxide (CO)    | Maintenance Plan  | Published February 2018  | This second ten-year Maintenance Plan is required for any area that was formerly designated as nonattainment to show that it will not regress to a nonattainment status. The current maintenance plan meets the requirements of Section 175A of the CAA and conforms to U.S. EPA guidance for CO maintenance plans. <sup>1</sup>                                                                                                                               |
| Ozone (O <sub>3</sub> ) | 2008 SIP          | Certified February 2018  | In February 2018, the MassDEP's transport SIP was certified. This Certification fulfilled the interstate transport requirements in Section 110(a)(2)(D)(i) of the CAA and completed MassDEP's Infrastructure SIP Certification in accordance with Sections 110(a) (1) and (2) of the CAA for the 2008 O <sub>3</sub> NAAQS. <sup>2</sup>                                                                                                                       |
|                         | 2015 SIP          | Certified September 2018 | In October 2015, U.S. EPA lowered (i.e., made stricter) the NAAQS for O <sub>3</sub> . In September 2018, MassDEP's infrastructure SIP was certified. This certification fulfilled the infrastructure requirements of CAA Sections 110(a)(1) and (2), as well as interstate transport requirements in Section 110(a)(2)(D)(i). <sup>3</sup>                                                                                                                    |
|                         | 2008 and 2015 SIP | Published October 2018   | MassDEP prepared this revision to the Massachusetts SIP to address RACT requirements for the 2008 and 2015 eight-hour O <sub>3</sub> NAAQS. For certain source categories, MassDEP is submitting regulations that establish new or more stringent RACT controls. For other source categories, MassDEP is certifying that previously adopted RACT regulations and controls represent RACT for implementing the 2008 and 2015 O <sub>3</sub> NAAQS. <sup>4</sup> |

Table U8-5 State Implementation Plans (SIPs) for the Boston Metropolitan Area

| Standard                                                                                                                                                                                                                                                                                                                                                 | Title                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Status | Comments |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|----------|
| Source: Commonwealth of Massachusetts, Massachusetts Department of Environmental Protection, "Massachusetts State Implementation Plans (SIPs)." August 30, 2023, <a href="https://www.mass.gov/lists/massachusetts-state-implementation-plans-sips#ozone-sip-">https://www.mass.gov/lists/massachusetts-state-implementation-plans-sips#ozone-sip-</a> . |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |          |
| Notes:                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |          |
| 1                                                                                                                                                                                                                                                                                                                                                        | MassDEP. <i>Revision to the Massachusetts State Implementation Plan for Carbon Monoxide, Second 10-Year Limited Maintenance Plan for the Boston Metropolitan Area, Lowell, Springfield, Waltham, and Worcester.</i> February 9, 2018. <a href="https://www.mass.gov/doc/second-10-year-limited-maintenance-plan-for-carbon-monoxide-for-the-boston-metropolitan-area/download">https://www.mass.gov/doc/second-10-year-limited-maintenance-plan-for-carbon-monoxide-for-the-boston-metropolitan-area/download</a> . |        |          |
| 2                                                                                                                                                                                                                                                                                                                                                        | MassDEP. <i>Certification of Adequacy of the Massachusetts State Implementation Plan with Clean Air Act Section 110(a)(2)(D)(i) Interstate Air Pollution Transport Requirements for the 2008 Ozone National Ambient Air Quality Standards.</i> February 9, 2018. <a href="https://www.mass.gov/doc/transport-sip-for-the-2008-ozone-standard-february-2018/download">https://www.mass.gov/doc/transport-sip-for-the-2008-ozone-standard-february-2018/download</a> .                                                |        |          |
| 3                                                                                                                                                                                                                                                                                                                                                        | MassDEP. <i>Certification of Adequacy of the Massachusetts State Implementation Plan Regarding Clean Air Act Sections 110(a)(1) and (2) for the 2015 Ozone National Ambient Air Quality Standards.</i> September 27, 2018.                                                                                                                                                                                                                                                                                          |        |          |
| 4                                                                                                                                                                                                                                                                                                                                                        | MassDEP. <i>Massachusetts Reasonably Available Control Technology State Implementation Plan Revision For the 2008 and 2015 Ozone NAAQS.</i> October 18, 2018.                                                                                                                                                                                                                                                                                                                                                       |        |          |

The intent of the Logan Airport Parking Freeze is to reduce air emissions by shifting air passengers to travel modes that require fewer vehicle trips. However, survey data since the 1970s has consistently shown that constrained parking has the unintended consequence of shifting air passengers to travel modes with higher numbers of vehicle trips, despite Massport's extensive efforts to provide and encourage the use of HOV travel modes. An amendment to increase the Logan Airport Parking Freeze by 5,000 on-Airport commercial parking spaces was finalized on March 6, 2018, and effective on April 5, 2018. For additional information, see the *Ground Access* chapter of the EDRs or ESPRs.

## U8.2.4 Statewide, National, and International Initiatives

Advancements on the national and international levels to decrease Airport-related air emissions have continued to focus primarily on three initiatives: the advanced quantification of particulate matter and hazardous air pollutants (HAPs) emissions from aircraft engines; the continued phasing-in of AFV; and the implementation of GHG emissions reduction strategies. These initiatives are briefly described below.

### U.S. Aviation Climate Action Plan – 2024 Update

The 2024 U.S. Aviation Climate Action Plan<sup>69</sup> outlines a comprehensive strategy to achieve net-zero GHG emissions by 2050. Key updates include the following:

- Continued investment in fuel-efficient designs and low-emission propulsion systems.
- Enhanced air traffic management and flight operations to reduce fuel burn.
- Expansion of SAF production with a goal of three billion gallons by 2030 and 35 billion gallons by 2050.

<sup>69</sup> U.S. EPA, U.S. Aviation Climate Action Plan. December 2024. <https://www.epa.gov/system/files/documents/2024-12/us-aviation-state-action-plan-2024-final.pdf>.

- Increased focus on contrails and other indirect climate effects of aviation.
- Electrification of GSEs and improved energy efficiency.
- Alignment with **International Civil Aviation Organization (ICAO)** goals and support for global decarbonization efforts.

### Massachusetts Clean Energy and Climate Plan for 2050

The Massachusetts Global Warming Solutions Act (GWSA), originally passed in August 2008 and most recently amended by Chapter 8 of the Acts of 2021, requires the state to achieve Net Zero GHG emissions in 2050. In December 2022, the EEA released the Clean Energy and Climate Plan for 2050 (2050 CECP) which lays out a suite of policies, actions, and strategies to achieve this goal. The aim of the 2050 CECP is to reduce statewide GHG emissions by at least 85 percent below the 1990 baseline level and augment carbon sequestration efforts to achieve Net Zero by 2050. To achieve this, the 2050 CECP sets emissions sub-limits across sectors including transportation, residential heating and cooling, commercial and industrial heating and cooling, electricity production, industrial production, and natural gas distribution and services.<sup>70</sup>

### Particulate Matter and Hazardous Air Pollutant Research

Conducted by the ICAO, FAA, U.S. EPA, and others, research continues to better characterize PM<sub>10</sub>/PM<sub>2.5</sub> and HAPs emissions (including Pb) from aircraft engines. Similarly, air quality monitoring efforts at other airports were also conducted at various locations to advance what is known about ambient levels of these air pollutants in the vicinities of airports. Massport continues to closely track these issues through its involvement in aviation industry organizations such as ACI-NA and AAAE.

### Climate Change Technology Standards

In October 2010, the 37th Assembly of the ICAO resolved to develop a CO<sub>2</sub> emissions standard to reduce GHG emissions from the air transport system. After six years of development, ICAO's Committee on Aviation Environmental Protection (CAEP) recommended an Airplane CO<sub>2</sub> emissions certification Standard which was adopted by the ICAO Council and published in 2017. The CO<sub>2</sub> standard is part of the ICAO's "Basket of Measures to Mitigate Climate Change" which include aircraft technology improvements, operational improvements, the use of SAF, and Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). The CO<sub>2</sub> Standard is the first global technology standard for CO<sub>2</sub> emissions for any sector. The CO<sub>2</sub> Standard aims to encourage more fuel-efficient technologies for airplane designs and applies to subsonic jet and turboprop airplanes that are "new type" designs from 2020. It also applies to "in-production" airplanes from 2023 that are modified and meet a specific change criteria. The Standard

<sup>70</sup> EEA. Clean Energy and Climate Plan for 2050. December 2022. <https://www.mass.gov/doc/2050-clean-energy-and-climate-plan/download>.

also sets a production cut-off in 2028, after which in-production airplanes that do not meet the Standard can no longer be produced unless their design is modified to comply with the Standard.<sup>71,72</sup>

### FAA Final Rule: Fuel Efficiency Standards

In February 2024, the FAA released a final rule to reduce carbon pollution emitted by most large airplanes flying in U.S. airspace.<sup>73</sup> The rule requires new aircraft designs certified after January 1, 2028, to meet stricter fuel efficiency standards. The following are some of the highlights:

- Applies to subsonic jets and large turboprops that are not yet certified.
- Targets aircraft like the Boeing 777-X, and newly built versions of the Boeing 787 Dreamliner; the Airbus A330-300; business jets such as the Cessna Citation; and civil turboprop airplanes such as the ATR 72 and the Viking Air Limited Q400.
- Does not apply to aircraft already in service.
- Supports the broader goal of net-zero emissions by 2050.

### ICAO Global Standards and Goals

The ICAO continues to lead global efforts through its Long-Term Aspirational Goal (LTAG) of net-zero carbon emissions by 2050. ICAO's strategy includes:

- updates to aircraft emissions and noise standards,
- promotion of SAF and lower-carbon aviation fuels,
- improved routing and air traffic procedures, and
- implementation of CORSIA.

## U8.2.5 Logan Airport Air Quality Permits for Stationary Emissions Sources

Massport received a Title V Air Quality Operating Permit for Logan Airport in September 2004, and must regularly renew this permit as prescribed by MassDEP.<sup>74</sup> This permit covers Massport-operated stationary sources including the Central Heating and Cooling Plant, snow melters, fuel dispensers, boilers, emergency generators, and fuel storage tanks. The permit requires Massport to adhere to federal and state regulations, which include operational limits, emission standards, and monitoring and testing protocols. Compliance activities include maintaining records of emissions, conducting regular maintenance and inspections, and submitting annual compliance reports to MassDEP and the U.S. EPA.

71 ICAO. "Environment: Climate Change Technology Standards." 2020. [https://www.icao.int/environmental-protection/Pages/ClimateChange\\_TechnologyStandards.aspx](https://www.icao.int/environmental-protection/Pages/ClimateChange_TechnologyStandards.aspx).

72 ICAO Secretariat. Introduction to the ICAO Basket of Measures to Mitigate Climate Change. 2019. [https://www.icao.int/environmental-protection/Documents/EnvironmentalReports/2019/ENVReport2019\\_pg111-115.pdf](https://www.icao.int/environmental-protection/Documents/EnvironmentalReports/2019/ENVReport2019_pg111-115.pdf).

73 FAA, FAA Finalizes Rule to Reduce Carbon Pollution from New Jets and Turboprops. February 2024. <https://www.faa.gov/newsroom/faa-finalizes-rule-reduce-carbon-pollution-new-jets-and-turboprops>.

74 Minor Modification (Application) No. MBR-95-OPP-094RM. <https://www.mass.gov/doc/boston-logan-international-airport/download>

Massport must also prevent emissions from impacting sensitive receptors and follow procedures for emissions trading and alternative operating scenarios.

## U8.2.6 Greenhouse Gas Policy and Guidelines

GHGs are known to contribute to climate change. In 2009, the U.S. EPA issued a proposed finding that GHGs also contribute to air pollution that may endanger public health or welfare. This action laid the initial legal groundwork for the regulation of GHG emissions nationwide under the CAA, although currently there are no specific U.S. laws or regulations that call for the regulation of GHGs for airports directly.<sup>75</sup> According to the U.S. EPA's most recent *Inventory of U.S. GHG Emissions and Sinks*, published in 2024, aircraft emissions represent 9 percent of the U.S. transportation sector GHG emissions. Additionally, the transportation sector's GHG emissions are estimated to be 28 percent of total U.S. emissions compared with other economic sectors, including electric power (25 percent), industry (23 percent), residential and commercial (13 percent), and agriculture (10 percent).<sup>76,77</sup>

In May 2010, the MEPA Office revised the *MEPA Greenhouse Gas Emissions Policy and Protocol*.<sup>78</sup> Under the revised policy, certain projects are subject to review under MEPA (though not annual EDR and ESPR filings). As part of MEPA review, projects are required to quantify GHG emissions generated by a proposed project and identify measures to avoid, minimize, or mitigate such emissions.<sup>79</sup>

In 2021, the Massachusetts EEA released a revised MEPA GHG Emissions Policy and Protocol to align with the "*Next-Generation Roadmap for Massachusetts Climate Policy*." This update reflects:

- Stronger GHG reduction targets (net-zero by 2050);
- Expanded project categories subject to GHG analysis;
- Updated modeling tools and thresholds; and
- Increased emphasis on climate resilience and environmental justice.

As of 2025, further updates are being developed under the 2024 Climate Act, which mandates:

- New guidance and regulations for environmental reviews;
- Consideration of cumulative impact analyses (CIAs); and

<sup>75</sup> GHG emission reduction measures have been adopted by the U.S. EPA for new aircraft engines, but these regulations do not apply directly to airports.

<sup>76</sup> U.S. EPA. "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021." <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2022> (published on April 11, 2024). Website was last updated on March 26, 2025.

<sup>77</sup> U.S. EPA. "Inventory of U.S. Greenhouse Gas Emissions and Sinks." <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>. Website was last updated on July 1, 2025.

<sup>78</sup> EEA. *Revised MEPA Greenhouse Gas Emissions Policy and Protocol*. Effective May 5, 2010, <https://www.mass.gov/doc/greenhouse-gas-emissions-policy-and-protocol/download>.

