PREPARED FOR

Massachusetts Port Authority

ENVIRONMENTAL NOTIFICATION FORM

Runway 27 End Runway Safety Area Improvements Project

Boston Logan International Airport

EAST BOSTON, MASSACHUSETTS

PREPARED BY

WSP and vhb

AUGUST 2021

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Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909
Telephone (617) 568-5000
www.massport.com

August 31, 2021

The Honorable Kathleen A. Theoharides, Secretary
Tori Kim, Director of MEPA Office
Executive Office of Energy and Environmental Affairs
Attn: MEPA Reviewer
100 Cambridge Street, Suite 900
Boston, Massachusetts 02114

Re: Boston Logan International Airport
Runway 27 End Runway Safety Area Improvements Project ENF

Dear Secretary Theoharides and Director Kim:

On behalf of the Massachusetts Port Authority (Massport), we are pleased to submit this Environmental Notification Form (ENF) for the Boston Logan International Airport, Runway 27 End Runway Safety Area (RSA) Improvements Project.

Massport is proposing to improve the RSA at the end of Runway 27 at Boston Logan International Airport. The proposed improvements are required to enhance the RSA, to the extent feasible, to be consistent with current Federal Aviation Administration (FAA) airport design criteria for RSAs and to enhance rescue access in the event of an in-water emergency. RSAs are safety improvements and **do not extend runways or have any effect on normal runway operations, runway capacity, or types of aircraft that can use the runways**. The ENF describes the purpose of, and need for, the proposed RSA enhancements, the alternatives considered, and the potential environmental impacts.

A 20-day public comment period for the ENF will begin on September 8, 2021, the publication date of the next *Environmental Monitor*, and will end on September 28, 2021. The distribution list included as Appendix B lists parties receiving a printed copy of this ENF, or notice of availability with a link to the full document posted on Massport's website at:
http://www.massport.com/massport/about-massport/project-environmental-filings/

A public virtual consultation session on the ENF will be held at 6PM on Wednesday, September 22, 2021 to receive comments on the project and for MEPA and the FAA use in determining the scope for a state DEIR and federal NEPA review document. Details on the date of the meeting will be posted on Massport's website at https://www.massport.com/massport/about-massport/project-environmental-filings/. Additional copies of the ENF may be obtained by calling (617) 568-3524 or emailing sdalzell@massport.com during the public comment period.

We look forward to your review of this document and to consultation with the MEPA Office and other reviewers. Please feel free to contact me at sdalzell@massport.com if you have any questions.

Sincerely,

Massachusetts Port Authority

Stewart Dalzell, Deputy Director
Environmental Planning & Permitting
Strategic & Business Planning Department

cc: J. Barrera, S. Dennechuk, F. Leo, A. Coppola, B. Washburn

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Acronyms

AAC	Aircraft Approach Category
AC	Advisory Circular
ADG	Airplane Design Group
ARFF	Aircraft Rescue and Firefighting
BMP	Best Management Practice
CDA	Critical Design Aircraft
CMP	Construction Management Plan
CMR	Code of Massachusetts Regulations
CO	Carbon monoxide
CZM	Massachusetts Coastal Zone Management Program
DEIR	Draft Environmental Impact Report
DNL	Average Day-Night Level
DOT OIG	United States Department of Transportation Office of Inspector General
EA	Environmental Assessment
EDR	Environmental Data Report
EEA	Executive Office of Energy and Environmental Affairs
EFH	Essential Fish Habitat
ENF	Environmental Notification Form
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EJ	Environmental Justice
EMAS	Engineered Materials Arresting System
ENF	Environmental Notification Form
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
GHG	Greenhouse Gas
HAPC	Habitat Area of Particular Concern
ILS	Instrument Landing System
ISA	Inclined Safety Areas
LSTA	Land Subject to Tidal Action

LUO	Land Under the Ocean
LUHPPL	Land Use With Higher Potential Pollutant Load
MassDEP	Massachusetts Department of Environmental Protection
MassDMF	Massachusetts Division of Marine Fisheries
MassDOT	Massachusetts Department of Transportation
Massport	Massachusetts Port Authority
MCAC	Massport Community Advisory Committee
MEPA	Massachusetts Environmental Policy Act
MHC	Massachusetts Historical Commission
MHW	Mean High Water
MLW	Mean Low Water
MTOW	Maximum Takeoff Weight
NEPA	National Environmental Policy Act
NHESP	Massachusetts Natural Heritage and Endangered Species Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NO_x	Nitrogen oxides
PH	Priority Habitat
PM	Particulate Matter
RDC	Runway Design Code
RIM	Runway Incursion Mitigation
ROFA	Runway Object Free Area
RSA	Runway Safety Area
SAV	Submerged Aquatic Vegetation
SO_x	Sulfur oxides
SWPPP	Stormwater Pollution Prevention Plan
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile organic compound
WPA	Massachusetts Wetlands Protection Act

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Massachusetts Environmental Policy Act (MEPA) Office

Environmental Notification Form

For Office Use Only

EEA#: _____

MEPA Analyst: _____

The information requested on this form must be completed in order to submit a document electronically for review under the Massachusetts Environmental Policy Act, 301 CMR 11.00.

Project Name: **Boston Logan International Airport Runway 27 End Runway Safety Area (RSA) Improvements Project**		
Street Address: **One Harborside Drive**		
Municipality: **East Boston**	Watershed: **Boston Harbor**	
Universal Transverse Mercator Coordinates: **19T, 46 91 691N, 3 36 352W**	Latitude: **42°21'37" N** Longitude: **70°59'14" W**	
Estimated commencement date: **2025**	Estimated completion date: **2026**	
Project Type: Aviation/Safety	Status of project design: **5** %complete	
Proponent: **Massachusetts Port Authority (Massport)**		
Street Address: **One Harborside Drive**		
Municipality: **East Boston**	State: **MA**	Zip Code: **02128**
Name of Contact Person: **Stewart Dalzell**		
Firm/Agency: **Massport**	Street Address: **One Harborside Drive**	
Municipality: **East Boston**	State: **MA**	Zip Code: **02128**
Phone: **617-568-3524**	Fax:	E-mail: **sdalzell@massport.com**

Does this project meet or exceed a mandatory EIR threshold (see 301 CMR 11.03)?

■ Yes ☐ No

If this is an Expanded Environmental Notification Form (ENF) (see 301 CMR 11.05(7)) or a Notice of Project Change (NPC), are you requesting:

a Single EIR? (see 301 CMR 11.06(8))	☐ Yes	■ No
a Special Review Procedure? (see 301CMR 11.09)	☐ Yes	■ No
a Waiver of mandatory EIR? (see 301 CMR 11.11)	☐ Yes	■ No
a Phase I Waiver? (see 301 CMR 11.11)	☐ Yes	■ No

(Note: Greenhouse Gas Emissions analysis must be included in the Expanded ENF.)

Which MEPA review threshold(s) does the project meet or exceed (see 301 CMR 11.03)?

11.03(3)(a)5. Provided that a Chapter 91 License is required, New non-water dependent use or Expansion of an existing non-water dependent structure, provided the use or structure occupies one or more acres of waterways or tidelands; and
11.03(3)(b)1.f. alteration of one half or more acres of any other wetlands.

Which State Agency Permits will the project require?

Massachusetts Wetlands Protection Act Order of Conditions, Section 401 Water Quality Certification and Chapter 91 License from Massachusetts Department of Environmental Protection, Federal Consistency Determination from the Massachusetts Office of Coastal Zone Management.

Identify any financial assistance or land transfer from an Agency of the Commonwealth, including the Agency name and the amount of funding or land area in acres:

This is a project funded by, and on land owned by, an agency of the Commonwealth. Additional funding will be sought from the Federal Aviation Administration (FAA).

Summary of Project Size & Environmental Impacts	Existing	Change	Total
LAND			
Total site acreage	10.5		
New acres of land altered		2.4	
Acres of impervious area	3.4	3.8	7.2
Square feet of new bordering vegetated wetlands alteration		0	
Square feet of new other wetland alteration		Total: 210,000 SF 107,200 SF Land Under Ocean 64,800 SF Land Subject to Coastal Storm Flowage 38,000 SF Land Subject to Tidal Action (Includes Coastal Beach) 117,300 Land Containing Shellfish (Includes Coastal Beach and Land Under Ocean)	
Acres of new non-water dependent use of tidelands or waterways		2.4	
STRUCTURES			
Gross square footage	NA	NA	NA
Number of housing units	NA	NA	NA
Maximum height (feet)	NA	NA	NA
TRANSPORTATION			
Vehicle trips per day	NA	NA	NA
Parking spaces	NA	NA	NA
WASTEWATER			
Water Use (Gallons per day)	NA	NA	NA
Water withdrawal (GPD)	NA	NA	NA
Wastewater generation/treatment (GPD)	NA	NA	NA
Length of water mains (miles)	NA	NA	NA

Length of sewer mains (miles)	NA	NA	NA

Has this project been filed with MEPA before?

☐ Yes (EEA #_____) ■ No

Has any project on this site been filed with MEPA before?

■ Yes (EEA # 14442, 3247, 5122) ☐No

***Impervious acreage mainly consists of the pile-supported deck over Boston Harbor.**

GENERAL PROJECT INFORMATION – all proponents must fill out this section

PROJECT DESCRIPTION:

Describe the existing conditions and land uses on the project site:

The Project Area is focused on the east end of Boston Logan International Airport's (Logan Airport or the Airport) Runway 9-27. The site includes the existing Runway 27 End, and the armored coastal shoreline and intertidal and subtidal areas seaward of the existing runway end.

Runway 9-27 is 7,001 feet long, 150 feet wide, and is constructed of asphalt pavement. The runway has 75-foot-wide paved shoulders on either side. The adjoining taxiways are predominantly 100 feet wide with 35-foot-wide paved shoulders. The runway is classified as a Runway Design Code (RDC) D-V.

The standard runway safety area (RSA) dimensions for Runway 9-27 are as follows per the FAA:

- **RSA Length Beyond Departure End: 1,000 feet**
- **RSA Length Prior to Threshold: 600 feet**
- **RSA Width: 500 feet**

At the approach end of Runway 9 (western end of the runway), the existing RSA meets the full dimensions set forth in the FAA design standards. The approach end of Runway 27 (eastern end of the runway) does not meet the current FAA design standards for length. This runway was constructed before the current FAA design guidelines were in place. The Runway 27 End RSA is 500 feet wide, thus meeting the cited requirement, but there is only 150 feet of length (compared to 1,000 feet) beyond the runway end before Boston Harbor.

See Attachment A: Chapter 1, Introduction and Project Overview, for more details.

Describe the proposed project and its programmatic and physical elements:

_____

NOTE: The project description should summarize both the project's direct and indirect impacts (including construction period impacts) in terms of their magnitude, geographic extent, duration and frequency, and reversibility, as applicable. It should also discuss the infrastructure requirements of the project and the capacity of the municipal and/or regional infrastructure to sustain these requirements into the future.

The Massachusetts Port Authority (Massport) is proposing to enhance the RSA at the end of Runway 27 at Logan Airport adjacent to Boston Harbor (Project). The proposed improvements are part of a continuing safety program and are required to enhance the RSA, to the extent feasible, to be consistent with the FAA's current airport design standards for RSAs and to enhance rescue access in the event of an airfield emergency. RSAs are safety improvements and do not extend runways or have any effect on normal runway operations, runway capacity, or types of aircraft that can use the runway.

To minimize environmental impacts to Boston Harbor, in 2019, FAA determined that the preferred option for the Runway 27 End RSA is an approximately 650-foot long by 306-foot wide RSA on a pile-supported deck (or pier) with an Engineered Materials Arresting System (EMAS) bed installed on the deck. An EMAS is constructed of collapsible concrete blocks with predictable deceleration forces. When an aircraft rolls into an EMAS bed, the tires of the aircraft collapse the lightweight concrete, and the aircraft is slowed down in a way that minimizes damage to the aircraft. Because of the irregular shoreline at this area, it is expected that the 306-foot-wide deck would extend between 450 to 500 feet over Boston Harbor. This option, which would not lengthen the existing Runway 9-27, will be the basis of the preliminary design and permitting associated with this Project.

Attachment A: Chapter 2, Project Purpose and Need, further describes the proposed safety enhancements, and purpose and need of the Project. Attachment A: Chapter 3, Alternatives Considered, discusses alternatives considered and dismissed from further evaluation. Attachment A: Chapter 4, Environmental Resources, Impacts, and Permits Required, discusses permanent and temporary (construction) impacts, which will be further evaluated in the Draft Environmental Impact Report (DEIR).