<sup>79</sup> GHGs are comprised primarily of carbon dioxide CO<sub>2</sub>, methane CH<sub>4</sub>, nitrous oxides N<sub>2</sub>O, and three groups of fluorinated gases (i.e., sulfur hexafluoride [SF<sub>6</sub>], hydrofluorocarbons [HFCs], and perfluorocarbons [PFCs]). GHG emission sources associated with airports are generally limited to CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O.

- Integration of community benefit agreements (CBAs) and site suitability criteria (SSC).

These changes are part of a broader effort to modernize MEPA and align it with Massachusetts' climate and equity goals. Draft regulations and stakeholder input processes are on-going, with implementation expected by July 1, 2026.

The EDRs and ESPRs are not subject to the MEPA GHG policy because these documents are not associated with a single specific project or projects. However, since the *2007 EDR*, Massport has voluntarily prepared an inventory of GHG emissions directly and in-directly associated with the Airport. The emission source categories analyzed in the EDRs and ESPRs comply with MEPA's requirement to analyze the environmental impacts of direct and in-direct mobile and stationary source emissions. In addition to the GHG emissions inventory prepared for the EDRs and ESPRs, Massport also prepares two other annual inventories for stationary sources at Logan Airport. These include:

- A GHG emissions inventory for the MassDEP GHG Emissions Reporting Program for those sources meeting the criteria for Category 1 and Scope 1 (only those sources under the direct ownership and control of Massport);<sup>80,81</sup> and
- A *U.S. EPA Greenhouse Gas Summary Report*.<sup>82</sup>

The GHG emissions inventories for the EDR and ESPR are consistent with methodological guidance by the Transportation Research Board's (TRB) ACRP 2024 publication titled *Airport Greenhouse Gas Emissions Inventory: A Primer*, as well as the guidance of the ACI Airport Carbon Accreditation (ACA) Program.<sup>83,84</sup> Notably, in 2021 the Airport entered the ACA program and achieved Level 1 – *Mapping*.

As shown below in **Table U8-6**, the inventory assigns GHG emissions into Scopes 1, 2, and 3 based on ownership and control.

80 Boston Logan International Airport. Calendar year 2024. MassDEP GHG Emissions Reporting Program.

81 Starting with the 2016 reporting year MassDEP combined GHG Reporting with its Source Registration reporting program.

82 U.S. EPA, Greenhouse Gas Summary Report for Boston Logan International Airport for calendar year 2024.

83 TRB. *Airport Cooperative Research Program, Airport Greenhouse Gas Emissions Inventory A Primer*, Washington, D.C.: The National Academies Press, 2024. <https://nap.nationalacademies.org/catalog/27981/airport-greenhouse-gas-emissions-inventory-a-primer>.

84 ACI. "Airport Carbon Accreditation." <https://aci-lac.aero/airport-carbon-accreditation/>. 2025.

Table U8-6 Logan Airport GHG Emission Sources by Scope

| Scope                                                                                                                      | Source                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Scope 1:</b> Emissions from sources that are owned and/or controlled by Massport                                        | Massport fleet vehicles and equipment (i.e., Massport ground service equipment, Massport shuttles, and Logan Express buses) |
|                                                                                                                            | Stationary sources (includes emergency generators, boilers, etc.)                                                           |
|                                                                                                                            | Fire training                                                                                                               |
| <b>Scope 2:</b> Emissions associated with the generation of electricity consumed but generated offsite at public utilities | Electricity consumption (Massport, tenant, and common areas) <sup>1</sup>                                                   |
| <b>Scope 3:</b> Emissions from sources that are public, and tenant owned and controlled                                    | Aircraft (on-ground, within the landing and takeoff up to 3,000 feet) <sup>2</sup>                                          |
|                                                                                                                            | Auxiliary Power Units                                                                                                       |
|                                                                                                                            | Ground Service Equipment                                                                                                    |
|                                                                                                                            | Passenger and Employee Transportation <sup>3</sup> including On-Airport Parking Lots                                        |

Source: CMT, 2025.

Notes:

- 1 Consistent with prior EDR and ESPR inventories, emissions associated with the generation of electricity consumed but generated offsite at public utilities are considered Scope 2.
- 2 Aircraft cruise mode emissions above the 3,000-foot atmospheric mixing height are not included.
- 3 Passenger and employee transportation are off- and on-airport employee, tenants, and public vehicle trips, which include private automobiles, taxis, limousines, buses, shuttle vans, etc.

Massport has direct ownership, or control over, a small percentage of the GHG emission sources at Logan Airport. As with most commercial service airports, the majority of the GHG emission sources are owned or controlled by the airlines; other airport tenants, like rental car companies; and the public, like passenger motor vehicles.

## U8.3 Air Quality and Emissions Modeling

The modeling tools and emission factor databases used to estimate air pollutant and GHG emissions for the analysis years and the FPH, which represents the forecasted emissions estimated for 10 to 15 years in the future, are described in the sections below.

### U8.3.1 FAA Aviation Environmental Design Tool (AEDT)

Massport uses the FAA's AEDT<sup>85</sup> for air quality modeling of aircraft-related emissions. The latest version of AEDT is used at the time of the preparation of the EDRs and ESPRs. AEDT replaced the FAA's legacy Emissions and Dispersion Modeling System (EDMS) tool in 2015 and was used for the first time for the emission estimates reported in the *2016 EDR*.

The AEDT noise and air quality model was released in 2015 and is the FAA's approved computer model for calculating emissions from aircraft-related sources. As discussed in *Noise* chapter of the EDRs and

85 FAA, "Aviation Environmental Design Tool (AEDT)," <https://aedt.faa.gov/>.

ESPRs, AEDT is also designed to assess airport noise. Refer to **Section U7.3** for more information on AEDT noise modeling.

The AEDT model was developed to incorporate the most up-to-date and best-available science. Furthermore, the earliest model applied was in the 1990 inventory, which was prepared using the Logan Dispersion Modeling System (LDMS). The 1998 through 2015 inventories were prepared using EDMS, the version of which varied by year, and the 2016 through present inventories used multiple versions of the AEDT model. As stated in the *2016 EDR*, significant differences between the EDMS and AEDT models yielded conflicting output results between the two models. This was primarily because of differences within the input datasets; variances in the aircraft operational characteristics; changes in the aircraft times-in-mode, in particular those for aircraft climb out during which emissions of NO<sub>x</sub> are greatest; alterations in aircraft emission factors; and a more robust airframe and engine database within the AEDT model. Updates and variances between modeling methodologies and outputs continue as new versions of AEDT are released.<sup>86</sup>

Notably, there are several limitations on the predictive ability of air quality models relating to years as distant as 10 to 15 years in the future. For example, AEDT modeling software and datasets used to analyze aircraft and GSE emissions are often updated by the FAA, but these updates do not account for future-year technological changes. The EDRs and ESPRs update assumptions based on current and anticipated technological advances given the information available at the time of the analysis. Future analysis years' emission estimates represent a conservative analysis based on forecasted passenger activity and operations data for Logan Airport within the **FPA**.

### U8.3.2 U.S. EPA MOtor Vehicle Emission Simulator (MOVES)

The U.S.EPA MOVES model was used for estimating emissions from mobile sources (i.e., on-road motor vehicles and non-road equipment).<sup>87</sup> MOVES estimates emissions at the national, county, and project level for criteria air pollutants and precursor pollutants, GHGs, and air toxics.

Similar to AEDT, MOVES undergoes periodic updates, resulting in differences between versions. For the preparation of the EDRs and ESPRs, the most current version of MOVES available at the time is utilized. Emission estimates are compared to those generated using the previous version to assess any changes or impacts resulting from the model update.

<sup>86</sup> FAA, Latest Version of AEDT at the time of the preparation of this User's Guide is Version 3g (AEDT 3g), [https://aedt.faa.gov/3g\\_information.aspx](https://aedt.faa.gov/3g_information.aspx).

<sup>87</sup> U.S. EPA. "Latest Version of MOtor Vehicle Emission Simulator (MOVES)". <https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves>. Website was last updated on June 9, 2025.

### U8.3.3 GHG Emission Factors Hub

The GHG emissions inventory was prepared using the U.S. EPA's GHG Emission Factors Hub.<sup>88</sup> U.S. EPA's GHG Emission Factors Hub is designed to provide organizations with a regularly updated and easy-to-use set of default emission factors for organizational GHG reporting. Key sources for these emissions factors include:

- U.S. EPA's Greenhouse Gas Reporting Program;
- U.S. EPA's Emissions & Generation Resource Integrated Database (eGRID);
- U.S. EPA's *Inventory of U.S. Greenhouse Gas Emissions and Sinks*;
- U.S. EPA's Waste Reduction Model (WARM); and
- The Intergovernmental Panel on Climate Change (IPCC), *Fifth Assessment Report (AR5)*.

The GHG Emissions Factors Hub is updated annually, so the emission factors used in the EDRs and ESPRs correspond to the specific year being analyzed.

## U8.4 Emissions Inventory Data Inputs and Assumptions Overview

The following sections provide an overview of the data inputs and assumptions associated with Logan Airport operations used to prepare the air quality and GHG inventory analyses for the EDRs and ESPRs.

### U8.4.1 Air Quality Emissions Inventory

Air emissions associated with Logan Airport operations result from aircraft; GSE, including APUs; motor vehicles; and a source category called "other." These source categories are explained further below:

#### Aircraft

Aircraft emission inventories are developed based on the actual number of aircraft operations, fleet mix, and operational times-in-mode (TIM) at Logan Airport for the analysis year(s). The aircraft fleet mix for the analysis year(s) is used as input to the FAA's AEDT. The most current version of AEDT available at the time of modeling is utilized. Key data inputs include aircraft type, engine type, and the number of annual LTOs.<sup>89</sup> Aircraft are categorized into four groups: air carriers (AC), cargo (CA), commuters (CO), and GA. When specific aircraft and engine combinations operating at Logan Airport are not available in the AEDT database, substitutions are made using professional judgment to identify the closest match based on aircraft frame and engine type. Aircraft emissions are calculated from ground level up to the mixing height

88 U.S. EPA. "GHG Emission Factors Hub." <https://www.epa.gov/climateleadership/ghg-emission-factors-hub>. The website holds the latest version of the Emission Factors Hub as well as previous versions. Website was last updated on January 16, 2025.

89 One LTO is equal to two operations (i.e., arrival + departure).

(i.e., 3,000 feet). Updated aircraft taxi and delay times are derived from data obtained through the FAA's Aviation System Performance Metrics (ASPM) database.

### GSE

GSE, including APUs, are modeled using the FAA's AEDT. GSE types and TIM data are based on the latest Logan Airport-specific GSE TIM survey, the GSE fuel use (i.e., gasoline, diesel, liquid petroleum gas, electric) data from Massport's Vehicle Aerodrome Permit Application Program for Logan Airport<sup>90</sup>, and AEDT's aircraft-specific GSE default data.

As stated, the most recent GSE and APU TIM Survey conducted at Logan Airport is used within the air quality analysis. The purpose of a GSE and APU TIM Survey is to provide up-to-date operating times, which directly affect GSE and APU emissions. TIM is the average time that GSE and APUs operate during a single aircraft LTO cycle. The surveyed TIM data is used in place of the default TIM values in AEDT, thus yielding emissions that better reflect actual conditions at Logan Airport. The TIM Surveys focus on the most prevalent airlines (i.e., Southwest, JetBlue, American, Delta, and United) and the most common aircraft types, such as narrow-body air carriers (e.g., A320, A321, B737, B757) and large commuter aircraft (e.g., ERJ170, ERJ190, CRJ700, CRJ900). Data from the survey, as well as information developed from ACRP's *Report 149: Improving Ground Support Equipment Operational Data for Airport Emissions Modeling* and AEDT's default TIM data, were used in support of the EDR and ESPR.<sup>91</sup>

APU operating times for wide-body or large commuter air carriers and small commuter aircraft were assumed to have a TIM of seven minutes per LTO. GA aircraft in the fleet were not equipped with APUs. Cargo aircraft APU TIM data was based on AEDT defaults (i.e., 26 minutes per LTO).

Additionally, reductions attributable to Massport's AFVs Program and the conversion of Massport and tenant GSE and fleet vehicles to CNG or electric are included in the analysis.

### Motor Vehicles

Emissions from motor vehicles are estimated from on-Airport VMT. On-Airport VMT is associated with airport roadways, terminal curbsides, and parking facilities. Motor vehicle emission factors for cruise and idling modes are obtained from MOVES combined with MassDEP-recommended motor vehicle fleet mix data, operating conditions, and other Massachusetts-specific input parameters. In general, the emission factors obtained from MOVES decrease as years progress due to improved manufacturers' engine efficiencies. However, variances in model versions and vehicle mixes affect emission factor outputs. Example MOVES input/output files are included in the Appendix associated with the *Ground Access* chapter of the EDR and ESPR. The *Ground Access* chapter provides a discussion of the on-Airport VMT

90 Recent data from a subset of airlines has suggested that Aerodrome data is not completely representative of the GSE at Logan Airport. This data is currently being evaluated.

91 TRB. *ACRP Report 149: Improving Ground Support Equipment Operational Data for Airport Emissions Modeling*. 2015. Washington, DC: The National Academies Press. <https://crp.trb.org/acrpwebresource4/acrp-report-149-improving-ground-support-equipment-operational-data-for-airport-emissions-modeling/>.

data and curbside/parking volumes used in the analysis. A curb idling survey was conducted in July/August of 2023. Vehicles' mode share is based on the latest *Logan Air Passenger Ground Access Survey* for calendar year 2022, prepared in March 2023.

### Other

Other sources include stationary sources at Logan Airport, such as fuel storage and handling facilities, boilers, snow melters, emergency generators, space heaters, and fire training activities. Emissions are based on annual fuel throughput records for the analysis year(s) and emission factors based on the following sources:

- U.S. EPA's Compilation of Air Pollution Emission Factors (AP-42);<sup>92</sup>
- Emission factors from manufacturer specification sheets; or
- Emission factors obtained from NO<sub>x</sub> RACT compliance testing.

Notably, Massport is planning to replace the existing dual-fuel Boiler 3 at the Central Heating and Cooling Plant at Logan Airport with a new natural gas-fired boiler of approximately the same capacity to accommodate the increase in heating load from the Terminal E expansion project. Massport is also planning to continue to further reduce the Central Heating and Cooling Plant emissions as part of a *Roadmap to Net Zero Roadmap by 2031* (Roadmap to Net Zero) strategy.

Emissions from the fire training fuel Tek Flame® used at Logan Airport are calculated using default emission factors from AEDT and actual annual fuel usage.

## U8.4.2 Greenhouse Gas Emissions Inventory

As stated in **Section U8.2.5, Greenhouse Gas Policy and Guidelines**, the EEA's MEPA Greenhouse Gas Emissions Policy and Protocol requires the quantification of GHGs for certain proposed projects and the identification of measures to avoid, minimize, or mitigate these emissions. While the purpose of the EDR and ESPR is not to assess a proposed project or projects, and is therefore not subject to the GHG policy, Massport regularly prepares inventories of GHG emissions directly and in-directly associated with Logan Airport and provides this information within EDRs and ESPRs.

GHG emissions estimates for Logan Airport are prepared for the given EDR or ESPR's analysis years for aircraft emissions occurring within the ground taxi/delay mode and up to 3,000 feet in altitude, GSE, APUs, motor vehicles, a variety of stationary sources, and electricity generation source emissions. Aircraft cruise emissions that occur above 3,000 feet in altitude are not estimated. The GHG emission estimates are prepared following the EEA, ACRP, and ACI ACA Program guidelines and emission factors considered

<sup>92</sup> U.S.EPA. "AP-42: Compilation of Air Pollutant Emission Factors." <https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors>. Website updated May 28, 2025.

appropriate for preparing GHG inventories as approved by the U.S. EPA and available within the GHG Emissions Factors Hub database.

Airport GHG emissions are calculated using the same general methodology applied to criteria air pollutants and their precursors as presented in **Section U8.4.1, Air Quality Emissions Inventory**. In other words, emissions are calculated using input data such as activity levels or material throughput rates (e.g., fuel usage, VMT, electrical consumption), which are applied to appropriate emission factors in units of GHG emissions per gallon of fuel. For the GHG emission estimates, the input data are either based on Massport records or data and information derived from the latest version of the FAA's AEDT model and database. Future analysis years GHG emission estimates are based on forecasted data and represent a conservative analysis.

## U8.5 Air Quality and GHG Management at Logan Airport

Massport is a national leader in studying, tracking, and reporting on Logan Airport's air quality environment and implementing emissions reduction measures. Massport's air quality management strategy and key initiatives to reduce criteria air pollutants and GHG emissions from Airport operations are discussed in this section.

A central element of Massport's emissions reduction initiatives is a comprehensive ground access strategy to diversify and enhance transportation options for passengers and employees, and to efficiently move vehicles while they are on Logan Airport property. Massport is committed to reducing on-Airport VMT and emissions associated with airport roadways and curbsides, parking facilities, and vehicle staging areas, as well as reducing the VMT by Airport users traveling to and from the Airport.

Massport strongly supports the Logan Express system and encourages its use by:

- Investing in Logan Express facility improvements and additional parking.
- Offering priority security lines for users.
- Reducing fares.
- Providing free fares for select Silver Line and Back Bay Logan Express routes.

Massport's ground transportation strategy is designed to help reduce vehicle air emissions and improve air quality by providing a broad range of HOV, public transit, and shared-ride options for travel to and from Logan Airport. The strategy also aims to reduce drop-off and pick-up modes by providing sufficient parking on-Airport for passengers choosing to drive or with limited HOV options.

Massport's Logan Express system remains a centerpiece of the Airport's HOV options. In addition to evaluating new Logan Express service offers, Massport is investing in existing Logan Express sites in the following ways:

- Increasing parking capacity and service frequency at Logan Express locations;
- Implementing priority security lines for Logan Express riders;

- Reducing urban Logan Express fares; providing free MBTA Silver Line outbound boarding from Logan Airport; and
- Providing free Back Bay Logan Express outbound fares.

Massport continues to carefully review both on- and off-Airport activity levels and adjusts its ground access programs to align with ridership levels. By enhancing the Airport's roadway system, vehicles can circulate more efficiently, resulting in lower overall emissions. The *Ground Access* chapter of the EDRs and ESPRs provides detailed information on Massport's ground access and parking management strategies.

Additionally, Massport is focused on reducing GHG emissions across all facilities and becoming Net Zero by 2031. The Roadmap to Net Zero focuses on reducing GHG emissions from Massport's Scope 1 and Scope 2 sources and is further discussed in **Section U8.5.2**.

As part of the Roadmap to Net Zero, Massport is collaborating with fuel vendors, airlines, and state and federal entities to secure SAF supplies in the Northeast. This initiative also supports the federal goal of three billion gallons of SAF use by 2030 for the aviation industry nationwide discussed in Section U8.5.3. Massport is a founding member of the **Zero Impact Aviation Alliance (ZIAA)**, which is a consortium of airports, aviation industry businesses, aircraft manufacturers, and academic institutions focused on achieving net zero for airport operations, including promoting SAF use. ZIAA is spearheaded by the MIT Department of Aeronautics and Astronautics, and with their support, ZIAA provides research-driven thought leadership across the aviation system to reduce environmental impacts.



<https://aeroastro.mit.edu/zero-impact-aviation-alliance-ziaa/>

In addition to Massport's initiatives, airlines operating at Logan Airport are also implementing strategies to reduce emissions. For example, jetBlue Airways has achieved carbon-neutral flying on all its domestic services through its fleet of aircraft and **carbon offsets** and has also announced a plan for an accelerated transition to SAF with a target to convert ten percent of the airline's total fuel usage to SAF on a blended basis by 2030. Airlines with similar goals include Delta Air Lines, which has set a target of ten percent SAF utilization by 2030, and United Airlines, which has a target of reaching 100 percent green net zero by 2050.

**Table U8-7** provides a list and status of Massport's Air Quality Emissions Reduction Goals along with the associated plan element descriptions.

**Table U8-7 Logan Airport Air Quality Management Strategy Status**

| Air Quality Emissions Reduction Goals                                                                                         | Plan Elements                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reduce emissions from Massport/Tenant fleet vehicles                                                                          | Convert Massport and Tenant fleet vehicles to electric, hybrid, or other alternative fuel by retrofitting or through new procurements.                                                                            |
| Encourage use of alternative fuel and alternative power vehicles by private fleet and airside service vehicle owners          | Provide infrastructure to support alternative fuels including electricity and green hydrogen.                                                                                                                     |
| Encourage use of alternative fuel and alternative power vehicles by private fleet and airside service vehicle owners          | Work with ground access fleet and airside service vehicle owners to encourage conversion.                                                                                                                         |
| Minimize emissions from motor vehicles                                                                                        | Implement a program to increase high-occupancy vehicle (HOV) ridership by air passengers and employees.                                                                                                           |
|                                                                                                                               | Expand HOV options for Airport employees.                                                                                                                                                                         |
|                                                                                                                               | Encourage employees to use alternative transportation to commute.                                                                                                                                                 |
| Minimize emissions from Construction Equipment                                                                                | Incorporate Clean Air Construction Initiative (CACI) into major earthwork construction projects.                                                                                                                  |
| Reduce emissions from fuel vapor loss                                                                                         | Provide state-of-the-art fuel storage and distribution equipment.                                                                                                                                                 |
|                                                                                                                               | Implement Tank Management Program.                                                                                                                                                                                |
| Reduce emissions from stationary sources                                                                                      | Employ Reasonable Available Control Technologies (RACT) for NO <sub>x</sub> at the Central Heating Plant.                                                                                                         |
|                                                                                                                               | Use alternative fuels in snow melters.                                                                                                                                                                            |
| Reduce emissions from stationary sources                                                                                      | Incorporate green building technologies and energy use reduction strategies.                                                                                                                                      |
|                                                                                                                               | Install diesel particulate filters on large emergency generators.                                                                                                                                                 |
| Reduce aircraft emissions                                                                                                     | Use of pre-conditioned air (PCA) at new and renovated terminals and terminal gates.                                                                                                                               |
|                                                                                                                               | Work with FAA to study and implement airfield-improvement concepts and operational changes that may have air quality benefits.                                                                                    |
| Reduce energy intensity and GHG emissions while increasing portion of Logan Airport's energy generated from renewable sources | <p>Increase the portion of Massport's energy generated from renewable sources.</p> <p>Reduce overall GHG emissions from Massport-operated mobile sources and energy consumed in Massport-operated facilities.</p> |

Source: Massport, 2025.

### U8.5.1 Massport's Net Zero Roadmap by 2031

In 2021, Massport prepared the *Roadmap to Net Zero by 2031* (Roadmap to Net Zero), with the goal of reducing carbon emissions across all facilities and achieving **Net Zero Emissions (Net Zero)** by 2031, coinciding with the Authority's 75th anniversary. The Roadmap to Net Zero focuses on 100 percent of the Scope 1 GHG emissions with continued influence of Scope 2 and Scope 3 emissions. The plan outlines the steps Massport will take to reduce emissions within the decade.

Components of the phased plan include:

- Improving energy efficiency in buildings through design standards and operational controls such as upgrading lighting systems across all facilities to LEDs;
- Transitioning to clean fuel sources such as renewable electricity, renewable natural gas, or other sustainable options;
- Promoting sustainable ground transportation initiatives;
- Generating as much renewable energy as possible onsite and making offsite renewable energy purchases; and
- Implementing all remaining facility-specific initiatives identified to ultimately reach net zero.

For fossil fuel sources that cannot be reduced, electrified, or switched to renewable energy in the near-term, Massport will invest in renewable energy credits, renewable identification numbers, and carbon offsets to reach the targets outlined in the plan. Carbon offsets are investments in GHG-reducing projects, such as a solar farm, which diminish the impact of an organization's own GHG emissions. Massport expects to be Net Zero without offsets by 2040. Massport's aim in this effort would be to purchase offsets that benefit projects within the state of Massachusetts.<sup>93</sup>

### U8.5.2 Sustainable Aviation Fuel (SAF) and Emissions Reduction

The primary GHG emission reductions associated with the use of **sustainable aviation fuel (SAF)** occur over the lifecycle of the fuel. Generally, the lifecycle emissions of a fuel include the production, extraction, transport, and final burning of the fuel into exhaust.

ICAO has developed the *Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)*, which is a global market-based measure and cooperative international approach of initiatives to reduce GHG emissions in aviation. Through CORSIA, ICAO determines if fuels are CORSIA Eligible Fuels (CEF) and develops associated default life cycle emission reduction values for each CEF. GHG reductions from CEFs vary by feedstock and the fuel conversion process.

Additionally, the International Standards Organization, American Society for Testing and Materials, has certified six fuel conversion processes for SAF use in aircraft based on the fuel feedstock and the

<sup>93</sup> Massport. "Environment: NetZero by 2031." <https://www.massport.com/environment/roadmap-to-net-zero>. Website was last updated May 2025.

associated technical specifications required to produce the fuel. ICAO has a set of procedures and requirements for a type of SAF to be certified as a CEF, and within the process, ICAO develops a life cycle emissions value (LSf). The LSf is a factor for each CEF that is used in the equation below to calculate the life cycle emissions reduction. The LSf is ratioed with a baseline life cycle emission factor (LC) for conventional aviation fuels (i.e., avgas and Jet-A). The LSf and LC both have units of grams of CO<sub>2</sub>e per unit of energy in megajoules (g/CO<sub>2</sub>e). Additionally, each fuel conversion process has an associated Fuel Conversion Factor (FCF) that is also applied. The emission reductions (ER) for GHGs are computed for metric tons of CO<sub>2</sub>e based on the mass of the fuel consumed (MS) using the equation below:

$$ER = FCF \times [MS \times (1 - (LSf/LC))]$$

For the purposes of computing GHG emissions for the EDRs and ESPRs, it is assumed the fuel consumed by aircraft at Logan Airport will be in line with the FAA's projected nationwide percentage of SAF aviation fuel use expected by the year 2030, which amounts to 10 percent. The variables for the equation above were determined based on the range of available SAF types currently being used in the U.S.

Switchgrass, soybean oil, camelina oil, corn grain, and poplar are among the feedstocks currently under consideration for producing CORSIA-eligible fuels in the U.S. However, their eligibility depends on meeting stringent sustainability and lifecycle GHG emissions reduction criteria. To qualify under CORSIA, fuels must demonstrate compliance with these requirements and be certified through an approved Sustainability Certification Scheme (SCS). While these feedstocks are being used or explored for SAF production in the U.S, their formal recognition under CORSIA hinges on fulfilling all necessary environmental and certification standards.

### U8.5.3 Single-Engine Taxiing

Single-engine taxiing is one measure being used by air carriers to help reduce fuel consumption and emissions. As a result, Massport supports the use of single-engine taxiing when it can be done safely, voluntarily, and at the pilot's discretion. Massport conducted three surveys of Logan Airport air carriers in 2006, 2009, and 2010 to understand the extent to which single-engine taxiing is used at Logan Airport. In addition, Massport was an active member of the FAA Partnership for Air Transportation Noise and Emissions Reduction (PARTNER) program on reducing noise and emissions.<sup>94</sup> In 2009, Massport offered to facilitate a more detailed survey of pilots at Logan Airport by MIT to better understand the use of single-engine taxiing. MIT completed its survey and issued a paper in March 2010, which was provided in the *2009 EDR*. The MIT survey confirms earlier Massport survey findings that single-engine taxiing is a crucial operational measure used by airlines to conserve fuel and is widely employed at Logan Airport. MIT issued

<sup>94</sup> The Partnership for Air Transportation Noise and Emissions Reduction (PARTNER) — was a leading aviation cooperative research organization headquartered at the Massachusetts Institute of Technology (MIT). An FAA Center of Excellence, PARTNER was sponsored by the FAA, the National Aeronautics and Space Administration (NASA), Transport Canada, the U.S. Department of Defense (U.S. DOD), and the U.S. EPA. In December 2015, PARTNER completed its Center of Excellence mandate and research. The ASCENT FAA Center of Excellence is now conducting similar research. Currently Massport is a member of the ASCENT Advisory Committee.

a paper in January 2011 reporting on a control strategy to minimize airport surface congestion, and thus taxiing time, by regulating the rate at which aircraft are pushed back from their gates. Massport continues to support the practice of single or reduced-engine taxiing and the use of idle reverse thrust.