Describe the on-site project alternatives (and alternative off-site locations, if applicable), considered by the proponent, including at least one feasible alternative that is allowed under current zoning, and the reasons(s) that they were not selected as the preferred alternative:

NOTE*: The purpose of the alternatives analysis is to consider what effect changing the parameters and/or siting of a project, or components thereof, will have on the environment, keeping in mind that the objective of the MEPA review process is to avoid or minimize damage to the environment to the greatest extent feasible. Examples of alternative projects include alternative site locations, alternative site uses, and alternative site configurations.*

Numerous runway safety alternatives were considered, developed, and reviewed by the FAA. Following the completion of other RSA improvement efforts, the FAA and Massport embarked on a study, the Logan International Airport Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study (the RIM/Runway 9-27 RSA Alternatives Study), to identify alternatives for enhancing Runway 9-27 RSAs, specifically the Runway 27 End closest to Boston Harbor. In the RIM/Runway 9-27 RSA Alternatives Study, Massport and the FAA developed the following six alternatives to bring the Runway 27 End RSA into conformance with FAA design standards:

- **Alternative 1 Declared Distances**
- **Alternative 2 Displaced Threshold Markings**
- **Alternative 3A Full RSA in Boston Harbor - Fill Option**
- **Alternative 3B Full RSA in Boston Harbor - Deck Option**
- **Alternative 4A EMAS on 500-Foot-Wide Deck**
- **Alternative 4B EMAS on 306-Foot-Wide Deck**
- **Alternative 5 No-Build**

Attachment A: Chapter 3, Alternatives Considered, presents the screening of each alternative. Alternative 4B (EMAS on 306-foot-wide deck) was selected as the Preferred Alternative to advance through the MEPA DEIR along with Alternative 5 (No-Build Alternative). The Preferred Alternative was selected because it is consistent with FAA design criteria and the highest level of aircraft safety, while maintaining the airfield utility and efficiency, retaining perimeter road, and adhering to the runway injunction requirements. It would do so with the least amount of impact to environmental resources in Boston Harbor (including avoiding the navigation channel) when compared to other reasonable alternatives that would meet the Project purpose and need.

A preliminary evaluation of alternatives for supporting the deck on which the EMAS would be constructed is included in in Attachment A: Chapter 3, Alternatives Considered, and will be further evaluated in the DEIR and NEPA review documents.

Summarize the mitigation measures proposed to offset the impacts of the preferred alternative:

The ENF narrative in Attachment A provides details on anticipated project-related impacts and proposed mitigation measures. Mitigation measures will be further identified in the DEIR. The DEIR will evaluate structural alternatives for the deck, with a goal of minimizing permanent and temporary construction impacts to the greatest extent feasible.

Impacts to shellfish beds and/or other marine species may result from in-water construction. To the extent any impacts result, potential mitigation measures and areas will be identified in the DEIR, in consultation with the National Oceanic and Atmospheric Administration (NOAA) Fisheries Service, and MA Division of Marine Fisheries. It is anticipated that any permanent impact to shellfish resource areas would be mitigated.

The DEIR will describe proposed mitigation measures to protect water quality during the construction period and, if required, post-construction. Massport anticipates the existing stormwater collection and treatment system at Logan Airport will be adequate to protect water quality in compliance with the Airport's National Pollutant Discharge Elimination System (NPDES) permit.

If the project is proposed to be constructed in phases, please describe each phase:

The Project is expected to be constructed as a single phase over two construction seasons.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN:

Is the project within or adjacent to an Area of Critical Environmental Concern?

☐ Yes (Specify_____)

■ No

if yes, does the ACEC have an approved Resource Management Plan? ___ Yes ___ No;
If yes, describe how the project complies with this plan.

_____

Will there be stormwater runoff or discharge to the designated ACEC? ___ Yes ___ No;
If yes, describe and assess the potential impacts of such stormwater runoff/discharge to the designated ACEC.

_____

RARE SPECIES:
Does the project site include Estimated and/or Priority Habitat of State-Listed Rare Species? (see http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/priority_habitat/priority_habitat_home.htm)

■ Yes (Specify):

The Project is located within Priority Habitat of Rare Species (PH 1322), which is mapped for upland sandpiper (Bartramia longicauda) and Eastern meadowlark (Sturnella magna). Coordination with NHESP has been initiated for work within Priority Habitat.

☐No

HISTORICAL /ARCHAEOLOGICAL RESOURCES:
Does the project site include any structure, site or district listed in the State Register of Historic Place or the inventory of Historic and Archaeological Assets of the Commonwealth?

■ Yes (Specify: **Logan Airport has been inventoried, but has not been evaluated by MHC for eligibility. No individually-listed resources or inventoried resources in the Area boundary are within or in close proximity to the Project area.)** ☐ No

If yes, does the project involve any demolition or destruction of any listed or inventoried historic or archaeological resources? ☐Yes (Specify_____) ■ No

WATER RESOURCES:
Is there an Outstanding Resource Water (ORW) on or within a half-mile radius of the project site?
___Yes **_X_No**;
if yes, identify the ORW and its location. _____

(NOTE: Outstanding Resource Waters include Class A public water supplies, their tributaries, and bordering wetlands; active and inactive reservoirs approved by MassDEP; certain waters within Areas of Critical Environmental Concern, and certified vernal pools. Outstanding resource waters are listed in the Surface Water Quality Standards, 314 CMR 4.00.)

Are there any impaired water bodies on or within a half-mile radius of the project site? ___Yes **X_No**;
if yes, identify the water body and pollutant(s) causing the impairment:_____.

Is the project within a medium or high stress basin, as established by the Massachusetts Water Resources Commission? ___Yes **_X _No**

STORMWATER MANAGEMENT:

Generally describe the project's stormwater impacts and measures that the project will take to comply with the standards found in MassDEP's Stormwater Management Regulations:____

Source control and pollution prevention will be implemented in accordance with the Massachusetts Stormwater Handbook. The proposed RSA enhancements would not increase the pollutant loading to Boston Harbor and would be designed to comply with applicable Stormwater Management Standards. The Airport's NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP). See Section 4.5 of Chapter 4, Environmental Resources, Impacts, and Permits, in Attachment A for more information.

MASSACHUSETTS CONTINGENCY PLAN:
Has the project site been, or is it currently being, regulated under M.G.L.c.21E or the Massachusetts Contingency Plan?
Yes ___ **No _X_** ; if yes, please describe the current status of the site (including Release Tracking Number (RTN), cleanup phase, and Response Action Outcome classification):_____

Is there an Activity and Use Limitation (AUL) on any portion of the project site? Yes ___ **No _X_**;

if yes, describe which portion of the site and how the project will be consistent with the AUL: _____.

Are you aware of any Reportable Conditions at the property that have not yet been assigned an RTN? Yes ___ **No** _**X**_ ; if yes, please describe:_____

SOLID AND HAZARDOUS WASTE:

If the project will generate solid waste during demolition or construction, describe alternatives considered for re-use, recycling, and disposal of, e.g., asphalt, brick, concrete, gypsum, metal, wood:_____

(NOTE: Asphalt pavement, brick, concrete, and metal are banned from disposal at Massachusetts landfills and waste combustion facilities, and wood is banned from disposal at Massachusetts landfills. See 310 CMR 19.017 for the complete list of banned materials.)

Massport will meet or exceed all state recycling guidelines to manage construction debris effectively and sustainably. Where possible, the pavement materials will be recycled and used elsewhere on the Airport. Any contaminated material encountered during construction will be managed in compliance with the Massachusetts Contingency Plan and Massachusetts General Law 21E. During construction, a Soil Management Plan may be required to determine whether any excavated soils generated during construction could be reused on site and/or determine requirements for off-site reuse, recycling, or disposal.

Will your project disturb asbestos containing materials? Yes ___ **No** _**X**_ ;
if yes, please consult state asbestos requirements at http://mass.gov/MassDEP/air/asbhom01.htm

Depending on the depth of excavation and potential to encounter utilities, this will be confirmed as design progresses.

Describe anti-idling and other measures to limit emissions from construction equipment:

To minimize air emissions, Massport requires that all contractors comply with construction guidelines including minimizing idling, retrofitting diesel equipment with a diesel oxidation catalyst and/or particulate filters, and vehicle trip management for construction workers. Massport participates in MassDEP's Clean Construction Equipment Initiative and requires engine retrofits to reduce exposure to diesel exhaust fumes and particulate emissions.

DESIGNATED WILD AND SCENIC RIVER:

Is this project site located wholly or partially within a defined river corridor of a federally designated Wild and Scenic River or a state designated Scenic River? Yes ___ **No** _**X**_ ;
if yes, specify name of river and designation:

If yes, does the project have the potential to impact any of the "outstandingly remarkable" resources of a federally Wild and Scenic River or the stated purpose of a state designated Scenic River?
Yes ___ No ___ ; if yes, specify name of river and designation: _____;
if yes, the project will result in any impacts to any of the designated "outstandingly remarkable" resources of the Wild and Scenic River or the stated purposes of a Scenic River.
Yes ___ No ___ ;
if yes, describe the potential impacts to one or more of the "outstandingly remarkable" resources or stated purposes and mitigation measures proposed.

ATTACHMENTS:

1. List of all attachments to this document.

   Attachment A: ENF Narrative
   Attachment B: ENF Distribution
   Attachment C: Agency Consultation
   Attachment D: FAA RSA Determination Form and RIM Study/Runway 9-27 RSA Alternatives Study
   Attachment E: MEPA Resiliency Documentation
   Attachment F: Eelgrass Survey Report
   Attachment G: ENF Pre-Filing Project Summary
   Attachment H: ENF Public Notice

2. U.S.G.S. map (good quality color copy, 8-½ x 11 inches or larger, at a scale of 1:24,000) indicating the project location and boundaries.

   See Figure 1.

3. Plan, at an appropriate scale, of existing conditions on the project site and its immediate environs, showing all known structures, roadways and parking lots, railroad rights-of-way, wetlands and water bodies, wooded areas, farmland, steep slopes, public open spaces, and major utilities.

   See Figures 2 and 4.

   Environmental Justice populations within a one-mile radius are shown in Figure 5.

4 Plan, at an appropriate scale, depicting environmental constraints on or adjacent to the project site such as Priority and/or Estimated Habitat of state-listed rare species, Areas of Critical Environmental Concern, Chapter 91 jurisdictional areas, Article 97 lands, wetland resource area delineations, water supply protection areas, and historic resources and/or districts.

   See Figures 3 and 4.

5. Plan, at an appropriate scale, of proposed conditions upon completion of project (if construction of the project is proposed to be phased, there should be a site plan showing conditions upon the completion of each phase).

   See Figure 3-6 in Chapter 3, Alternatives Considered, of Attachment A: ENF Narrative.

6. List of all agencies and persons to whom the proponent circulated the ENF, in accordance with 301 CMR 11.16(2).

   See Attachment B: ENF Distribution.

7. List of municipal and federal permits and reviews required by the project, as applicable.

   See Section 4.5 in Chapter 4, Environmental Resources, Impacts, and Permits Required, in Attachment A: ENF Narrative.

LAND SECTION – all proponents must fill out this section

I. Thresholds / Permits

A. Does the project meet or exceed any review thresholds related to **land** (see 301 CMR 11.03(1) ___ Yes _**X**_ **No**; if yes, specify each threshold:

II. Impacts and Permits

A. Describe, in acres, the current and proposed character of the project site, as follows:

	Existing	Change	Total
Footprint of buildings	0	0	0
Internal roadways	0.6	0	0.6
Parking and other paved areas	2.8	3.8	6.6
Other altered areas	4.7	-1.4	3.3
Undeveloped areas	2.4	-2.4	0
Total: Project Site Acreage	10.5	0	10.5

B. Has any part of the project site been in active agricultural use in the last five years? ___ Yes _**X**_ **No**; if yes, how many acres of land in agricultural use (with prime state or locally important agricultural soils) will be converted to nonagricultural use?

C. Is any part of the project site currently or proposed to be in active forestry use? ___ Yes _**X**_ **No**; if yes, please describe current and proposed forestry activities and indicate whether any part of the site is the subject of a forest management plan approved by the Department of Conservation and Recreation:

D. Does any part of the project involve conversion of land held for natural resources purposes in accordance with Article 97 of the Amendments to the Constitution of the Commonwealth to any purpose not in accordance with Article 97? ___ Yes _**X**_ **No**; if yes, describe:

E. Is any part of the project site currently subject to a conservation restriction, preservation restriction, agricultural preservation restriction or watershed preservation restriction? ___ Yes_**X**_ **No**; if yes, does the project involve the release or modification of such restriction? ___ Yes ___ No; if yes, describe:

F. Does the project require approval of a new urban redevelopment project or a fundamental change in an existing urban redevelopment project under M.G.L.c.121A? ___ Yes _**X**_ **No**; if yes, describe:

G. Does the project require approval of a new urban renewal plan or a major modification of an existing urban renewal plan under M.G.L.c.121B? Yes ___ **No** _**X**_; if yes, describe:

III. Consistency

A. Identify the current municipal comprehensive land use plan

Land use in East Boston is governed by East Boston Neighborhood District Zoning Article (Article 53) that was developed out of the East Boston Neighborhood Plan. Regional and local land use plans recognize continual use of Logan Airport for airport purposes. The proposed RSA enhancements are consistent with such use. Massport/Logan Airport is not subject to local zoning but takes the parameters of Article 53 into consideration.

Massport comprehensively evaluates the environmental impacts associated with Logan Airport in the Logan Airport Environmental Status and Planning Reports and

Environmental Data Reports (ESPRs and EDRs). The Logan Airport 2018/2019 EDR (EEA #3247) was filed with the MEPA Office on December 30, 2020, and provides a detailed discussion of 2018 and 2019 conditions at Logan Airport, including flight operations and planning project updates.