MIT and the Center for Air Transportation Systems Research (CATSR) developed a methodology to account for single-engine taxi procedures during the taxi-in or taxi-out modes.<sup>95,96,97</sup> Some of the single-engine taxi challenges noted in these studies include: (1) excessive thrust and associated issues; (2) maneuverability problems, particularly related to tight taxiway turns and weather; (3) problems starting the second engine; and (4) distractions and workload issues. Thus, pilots do not typically use single-engine taxiing during each aircraft operation in practice, and when they do, it is not for the entire operation. Pilots use single-engine taxiing even less often when taxiing out.

The MIT methodology, supported by data sources such as aircraft pilot surveys, can be applied to Logan Airport operational data to estimate potential reductions in jet fuel consumption and associated GHG emissions from operational initiatives (e.g., single-engine taxiing). When implemented, this approach can quantify fuel savings and CO<sub>2</sub>e emissions reductions for a given analysis year within an ESPR or EDR.

## U8.6 Air Quality Studies and Research

The following sections provide an overview on air quality-related studies that have taken place in the vicinity of Logan Airport and other air quality related topics.

### U8.6.1 Massachusetts Department of Public Health Study

In 2004, the Massachusetts Legislature appropriated funds for the Department of Public Health (MassDPH) to assess the potential health impacts of Logan Airport in the East Boston section of the city and any other communities located within a five-mile radius of the Airport, with a focus on noise and air quality. This study was completed in May 2014 and consisted of an epidemiological survey combined with computer modeling of noise levels and air pollution concentrations. Massport has cooperated in this effort by providing funding to complete the study and Airport operational data in support of the study. In the spring of 2011, Massport also gave technical assistance in support of the MassDPH study by providing geographic information systems (GIS) analysis of the roadway network in and around Logan Airport in a format compatible with the FAA's Emissions and Dispersion Modeling System (EDMS). Massport is collaborating with MassDPH and the East Boston Neighborhood Health Center to implement MassDPH recommendations related to Massport.

95 MIT. 2010. "A Survey of Airline Pilots Regarding Fuel Conservation Procedures for Taxi Operations."

96 Balakrishnan, Hamsa, Indira Deonandan, and Ioannis Simaiakis. Opportunities for Reducing Surface Emissions through Airport Surface Movement Optimization. Report No. ICAT-2008-7. MIT. December 2008. <https://dspace.mit.edu/handle/1721.1/66491>.

97 Kimar, Vivek, Lance Sherry, and Terry Thompson. "Analysis of Emissions Inventory for Single Engine Taxi-out Operations." CATSR. 2009. [https://catsr.vse.gmu.edu/pubs/Kumar\\_Sherry\\_Thompson\\_ICRAT\\_Env\\_Final.pdf](https://catsr.vse.gmu.edu/pubs/Kumar_Sherry_Thompson_ICRAT_Env_Final.pdf).

In response to the MassDPH study recommendations, Massport has renewed an agreement to provide funding to the East Boston Neighborhood Health Center to help expand the efforts of their Asthma and Chronic Obstructive Pulmonary Disease (COPD) Prevention and Treatment Program in East Boston and Winthrop that provides services including screenings for children, distribution of asthma kits, and home visits, among others.

## U8.6.2 Recent Studies on Aviation Emissions Impacts to Air Quality and Public Health

Massport continues to stay apprised of studies regarding the impact of aviation on air quality and public health. The following is a brief overview of recent studies on Impacts of Aviation Emissions on Air Quality and Public Health:

- The study conducted by Tufts University, *Impacts of Aviation Emissions on Near-Airport Residential Air Quality*, and published in 2020, examined CO, CO<sub>2</sub>, NO, NO<sub>2</sub>, PM<sub>2.5</sub>, Ultrafine Particulates (UFPs), and Black Carbon (BC) at a residence near Logan Airport.<sup>98</sup> The residence was located under a flight trajectory of the most utilized runway configuration. The study showed that gaseous and particulate pollutant concentrations were higher at the residence when it was downwind compared to when it was not.
- Olin College is collaborating with Air Inc. and the Town of Winthrop to monitor air quality in the community. Monitors were placed in Winthrop to continuously measure pollutants such as CO, CO<sub>2</sub>, NO, NO<sub>2</sub>, and O<sub>3</sub>, as well as the mass concentration of PM<sub>10</sub>/PM<sub>2.5</sub>, and all relevant meteorological conditions. The Olin College collaboration with AIR Inc. and the Town of Winthrop on air quality monitoring is still on-going as part of a broader strategic initiative funded by a State Action for Public Health Excellence (SAPHE) grant. Massport will continue to provide operational data and collaborate as needed.
- The University of Southern California (USC) and the University of Washington (UW) have conducted influential studies on the health impacts of UFPs from aviation and roadway sources. USC's 2022 study indicated that there could be adverse health effects following exposure to airport and roadway traffic-related UFPs near Los Angeles International Airport (LAX). Meanwhile, UW's Mobile ObserVations of Ultrafine Particles (MOV-UP) two-year study (from 2018 to 2019) examined UFPs near Seattle-Tacoma International Airport (SEA). The findings reveal significant differences between the particle size distribution and the BC concentration for both roadway and aircraft features.
- The Transportation Research Board (TRB's) Airports Cooperative Research Program (ACRP) Report 135: *Understanding Airport Air Quality and Public Health Studies Related to Airports* provides a comprehensive overview of how airport-related emissions affect air quality and public health. It guides airport operators, planners, and public health officials in interpreting scientific studies,

98 Neelakshi Hudda et al, "Impacts of Aviation Emissions on Near-Airport Residential Air Quality," Environ. Sci. Technol. 2020, 54, 8580–8588. <https://doi.org/10.1021/acs.est.0c01859>.

understanding pollutant types (such as PM<sub>2.5</sub>, NO<sub>x</sub>, and ultrafine particles), and evaluating health risks, including respiratory and cardiovascular impacts. The report also outlines methodologies used in environmental health research, presents case studies from various airports, and offers practical strategies for mitigating emissions and engaging with affected communities. A second edition released in 2024 expands on climate change, environmental justice, and tools for community risk communication.

- The collaborative study by the University of North Carolina at Chapel Hill and the Harvard T.H. Chan School of Public Health's Center for Climate, Health, and the Global Environment (Harvard Chan C-CHANGE), published in October 2021 and funded by the FAA through the Center of Excellence for Alternative Jet Fuels and Environment (ASCENT) program, investigated the health impacts of aircraft emissions during LTO operations across U.S. airports. Using emissions data from 2011 and 2016, the researchers found that pollutants such as PM<sub>2.5</sub>, NO<sub>2</sub>, and O<sub>3</sub> from LTO activities contribute significantly to human health, with California being the most affected state.

### U8.6.2.1 Black Carbon (BC)

Particulate matter of all sizes is comprised of multiple components, one of the more significant being BC. BC particles, also referred to as soot, form because of incomplete combustion, particularly at the higher temperatures at which aircraft burn fuel, making BC emissions common from aircraft. BC from aviation activities largely contributes to smaller particulate matter particles (i.e., PM<sub>2.5</sub> and UFPs). PM<sub>2.5</sub> is classified as a criteria air pollutant by the U.S. EPA and regulated by NAAQS.

BC is known to have negative impacts on both human health and the environment. According to U.S. EPA, BC is associated with respiratory distress, cardiovascular disease, cancer, and birth defects. A 2009 study using air quality monitors near an airport showed that airports can contribute from 24 to 28 percent of total BC within four kilometers.<sup>99</sup> However, modeling studies, commonly used to ascertain the extent of impacts on human health and the environment, have shown the level of contribution by an airport to be less, only on the order of two to five percent. Researchers are working on understanding the reasons for this discrepancy. This may indicate that emission estimates from airports need improvement.<sup>100</sup> A very recent study (September 2022) states that due to the complexity and cost of the instrumentation and the lack of reference modeling protocol, data availability on BC is limited.<sup>101</sup>

To fully understand the extent of impacts from airport-related BC emissions, much more research is needed. Research should focus on improving emissions estimates of BC from airports and improved

99 Dodson Robin, E., et. al. "An analysis of continuous black carbon concentrations in proximity to an airport and major roadways." *Atmospheric Environment*. Vol. 43, issue 24, Pages 3764-3773. 2009. <https://doi.org/10.1016/j.atmosenv.2009.04.014>.

100 Arunachalam, Saravanan, et. al. "Comparing Monitoring-Based and Modeling-Based Approaches for Evaluating Black Carbon Contributions from a US Airport." In *Air Pollution Modeling and its Applications XXI*, Pages 619-623. [https://doi.org/10.1007/978-94-007-1359-8\\_102](https://doi.org/10.1007/978-94-007-1359-8_102).

101 J.Rovira, et. al. "Non-linear models for black carbon exposure modelling using air pollution datasets." *Environmental Research*, Vol. 212, Part B, 2022. Volume 212, Part B. <https://doi.org/10.1016/j.envres.2022.113269>.

modeling studies. In addition to the U.S. EPA and other performing BC-related studies, the FAA also conducts BC research through ASCENT.

### U8.6.2.2 Ultrafine Particulate Matter (UFP)

Within the field of air quality, airborne particles are collectively categorized as PMs and subdivided into size categories based on their diameters. These divisions are total suspended particles (TSP) with diameters ranging from 2.5 to 40 micrometers ( $\mu\text{m}$ ), coarse particles  $\text{PM}_{10}$  with diameters ranging from 2.5 to 10  $\mu\text{m}$ , fine particles  $\text{PM}_{2.5}$  with diameters less than 2.5  $\mu\text{m}$ , and UFPs with diameters less than 0.1  $\mu\text{m}$ . Most of these particles originate from the exhaust gases generated by fossil fuel-powered engines and other high-temperature combustion sources, including aircraft.

Under the CAA, the U.S. EPA has established NAAQS for six criteria air pollutants, including  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$ . Outdoor concentrations within U.S. EPA standards are considered safe for the public. Presently, UFPs (by themselves) are not regulated as ambient air pollutants. UFPs cannot be considered part of  $\text{PM}_{2.5}$  because  $\text{PM}_{2.5}$  regulates by a mass per volume concentration, and UFPs have a comparatively negligible mass. Any eventual UFP regulation would likely be regulated by particle count (or particle number concentrations).

On December 18, 2020, the U.S. EPA published a final action in the Federal Register detailing the agency's review of the NAAQS for  $\text{PM}_{10}/\text{PM}_{2.5}$ . In the supplemental information of the notice, UFPs were acknowledged as a component of  $\text{PM}_{2.5}$ . However, the U.S. EPA concluded that due to significant uncertainties, limited health evidence, and a lack of widespread air monitoring data, the available science did not support establishing a separate standard or using  $\text{PM}_{2.5}$  as a formal regulatory indicator for UFPs at that time.

Studies conducted at Zurich Airport in Switzerland and London Heathrow Airport in England have demonstrated that UFP dispersion is highly dependent on wind speed and direction with UFP particle counts being on the order of ten times higher when measured downwind of the airports.<sup>102,103</sup> A study conducted at Brussels Airport in Belgium demonstrated the UFP emissions from the airport can significantly impact concentrations up to seven kilometers (4.3 miles) away from the source.<sup>104</sup> These studies have begun to explain the dispersion characteristics of UFPs from airports, but specific health studies to assess the impacts of UFPs from airport sources have yet to be conducted.

As detailed in Section 8.7.2, a study performed by the USC demonstrated adverse health effects following exposure to airport-related and roadway traffic-related UFPs near LAX. To understand the distinct health

102 Fleuit, Emanuel, et. al. Ultrafine Particle Measurements At Zurich Airport. Flughafen Zurich AG. March 2017. [https://www.adra-bale-mulhouse.fr/wp-content/uploads/2021/07/PUF\\_Mesures\\_Zurich\\_201703.pdf](https://www.adra-bale-mulhouse.fr/wp-content/uploads/2021/07/PUF_Mesures_Zurich_201703.pdf).

103 Masiol, Mauro, et. al. "Sources of sub-micrometre particles near a major international airport." *Atmospheric Chemistry and Physics*. Vol. 17, Issue, 20, Pages 12379-12403. 2017. <https://doi.org/10.5194/acp-17-12379-2017>.

104 Peters, J., Berghmans, P., and Frijns, E. Ultrafine Particles and Black Carbon monitoring in the surroundings of Brussels Airport. Brussels Environmental Agency. 2018.

impacts associated with each source, a source apportionment analysis was conducted.<sup>105</sup> UW's MOV-UP study of air traffic-related air quality impacts of communities located below and near the flight paths of Sea-Tac showed that differences exist in the particle size distribution and the BC concentration for roadway and aircraft features. These differences are important because they help distinguish between the spatial impact of roadway traffic and aircraft UFP emissions using a combination of mobile monitoring and standard statistical methods.<sup>106</sup>

In 2021, as part of the Center for Air Climate and Energy Solutions (CACES), a team from the University of Washington and Virginia Tech developed the first national model estimate for airborne UFP concentrations. The model will ultimately lead to a better understanding of UFP effects on health and could one day impact air pollution policy.<sup>107</sup>

Massport supports cooperative research efforts conducted by ASCENT. ASCENT is funded by the FAA, National Aeronautics and Space Administration (NASA), the U.S. Department of Defense (U.S. DOD), and Transport Canada, and its research is co-led by Washington State University and MIT.<sup>108</sup> The primary purpose of the research is to measure aviation emissions and their contribution to ambient levels of air pollution. As part of the studies, ACSCENT is measuring UFPs in the vicinity of Logan Airport to determine spatial and short-term temporal variations in the contribution of aviation emissions to ground-level air pollutant concentrations. They are also constructing regression models using measured data from the years 2017 and 2018 to determine the contributions of aviation sources to UFP and BC.<sup>109</sup>

In 2023 as part of the TRB Annual and Mid-Year Meetings the following presentations on UFP research studies were given:

- *Changes in Ultrafine Particle Concentrations near a Major Airport Following Reduced Transportation Activity during the COVID-19 Pandemic* by Sean Mueller et al., 2022.
- *Air Quality Impacts of Aviation Activities at a Mid-sized Airport in Central Europe* by Ivonne Trebs et al., 2023.