The 2017 ESPR was filed on August 7, 2019 and considered Airport activities and cumulative impacts for the next 10 to 15 years. The purpose of the EDR and companion ESPRs is to evaluate the cumulative effects of growth and change at the Airport and to provide a long-term planning and environmental impacts context within which specific assessments can be reviewed. The Project has been discussed in Chapter 3, Airport Planning of the EDRs and ESPRs since 2017. The 2017 ESPR describes the overall planning strategy for Logan Airport and provides a projection of environmental impacts associated with projected growth in passengers, aircraft operations, and ground access activity for the next 10 to 15 years. Impact analyses of ground transportation, noise, air quality, and greenhouse gases were completed that considered the cumulative impact of aircraft operations and passenger activity levels for the next 10 to 15 years. The Runway 27 End RSA Improvements Project is consistent with the analyses of future operational conditions contained in the 2017 ESPR.

B. Describe the project's consistency with that plan with regard to:

1) <u>Economic Development</u>

Approximately 23,000 people are employed at Logan Airport, which includes the approximately 820 Massport staff. Including Airport-related activities, Logan Airport contributes $16.3 billion annually to the local economy. The Massachusetts Department of Transportation (MassDOT) Aeronautics Division's Statewide Airport Economic Impact Study found that in 2019, Logan Airport supported approximately 162,000 jobs. The total economic impact includes on-Airport, visitor-related, construction, and all associated multiplier impacts. The Runway 27 End RSA Improvements Project will improve safety conditions via increasing the margin of safety for Airside Airport operations. This improvement project will ensure that Logan Airport can continue to address and maximize public safety without compromising operations. This plan is consistent with Climate Ready Boston and Massport's Resilient Design Standards and Guidelines to allow Logan Airport to continue to serve as an efficient gateway to the national and international air transport network as flooding, storm, and energy vulnerability concerns become more prevalent.

2) <u>Adequacy of Infrastructure</u>

The Runway 27 End RSA Improvements Project is aligned with overall goals to preserve and improve the current Airport infrastructure in a state of good repair and safe operations. Following FAA requirements for RSAs to accommodate aircraft overruns, undershoots, and veer-offs in emergency situations, Massport is pursuing this opportunity to increase the margin of safety for Runway 27. This includes the approved use of an EMAS for aircraft overrun protection. Building these enhancements will meet FAA safety requirements while minimizing environmental impacts. This plan is consistent with Climate Ready Boston and Massport's Resilient Design Standards and Guidelines to allow Logan Airport to ensure safe Airport operations as flooding, storm, and energy vulnerability concerns become more

prevalent.

3) **Open Space Impacts**

The Runway 27 End RSA Improvements Project will include coverage over a portion of Boston Harbor, most of which is within the restricted Logan Airport security zone. The proposed enhancements are limited to the Runway 27 End area and service areas of Logan Airport. There will be minimal effect on the condition, use, or access to any nearby open space or recreation area due to the extent of the deck.

4) **Compatibility with Adjacent Land Uses**

The Runway 27 End RSA Improvements Project is compatible with adjacent land uses and is located within the Airport campus or bordering Boston Harbor waters. The Project Area includes the existing runway-end, the armored coastal bank and the intertidal and subtidal areas seaward of the existing runway end. The proposed RSA would extend approximately 450 to 500 feet over Boston Harbor. The Runway 27 End RSA will be located within the Boston Zoning Commission's Logan International Airport (LIA) Subdistrict. Although Massport is not subject to local zoning, the Project is consistent with the East Boston Neighborhood District Zoning Article (Article 53) which includes establishment of the LIA Subdistrict. The LIA has a stated purpose "to accommodate those uses necessary to the operation of an international airport while ensuring that land uses and development associated with operations of the airport are confined to the airport boundary and that such uses do not impose adverse impacts on other areas of the East Boston Neighborhood District." The LIA Subdistrict Zoning regulations support the East Boston Master Plan and East Boston Municipal Harbor Plan.

C. Identify the current Regional Policy Plan of the applicable Regional Planning Agency (RPA)

Regional and local land use plans recognize continual use of Logan Airport for airport purposes. The proposed RSA enhancements are consistent with such use. Logan Airport is thus not subject to local zoning but takes the goals and plan parameters of Boston Region Metropolitan Planning Organization's Charting Progress to 2040 into consideration.

D. Describe the project's consistency with that plan with regard to:
   1) economic development _____
   2) adequacy of infrastructure _____
   3) open space impacts _____

See Section B above.

RARE SPECIES SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **rare species or habitat** (see 301 CMR 11.03(2))? ___ Yes _**X**_ **No**; if yes, specify, in quantitative terms:

Coordination with NHESP is ongoing for work within Priority Habitat of Rare Species.

(NOTE: If you are uncertain, it is recommended that you consult with the Natural Heritage and Endangered Species Program (NHESP) prior to submitting the ENF.)

B. Does the project require any state permits related to **rare species or habitat**? _**X**_ **Yes** __ No

C. Does the project site fall within mapped rare species habitat (Priority or Estimated Habitat?) in the current Massachusetts Natural Heritage Atlas (attach relevant page)? _**X**_ **Yes** ___ No.

See Figure 3.

D. If you answered "No" to all questions A, B and C, proceed to the **Wetlands, Waterways, and Tidelands Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Rare Species section below.

II. Impacts and Permits

A. Does the project site fall within Priority or Estimated Habitat in the current Massachusetts Natural Heritage Atlas (attach relevant page)? _**X**__ **Yes** ___ No. If yes,

1. Have you consulted with the Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program (NHESP)? _**X**_ **Yes** ___No; if yes, have you received a determination as to whether the project will result in the "take" of a rare species? ___ Yes _**X**__ **No**; if yes, attach the letter of determination to this submission.

2. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes _**X**_ **No**; if yes, provide a summary of proposed measures to minimize and mitigate rare species impacts

3. Which rare species are known to occur within the Priority or Estimated Habitat?

The Project is located within PH 1322, which is mapped for upland sandpiper (Bartramia longicauda) and eastern meadowlark (Sturnella magna).

4. Has the site been surveyed for rare species in accordance with the Massachusetts Endangered Species Act? _**X**_ **Yes** ___ No

4. If your project is within Estimated Habitat, have you filed a Notice of Intent or received an Order of Conditions for this project? ___ Yes _**X**_ **No**; if yes, did you send a copy of the Notice of Intent to the Natural Heritage and Endangered Species Program, in accordance with the Wetlands Protection Act regulations? ___ Yes ___ No

B. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes _**X**_ **No**; if yes, provide a summary of proposed measures to minimize and mitigate impacts to significant habitat:

Coordination with NHESP will continue as a part of the MEPA review process and through the joint Massachusetts Wetlands Protection Act/Massachusetts Endangered Species Act review progress as the design progresses.

WETLANDS, WATERWAYS, AND TIDELANDS SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **wetlands, waterways, and tidelands** (see 301 CMR 11.03(3))? **_X_ Yes** ___ No; if yes, specify, in quantitative terms:

11.03(3)(b)1.f. alteration of one half or more acres of any other wetlands.

B. Does the project require any state permits (or a local Order of Conditions) related to **wetlands, waterways, or tidelands**? **_X_ Yes** ___ No; if yes, specify which permit:

- **Boston Conservation Commission - Massachusetts Wetlands Protection Act Order of Conditions**
- **MA DEP - Chapter 91 Waterways License for work seaward of mean high water**

C. If you answered "No" to both questions A and B, proceed to the **Water Supply Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wetlands, Waterways, and Tidelands Section below.

II. Wetlands Impacts and Permits

A. Does the project require a new or amended Order of Conditions under the Wetlands Protection Act (M.G.L. c.131A)? **_X_ Yes** ___ No; if yes, has a Notice of Intent been filed? ___ Yes **_X_ No**; if yes, list the date and MassDEP file number: _____; if yes, has a local Order of Conditions been issued? ___ Yes ___ No; Was the Order of Conditions appealed? ___ Yes ___ No. Will the project require a Variance from the Wetlands regulations? ___ Yes **_X_ No**.

B. Describe any proposed permanent or temporary impacts to wetland resource areas located on the project site: Project will require installation of pilings/caissons to support new Runway Safety Area deck. Alteration of the armored bulkhead and the existing gravel covered Inclined Safety Area will also be required.

Construction will involve temporary impacts to the water column and harbor bottom.

C. Estimate the extent and type of impact that the project will have on wetland resources, and indicate whether the impacts are temporary or permanent:

Coastal Wetlands	Area (square feet) or Length (linear feet)	Temporary or Permanent Impact?
Land Under the Ocean	107,200 sf	Permanent
Designated Port Areas		
Coastal Beaches	10,100 sf	Permanent
Coastal Dunes		
Barrier Beaches		
Coastal Banks		
Rocky Intertidal Shores		
Salt Marshes		
Land Under Salt Ponds		
Land Containing Shellfish	117,300 sf	Permanent
Fish Runs		
Land Subject to Coastal Storm Flowage	64,800 sf	Permanent
Inland Wetlands		
Bank (lf)		
Bordering Vegetated Wetlands		

Isolated Vegetated Wetlands	_____	_____
Land under Water	_____	_____
Isolated Land Subject to Flooding	_____	_____
Bordering Land Subject to Flooding	_____	_____
Riverfront Area	_____	_____

D. Is any part of the project:

1. proposed as a **limited project**? ___ Yes _**X** _ **No**; if yes, what is the area (in sf)?____
2. the construction or alteration of a **dam**? ___ Yes _**X** _ **No**; if yes, describe:
3. fill or structure in a **velocity zone** or **regulatory floodway**? _**X** _ **Yes** ___ No
4. dredging or disposal of dredged material? ___ Yes _**X** _ **No**; if yes, describe the volume of dredged material and the proposed disposal site:
5. a discharge to an **Outstanding Resource Water (ORW) or** an **Area of Critical Environmental Concern (ACEC)**? ___ Yes _**X** _ **No**
6. subject to a wetlands restriction order? ___ Yes _**X** _ **No**; if yes, identify the area (in sf):
7. located in buffer zones? _**X** _**Yes** ___No; if yes, how much (in sf) _**40,500 sf**_

E. Will the project:

1. be subject to a local wetlands ordinance or bylaw? ___ Yes _**X** _ **No**
2. alter any federally-protected wetlands not regulated under state law? ___ Yes _**X** _ **No**; if yes, what is the area (sf)?

III. Waterways and Tidelands Impacts and Permits

A. Does the project site contain waterways or tidelands (including filled former tidelands) that are subject to the Waterways Act, M.G.L.c.91? _**X**_ **Yes** __ No; if yes, is there a current Chapter 91 License or Permit affecting the project site? _**X** _ **Yes** ___ No; if yes, list the date and license or permit number and provide a copy of the historic map used to determine extent of filled tidelands:

- **Logan Airport RSA, 2012- MassDEP License No. 13263**
- **Logan Airport ISA, 1993- MassDEP License No. 3467**

Details on the extent of filled tidelands will be provided in the DEIR.

B. Does the project require a new or modified license or permit under M.G.L.c.91? _**X** _ **Yes** _ No; if yes, how many acres of the project site subject to M.G.L.c.91 will be for non-water-dependent use? Current **2.46 ac.** Change **0** Total **2.46 ac.**
If yes, how many square feet of solid fill or pile-supported structures (in sf)?

C. For non-water-dependent use projects, indicate the following:
Area of filled tidelands on the site **574,500 sf**
Area of filled tidelands covered by buildings: **N/A**
For portions of site on filled tidelands, list ground floor uses and area of each use:
_____
Does the project include new non-water-dependent uses located over flowed tidelands?
Yes X No ___
Height of building on filled tidelands: **The top of the proposed deck is located at elevation 15.7 feet and stands approximately 10 feet above Mean High Water.**

Also show the following on a site plan: Mean High Water, Mean Low Water, Water-dependent Use Zone, location of uses within buildings on tidelands, and interior and exterior areas and facilities dedicated for public use, and historic high and historic low

water marks.

D. Is the project located on landlocked tidelands? ___ Yes __**X**_ **No**; if yes, describe the project's impact on the public's right to access, use and enjoy jurisdictional tidelands and describe measures the project will implement to avoid, minimize, or mitigate any adverse impact:

E. Is the project located in an area where low groundwater levels have been identified by a municipality or by a state or federal agency as a threat to building foundations? ___Yes __**X** **No**; if yes, describe the project's impact on groundwater levels and describe measures the project will implement to avoid, minimize, or mitigate any adverse impact:

F. Is the project non-water-dependent **and** located on landlocked tidelands **or** waterways or tidelands subject to the Waterways Act **and** subject to a mandatory EIR? _**X**_ **Yes** ___ No;
(NOTE: If yes, then the project will be subject to Public Benefit Review and Determination.)

G. Does the project include dredging? __ Yes _**X**__ **No**; if yes, answer the following questions:
What type of dredging? Improvement ___ Maintenance ___ Both ____
What is the proposed dredge volume, in cubic yards (cys) _____
What is the proposed dredge footprint ____length (ft) ___width (ft)____depth (ft);
Will dredging impact the following resource areas?
Intertidal Yes__ No__; if yes, ___ sq ft
Outstanding Resource Waters Yes__ No__; if yes, ___ sq ft
Other resource area (i.e. shellfish beds, eel grass beds) Yes__ No__; if yes __ sq ft
If yes to any of the above, have you evaluated appropriate and practicable steps to: 1) avoidance; 2) if avoidance is not possible, minimization; 3) if either avoidance or minimize is not possible, mitigation?
If no to any of the above, what information or documentation was used to support this determination?
Provide a comprehensive analysis of practicable alternatives for improvement dredging in accordance with 314 CMR 9.07(1)(b). Physical and chemical data of the sediment shall be included in the comprehensive analysis.
Sediment Characterization
Existing gradation analysis results? __Yes ___No: if yes, provide results.
Existing chemical results for parameters listed in 314 CMR 9.07(2)(b)6? ___Yes ____No; if yes, provide results.
Do you have sufficient information to evaluate feasibility of the following management options for dredged sediment? If yes, check the appropriate option.

Beach Nourishment ___
Unconfined Ocean Disposal ___
Confined Disposal:
Confined Aquatic Disposal (CAD) ___
Confined Disposal Facility (CDF) ___
Landfill Reuse in accordance with COMM-97-001 ___
Shoreline Placement ___
Upland Material Reuse____
In-State landfill disposal____
Out-of-state landfill disposal ____
(NOTE: This information is required for a 401 Water Quality Certification.)

IV. Consistency:
A. Does the project have effects on the coastal resources or uses, and/or is the project located within the Coastal Zone? _**X**__ **Yes** ___ No; if yes, describe these effects and the projects consistency with the policies of the Office of Coastal Zone Management:

The DEIR will address how the Project is consistent with the policies of the Massachusetts Coastal Zone Management Plan.

B. Is the project located within an area subject to a Municipal Harbor Plan? ___ Yes _**X**_ **No**; if yes, identify the Municipal Harbor Plan and describe the project's consistency with that plan:

WATER SUPPLY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **water supply** (see 301 CMR 11.03(4))? ___ Yes _**X**_ **No**; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **water supply**? ___ Yes _**X**_ **No**; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Wastewater Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Water Supply Section below.

II. Impacts and Permits

A. Describe, in gallons per day (gpd), the volume and source of water use for existing and proposed activities at the project site:

	Existing	Change	Total
Municipal or regional water supply	_____	_____	_____
Withdrawal from groundwater	_____	_____	_____
Withdrawal from surface water	_____	_____	_____
Interbasin transfer	_____	_____	_____

(NOTE: Interbasin Transfer approval will be required if the basin and community where the proposed water supply source is located is different from the basin and community where the wastewater from the source will be discharged.)

B. If the source is a municipal or regional supply, has the municipality or region indicated that there is adequate capacity in the system to accommodate the project? ___ Yes ___ No

C. If the project involves a new or expanded withdrawal from a groundwater or surface water source, has a pumping test been conducted? ___ Yes ___ No; if yes, attach a map of the drilling sites and a summary of the alternatives considered and the results. _____

D. What is the currently permitted withdrawal at the proposed water supply source (in gallons per day)? _____Will the project require an increase in that withdrawal? ___Yes ___No; if yes, then how much of an increase (gpd)? _____

E. Does the project site currently contain a water supply well, a drinking water treatment facility, water main, or other water supply facility, or will the project involve construction of a new facility? ___ Yes ___No. If yes, describe existing and proposed water supply facilities at the project site:

	Permitted Flow	Existing Avg Daily Flow	Project Flow	Total
Capacity of water supply well(s) (gpd)	_____	_____	_____	_____
Capacity of water treatment plant (gpd)	_____	_____	_____	_____

F. If the project involves a new interbasin transfer of water, which basins are involved, what is the

direction of the transfer, and is the interbasin transfer existing or proposed?

G. Does the project involve:

1. new water service by the Massachusetts Water Resources Authority or other agency of the Commonwealth to a municipality or water district? ___ Yes ___ No
2. a Watershed Protection Act variance? ___ Yes ___ No; if yes, how many acres of alteration?
3. a non-bridged stream crossing 1,000 or less feet upstream of a public surface drinking water supply for purpose of forest harvesting activities? ___ Yes ___ No

III. Consistency

Describe the project's consistency with water conservation plans or other plans to enhance water resources, quality, facilities, and services:

WASTEWATER SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **wastewater** (see 301 CMR 11.03(5))? ___ Yes **_X_ No**; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **wastewater**? ___ Yes **_X_ No**; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Transportation -- Traffic Generation Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wastewater Section below.

II. Impacts and Permits

A. Describe the volume (in gallons per day) and type of disposal of wastewater generation for existing and proposed activities at the project site (calculate according to 310 CMR 15.00 for septic systems or 314 CMR 7.00 for sewer systems):

	Existing	Change	Total
Discharge of sanitary wastewater	_____	_____	_____
Discharge of industrial wastewater	_____	_____	_____
TOTAL	_____	_____	_____

	Existing	Change	Total
Discharge to groundwater	_____	_____	_____
Discharge to outstanding resource water	_____	_____	_____
Discharge to surface water	_____	_____	_____
Discharge to municipal or regional wastewater facility	_____	_____	_____
TOTAL	_____	_____	_____

B. Is the existing collection system at or near its capacity? ___ Yes ___ No; if yes, then describe the measures to be undertaken to accommodate the project's wastewater flows:

C. Is the existing wastewater disposal facility at or near its permitted capacity? ___ Yes___ No; if yes, then describe the measures to be undertaken to accommodate the project's wastewater flows:

D. Does the project site currently contain a wastewater treatment facility, sewer main, or other wastewater disposal facility, or will the project involve construction of a new facility? ___ Yes ___ No; if yes, describe as follows:

	Permitted	Existing Avg Daily Flow	Project Flow	Total
Wastewater treatment plant capacity (in gallons per day)	_____	_____	_____	_____

E. If the project requires an interbasin transfer of wastewater, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or new?

(NOTE: Interbasin Transfer approval may be needed if the basin and community where wastewater will be discharged is different from the basin and community where the source of water supply is

located.)

F. Does the project involve new sewer service by the Massachusetts Water Resources Authority (MWRA) or other Agency of the Commonwealth to a municipality or sewer district? ___ Yes ___ No

G. Is there an existing facility, or is a new facility proposed at the project site for the storage, treatment, processing, combustion or disposal of sewage sludge, sludge ash, grit, screenings, wastewater reuse (gray water) or other sewage residual materials? ___ Yes ___ No; if yes, what is the capacity (tons per day):

	Existing	Change	Total
Storage	_____	_____	_____
Treatment	_____	_____	_____
Processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

H. Describe the water conservation measures to be undertaken by the project, and other wastewater mitigation, such as infiltration and inflow removal.

III. Consistency

A. Describe measures that the proponent will take to comply with applicable state, regional, and local plans and policies related to wastewater management:

B. If the project requires a sewer extension permit, is that extension included in a comprehensive wastewater management plan? ___ Yes ___ No; if yes, indicate the EEA number for the plan and whether the project site is within a sewer service area recommended or approved in that plan:

TRANSPORTATION SECTION (TRAFFIC GENERATION)

I. Thresholds / Permit

A. Will the project meet or exceed any review thresholds related to **traffic generation** (see 301 CMR 11.03(6))? ___ Yes _**X**_ **No**; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **state-controlled roadways**? ___ Yes _**X**_ **No**; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Roadways and Other Transportation Facilities Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Traffic Generation Section below.

II. Traffic Impacts and Permits

A. Describe existing and proposed vehicular traffic generated by activities at the project site:

	Existing	Change	Total
Number of parking spaces	_____	_____	_____
Number of vehicle trips per day	_____	_____	_____
ITE Land Use Code(s):	_____	_____	_____

B. What is the estimated average daily traffic on roadways serving the site?

Roadway	Existing	Change	Total
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____

C. If applicable, describe proposed mitigation measures on state-controlled roadways that the project proponent will implement:

D. How will the project implement and/or promote the use of transit, pedestrian and bicycle facilities and services to provide access to and from the project site?

C. Is there a Transportation Management Association (TMA) that provides transportation demand management (TDM) services in the area of the project site? ____ Yes ____ No; if yes, describe if and how will the project will participate in the TMA:

D. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation facilities? ____ Yes ____ No; if yes, generally describe:

E. If the project will penetrate approach airspace of a nearby airport, has the proponent filed a Massachusetts Aeronautics Commission Airspace Review Form (780 CMR 111.7) and a Notice of Proposed Construction or Alteration with the Federal Aviation Administration (FAA) (CFR Title 14 Part 77.13, forms 7460-1 and 7460-2)?

III. Consistency

Describe measures that the proponent will take to comply with municipal, regional, state, and federal plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services:

TRANSPORTATION SECTION (ROADWAYS AND OTHER TRANSPORTATION FACILITIES)

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **roadways or other transportation facilities** (see 301 CMR 11.03(6))? ___ Yes _**X**_ **No**; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **roadways or other transportation facilities**? ___ Yes _**X**_ **No**; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Energy Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Roadways Section below.

II. Transportation Facility Impacts

A. Describe existing and proposed transportation facilities in the immediate vicinity of the project site:

B. Will the project involve any

1. Alteration of bank or terrain (in linear feet)? _____
2. Cutting of living public shade trees (number)? _____
3. Elimination of stone wall (in linear feet)? _____

III. Consistency -- Describe the project's consistency with other federal, state, regional, and local plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services, including consistency with the applicable regional transportation plan and the Transportation Improvements Plan (TIP), the State Bicycle Plan, and the State Pedestrian Plan:

ENERGY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **energy** (see 301 CMR 11.03(7))? ___ Yes _**X**_ **No**; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **energy**? ___ Yes _**X**_ **No**; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Air Quality Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Energy Section below.

II. Impacts and Permits

A. Describe existing and proposed energy generation and transmission facilities at the project site:

	Existing	Change	Total
Capacity of electric generating facility (megawatts)	_____	_____	_____
Length of fuel line (in miles)	_____	_____	_____
Length of transmission lines (in miles)	_____	_____	_____
Capacity of transmission lines (in kilovolts)	_____	_____	_____

B. If the project involves construction or expansion of an electric generating facility, what are:

1. the facility's current and proposed fuel source(s)?
2. the facility's current and proposed cooling source(s)?

C. If the project involves construction of an electrical transmission line, will it be located on a new, unused, or abandoned right of way? ___Yes ___No; if yes, please describe:

D. Describe the project's other impacts on energy facilities and services:

III. Consistency

Describe the project's consistency with state, municipal, regional, and federal plans and policies for enhancing energy facilities and services:

AIR QUALITY SECTION

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **air quality** (see 301 CMR 11.03(8))? ___ Yes __**X**_ **No**; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **air quality**? ___ Yes __**X**_ **No**; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Solid and Hazardous Waste Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Air Quality Section below.

II. Impacts and Permits

A. Does the project involve construction or modification of a major stationary source (see 310 CMR 7.00, Appendix A)? ___ Yes ___ No; if yes, describe existing and proposed emissions (in tons per day) of:

	Existing	Change	Total
Particulate matter	_____	_____	_____
Carbon monoxide	_____	_____	_____
Sulfur dioxide	_____	_____	_____
Volatile organic compounds	_____	_____	_____
Oxides of nitrogen	_____	_____	_____
Lead	_____	_____	_____
Any hazardous air pollutant	_____	_____	_____
Carbon dioxide	_____	_____	_____

B. Describe the project's other impacts on air resources and air quality, including noise impacts:

III. Consistency

A. Describe the project's consistency with the State Implementation Plan:

B. Describe measures that the proponent will take to comply with other federal, state, regional, and local plans and policies related to air resources and air quality:

SOLID AND HAZARDOUS WASTE SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **solid or hazardous waste** (see 301 CMR 11.03(9))? ___ Yes _**X**_ **No**; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **solid and hazardous waste**? ___ Yes _**X**_ **No**; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Historical and Archaeological Resources Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Solid and Hazardous Waste Section below.

II. Impacts and Permits

A. Is there any current or proposed facility at the project site for the storage, treatment, processing, combustion, or disposal of solid waste? ___ Yes ___ No; if yes, what is the volume (in tons per day) of the capacity:

	Existing	Change	Total
Storage	_____	_____	_____
Treatment, processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

B. Is there any current or proposed facility at the project site for the storage, recycling, treatment or disposal of hazardous waste? ___ Yes ___ No; if yes, what is the volume (in tons or gallons per day) of the capacity:

	Existing	Change	Total
Storage	_____	_____	_____
Recycling	_____	_____	_____
Treatment	_____	_____	_____
Disposal	_____	_____	_____

C. If the project will generate solid waste (for example, during demolition or construction), describe alternatives considered for re-use, recycling, and disposal:

D. If the project involves demolition, do any buildings to be demolished contain asbestos? ___ Yes ___ No

E. Describe the project's other solid and hazardous waste impacts (including indirect impacts):

III. Consistency

Describe measures that the proponent will take to comply with the State Solid Waste Master Plan:

HISTORICAL AND ARCHAEOLOGICAL RESOURCES SECTION

I. Thresholds / Impacts

A. Have you consulted with the Massachusetts Historical Commission? __ Yes **_X_ No**; if yes, attach correspondence. For project sites involving lands under water, have you consulted with the Massachusetts Board of Underwater Archaeological Resources? **_X_ Yes** __ No; if yes, attach correspondence

Attachment C provides the March 29, 2021 letter submitted by Massport to the Massachusetts Board of Underwater Archaeological Resources requesting existing information for the Project.

B. Is any part of the project site a historic structure, or a structure within a historic district, in either case listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? **_X__ Yes** __ No; if yes, does the project involve the demolition of all or any exterior part of such historic structure? ___ Yes **_X_ No**; if yes, please describe:

C. Is any part of the project site an archaeological site listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? ___ Yes **_X_ No**; if yes, does the project involve the destruction of all or any part of such archaeological site? ___ Yes _ No; if yes, please describe:

D. If you answered "No" to all parts of both questions A, B and C, proceed to the **Attachments and Certifications** Sections. If you answered "Yes" to any part of either question A or question B, fill out the remainder of the Historical and Archaeological Resources Section below.