The Mueller et al. study, an ASCENT supported project, shows the effect of pandemic-related mobility changes on UFP counts in a near-airport community in the U.S. and distinguishes aviation-related and ground transportation source contributions.

105 Habre, Rima et al. "Short-term effects of airport-associated ultrafine particle exposure on lung function and inflammation in adults with asthma." *Environment international*. Vol. 118, Pages 48-59. 2018. <https://doi.org/10.1016/j.envint.2018.05.031>.

106 University of Washington, Department of Environmental & Occupational Health Sciences. Mobile ObserVations of Ultrafine Particles: The MOV-UP study report. December 2019. <https://deohs.washington.edu/sites/default/files/Mov-Up%20Report.pdf>.

107 Provata K. Saha et al. "High-Spatial-Resolution Estimates of Ultrafine Particle Concentrations across the Continental United States." *Environmental Science & Technology*. 2021. <https://doi.org/10.1021/acs.est.1c03237>.

108 U.S. DOT, FAA, Center of Excellence for Alternative Jet Fuels & Environment. <https://ascent.aero/>. Website was last updated in 2025.

109 Lane, Kevin J., and Jonathan I. Levy. "Project 018 Community Measurements of Aviation Emissions Contribution to Ambient Air Quality. Boston University School of Public Health and ASCENT. 2020. <https://s3.wp.wsu.edu/uploads/sites/2479/2021/04/ASCENT-Project-018-2020-Annual-Report.pdf>.

Additionally, the Trebs et al study performed at a European airport concludes that UFP counts at the studied airport decline at daytime despite significant flight activities during that same time period. The study states that this decline is due to efficient turbulent mixing (high wind speeds and solar radiation) during daytime, causing depletion of nucleation mode particle numbers whereas at nighttime there is a presence of stable nocturnal boundary layer, where pollutants are accumulated.

Massport is also cooperating with Boston University, Tufts University, and other researchers in identifying aircraft-specific related UFPs in an urban environment with non-airport related sources. This research is on-going in the East Boston area and Massport continues to contribute by providing Logan Airport operational and other pertinent data.

Findings from the following studies on UFP have been discussed as a part of MEPA's Logan Airport Work Group, the following studies have been presented upon by lead researchers:

- **Aircraft arrival and departure contribution to ultrafine particle size distribution in a near airport community (van Loenen et al, 2025):** Conducted over a two-year period, the research utilized variables for flight activity and meteorology to analyze UFP concentrations and size distribution at a monitoring site close to the airport. Findings indicated that total particle number concentration (PNC) was approximately 2-fold higher when the site was downwind of the airport. Particles between 8 and 12 nm in diameter comprised the largest proportion of overall PNC, aligning with aircraft sources. Notable differences in particle size distribution were observed during predominant aircraft arrival times (9–11 nm peak modal diameter) compared to departure times (39–52 nm peak modal diameter).<sup>110</sup>
- **Assessing the impact of aircraft arrival on ambient ultrafine particle number concentrations in near-airport communities in Boston, Massachusetts (Chung et al, 2023):** The study was conducted across six study sites located 3 to 17 km from a major arrival flight path, utilizing real-time aircraft activity and meteorological data. It found that ambient PNC varied significantly, especially at the 95th and 99th percentiles, with more than two-fold increases observed at sites closer to the airport. PNC was notably elevated during hours with high aircraft activity, particularly at sites downwind from the airport. Regression models showed that the number of arrival aircraft per hour strongly correlated with measured PNC, contributing up to 50% of total PNC at a monitor 3 km from the airport during peak arrival periods. Overall, the study highlighted strong but intermittent impacts of aircraft arrivals on ambient PNC in nearby communities, indicating aviation contributions to air pollution.<sup>111</sup>

110 van Loenen, B. D., Black-Ingersoll, F., Durant, J. L., Levy, J. I., Patil, P., Mueller, S. C., Gause, E., Hudda, N., Bermudez, M., & Lane, K. J. (2025). Aircraft arrival and departure contribution to ultrafine particle size distribution in a near airport community. *Environmental Science & Technology*, 59(25), 12853-12864. <https://doi.org/10.1021/acs.est.5c04799>

111 Chung, C. S., Lane, K. J., Black-Ingersoll, F., Kolaczyk, E., Schollaert, C., Li, S., Simon, M. C., & Levy, J. I. (2023). Assessing the impact of aircraft arrival on ambient ultrafine particle number concentrations in near-airport communities in Boston, Massachusetts. *Environmental research*, 225, 115584. <https://doi.org/10.1016/j.envres.2023.115584>

- Aviation-Related Impacts on Ultrafine Particle Number Concentrations Outside and Inside Residences near an Airport (Hudda et al, 2018):** Conducted in the greater Boston metropolitan area, the study focused on 16 residences in two areas: Chelsea, located approximately 4-5 km from the Airport, and Boston, about 5-6 km away. The research found that during winds from the airport direction, both outdoor and indoor UFP concentrations increased significantly, with a median increase of 1.7-fold compared to other wind directions. The study concluded that aviation-related emissions infiltrate indoors, leading to elevated indoor PNC levels, and emphasized the need for further investigation as these impacts are likely not unique to Logan Airport.<sup>112</sup>
- Aviation Emissions Impact Ambient Ultrafine Particle Concentrations in the Greater Boston Area (Hudda et al 2016):** The was conducted at two monitoring sites between 4 and 7 kilometers from the airport for timeframes varying between 3 months and more than 3 years. Findings found that average PNCs were significantly higher when winds were from the airport's direction, highlighting aviation impacts extending kilometers downwind. There was a positive correlation between PNCs and flight activity, even after accounting for meteorological conditions, traffic volume, and time of observation. Notably, PNCs rose with increasing wind speed from the airport's direction, suggesting aviation emissions as the source, whereas other pollutants such as CO and black carbon decreased with wind speed, indicating a separate source likely from road traffic. The study underscores the importance of acknowledging aircraft emissions in PNC exposure assessments, particularly in communities near airports.<sup>113</sup>

112 Hudda, N., Simon, M. C., Zamore, W., & Durant, J. L. (2018). Aviation-Related Impacts on Ultrafine Particle Number Concentrations Outside and Inside Residences near an Airport. *Environmental science & technology*, 52(4), 1765–1772.  
<https://doi.org/10.1021/acs.est.7b05593>

113 Hudda, N., Simon, M. C., Zamore, W., Brugge, D., & Durant, J. L. (2016). Aviation Emissions Impact Ambient Ultrafine Particle Concentrations in the Greater Boston Area. *Environmental science & technology*, 50(16), 8514–8521.  
<https://doi.org/10.1021/acs.est.6b01815>

## U9. Water Quality

The *Water Quality* chapter within EDRs and ESPRs reports on Massport's environmental programs at Logan Airport pertaining to environmental compliance and management and water quality. The chapter summarizes key findings and details the performance status of Massport's environmental compliance management programs for the given reporting year, prior reporting year, and established benchmark years in both EDRs and ESPRs. However, unlike other technical chapters, such as *Noise* or *Ground Access*, the *Water Quality* chapter in ESPRs does not contain analyses of forecasted future conditions based on the Future Planning Horizon (FPH).

The chapter does discuss the many state and federal regulations applicable to Logan Airport's operations that both Massport as the owner and operator as well as its tenants and users must comply with. Massport routinely assesses environmental performance through regular water quality, stormwater, fuel use and storage, and soils monitoring, recordkeeping, and reporting. Massport is also continually developing, implementing, evaluating, and adapting to improve policies and programs. This chapter reports on Massport's environmental programs at Logan Airport pertaining to environmental compliance and management and water quality.

In addition to these topics, Massport implements Logan Airport's *Sustainability Management Plan* (SMP) and Massport's *Sustainability Design Guidelines* (SDGs), which must be used by architects, engineers, and planners when implementing new development projects. These are discussed in greater detail in Chapter 2, *Sustainability, Outreach, and Environmental Justice*. Massport also has compliance requirements pertaining to air quality; reporting and discussion regarding that program is provided in Chapter 8, *Air Quality and Greenhouse Gas Emissions*.

### Environmental Management Policy

*"Massport is committed to operate all of its facilities in an environmentally sound and responsible manner. Massport will strive to minimize the impact of its operations on the environment through the continuous improvement of its environmental performance and the implementation of pollution prevention measures, both to the extent feasible and practicable in a manner that is consistent with Massport's overall mission and goals."*

### U9.1 Stormwater Quality and Regulatory Framework

Massport's primary water quality goal is to prevent or minimize pollutant discharges to stormwater, thus limiting adverse water quality impacts to Boston Harbor associated with Airport activities. Massport employs a multitude of programs that promote awareness of potential environmental compliance issues that could arise from Massport and tenant activities and how to avoid these situations, which in turn support improved surface and groundwater quality.

## U9.1.1 NPDES Stormwater Compliance Overview

Generally, NPDES regulatory compliance requirements for permittees authorized to discharge stormwater from areas where industrial activities occur, like airport operations, include:

- Implementing **best management practices (BMPs)** for pollution prevention and enforcing compliance within the permit-holder's organization as well as among **co-permittees**, like tenants or construction contractors;
- Providing staff and tenant training;
- Maintaining a comprehensive **Stormwater Pollution Prevention Plan (SWPPP)** including a current map of drainage areas, outfalls, and stormwater infrastructure covered under the permit; and
- Consistently employing good housekeeping measures throughout permitted areas and facilities.

## U9.1.2 Logan Airport NPDES Permits

Massport holds two separate individual permits under the U.S. Environmental Protection Agency's (U.S.EPA) and the Massachusetts Department of Environmental Protection's (MassDEP) **National Pollutant Discharge Elimination System (NPDES)** Program as mandated by the **Clean Water Act (CWA)**. The NPDES permits cover Massport and its **co-permittees** at Logan Airport and establish effluent limitations and monitoring requirements for discharges from specified stormwater **outfalls**. The Logan Airport SWPPP defines the NPDES Program stormwater discharge compliance requirements applicable to Logan Airport and Massport's strategy and policies implemented to meet those requirements. The SWPPP addresses how to prevent exposure of deicing and deicing chemicals, bacteria, fuel and oil, and other contaminants to the environment and includes BMPs specific to aviation activities.

Massport holds two separate NPDES Permits for Logan Airport:

- Individual NPDES Stormwater Permit for Logan Airport (NPDES Permit MA0000787)
- Individual NPDES Permit/Massachusetts Surface Water Discharge Permit for the Fire Training Facility located on Governor's Island (NPDES Permit MA0032751)

On July 31, 2007, U.S.EPA and MassDEP authorized the Individual NPDES Stormwater Permit for Logan Airport, Permit No. MA0000787 (2007 NPDES Permit). The 2007 NPDES Permit became effective on September 29, 2007, and remained in effect with stipulated terms and conditions applicable until November 1, 2023.

The U.S.EPA and MassDEP authorized a revised Permit No. MA0000787 (2023 NPDES Permit) for Massport and co-permittees with an effective date of November 1, 2023.

The following sections describe the permit requirements and Massport's compliance with these requirements.<sup>114</sup> These permits can be reviewed using the following weblink.

- <https://www.epa.gov/npdes-permits/massport-logan-international-airport-npdes-permit>

### U9.1.2.1 Construction NPDES Permits

Massport requires contractors to comply with the U.S.EPA *NPDES Construction General Permit (CGP) for Stormwater Discharges from Construction Activities* for all construction projects impacting one or more acres.<sup>115</sup> For smaller projects, Massport requires compliance with the Logan Airport SWPPP BMPs. Massport also requires every new development and construction project to comply with Massport's SDGs.<sup>116</sup> The SDGs were recently revised in 2024 and include additional BMPs, design requirements, and construction procedures to protect stormwater quality. Massport projects must meet or exceed the *Massachusetts Stormwater Management Handbook* requirements, and to the extent practicable, projects must also meet the minimum performance thresholds for **Leadership in Energy and Environmental Design (LEED®)**, **Parksmart**, or **Envision®** certification.<sup>117</sup>

Although contractors are ultimately responsible for their own compliance with their NPDES construction stormwater permits, Massport also reviews project-specific construction SWPPPs for projects at Logan Airport to verify contractors are in compliance with NPDES and state regulations as well as Massport's policies.

### U9.1.3 Stormwater Pollution Prevention Plan (SWPPP)

A Stormwater Pollution Prevention Plan (SWPPP) is a comprehensive document designed to identify and manage potential sources of pollution that may affect stormwater quality at a facility, such as an airport. The SWPPP outlines strategies and practices to prevent pollutants from entering stormwater systems and ultimately discharging into nearby water bodies. It includes measures for pollution prevention, control, and mitigation to ensure compliance with environmental regulations and protect water quality. SWPPPs are reviewed annually, at a minimum, and updated as appropriate if the policies or procedures prescribed in the SWPPP prove to be inadequate to protect stormwater quality in discharges.

Common components often found in an airport SWPPP include:

114 On April 12, 2021, the U.S.EPA issued a draft NPDES permit under the CWA for stormwater and wastewater discharges from Logan Airport, which regulates the discharge of pollutants to state waters, like Boston Harbor. This permit was initially finalized on August 24, 2023, and will update and replace the existing permit issued in 2007 when it becomes effective.

115 U.S. EPA.NPDES CGP for Stormwater Discharges from Construction Activities (as modified). 2022. <https://www.epa.gov/system/files/documents/2025-04/2022-cgp-permit-as-modified.pdf>.