II. Impacts

Describe and assess the project's impacts, direct and indirect, on listed or inventoried historical and archaeological resources:

No demolition of listed or inventoried historical and archaeological resources is anticipated for this Project.

III. Consistency

Describe measures that the proponent will take to comply with federal, state, regional, and local plans and policies related to preserving historical and archaeological resources:

While there are no known historical or archaeological assets in the project area, The Massachusetts Historical Commission (MHC) will receive a copy of this ENF, which will also initiate review of the Project under State Register Review (M.G. L. Chapter 9, Sections 27-27c, as amended by Chapter 254 of the Acts of 1988). If it is determined the Project will result in an adverse effect to historic properties, consultation with the MHC will continue to identify ways to avoid, minimize, or mitigate these adverse effects.

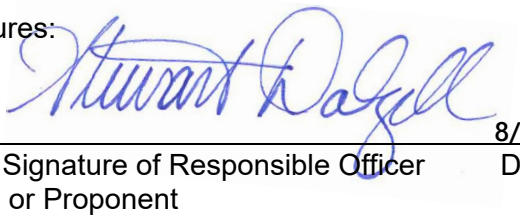
CERTIFICATIONS:

1. The Public Notice of Environmental Review has been/will be published in the following newspapers in accordance with 301 CMR 11.15(1):

   (Name) Boston Herald (Date) September 2, 2021

2. This form has been circulated to Agencies and Persons in accordance with 301 CMR 11.16(2).

Signatures:

8/27/21		8/31/21	
Date	Signature of Responsible Officer or Proponent	Date	Signature of person preparing ENF (if different from above)

Stewart Dalzell	Kristen Bergassi
Name (print or type)	Name (print or type)
Massport	VHB
Firm/Agency	Firm/Agency
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East Boston, MA 02128	Watertown, MA 02472-4026
Municipality/State/Zip	Municipality/State/Zip
617-568-3524	617-607-2989
Phone	Phone

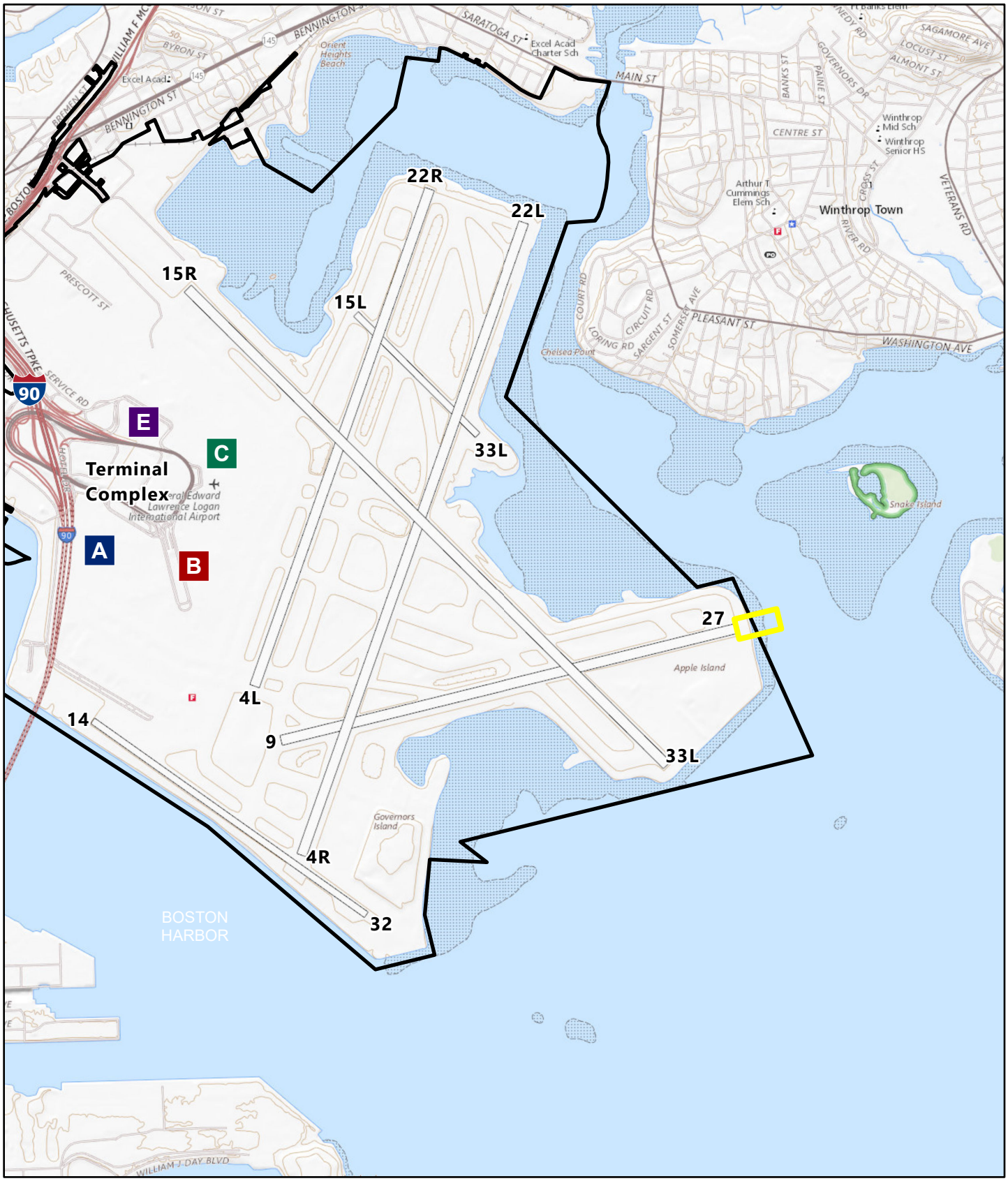

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FIGURE 1: Project Location

Runway 27 End RSA Improvements Project

Site Boundary

Airport Boundary

0 1000 2000 4000 Feet

Sources: VHB (2021), Massport (2021), USGS ESRI National Map (2021)

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FIGURE 2: Logan Airport Aerial

Runway 27 End RSA Improvements Project

Project Area

Airport Boundary

0 1250 2500 5000 Feet

Sources: VHB 2021, ESRI, Nearmap Imagery March 2021

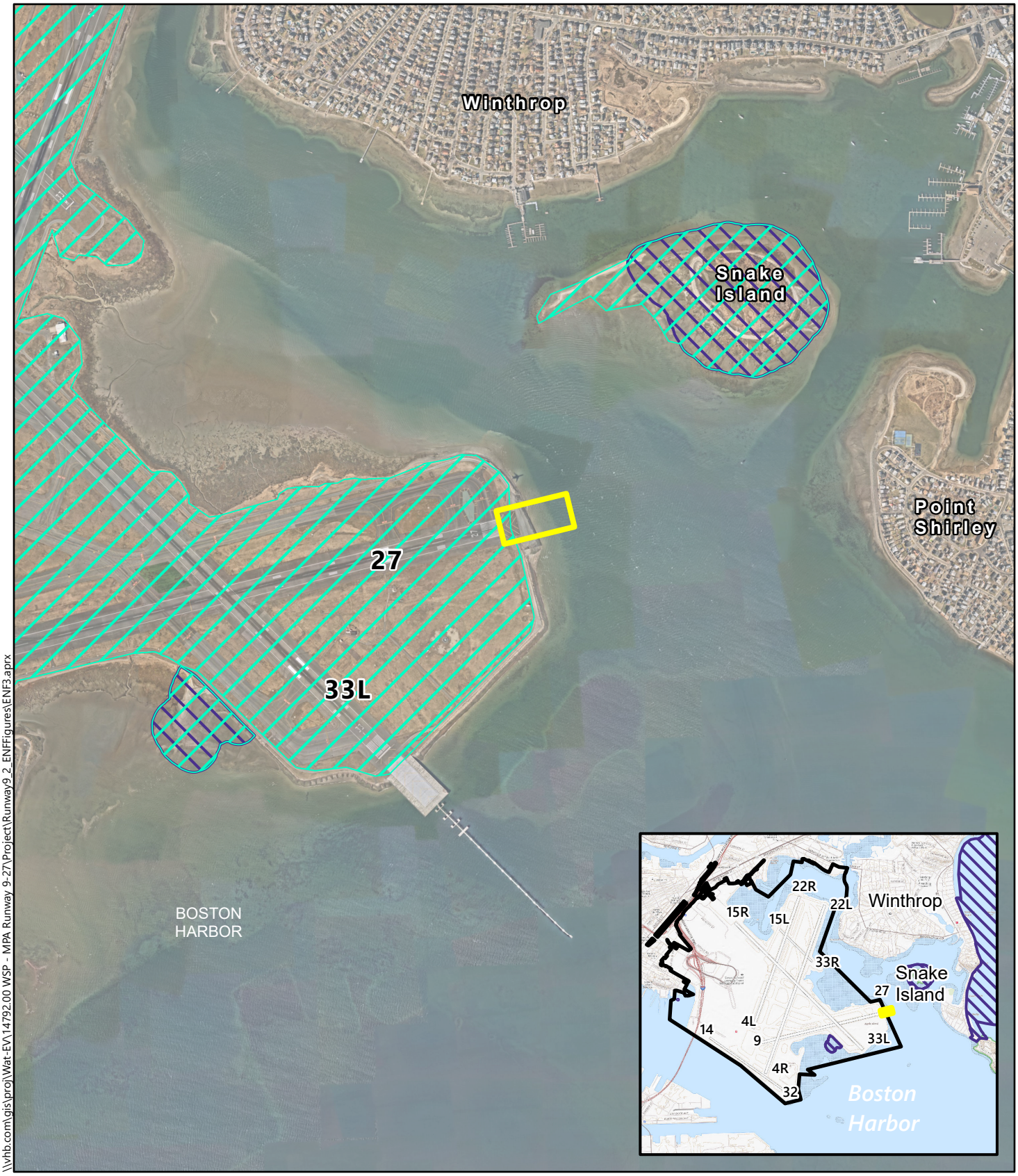

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FIGURE 3: NHESP Resource Areas

Runway 27 End RSA Improvements Project

Project Area

Natural Heritage & Endangered Species Program Priority Habitat

Natural Heritage & Endangered Species Program Estimated Habitat

0 600 1200 2400 Feet

Sources: VHB 2021, ESRI, Nearmap Imagery March 2021, MassGIS: NHESP 2021

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FIGURE 4: Preliminary Resource Areas **Runway 27 End RSA Improvements Project**

- Project Area
- FEMA 100-Year Flood Zone
- Land Under Ocean
- Coastal Beach
- Land Subject to Tidal Action
- Salt Marsh
- Designated Shellfish Growing Area Conditionally Restricted

0 125 250 500 Feet

Sources: VHB 2021, ESRI, Nearmap Imagery March 2021, MassGIS: FEMA 100-Year Flood Zone 2017, Salt Marsh 2019, Designated Shellfish Growing Area 2000

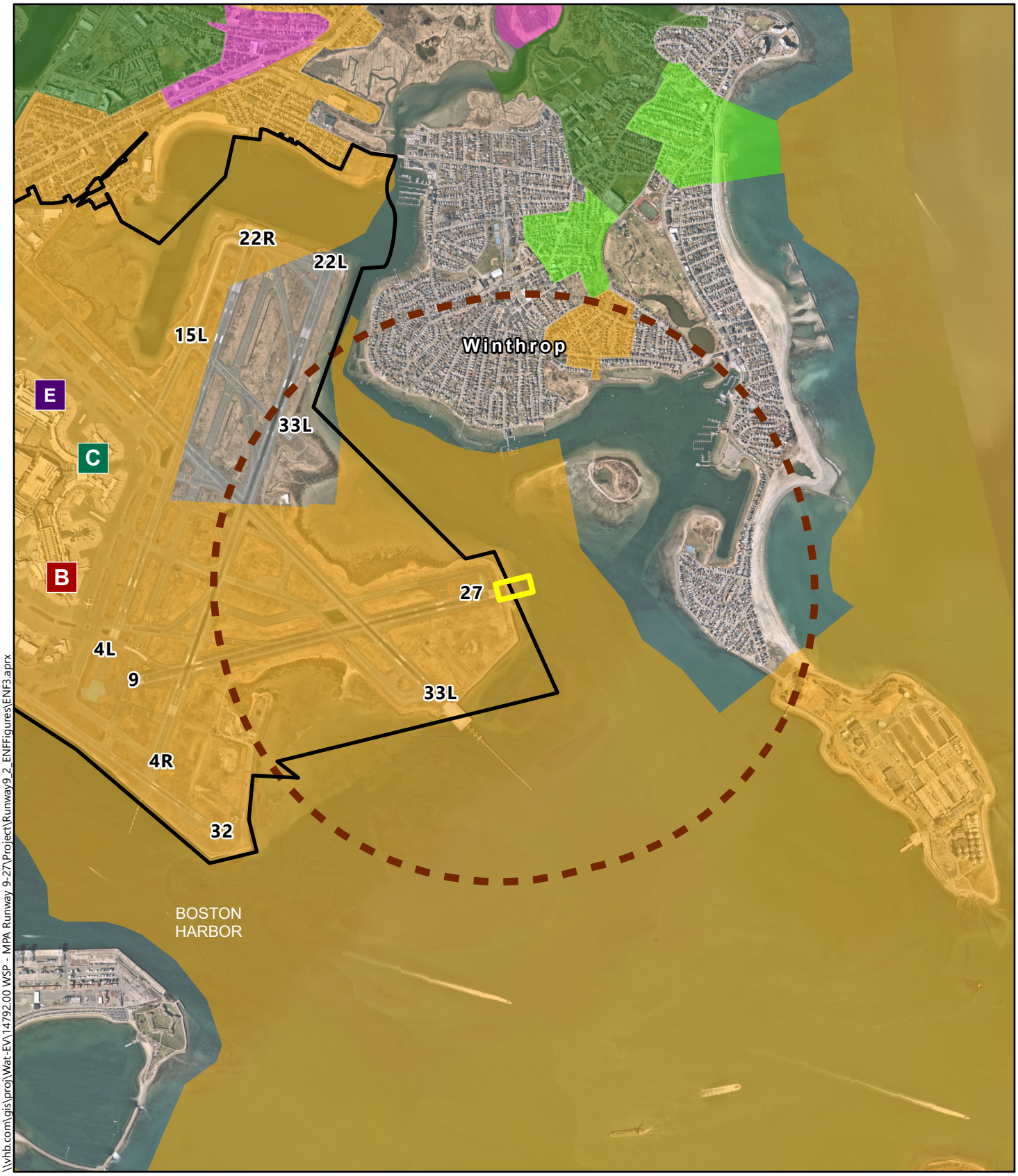

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Figure 5: Environmental Justice Populations **Runway 27 End RSA Improvements Project**

- Project Area
- 1 Mile Site Radius
- Airport Boundary
- Minority
- Income
- English Isolation
- Minority and Income
- Minority and English Isolation
- Income and English Isolation
- Minority, Income and English Isolation

0 1250 2500 5000 Feet

Sources: Nearmap Imagery March 2021,
MassGIS: Environmental Justice Population in 2020; EEAGIS

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Attachment A- ENF Narrative

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1 Introduction and Project Overview

The Massachusetts Port Authority (Massport) is proposing to improve the runway safety area (RSA) at the end of Runway 27 at Boston Logan International Airport (Logan Airport or the Airport), adjacent to Boston Harbor, as shown in **Figure 1-1**.

The Runway 27 End RSA Improvements Project (the Project) includes improvements that are part of a continuing safety program and are required to enhance the RSA, to the extent feasible, to be consistent with the Federal Aviation Administration's (FAA) current airport design standards[1] for RSAs, and to enhance rescue access in the event of an emergency. **This Project will enhance safety, but will not extend runways nor have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway**.

In accordance with the Massachusetts Environmental Policy Act (MEPA) Regulations, 301 Code of Massachusetts Regulations (CMR) 11.00, Massport has prepared this Environmental Notification Form (ENF), which describes the proposed enhancements to the RSA at the end of Runway 27, alternatives considered, potential environmental impacts, and preliminary mitigation strategies. The Project will be further assessed in a forthcoming Draft Environmental Impact Report (DEIR) which is required due to the need for a Chapter 91 license modification. The Project will also be subject to review by the FAA under the National Environmental Policy Act (NEPA).

1.1 Project Overview

Runway 9-27 is 7,001 feet long, 150 feet wide, and is constructed of asphalt pavement. The runway has 75-foot-wide paved shoulders on either side. The adjoining taxiways are predominantly 100-feet wide with 35-foot-wide paved shoulders.

The FAA's standards for a full dimension RSA are as follows:

- RSA Length Beyond Departure End: 1,000 feet
- RSA Length Prior to Threshold: 600 feet
- RSA Width: 500 feet

1 United States Department of Transportation, Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13A*, *Airport Design*, Change 1, February 26, 2014.

FAA directed Massport to conduct a Runway Safety Area Alternatives Study as part of the *Boston Logan Airport Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study (*the RIM/Runway 9-27 RSA Alternatives Study*)* (see Attachment D), since the current FAA design standards were not fully met for Runway 9-27 in its current condition.[2] At the approach end of Runway 9 (western end of the runway), the existing RSA meets the full dimensions set forth in the FAA design standards. However, the approach end of Runway 27 (eastern end of the runway) has an inclined safety area (ISA) in place that meets the RSA required dimensions for width (500 feet), but does not meet the RSA length requirements of 1,000-foot overrun or 600-foot undershoot protection required by the FAA current design standards. The Runway 27 end is 500 feet wide, thus meeting the cited requirement, but there is only 150 feet of length beyond the runway end. The RIM/Runway 9-27 RSA Alternatives Study, which was conducted for the FAA, evaluated six potential options to enhance the Runway 27 RSA. The methodology and findings of this study are summarized in Chapter 3, *Alternatives Considered*. While full dimension RSAs at the end of a runway are typically level areas measuring 1,000 feet long by 500 feet wide, they may be shorter in length if an Engineered Materials Arresting System (EMAS)[3] is installed at the runway end to provide an equivalent level of safety.

Based on study findings, FAA determined the preferred RSA improvements for this Project includes a 600 to 650-foot-long RSA, with EMAS and pile-supported deck.[4] The RSA would be constructed on 150 feet of land at the end of the runway, and the remaining 450 to 500 feet would extend onto a new deck over Boston Harbor. The portion of the RSA on land would be a standard 500 feet wide and the FAA has determined that to minimize environmental impacts, the portion of the RSA on the deck over Boston Harbor can be narrowed to 300 feet wide (306 feet wide to accommodate safety rails).

The EMAS (dimensions to be determined by the manufacturer) will be placed within the footprint of the RSA. The EMAS dimensions will determine the final length of the deck (total length between 450-500 feet).

This RSA improvement and deck with EMAS will be the subject of detailed environmental review in the DEIR[5] which will further examine alternative foundation options for the deck. The deck will have a 75-year design life, and will incorporate climate change considerations.

1.2 Contents of this ENF

This narrative describes the purpose of, and need for, the proposed RSA enhancements, the alternatives considered, and the potential environmental impacts. The narrative includes the following chapters:

- **Chapter 1, *Introduction and Project Overview*** – This chapter describes Logan Airport, provides an introduction and overview of airport safety, provides a history of efforts leading up to this phase of proposed RSA enhancements, and describes the MEPA and NEPA review processes. An overview of public outreach, including environmental justice (EJ) communities is also presented.

2 Massport, Boston Logan Airport, *Runway Incursion Mitigation Study, Runway 9-27 Runway Safety Area (RSA) Alternatives Study*, January 8, 2019.
3 An EMAS bed is constructed of collapsible concrete blocks with predictable deceleration forces. When an aircraft rolls into an EMAS bed, the tires of the aircraft collapse the lightweight concrete, and the aircraft is slowed down to a safe stop in a way that minimizes damage to the aircraft.
4 Massport, Boston Logan Airport, *Runway Incursion Mitigation Study*, *Runway 9-27 Runway Safety Area (RSA) Alternatives Study*, January 8, 2019.
5 This Project is also subject to review under the National Environmental Policy Act (NEPA), as further described in Section 1.6.

- **Chapter 2, *Purpose and Need* –** This chapter describes the purpose of, and need for, the proposed enhancements to the RSA at the end of Runway 27, and describes the FAA's current airport design criteria for RSAs.
- **Chapter 3, *Alternatives Considered*** – This chapter describes the existing Runway 27 and its associated RSA, alternatives considered to identify reasonable alternatives for the proposed safety enhancements (deck with EMAS), and describes additional alternatives (foundation/pile alternatives) that would be evaluated in the DEIR and the future NEPA review document.
- **Chapter 4, *Description of Environmental Resources, Impacts, and Permits Required*** – This chapter describes existing environmental conditions at the Runway 27 end, addresses environmental resources potentially impacted or not impacted by the proposed RSA enhancements, and identifies regulatory permits required for the Project.

1.3 Boston Logan International Airport

Logan International Airport, owned and operated by Massport, is New England's primary international and domestic airport. According to the FAA, it was the 16th busiest commercial aviation facility in the United States based on air passengers in 2019. Logan Airport had 427,176 aircraft operations and served a total of 42.5 million passengers in 2019. In 2019, 48 airlines provided scheduled or charter passenger service from Logan Airport to more than 141 international and domestic destinations. It serves as the long-haul international gateway for the New England Region and had non-stop service to 59 international destinations in 2019, including points in Europe, the Middle East, North Africa, Canada, Central and South America, Bermuda, the Caribbean, and Asia. Logan Airport has a diverse aircraft fleet mix, accommodating heavy, light, and regional jets, and turboprops. While Airport activity has been reduced during 2020 and 2021 due to the COVID-19 pandemic, the proposed safety improvements are required based on current FAA runway design and safety requirements.

Logan Airport includes approximately 2,400 acres in East Boston and Winthrop, including 700 acres in Boston Harbor. Logan Airport, shown in **Figure 1-1**, is one of the most land-constrained hub airports[6] in the nation and is surrounded on three sides by Boston Harbor. The airfield has six runways (which vary in length from 2,557 feet to 10,081 feet), 15 miles of taxiways, and approximately 240 acres of concrete and asphalt apron. Logan Airport has four passenger terminals (Terminal A, B, C, and E), each with its own ticketing, baggage claim, and ground transportation facilities.[7]

6 The FAA designates Logan Airport as a large hub airport based on percentage of U.S. enplanements.
7 Boston Logan International Airport, *2018/2019 Environmental Data Report*, December 2020.

FIGURE 1-1: Logan Airport Aerial **Runway 27 End RSA Improvements Project**

Project Area
Airport Boundary

0 1250 2500 5000 Feet

Sources: VHB 2021, ESRI, Nearmap Imagery March 2021

1.4 Airport Safety

Airport safety and security are the highest priorities for the FAA and Massport. A critical, national initiative by the FAA is to enhance RSAs when and where practicable. RSA improvement projects are among the most critical safety features on an airfield.[8] As described by the FAA, a RSA is a flat surface surrounding the runway that is clear of obstructions (such as trees, terrain, or other objects), and is designed to reduce the risk of damage to aircraft in the event of an unintentional "excursion" from the runway during landing or takeoff.

As the owner and operator of Logan Airport, Massport's primary focus is also safety and security. Safety is integrated into all aspects of planning, development, construction, and operation of Logan Airport. Aviation safety requirements are constantly evolving and are subject to ongoing re-evaluation and enhancement. Like many established airports, Logan Airport was built over many years and today is subject to different design and safety standards than were in effect when airport facilities were constructed. In particular, the current design criteria, contained in the FAA's *Airport Design Advisory Circular* for RSAs (see Section 2.3 of Chapter 2, *Project Purpose and Need*) represent a significant upgrade over earlier standards.[9] As the FAA's design criteria have evolved, Massport has continued to enhance its RSAs as part of an ongoing program of airfield safety improvements at Logan Airport. Section 1.5 of this chapter describes the efforts that Massport has taken to date to enhance the RSAs at the ends of its runways.

1.5 Background

This section provides details of RSA requirements implemented by the FAA, EMAS, and previous runway safety enhancements completed at Logan Airport.

1.5.1 Runway Safety Area (RSA) Requirements

The FAA requires airports to provide a safety area at runway ends and on the sides of a runway to reduce the risk of damage to aircraft and protection of passengers in the event of an unintentional "excursion" from the runway. An "excursion" from the runway can include an overrun (an arriving aircraft fails to stop before the end of the runway), an undershoot (an aircraft arriving on a runway touches down before the start of the paved runway surface), or a veer-off to one side of a runway. The FAA requires that airports receiving federal funding for airport improvement projects and commercial service airports provide standard RSAs where possible. To the extent practicable, airports receiving federal funding for airport improvement projects are required to meet RSA design standards as detailed in *Advisory Circular 150/5300-13A, Airport Design, Change 1.*

As noted in Section 1.1, while full dimension RSAs at the end of a runway are typically level areas and 1,000 feet long by 500 feet wide, they may be shorter in length if an EMAS is installed at the runway end to provide an equivalent level of safety.

8 United States Department of Transportation, Federal Aviation Administration, Order 5100.38D, *Airport Improvement Program Handbook*, Change 1, February 26, 2019.
9 United States Department of Transportation, Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13A*, *Airport Design*, Change 1, February 26, 2014.

1.5.2 Engineered Materials Arresting System (EMAS) Overview

EMAS is often used when a full-dimension RSA is not possible due to lack of available land and provides a level of safety equivalent to a full-dimension RSA. The material is designed to stop an aircraft traveling at a speed of 70 knots. EMAS is an energy absorbing material placed at the end of a runway and designed to accommodate a runway's critical aircraft. The material crushes under the weight of and surrounds the landing gear, stopping the aircraft. The runway's critical aircraft determines the length of the EMAS bed. FAA provides guidance in comparing RSA alternatives and EMAS to determine financial feasibility. This guidance is suggested for airports that display one or more of the criteria:

- The existing RSA determination indicates the RSA does not meet full-dimension RSA standards, but it is practicable for it to meet the standard through some other means.
- The runway serves air carriers at a commercial service airport or is required to meet the FAA design standards under federal grant obligations.
- The runway serves aircraft with a maximum takeoff weight (MTOW) of 25,000 pounds or more.
- The width of the RSA or its length beyond the runway end is less than 90 percent of the RSA standard.

Runway 9-27 meets these criteria. The alternatives analysis presented in Chapter 3, *Alternatives Considered* includes the use of EMAS to bring the RSA on Runway 27 End into compliance.