116 Massport. Massport [https://www.massport.com/sites/default/files/2025-01/2025-Massport-Sustainability-Design-Guidelines\\_FINAL.pdf](https://www.massport.com/sites/default/files/2025-01/2025-Massport-Sustainability-Design-Guidelines_FINAL.pdf)

117 MassDEP. Massachusetts Stormwater Management Handbook. Updated February 2008. <https://www.mass.gov/guides/massachusetts-stormwater-handbook-and-stormwater-standards>

- **Pollution Prevention Team:** A designated group of persons within the permittee organization responsible for implementing the SWPPP and ensuring compliance.
- **Description of the Facility:** Details regarding potential pollution sources, site layout, and receiving waters.
- **Risk Identification and Assessment:** Methods and procedures for identifying and evaluating activities and materials that could contribute pollutants to stormwater to inform developing effective control measures and policies.
- **Preventative Maintenance:** Regular inspections and maintenance of stormwater management, pollution prevention, and spill containment devices.
- **Good Housekeeping Practices:** Policies and routine procedures implemented to maintain a clean and orderly facility, which helps prevent pollutants or spills from being exposed to stormwater or the environment.
- **Spill Prevention and Response Procedures:** Strategies to prevent and respond to spills that could affect stormwater quality.
- **Stormwater Management Controls and BMPs:** Implementation of controls to manage stormwater runoff and exposure to pollutants, including structural controls, like oil/water separators, and non-structural controls, like routine staff compliance training.
- **Employee Training:** Programs to educate staff on SWPPP components and goals.
- **Visual Inspections:** Regular facility and airport property inspections to identify potential pollutant sources and pathways by which those pollutants could be conveyed to stormwater or other environmental media.
- **Recordkeeping and Reporting:** Documentation of compliance related activities, including inspections, maintenance activities, and responses to significant spill events.
- **Amending the SWPPP:** Procedures for updating the SWPPP in response to changes within the facility or among the permittee or co-permittee organizations, or if deficiencies are identified within the SWPPP.

### U9.1.4 Best Management Practices (BMPs)

Set of practices or measures implemented to control pollution and manage environmental impacts effectively are commonly referred to as best management practices, or BMPs. In the context of stormwater management and environmental protection, BMPs are designed to minimize the use of harmful substances, reduce runoff, and prevent contamination of water bodies. These practices can include structural solutions like vegetative swales and infiltration systems, as well as operational strategies such as metered application systems and regular monitoring.

Massport, as the permittee, actively implements a series of BMPs at Logan Airport to minimize environmental impacts and ensure compliance with stormwater management regulations and requires co-permittees to meet the same level of compliance with NPDES permit conditions. Through these

proactive measures, Massport ensures that Logan Airport operates in an environmentally responsible manner. Below are some examples of the BMPs Massport implements at the Airport:

- **Implementing a Pollution Control Program:** Massport maintains a team of qualified environmental personnel responsible for implementing Logan Airport's Stormwater Pollution Prevention Plan (SWPPP). They conduct regular assessments of pollution sources and select appropriate environmental management practices. The team also periodically evaluates the SWPPP's effectiveness in preventing pollutant releases to the stormwater system.
- **Addressing Containment, Mitigation, and Cleanup:** Massport employs management practices to address containment, mitigation, and cleanup of pollutants. This includes maintaining records of inspections and verifying problems observed during inspections are addressed promptly.
- **Reducing Deicing and Anti-Icing Chemical Sources:** Massport and co-permittees implement BMPs for deicing and anti-icing chemicals. They maintain records of chemical types and quantities used, and consider alternatives to reduce environmental impact while maintaining flight safety. Massport also implements a Blend-to-Temperature Program to reduce glycol usage.
- **Identifying and Reducing Illicit Discharges:** Massport continues to implement a comprehensive plan to identify and eliminate illicit discharges to the stormwater sewer system. This includes visual observations, and when appropriate, conducting video inspections, dye testing, or additional investigative techniques.
- **Managing Fuel and Oil Sources:** Massport implements BMPs to prevent stormwater from contacting pollutants associated with fueling activities. This includes using spill and overflow practices, maintaining oil/water separators, collecting stormwater runoff, and maintaining spill response materials.
- **Minimizing Rubber Removal Sources:** Massport uses high-pressure water spray to remove rubber deposits from runways and implements measures to minimize the discharge of dislodged material into the drainage system. Collected rubber debris is disposed of according to local or state ordinances.
- **Implementing Protective Fueling Practices:** Massport and co-permittees employ fuel spill cleanup practices that prevent stormwater contamination by using absorptive materials, dry cleanup methods, and proper disposal of spilled fuel. They also maintain logbooks for fueling equipment maintenance and inspections as a proactive measure to prevent leaks from vehicles or equipment.
- **Conducting Aircraft Maintenance Activities:** Massport requires tenants to perform major maintenance indoors and to use biodegradable products. Maintenance activities should not occur near stormwater catch basins and catch basin filter inserts should be installed near maintenance areas to remove oil.

- **Maintaining Automotive and Ground Service Equipment (GSE):** Massport conducts maintenance indoors, uses water-based cleaning agents, and does not discharge wash waters to stormwater systems. Massport also provides secondary containment for waste fluids.
- **Applying Runway Deicing and Anti-Icing Techniques:** Massport and co-permittees use techniques to minimize deicing chemical use and control deicing chemical runoff quantities.
- **Managing Runoff:** Massport implements a program to control or manage contaminated runoff, considering options like directing runoff into vegetative swales.
- **Conducting Inspections:** Massport's inspection frequency is described in their SWPPP, but Massport may increase the frequency of inspections, if necessary.

### U9.1.5 NPDES Stormwater Monitoring Program

Stormwater sampling is a critical component of a monitoring program designed to ensure compliance with permit requirements, such as those outlined in NPDES permits. The primary purpose of stormwater sampling is to assess the quality of stormwater discharges from industrial activities, including those at airports, and to evaluate the presence and concentration of pollutants. By systematically collecting and analyzing samples, permittees can identify potential sources of pollution, measure the effectiveness of implemented BMPs, and confirming discharges do not exceed established effluent limitations. This process helps protect water quality in receiving bodies, such as rivers, lakes, and oceans, and supports the overall goal of maintaining environmental health and compliance with regulatory standards.

#### U9.1.5.1 Monitoring Frequency and Discharge Conditions

Stormwater sampling at different frequencies, during various seasons, or under specific conditions such as precipitation or dry weather, serves multiple purposes in a monitoring program for permit compliance. Sampling frequency and timing are strategically chosen to capture the variability in pollutant levels that can occur due to changes in weather, operational activities, and seasonal variations. By tailoring the sampling strategy to these different conditions and frequencies, permittees like Massport can obtain a comprehensive understanding of their discharge characteristics, confirming compliance with environmental regulations and protecting water quality.

Conducting a sampling event may not be possible under certain conditions, such as when there are no discharges during the specified period or when weather conditions prevent safe or practical sampling. For example, if a storm event does not produce a measurable discharge, or if sampling during the first 30 minutes of a discharge is not feasible, the permittee should conduct sampling as soon as practicable after this period.

In situations where sampling cannot be conducted during the specified month, the permittee should attempt to sample during the following month. Additionally, if no sample is collected during the defined measurement frequencies, the permittee must report an appropriate No Data Indicator Code in

the DMR, such as "C" for "No Discharge". This reporting helps maintain transparency and accountability in monitoring efforts. Below describes common monitoring conditions and frequencies prescribed by Massport's stormwater NPDES permit for Logan Airport.

### Monthly Sampling Events

A monthly sampling event involves collecting a sample from one discharge event within each calendar month. This approach is used to regularly monitor and assess the quality of effluent discharges, allowing for the detection and management of any variations in pollutant levels.

### Quarterly Sampling Events

A quarterly sampling event involves collecting a sample from one discharge event during each calendar quarter. Calendar quarters are defined as January through March, April through June, July through September, and October through December. This sampling frequency is used to monitor and assess the quality of effluent discharges over a longer period, capturing seasonal variations and trends in pollutant levels.

### Deicing Season Sampling Events

A deicing sampling event involves collecting samples from stormwater discharges associated with aircraft and airfield pavement or runway deicing activities. These samples are typically collected during the deicing season, which runs from October through April at Logan Airport. The sampling focuses on monitoring specific effluent characteristics such as propylene glycol, biochemical oxygen demand (BOD), chemical oxygen demand (COD), and other relevant parameters. The purpose of these sampling events is to assess the impact of deicing activities on stormwater quality and to track the effectiveness of deicing management practices.

### Wet Weather Sampling

A wet weather sampling event involves collecting samples during storm events that result in significant rainfall, typically defined as greater than 0.1 inches in magnitude. These samples are collected at least 72 hours after the previous measurable storm event to capture the effects of stormwater runoff on pollutant levels. Sampling during wet weather is required because stormwater can carry pollutants from surfaces into water bodies, potentially leading to elevated levels of contaminants.

### Dry Weather Sampling

A dry weather sampling event involves collecting samples during periods when there has been no precipitation, typically defined as at least 72 hours after the last measurable rainfall. This type of sampling is required to identify potential illicit discharges or leaks that might not be apparent during wet weather conditions. Sampling during dry weather helps detect pollutants that may be entering the stormwater system from sources other than stormwater runoff, such as illegal connections or leaks from sanitary sewer systems.

A dry weather sampling event involves collecting samples during periods when there has been no precipitation, typically defined as at least 72 hours after the last measurable rainfall. This type of sampling is required to identify potential illicit discharges or leaks that might not be apparent during wet weather conditions. Sampling during dry weather helps detect pollutants that may be entering the stormwater system from sources other than stormwater runoff, such as illegal connections or leaks from sanitary sewer systems.

### U9.1.5.2 Sample Collection Techniques

Different sampling techniques are appropriate for different pollutants or effluent constituents because each method is tailored to capture specific characteristics of the pollutant or the conditions under which it is found. The choice of sampling technique ensures that the data collected is representative of the pollutant's behavior and concentration, allowing for accurate monitoring and compliance with regulatory standards.

#### Grab Sampling

Grab sampling is a method of collecting a water sample at a specific point in time and location to analyze the concentration of pollutants or other parameters. This type of sampling is typically used to obtain a snapshot of the water quality at the moment the sample is taken. It is often employed in environmental monitoring to assess compliance with regulatory standards, such as those set by the National Pollutant Discharge Elimination System (NPDES) permits.

#### Composite Sampling

Composite sampling is a method of collecting multiple samples over a specified period or flow volume, which are then combined to form a single sample for analysis. This technique is used to provide a more representative average of the water quality or pollutant concentration over time, especially for constituents that may vary significantly during different times of the day or under varying flow conditions. Composite sampling is particularly useful for monitoring pollutants that have fluctuating concentrations, ensuring that the data reflects the overall discharge characteristics rather than a single point in time.

#### In Situ Sampling

In situ sampling refers to the process of collecting samples directly from the environment where the pollutant or parameter of interest is located, without altering the conditions of the sample site. This method allows for real-time analysis and monitoring of environmental conditions, providing accurate data on the presence and concentration of pollutants or other parameters in their natural state. In situ sampling is particularly useful for assessing water quality, soil conditions, and atmospheric pollutants, as it captures the immediate conditions of the environment.

### Whole Effluent Toxicity (WET) Sampling

**Whole Effluent Toxicity (WET)** sampling is a method used to assess the potential toxic effects of effluent discharges on aquatic organisms. This type of testing involves exposing specific test species, such as Mysid Shrimp and Inland Silverside, to samples of effluent under controlled conditions to determine the concentration at which the effluent becomes toxic. The results of WET testing are intended to show the acute and chronic toxicity levels of the effluent, providing information on the potential impact on aquatic life in the receiving waters. WET testing is used to verify effluent discharges comply with environmental regulations. By identifying the concentration at which effluent becomes toxic, permittees can adjust their treatment processes to minimize environmental impact.

## U9.2 Aircraft and Airfield Deicing

Deicing operations involve the application of specific chemicals to remove or prevent the accumulation of frost, snow, or ice on aircraft and airfields. These chemicals, primarily glycols and acetates, can enter stormwater systems through runoff, leading to pollution of nearby water bodies.

The primary concern with deicing chemicals is their contribution to biochemical oxygen demand (BOD) and chemical oxygen demand (COD) in water bodies. High levels of BOD and COD can deplete oxygen in aquatic environments, adversely affecting aquatic life and ecosystem health. Glycols, commonly used in deicing fluids, are particularly known for increasing BOD and COD levels.

To mitigate these impacts, airports implement best management practices (BMPs) to minimize the use of deicing chemicals and manage deicing chemical quantities in runoff.

### U9.2.1 Deicing Effluent Limitations and Performance Standards

The EPA mandates that Logan Airport complies with effluent limitations guidelines (ELGs) and new source performance standards (NSPS) under the Clean Water Act, specifically targeting discharges from deicing operations. These regulations require the Airport to develop and implement robust best management practices for collecting, managing, and treating wastewater resulting from deicing activities to mitigate environmental pollution.

Massport must adhere to technology-based requirements to capture and treat runoff from Logan Airport deicing operations effectively. The permit requires deicing fluid collection systems and treatment technologies be used to reduce chemical oxygen demand (COD) in the water released into the environment. Massport is also tasked with establishing comprehensive monitoring programs to consistently assess the quality of effluent discharges, verifying pollutant levels remain within permissible limits.

Furthermore, Massport and co-permittees must maintain detailed records of deicing activities, including the types and quantities of chemicals used, and submit regular reports to the relevant environmental authorities to demonstrate compliance with the established ELGs and NSPS. These

requirements not only aim to enhance water quality by minimizing the contamination risk associated with deicing chemicals but also align with the EPA's commitment to implementing stringent pollution control measures across the airport industry, promoting environmental sustainability.

### U9.2.2 Deicing Monitoring

Aircraft and pavement deicing are typically conducted at Logan Airport from October or November through March or April, depending on weather conditions in a given year. Deicer use is subject to the NPDES permit currently in effect, but Massport and each airline and FBO conducting deicing at Logan Airport has developed tailored plans for efficient aircraft and pavement deicer application. Massport and its co-permittees conducted a *Deicing Management Feasibility Study* to evaluate various technologies to reduce glycol-containing aircraft deicing fluid discharges to Boston Harbor, which was submitted to the U.S. EPA in May 2017, and included a proposal for implementing a Blend-to-Temperature Program for tracking and reducing the use of glycols.