1.5.3 Runway Safety Enhancements at Logan Airport

Over the years, Massport has implemented a number of runway safety improvements at Logan Airport. In the early 1990s, RSA improvements in the form of Inclined Safety Areas (ISAs) were constructed at the ends of Runways 22L and 27. ISAs generally consisted of 500-foot by 400-foot inclined crushed stone ramps that extend beyond the runway threshold to mean low water. The ISAs provide a graded transitional surface at the end of the runway that allows aircraft that overrun the end of the runway to make a gradual transition into the water. These ISAs were installed by Massport prior to the establishment of the current FAA criteria on RSA designs and thus do not officially constitute an RSA under the FAA's current regulations. Additionally, in the early 1990s, Massport installed a rescue access ramp between Runway Ends 4L and 4R to enhance rescue access to Boston Harbor along the main shipping channel.

Improvements have since been made to the RSAs at the ends of Runway 33L and Runway 22R, including a 650-foot long and 306-foot wide EMAS deck on Runway 33L and an ISA at the end of Runway 22R. At Runway 22R there is also an EMAS bed, which was first built in 2005 and replaced in 2014.

Massport continues to consider future safety improvements and will continue to work with the FAA as any new actions are deemed reasonably foreseeable.

1.6 MEPA and NEPA Processes

The MEPA Office within the Executive Office of Energy and Environmental Affairs (EEA) oversees the state environmental review of the Project. MEPA review is required when 1) a project is undertaken by a state agency, requires a permit from a state agency, or involves financial assistance or a land transfer by a state agency, and 2) one or more thresholds, as defined in 301 CMR 11.03, are met or exceeded. This Project requires permits from state agencies and exceeds a MEPA threshold 301 CMR 11.03(3)(b)1.f and 301 CMR 11.03(3)(a)5, which requires an ENF and mandatory EIR. The filing of this ENF initiates the MEPA review process.

The federal environmental review of the proposed RSA enhancements is the responsibility of the FAA. As a source of funding of the proposed enhancements, and because FAA needs to approve any modifications to the Airport Layout Plan to reflect the changes to the airfield, the FAA is required to conduct an environmental evaluation of the proposed RSA enhancements under NEPA. For current planning purposes, Massport assumes (based on the proposed scope of work and anticipated level of environmental resource effects), this Project may qualify for preparation of an Environmental Assessment (EA) in accordance with the FAA's NEPA regulations (FAA Order 1050.1F[10] and FAA Order 5050.4B[11]).[12] The FAA will determine the appropriate level of NEPA documentation for the Project as planning proceeds.

Massport intends to meet the requirements of both NEPA and MEPA; where possible, the review documents could be combined.

1.7 Community Involvement/Environmental Justice (EJ)

The state and federal environmental review processes require public involvement and consideration of designated EJ populations. During the development of this ENF, the MEPA Office released *Interim Protocol for Environmental Justice Outreach,* followed by *Transition Rules for Public Involvement Requirements for Environmental Justice Populations* effective June 24, 2021, and *Draft MEPA Public Involvement Protocol for Environmental Justice Populations* which is anticipated to be effective October 1, 2021. The *Transition Rules for Public Involvement Requirements for Environmental Justice Populations,* effective June 24, 2021, requires all ENFs and expanded ENFs (EENFs) filed with the MEPA Office to identify the location of a Project relative to EJ Populations as depicted on the *Massachusetts 2020 Environmental Justice Populations* mapping tool (EJ mapping tool).[13] In advance of the *Transition Rules for Public Involvement Requirements for Environmental Justice Populations*, Massport followed EEA's *Interim Protocol for Environmental Justice Outreach* and conducted EJ outreach prior to this ENF filing. Additionally, Massport documented its findings from the *Massachusetts 2020 Environmental Justice Populations mapping tool*. These efforts are further described below.

A figure of the Project location and a one-mile buffer using the EJ mapping tool, included in **Figure 5** of the ENF Form, indicates that portions of the Logan Airport airfield are adjacent to an EJ population. Massport consulted

10 United States Department of Transportation, Federal Aviation Administration, *1050.1F Environmental Impacts: Policies and Procedures*, July 16, 2015.
11 United States Department of Transportation, Federal Aviation Administration, *Order 5050.4B National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*, April 28, 2006.
12 "The purpose of an EA is to determine whether a proposed action has the potential to significantly affect the human environment. An EA is a concise public document that briefly provides sufficient evidence and analysis for determining whether to prepare an [Environmental Impact Statement (EIS)] or a [Finding of No Significant Impact (FONSI)]." United States Department of Transportation, Federal Aviation Administration, *1050.1F Environmental Impacts: Policies and Procedures*, July 16, 2015.
13 Massachusetts Environmental Policy Act Office, *MEPA Public Involvement Protocol for Environmental Justice Populations*, https://www.mass.gov/doc/mepa-revised-public-involvement-protocol-for-environmental-justice-populations-june-2021-clean/download.

with the MEPA Office prior to filing this ENF to discuss and confirm an appropriate EJ outreach strategy for this safety Project. Moving forward, Massport will follow the EEA's *Transition Rules for Public Involvement Requirements for Environmental Justice Populations* as updated on June 24, 2021 and will include enhanced analysis of impacts and mitigation, as needed, under MEPA.

Based on coordination with the MEPA Office, Massport initiated and will continue to conduct outreach with local EJ communities. The EEA mapping tool identifies "Minority" populations within the one-mile radius of the RSA site. Accordingly, and as has been Massport's past practice, throughout this Project, Massport will offer translation and interpretation services in languages spoken by a substantial portion of the population. These language service requirements will apply to notices, documents, and community meetings that pertain to the proposed Project. In review of the MEPA Office's *Interim Protocol for Environmental Justice Outreach*, Spanish was identified as a language spoken by a substantial portion of the population within the one-mile radius.

In accordance with guidance from the MEPA Office, Massport held a virtual pre-ENF filing public meeting at 6:00 PM on June 29, 2021. The virtual meeting provided an overview of the purpose and need of the project, a preliminary indication of likely potential construction impacts and a summary of the future environmental review process and anticipated project schedule. The meeting was attended by representatives of State Representative Adrian Madaro's office, City of Boston, Town of Winthrop, various community interest groups, and private citizens. In advance of the meeting, a Project summary was posted on Massport's website in English and Spanish (see Attachment G) and a translator simultaneously streamed the meeting in Spanish. In preparation for this meeting, Massport reached out to local and state elected officials, representatives in East Boston and Winthrop, the Massport Community Advisory Committee (MCAC), and area community interest groups. Notice of the meeting was placed in English and Spanish in the East Boston Times, Winthrop Transcript, El Mundo, and on Massport's website. The bi-lingual public notices included the opportunities to request additional languages for the virtual meeting. Although no additional languages were requested for this meeting, Massport will continue to conduct similar outreach throughout the MEPA and NEPA process.

Massport will circulate the ENF and supporting documentation in accordance with MEPA requirements and copies will be provided to Winthrop and City of Boston Library branches for public review. Copies of the ENF are available for download on Massport website https://www.massport.com/massport/about-massport/project-environmental-filings/logan-airport/. Massport will also hold a virtual consultation session on the ENF in September 2021, as required under MEPA.

2 Project Purpose and Need

This chapter describes the purpose of and the need for the proposed RSA improvements for Runway 27 to enhance safety at Logan Airport, and describes the FAA airport design criteria for RSAs.

2.1 Purpose of the Project

The purpose of the Project is to enhance safety for aircraft and their passengers in emergency situations by constructing improvements to the RSA at the end of Runway 27 consistent with the current FAA requirements.

2.2 Need for the Project

Logan Airport is a commercial service and general aviation airport that receives federal funding for airport improvement projects, and therefore is required by the FAA to meet the RSA and other design criteria contained in the FAA's *Airport Design Advisory Circular* to the extent practicable.[1]

2.2.1 Background

On March 3, 2009, the United States Department of Transportation Office of Inspector General (DOT OIG) released a report entitled *Actions Taken and Needed to Improve FAA's Runway Safety Program*.[2] The report indicated that, while the FAA has made significant progress in improving RSAs as required by the 2005 mandate by Congress, further action is needed. The DOT OIG report made specific recommendations, including proposals that the FAA take action at 11 of the nation's largest airports. Logan Airport was one of the 11 airports that the DOT OIG identified as requiring further action to improve RSAs and stated that the FAA and Massport should complete the full RSA improvements as soon as possible. Since that time, an FAA-compliant Engineered Materials Arresting System (EMAS) bed was installed on a pile-supported deck for Runway 33L, and for Runway 22R an Inclined Safety Area (ISA) was installed to enhance the 190-foot-long EMAS bed. In accordance with the 2005 mandate by Congress, the enhancement of the Runway 33L RSA was completed before 2015.[3] At Runway 22R there is an EMAS bed, which was first built in 2005 and replaced in 2014.

1 Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13A, Airport Design*, Consolidated Change 1, September 28, 2012.
2 Federal Aviation Administration. *Actions Taken and Needed to Improvement FAA's Runway Safety Area Program Report*, Report Number: AV-2009-039, March 3, 2009. Available at: https://www.oig.dot.gov/sites/default/files/11WEB_FILE_RSA_Report_03-3-09_Issued.pdf
3 Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13A, Airport Design*, Consolidated Change 1, September 28, 2012.

2.2.2 Runway 27 RSA Needed Improvements

In 2017, Massport was notified by FAA that Runway 27 did not meet current standards. In response, Massport embarked on a Runway Incursion Mitigation Study and Comprehensive Airfield Geometry Analysis that included a comprehensive airfield geometry analysis, and in 2019 published the *Boston Logan Airport Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study* (the RIM/Runway 9-27 RSA Alternatives Study)[4], that identified options for enhancing Runway 9-27 RSAs, specifically the Runway 27 End closest to Boston Harbor (see **Figure 1-1)**. The RIM/Runway 9-27 RSA Alternatives Study was included as an attachment to the FAA's Determination on the acceptable improvements to improve the Runway 27 RSA (see Attachment D).

Figure 2-1 Runway 27 End – Existing Runway Safety Area

Not to scale

Runway 9-27 is 7,001 feet in length and 150 feet wide, with 75-foot-wide paved shoulders on each side of the runway (see **Figure 2-1**). On the approach end of Runway 9 (west end of runway), the current RSA meets the full dimension RSA standards. Enhancements to the RSA at the Runway 27 End (east end of runway) were made in 1992 through construction of an ISA (EEA #5122), a graded transition to mean low water. While the ISA enhanced safety, it pre-dates current technologies and research conducted by the FAA and the National Transportation Safety Board on runway safety improvements, the formation of the FAA Runway Safety Area Program, and the adoption by the FAA of current RSA standards.

4 Massport, Boston Logan Airport, *Runway Incursion Mitigation Study, Runway 9-27 Runway Safety Area (RSA) Alternatives Study*, January 8, 2019.

With the ISA in place, the Runway 27 End meets the RSA required dimensions for width (500 feet), but does not meet the RSA length requirements of 1,000-foot overrun or 600-foot undershoot protection required by the FAA standards (see Section 2.3). Therefore, physical improvements to the Runway 27 End RSA are needed to further enhance the safety of aircraft and passengers during takeoff and landing.

Improving the Runway 27 End RSA would fulfill the overriding public interest to optimize safety. Improvements to the RSA would enhance safety through reducing the potential for injury to passengers, aircraft crew, and Airport employees.

2.3 FAA Design Criteria for Runway Safety Areas

The FAA requires that, to the extent practicable, airports that receive federal funding for airport improvement projects provide standard RSAs that comply with the FAA's design criteria (standards).[5] The FAA specifically precludes the granting of a "Modification to Design Standards" for a non-standard RSA in their criteria, requiring that RSAs be assessed through an RSA Determination of Practicability to identify the most practicable and feasible option for improving non-standard RSAs.

The FAA requires airports to provide an RSA at each runway end and along the sides of a runway to reduce the risk of damage to aircraft in the event of an unintentional "excursion" from the runway in an emergency situation. An "excursion" from the runway can include an overrun (an arriving aircraft fails to stop before the end of the runway), an undershoot (an aircraft arriving on a runway touches down before the start of the paved runway surface), or a veer-off to one side of a runway.

The design criteria for RSAs are contained in the FAA's *Airport Design Advisory Circular*.[6] The *Airport Design Advisory Circular* contains a coding system used to designate design standards for runways based on the types of aircraft that use the runway. Each runway is assigned a Runway Design Code (RDC) that signifies the length, width, and other requirements for the runway, its RSAs, and other associated facilities. The RDC is assigned based on two characteristics:[7]

- Aircraft Approach Category (AAC): A grouping of aircraft based on landing speed, expressed alphabetically (A through E, from slowest to fastest).
- Airplane Design Group (ADG): A classification of aircraft based on wingspan and tail height, expressed numerically (I to VI, smallest to largest). When the aircraft wingspan and tail height fall in different groups, the higher group is used.