## U9.3 NPDES Stormwater Reporting Requirements

Massport electronically submits the prescribed monthly and quarterly data discharge monitoring reports (DMRs) to the U.S.EPA via the U.S.EPA's NetDMR web application. MassDEP accesses Logan Airport's monitoring data submitted through the NetDMR website; however, direct submissions of information to MassDEP are made when specifically requested. The outfall water quality monitoring results are provided in the associated Appendix for the *Water Quality* chapter, along with historical water quality monitoring results dating back to 1993.

## U9.4 NPDES Stormwater Permit Notification Requirements

The notification requirements for the permittee and co-permittees, as outlined in the document, include several key responsibilities:

1. **Stormwater Co-Permittee Applications (SWCPAs):** The permittee, Massport, is required to maintain all SWCPAs completed by co-permittee tenants. When a new co-permittee begins or ceases operations at Logan, Massport must update the list of SWCPAs accordingly.
2. **Submission of Stormwater Pollution Prevention Plan (SWPPP):** New co-permittee tenants must submit their own SWPPP for approval or agree to adopt Massport's SWPPP within 60 days of being designated as a new co-permittee.
3. **Annual Reporting:** Massport must provide an annual report to the EPA and MassDEP, including certifications from all current co-permittees for their industrial activities. This report must document inspections, maintenance activities, and compliance with the SWPPP.
4. **Change in Ownership or Operational Control:** Massport must follow the requirements of 40 C.F.R. §122.63(d) for changes in ownership or operational control of co-permittees.

5. **Availability of SWPPP:** Massport must keep a copy of its current SWPPP, including all co-permittees' SWPPPs, at its Environmental Department offices at Logan and make them available upon request to representatives of EPA or MassDEP.

These requirements ensure that both Massport and its co-permittees are accountable for managing stormwater discharges and maintaining compliance with environmental regulations.

#### U9.4.1 Effluent Types, Characteristics, and Regulatory Limitations

The types of effluent, required field and laboratory measurement techniques and procedures, and reporting requirements are summarized in **Table U9-1** below.

Table U9-1 Logan Airport NPDES Permit (No. MA0000787) Stormwater Outfall Monitoring Requirements (2007)

| Monitoring Event                                           | North Outfall 001            |                                                                                                                                                                                                            | West Outfall 002             |                                                                                                                                                                                                            | Maverick Outfall 003         |                                                                                                                                                                                                            |
|------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                            | Field Measurement            | Laboratory Analysis                                                                                                                                                                                        | Field Measurement            | Laboratory Analysis                                                                                                                                                                                        | Field Measurement            | Laboratory Analysis                                                                                                                                                                                        |
| Monthly Dry Weather                                        | Not Required                 | Oil and Grease<br>TSS <sup>1</sup><br>Benzene<br>Surfactant<br>Fecal Coliform<br><i>Enterococcus</i>                                                                                                       | Not Required                 | Oil and Grease<br>TSS <sup>1</sup><br>Benzene<br>Surfactant<br>Fecal Coliform<br><i>Enterococcus</i>                                                                                                       | Not Required                 | Oil and Grease<br>TSS <sup>1</sup><br>Benzene<br>Surfactant<br>Fecal Coliform<br><i>Enterococcus</i>                                                                                                       |
| Monthly Wet Weather                                        | pH<br>Flow Rate <sup>6</sup> | Oil and Grease<br>TSS <sup>1</sup><br>Benzene <sup>2</sup><br>Surfactant<br>Fecal Coliform<br><i>Enterococcus</i>                                                                                          | pH<br>Flow Rate <sup>6</sup> | Oil and Grease<br>TSS <sup>1</sup><br>Benzene <sup>2</sup><br>Surfactant<br>Fecal Coliform<br><i>Enterococcus</i>                                                                                          | pH<br>Flow Rate <sup>6</sup> | Oil and Grease<br>TSS <sup>1</sup><br>Benzene <sup>2</sup><br>Surfactant<br>Fecal Coliform<br><i>Enterococcus</i>                                                                                          |
| Quarterly Wet Weather                                      | pH<br>Flow Rate <sup>6</sup> | PAHs <sup>3</sup> :<br>- Benzo(a)anthracene<br>- Benzo(a)pyrene<br>- Benzo(b)fluoranthene<br>- Benzo(k)fluoranthene<br>- Chrysene<br>- Dibenzo(a,h)anthracene<br>- Indeno(1,2,3-cd)pyrene<br>- Naphthalene | pH<br>Flow Rate <sup>6</sup> | PAHs <sup>3</sup> :<br>- Benzo(a)anthracene<br>- Benzo(a)pyrene<br>- Benzo(b)fluoranthene<br>- Benzo(k)fluoranthene<br>- Chrysene<br>- Dibenzo(a,h)anthracene<br>- Indeno(1,2,3-cd)pyrene<br>- Naphthalene | pH<br>Flow Rate <sup>6</sup> | PAHs <sup>3</sup> :<br>- Benzo(a)anthracene<br>- Benzo(a)pyrene<br>- Benzo(b)fluoranthene<br>- Benzo(k)fluoranthene<br>- Chrysene<br>- Dibenzo(a,h)anthracene<br>- Indeno(1,2,3-cd)pyrene<br>- Naphthalene |
| Deicing Episode (2/Deicing Season)                         | Not Required                 | Ethylene Glycol<br>Propylene Glycol<br>BOD <sup>5</sup> <sup>4</sup><br>COD <sup>5</sup><br>Total Ammonia Nitrogen<br>Nonylphenol<br>Tolyltriazole                                                         | Not Required                 | Ethylene Glycol<br>Propylene Glycol<br>BOD <sup>5</sup> <sup>4</sup><br>COD <sup>5</sup><br>Total Ammonia Nitrogen<br>Nonylphenol<br>Tolyltriazole                                                         | Not Required                 | Not Required                                                                                                                                                                                               |
| Whole Effluent Toxicity (1st and 3rd Year Deicing Season)  | Not Required                 | Menidia beryllina<br>Arbacia punctulata                                                                                                                                                                    | Not Required                 | Menidia beryllina<br>Arbacia punctulata                                                                                                                                                                    | Not Required                 | Not Required                                                                                                                                                                                               |
| Treatment System Sampling (Internal Outfalls) <sup>7</sup> | pH<br>Quantity, Gallons      | Oil and Grease<br>TSS <sup>1</sup><br>Benzene <sup>2</sup>                                                                                                                                                 | Not Required                 | Not Required                                                                                                                                                                                               | Not Required                 | Not Required                                                                                                                                                                                               |

Table U9-1 Logan Airport NPDES Permit (No. MA0000787) Stormwater Outfall Monitoring Requirements (2007)

| Monitoring Event                                           | North Outfall 001            |                                                            | West Outfall 002             |                                                                                                                                                                                                            | Maverick Outfall 003 |                                                                                                                                                   |
|------------------------------------------------------------|------------------------------|------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                            | Field Measurement            | Laboratory Analysis                                        | Field Measurement            | Laboratory Analysis                                                                                                                                                                                        | Field Measurement    | Laboratory Analysis                                                                                                                               |
| Monthly Dry Weather                                        | Not Required                 | Not Required                                               | Not Required                 | Oil and Grease<br>TSS <sup>1</sup><br>Benzene<br>Surfactant<br>Fecal Coliform<br><i>Enterococcus</i>                                                                                                       | Not Required         | Not Required                                                                                                                                      |
| Monthly Wet Weather                                        | Not Required                 | Not Required                                               | pH<br>Flow Rate              | Oil and Grease<br>TSS <sup>1</sup><br>Benzene <sup>2</sup><br>Surfactant<br>Fecal Coliform<br><i>Enterococcus</i>                                                                                          | Not Required         | Not Required                                                                                                                                      |
| Quarterly Wet Weather                                      | pH<br>Flow Rate <sup>6</sup> | Oil and Grease<br>TSS <sup>1</sup><br>Benzene <sup>2</sup> | pH<br>Flow Rate <sup>6</sup> | PAHs <sup>3</sup> :<br>- Benzo(a)anthracene<br>- Benzo(a)pyrene<br>- Benzo(b)fluoranthene<br>- Benzo(k)fluoranthene<br>- Chrysene<br>- Dibenzo(a,h)anthracene<br>- Indeno(1,2,3-cd)pyrene<br>- Naphthalene | pH                   | Oil and Grease<br>TSS <sup>1</sup><br>Benzene <sup>2</sup>                                                                                        |
| Deicing Episode (2/Deicing Season)                         | Not Required                 | Not Required                                               | Not Required                 | Ethylene Glycol<br>Propylene Glycol<br>BOD <sup>5</sup> <sup>4</sup><br>COD <sup>5</sup><br>Total Ammonia Nitrogen<br>Nonylphenol<br>Tolytriazole                                                          | Not Required         | Ethylene Glycol<br>Propylene Glycol<br>BOD <sup>5</sup> <sup>4</sup><br>COD <sup>5</sup><br>Total Ammonia Nitrogen<br>Nonylphenol<br>Tolytriazole |
| Whole Effluent Toxicity (1st and 3rd Year Deicing Season)  | Not Required                 | Not Required                                               | Not Required                 | Menidia beryllina<br>Arbacia punctulata                                                                                                                                                                    | Not Required         | Not Required                                                                                                                                      |
| Treatment System Sampling (Internal Outfalls) <sup>7</sup> | Not Required                 | Not Required                                               | Not Required                 | Not Required                                                                                                                                                                                               | Not Required         | Not Required                                                                                                                                      |

Table U9-1 Logan Airport NPDES Permit (No. MA0000787) Stormwater Outfall Monitoring Requirements (2007)

| Monitoring Event | North Outfall 001 |                     | West Outfall 002  |                     | Maverick Outfall 003 |                     |
|------------------|-------------------|---------------------|-------------------|---------------------|----------------------|---------------------|
|                  | Field Measurement | Laboratory Analysis | Field Measurement | Laboratory Analysis | Field Measurement    | Laboratory Analysis |

Source: Massport

Notes: Requirements are from NPDES Permit MA0000787, issued July 31, 2007.

- 1 TSS - Total Suspended Solids
- 2 Benzene must be collected with HDPE bailer.
- 3 PAH - Polycyclic Aromatic Hydrocarbons
- 4 BOD - Biological Oxygen Demand
- 5 COD - Chemical Oxygen Demand
- 6 Flow Rate will be estimated based on measured precipitation and the hydraulic model developed for the Logan Airport drainage system.
- 7 Outfalls 001D and 001E samples collected by Swissport.

## U9.5 Fire Training Facility NPDES Monitoring Requirements

Treated water generated from fire training exercises, which generally occur from April through November, are collected and stored in an above ground holding tank onsite. Wastewater is treated by oil/water (OW) separation and granular activated carbon (GAC) filtration methods to remove fuel contaminants, then reused onsite to recharge the fire training pit for training exercises.

If tank storage capacity is unavailable, the treated water is tested to confirm water quality standards are met prior to discharge from airfield Outfall 001. Because treated wastewater is typically recycled for future training use, discharges are infrequent during the training season. Controlled, batch-type treated wastewater discharges are conducted at the end of the season by a licensed Massachusetts wastewater treatment operator. Prior to the controlled discharges, Massport provides the treated wastewater water quality testing results to the Massachusetts Division of Marine Fisheries (MassDMF) to obtain approval prior to the discharge event in conformance with the permit.

On March 10, 2021, the U.S.EPA issued a minor modification to the NPDES Permit No. MA0032751 to clarify that **grab samples** should be collected from above-ground holding tanks after the water has undergone treatment, but prior to discharge.<sup>118</sup> Previous EDRs and ESPRs reported findings derived using the prior monitoring method, which required composite sampling as well as sample collection during active discharge.

<sup>118</sup> Letter via email "Minor Modification of NPDES Permit No. MA0032751 (for) the Massachusetts Port Authority's Fire Training Facility" (March 10, 2021). <https://www3.epa.gov/region1/npdes/permits/2021/finalma0032751permitminormod.pdf>

**Table U9-2 Fire Training Facility NPDES Permit (No. MA0032751) Outfall Monitoring Requirements (2014)**

| Monitoring Event                                                             | Outfall Serial Number 001    |                                                                                                                                                           |
|------------------------------------------------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                              | Field Measurement            | Laboratory Analysis                                                                                                                                       |
| Each Discharge Event <sup>1</sup>                                            | Flow Rate <sup>2</sup><br>pH | TSS <sup>3</sup><br>Oil and Grease <sup>4</sup><br>Total BTEX <sup>5</sup><br>- Toluene<br>- Benzene<br>- Ethylbenzene<br>- Xylene<br>PAHs <sup>5,6</sup> |
| Whole Effluent Toxicity<br>(once per permit terms<br>during discharge event) | Not Required                 | Acute Toxicity <sup>7</sup>                                                                                                                               |

Source: Massport

Notes: Requirements are from NPDES Permit MA0032751, issued August 15, 2014.

All samples, except for wet testing, shall be collected after treatment and prior to discharge from above ground holding tank.

- 1 Flows from more than one training session may be held in treatment train for several weeks. Treatment and subsequent discharge through Outfall 001 is usually triggered by tank levels. Sampling will be conducted during each discharge event with the sampling point after the GAC unit and prior to discharge from the above ground holding tank. Each sample shall be a composite of three equally weighted (same volume) grab samples taken at the bottom, middle, and top of the above ground tank.
- 2 Total flow volume shall be reported monthly in gallons and the maximum flow rate in gallons per minute shall be reported for each month.
- 3 TSS - Total Suspended Solids
- 4 Oil and grease is measured using EPA Method 1664.
- 5 BTEX and PAH compounds shall be analyzed using EPA approved methods. Testing method used and method detection level for each parameter will be included in each DMR submittal.
- 6 PAH - Polycyclic Aromatic Hydrocarbons
- 7 The permittee shall conduct one acute toxicity test per year. The test results shall be submitted by the last day of the full month following completion of the test in accordance with protocols defined in the permit.

**Table U9-3 Fire Training Facility NPDES Permit (No. MA0032751) Outfall Monitoring Requirements (2021)**

| Monitoring Event                                                            | Outfall Serial Number 001    |                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------------------------------------------------|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                             | Field Measurement            | Laboratory Analysis                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Each Discharge Event <sup>1</sup>                                           | Flow Rate <sup>2</sup><br>pH | TSS <sup>3</sup><br>Fecal Coliform Bacteria<br><i>Enterococcus Bacteria</i><br>Oil and Grease <sup>4</sup><br>Total BTEX <sup>5</sup><br>- Toluene<br>- Benzene<br>- Ethylbenzene<br>- Xylene<br>PAHs, Total, Group I <sup>5,6</sup><br>- Benzo(a)anthracene<br>- Benzo(a)pyrene<br>- Benzo(b)fluoranthene<br>- Benzo(k)fluoranthene<br>- Chrysene<br>- Dibenzo(a,h)anthracene<br>- Indeno(1,2,3-cd)pyrene | PAHs, Total, Group II <sup>5,6</sup><br>- Acenaphthylene<br>- Anthracene<br>- Benzo(g,h,i)perylene<br>- Fluoranthene<br>- Fluorene<br>- Naphthalene<br>- Phenanthrene<br>- Pyrene<br>Perfluorohexanesulfonic acid (PFHxS) <sup>7</sup><br>Perfluoroheptanoic acid (PFHpA)<br>Perfluoranonanoic acid (PFNA)<br>Perfluorooctanesulfonic acid (PFOS)<br>Perfluorooctanoic acid (PFOA)<br>Perfluorodecanoic acid (PFDA) |
| Whole Effluent Toxicity (WET; once per permit terms during discharge event) | Not Required                 | Acute Toxicity <sup>8</sup>                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                     |

Source: Massport

Notes: Requirements are from NPDES Permit MA0032751, issued January 27, 2021.

- 1 Flows from more than one training session may be held in treatment train for several weeks. Treatment and subsequent discharge through Outfall 001 is usually triggered by tank levels. Except for WET samples, sampling will be conducted during each discharge event with the sampling point after the GAC unit and prior to discharge from the above ground holding tank. Each sample shall be a grab sample collected from the above ground tank. WET sampling shall occur from the outfall discharge.
- 2 Total flow volume shall be reported monthly in average gallons per day and the maximum flow rate in gallons per day shall be reported for each month.
- 3 TSS - Total Suspended Solids
- 4 Oil and grease is measured using EPA Method 1664.
- 5 BTEX and PAH compounds shall be analyzed using EPA approved methods. Testing method used and method detection level for each parameter will be included in each DMR submittal.
- 6 PAH - Polycyclic Aromatic Hydrocarbons
- 7 The reporting requirements for the listed PAH parameters takes effect six months after EPA's multi-lab validated method for wastewater is made available to the public on EPA's Clean Water Act (CWA) methods program website.
- 8 The permittee shall conduct one acute toxicity test per year. The test results shall be submitted by the last day of the full month following completion of the test in accordance with protocols defined in the permit.

## U9.6 Fuel Use and Spills

Massport maintains a **Spill Prevention, Control, and Countermeasures (SPCC) Plan** for facilities storing petroleum products. Tenants meeting certain thresholds are required to prepare their own SPCC plans for their facilities. Additionally, tenants receive information on Massport BMPs, which focus on spill management and prevention.

### U9.6.1 Fuel Use and Spills Compliance Requirements

Management of Massport's Aircraft Fueling System (AFS) consolidated jet fuel storage facility and hydrant distribution system was designed to minimize water quality impacts by implementing SWPPP BMPs and good housekeeping procedures. More specifically, integral AFS components include cathodic protection, leak detection devices, secondary containment sufficient to capture and contain spills or leaks, and tank overfill protection methods such as alarms, inventory-gauging sensors in the tanks, and emergency fuel shut-off systems. Built-in environmental controls, unified operations (the AFS facility is leased and operated by BOSFuel Corporation, a consortium of airlines), and on-going contingency planning provide heightened environmental protection and more efficient fuel handling operations. In addition, the AFS reduces at-gate tanker truck fuel deliveries thereby minimizing fuel handling and opportunities for spills to occur.

The AFS facility is leased and operated by BOSFuel Corporation. Operation of the AFS was performed by Swissport Fueling until Spring 2024, after which time FSM Group has operated the facility on behalf of BOSFuel. Massport Fire Rescue maintains records of spills at Logan Airport. State environmental regulations require fuel spills of 10 gallons or more in volumes reported to MassDEP. Spills that enter storm drains of any volume must also be reported to MassDEP. Massport maintains records of spills, including those less than the reporting threshold.

## U9.7 Tank Management Program

Massport also implements a Tank Management Program, which is a continuing program of inspections, testing, and minor repairs of Massport-owned **underground storage tanks (USTs)**, **aboveground storage tanks (ASTs)**, related piping, tank monitoring systems, and related equipment. Massport's Tank Management Program includes the following processes and procedures:

- A continuing program of routine inspections, testing, and minor repairs of all Massport-owned USTs, related piping, tank monitoring systems, and related equipment.
- Annual Stage I Vapor Recovery testing on Logan Airport's gasoline USTs and piping systems. Stage I vapor recovery involves the recovery of vapors from the gasoline tank by the tanker truck during the fuel unloading process.
- Annual Department of Fire Services (DFS) inspections of Massport's ASTs greater than 10,000 gallons in volume, and submittal of the inspection documentation to DFS. Massport owns three ASTs at

Logan Airport with volumes greater than 10,000 gallons. Two of these tanks are located in the North Service Area and contain potassium acetate runway deicing fluid. The third tank is located at the Central Heating Plant and is used for the storage of heating oil.

- Review of all proposed tenant tank upgrades, installations, and tank removals under Massport's **Tenant Alteration Application (TAA)** process<sup>119</sup> to ensure compliance with applicable state and federal regulations and with Massport policy.
- On-going upgrade and maintenance of a database on all USTs located on Massport property. The database tracks location, permit status, and tank and monitoring system equipment summaries. Information on ASTs is kept in a separate database developed in 2010.
- Information provided to tenants regarding the revised storage tank regulatory requirements and assistance with tenants' tank permitting procedures.

## U9.8 Site Assessment and Remediation

The **Massachusetts Contingency Plan (MCP)** lays out regulations that govern the reporting, assessment, and cleanup of spills of oil and hazardous materials in Massachusetts. The MCP, which is administered by MassDEP, prescribes the site cleanup process based on the nature and extent of a release's contamination. The MCP defines the roles for those parties affected by and potentially responsible for the release and establishes the release reporting program and submission deadlines for tracking events from initial release to regulatory closure.

Massport complies with the MCP, 310 Code of Massachusetts Regulations [CMR] 40 et seq., by monitoring fuel and oil and hazardous materials spills, and tracking the status of spill response actions. In accordance with the MCP, Massport assesses, remediates, and brings to regulatory compliance closure areas of subsurface contamination. The status of active MCP sites associated with Logan Airport is provided annually in EDRs or ESRs with supporting data provided in the technical appendix.

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## U10. Project Mitigation

Massport's approach to mitigation encompasses a wide range of strategies intended to avoid, minimize, or offset potential environmental and community impacts associated with planning, development, and operations at Logan Airport. These strategies are organized into three primary categories: project mitigation, community mitigation, and other environmental measures. Each category is addressed in a different chapter of the EDRs and periodic ESPRs, reflecting both regulatory obligations and broader voluntary initiatives undertaken by Massport.

### Project Mitigation

Project Mitigation, described in the Project Mitigation chapter, refers to legally binding commitments made through the MEPA process. These measures are documented as **Section 61 Findings** in the MEPA Certificate issued by the Secretary of EEA for projects that require the preparation of an Environmental Impact Report (EIR). The Project Mitigation Chapter serves as the primary tracking and reporting tool for these Section 61 commitments, which remain active until fully implemented or otherwise resolved.

### Community Mitigation

Community Mitigation efforts are discussed in the *Outreach and Environmental Justice* chapter and reflect Massport's voluntary investments in local quality of life beyond what is required by regulation. These initiatives are designed to support EJ populations and neighboring communities that may experience disproportionate effects from airport operations. While not linked to any one project, these programs help build long-term partnerships and trust between Massport and its surrounding communities.

### Other environmental measures

Other environmental measures are discussed in the *Sustainability and Climate Resilience* chapter, with supporting detail included in the *Ground Access, Noise, and Air Quality* chapters. These measures include a variety of operational and planning initiatives that are not directly tied to MEPA filings but contribute to Massport's broader environmental goals. These efforts demonstrate Massport's commitment to environmental stewardship, climate leadership, and innovation across all airport functions.

Together, these three categories provide a comprehensive picture of how Massport mitigates environmental and community impacts. The purpose of the *Project Mitigation* chapter is specifically to track and report on MEPA-related mitigation measures that have been formally adopted as part of the state environmental review process. This chapter includes detailed project-level tables showing each Section 61 Finding, its implementation status, and any on-going obligations. Measures remain in the report until they are fully completed, at which point they are removed from future EDRs. The consistent tracking and annual reporting of these mitigation commitments ensure transparency and accountability

for projects subject to MEPA review. The following sections summarize the MEPA regulatory framework, and EDR reporting requirements.

## U10.1 MEPA Regulatory Framework

Project mitigation at Logan Airport is guided by a structured regulatory framework that originates from MEPA, codified in 301 Code of Massachusetts Regulations (CMR) 11.00. Section 61 is central to this process, requiring that all state agencies evaluate the environmental impacts of any action they undertake, fund, permit, or approve, and to commit to all feasible measures to avoid, minimize, or mitigate such impacts.

These legally binding mitigation measures, commonly referred to as Section 61 Findings, must be issued whenever the EEA requires the preparation of an EIR for a project. As detailed in 301 CMR 11.07(6)(k) and 301 CMR 11.12(5), the findings are developed based on the final EIR and serve as formal documentation that the agency has considered environmental effects and committed to mitigation. These findings are typically embedded in permits, contracts, or other authorizing documents, and include implementation schedules, funding responsibilities, and specific mitigation actions.

Section 61 Findings play a critical role in holding both project proponents and state agencies accountable for environmental stewardship. The purpose is not simply to identify impacts, but to ensure that mitigation measures are both feasible and enforceable. For each commitment, the findings must specify the party responsible for implementation, the anticipated timeline, and verification that the action has been integrated into the project's execution.

Importantly, these findings are limited in scope to the aspects of a project that fall under a particular agency's jurisdiction. For example, if MassDEP is issuing a water quality certificate, its Section 61 Finding will pertain only to the water-related impacts and mitigation measures within that domain. This ensures that mitigation is targeted, relevant, and within the regulatory authority of the reviewing agency.

Once established, these Section 61 mitigation measures are tracked by Massport in the *Project Mitigation* chapter of the EDR or ESRP until they are fully implemented. Only after a commitment has been fulfilled can it be closed out and removed from future reporting. This process of continual monitoring and reporting ensures long-term compliance with MEPA obligations and reinforces the agency's commitment to transparency and environmental responsibility.

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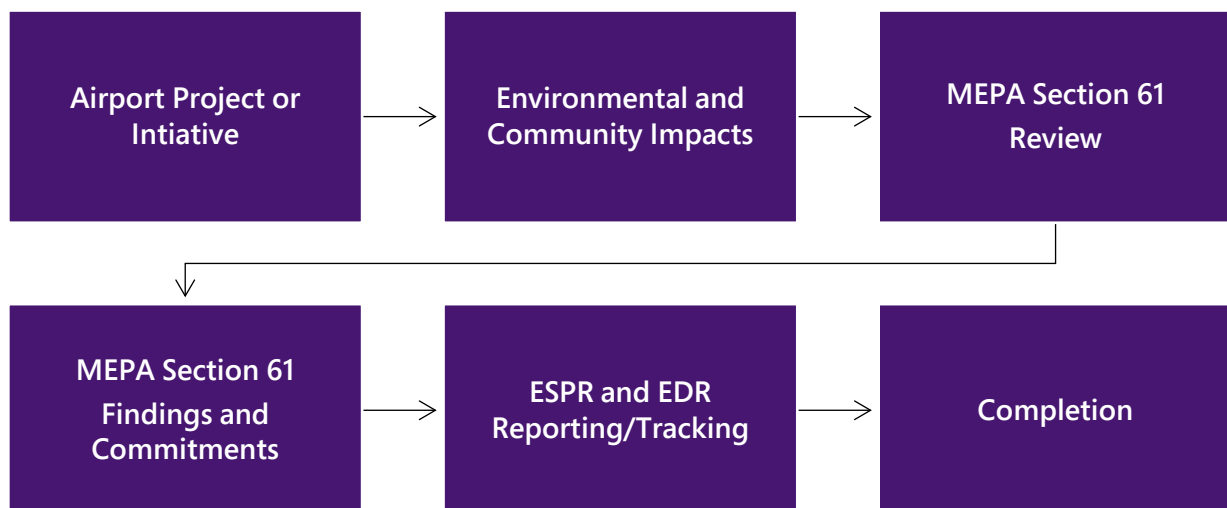
## U10.2 EDR and ESRP Mitigation Status Reporting

Massport reports annually on the implementation status of all active Section 61 mitigation measures through the EDR, and more broadly through the ESRP every five years. These reports serve as the formal mechanism for tracking compliance with MEPA-required mitigation and for documenting how those commitments are incorporated into the airport's evolving environmental programs.

The MEPA Section 61 mitigation process is outlined in **Figure U10-1**. Many long-standing initiatives at Logan Airport, such as HOV programs, EV charging stations, and noise reduction strategies, were originally developed in response to Section 61 commitments but have since been integrated into airport policies. In some cases, Section 61 measures may no longer be feasible due to changes in technology, regulation, or project conditions. When this occurs, Massport evaluates alternative programs or strategies that can achieve comparable environmental benefits.

In response to agency feedback, Massport is also working to enhance the transparency of its mitigation reporting by improving how it quantifies and communicates progress. Current efforts focus on clarifying the relationship between project-level mitigation and long-term environmental performance, and on more clearly documenting measurable outcomes in areas such as emissions reductions, noise mitigation, and transportation impacts.

**Figure U10-1** MEPA Section 61 Mitigation Process



Source VHB.

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