Runway 9-27 is classified as RDC D-V.[8] The dimensions of a standard RSA for RDC D-V should be 1,000 feet long beyond the departure end of the runway and 500 feet wide centered on the runway, as shown in **Figure 2-2.**[9]

RSAs are required to meet dimensional standards, longitudinal and lateral grade requirements. The FAA also requires that RSAs are: 1) cleared and graded with no potentially hazardous ruts, humps, depressions, or other surface variations; 2) drained by grading or with drainage structures if necessary to prevent water

5 Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13A, Airport Design*, Consolidated Change 1, September 28, 2012.
6 *Ibid.*
7 Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13A, Airport Design*, Consolidated Change 1, September 28, 2012, p. 2-3.
8 *Logan Airport Layout Plan*, February 2021.
9 Massport, Boston Logan Airport, *Runway Incursion Mitigation Study, Runway 9-27 Runway Safety Area (RSA) Alternatives Study*, January 8, 2019, p. 1-2.

accumulation; 3) capable under dry conditions of supporting snow removal and aircraft rescue firefighting equipment (ARFF) activity, and the occasional passage of aircraft without causing significant damage to the aircraft; and 4) free of objects and vegetation, except for objects that must be located in the RSA because of their function, such as lights, signs, and landing instrumentation, which must be frangible, and collapse on impact.[10]

By comparing **Figure 2-1** showing the existing Runway 27 RSA dimensions, with a full dimension RSA as shown in **Figure 2-2**, it is evident that the Runway 27 End RSA does not meet the FAA standards since the current RSA at the Runway 27 End is only 150 feet long.

Figure 2-2 Standard Runway Safety Area for Runway Design Code (RDC) D-V

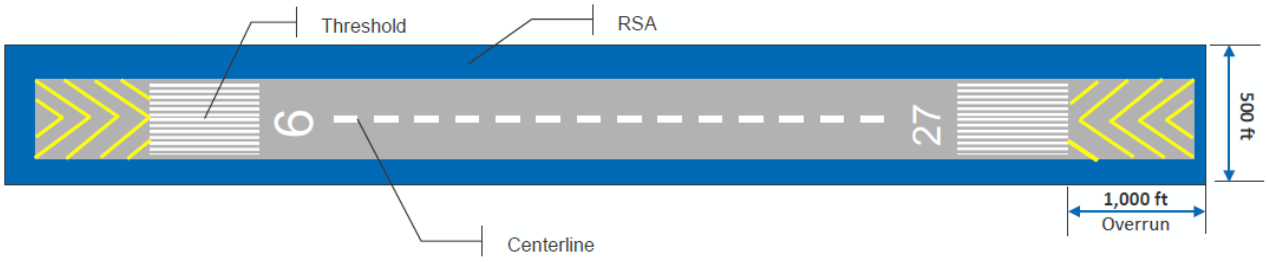
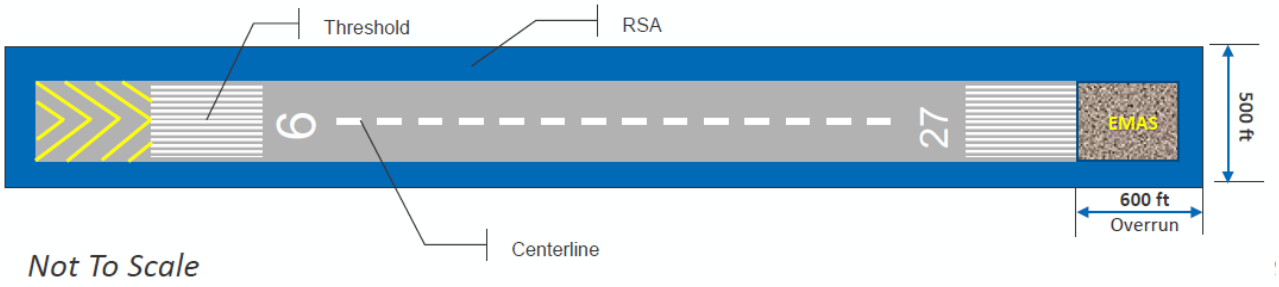


Figure 2-3 Shortened Runway End RSA with EMAS



Terrain, nature, and man-made challenges can limit the availability of land and make constructing standard RSAs challenging for runways that were constructed prior to the current standards. To address these challenges, EMAS was invented and approved by the FAA to be used in place of a standard RSA. An EMAS is a bed of energy-absorbing material with predictable deceleration forces; it is either collapsible concrete blocks or foamed silica within a high-strength plastic mesh system covered with concrete.[11] In an emergency situation, when an aircraft rolls into an EMAS bed, the tires of the aircraft collapse the energy-absorbing material, and the aircraft is slowed down to a safe stop in a way that minimizes damage to the aircraft and resulting injuries to passengers and crew members. EMAS allows for the shortening of the overall RSA length while providing an FAA-approved level of safety that is equivalent to an RSA built to the standard dimensions.[12] **Figure 2-3** shows the dimensions of a shortened RSA with EMAS. EMAS has demonstrated its effectiveness in arresting aircraft

10 Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13A*, *Airport Design*, Consolidated Change 1, February 26, 2014, p. 60-61.
11 *Federal Aviation Administration Fact Sheet - Engineered Material Arresting System (EMAS)*, https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=13754, March 5, 2021.
12 Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13A*, *Airport Design*, Consolidated Change 1, September 28, 2012, p. 61.

overruns; since 1999 there have been a total of 15 incidents at other airports where EMAS has safely stopped overrunning aircraft.[13]

2.4 FAA Determination for Runway 27 End RSA Improvements

Based on the findings of the RIM/Runway 9-27 RSA Alternatives Study, the FAA reviewed potential improvements to the Runway 27 End RSA and "(*B)ased on consideration of these alternatives and their attributes and constraints, the preferred alternative for the resolution of RSA deficiencies on Runway 9-27 is the implementation of … EMAS on a 300' - wide deck (the actual width of the deck would be 306' to allow for safety rails). This alternative is preferred as it will provide the highest level of aircraft safety without reducing the operational capability of the BOS airfield while also minimizing environmental impacts from additional construction in the harbor.*"[14]

The FAA determined that the construction of a 600 to 650-foot long by 306-foot wide RSA with an EMAS bed on a pile-supported deck would have an equivalent level of safety as a standard 1,000-foot by 500-foot RSA. Chapter 3, *Alternatives Considered*, describes the range of alternatives considered and the rationale for selecting the alternative that meets the FAA's requirements.

2.5 Refining the Runway 27 End RSA Improvements

The FAA's 2019 RSA Determination directed Massport to construct an enhanced RSA with EMAS on a deck, but did not specify the type of deck structure to be constructed, nor did it specify the size of the EMAS bed.

2.5.1 Runway 27 End RSA – Deck Foundation Considerations

The Runway 33L RSA improvements project concluded that a pile-supported deck, along with the use of EMAS to reduce the overall length of the RSA and width of the deck, would be the least environmentally damaging alternative compared to solid fill with a steel sheet bulkhead, or solid fill with a riprap stone dike. The FAA took this finding into account when it determined the RSA improvements for the Runway 27 End should include a deck structure. The deck width at the Runway 27 End would be 300 feet, with 3-foot safety rails on either side for a total of 306 feet. The final length of the deck will be based on the deck design, and because of the irregular shoreline in this area, it is expected that the pile-supported deck would extend between 450 to 500 feet over Boston Harbor. As this Project moves into the conceptual design phase, consideration will be given to different foundation types and associated environmental and constructability considerations. The evaluation of alternative deck foundation structures is described in Section 3.5 of Chapter 3, *Alternatives Considered*. The deck support structure alternatives will be evaluated in detail in the DEIR and the FAA's NEPA review document.

13 *Federal Aviation Administration Fact Sheet - Engineered Material Arresting System (EMAS)*, https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=13754, March 5, 2021.
14 FAA Appendix B. *RSA Determination Form*, January 2019.

2.5.2 Runway 27 End RSA - EMAS Bed Considerations

As the preliminary design process proceeds, considerations for determining the length of the required EMAS bed for the Runway 27 End will include:[15]

- Confirming the aircraft fleet mix operating on the associated runway, as it is for a standard RSA.
- Evaluating aircraft design data based on the configuration and operational characteristics of the critical design aircraft[16] operating on the runway using a proprietary computer model which is not publicly available.[17]

Given the inability to define the exact length of an EMAS bed for Runway 27 at that time, RIM/Runway 9-27 RSA Alternatives Study) used (as a proxy) the same EMAS configuration constructed on the approach end of Runway 33L (completed in 2013). The Runway 33L EMAS bed sizing was constructed based on the requirements for the aircraft fleet mix anticipated to use that runway. The Runway 33L End RSA EMAS provides a good basis for understanding the required design of an EMAS on Runway 9-27 given the need to accommodate similarly sized aircraft. The Runway 9-27 RSA design considerations also involve similar operational realities, construction techniques, and regulatory requirements that were addressed as a part of the Runway 33L RSA program.[18] To achieve both overrun and undershoot protection, the final dimensions of the Runway 33L EMAS bed was 506 feet long and 178 feet wide. The Runway 33L case study and other factors (such as an updated fleet mix and critical aircraft, and runway use) will inform the deck and EMAS bed alternatives that will be evaluated in the DEIR and in the NEPA process.

In development of the DEIR, the next step in the conceptual design process is to confirm the aircraft fleet mix for the runway, and to work with the EMAS manufacturer to perform preliminary modelling to calculate the estimated dimensions of the EMAS bed and the sizes of the associated EMAS blocks. This analysis is not expected to change the overall dimension of the RSA and deck referenced herein.

15 Massport, Boston Logan Airport, *Runway Incursion Mitigation Study, Runway 9-27 Runway Safety Area (RSA) Alternatives Study*, January 8, 2019.
16 The critical design aircraft is the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of an airport or a particular runway. Regular use is 500 annual operations. An operation is either a takeoff or landing. The critical design aircraft sets dimensional requirements on an airport or runway, such as the distance between taxiways and runways, and the size of certain areas protecting the safety of aircraft operations and passengers, including the RSAs. (Also called the "critical aircraft" or "design aircraft.")
17 Massport, Boston Logan Airport, *Runway Incursion Mitigation Study, Runway 9-27 Runway Safety Area (RSA) Alternatives Study*, January 8, 2019., pp. 23-24.
18 Massport, *Boston Logan International Airport Runway Safety Area Improvements Project Final Environmental Assessment/Environmental Impact Report* (EEA File #14442), January 2011, p. S-6.

3 Alternatives Considered

This chapter describes the existing Runway 27 End and its RSA, and the process undertaken by the FAA and Massport to identify reasonable alternatives for enhancing the existing RSA. **RSAs are safety improvements and do not extend runways or have any effect on normal runway operations, runway capacity, or the types of aircraft that can use the runways.**

Before initiating preparation of this ENF, the FAA and Massport conducted a detailed analysis to identify and evaluate alternatives to enhance the Runway 27 End RSA. That analysis is documented in the *Logan International Airport Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study* (the RIM/Runway 9-27 RSA Alternatives Study)[1] summarized here, and is included as Attachment D to this document. A description of Runway 9-27 (see Section 3.1) and design criteria described in the RIM/Runway 9-27 Alternatives Study (see Section 3.2) establish needs and guidelines used to identify the proposed action.

The RIM/Runway 9-27 Alternatives Study examined six build alternatives and the No-Build Alternative. The RIM/Runway 9-27 Alternatives Study concluded that the only reasonable alternative for enhancing the RSA at the end of Runway 27, consistent with the FAA requirements, is a 600 to 650-foot-long RSA with an Engineered Materials Arresting System (EMAS) bed on a 306-foot-wide deck extending over Boston Harbor. This alternative is Alternative 4B, which is described in Section 3.3, along with the other examined alternatives. A summary of these alternatives can be found in Section 3.4. As noted in Chapter 2, *Project Purpose and Need*, the FAA concurred and stated that Alternative 4B would provide the highest level of aircraft safety without reducing the operational capability, while also minimizing environmental impacts in the harbor. The FAA's 2019 RSA Determination directed Massport to construct an enhanced RSA with EMAS on a deck, but did not specify the type of deck structure to be constructed, nor did it specify the size of the EMAS bed.[2] All options would need to include emergency access/egress ramps similar to Runway 33L.

Section 3.5 of this chapter discusses several alternatives/configurations for supporting the elevated deck, which will be evaluated further in the DEIR and NEPA process.

1 Massport, Boston Logan Airport, *Runway Incursion Mitigation Study, Runway 9-27 Runway Safety Area (RSA) Alternatives Study*, January 8, 2019.
2 Note that the length of the deck and foundation structure, and the size of the EMAS bed will be determined as the project moves into conceptual design.

3.1 Description and Use of Runway 9-27

Runway 9-27 is 7,001 feet long and 150 feet wide as shown on **Figure 1-1**. The Runway 9 end is at the southwestern end of the airfield, and the Runway 27 End is at the northeastern edge of the airfield, adjacent to Boston Harbor. RSAs are located at either end of Runway 9-27. Runway 9-27 intersects with Runways 4R-22L and Runway 15R-33L. Runway 9 is predominantly used for departures, while Runway 27 is used for both arrivals and departures.

As described in Chapter 1, *Introduction and Project Overview,* and Chapter 2, *Project Purpose and Need*, every runway is assigned a Runway Design Code (RDC) that signifies the length, width, and other requirements for the runway, its RSAs, and other associated facilities. The RDC is assigned based on an Aircraft Approach Category (AAC): A grouping of aircraft based on landing speed, expressed alphabetically (A through E, from slowest to fastest), and Airplane Design Group (ADG). Runway 9-27 is classified as RDC D-V. The classification determines the dimensions of the RSA that is required as per FAA *Advisory Circular (AC) 150/5300-13A, Airport Design.*

The RSA for the Runway 9 End is 500 feet wide and 1,000 feet long beyond the runway end, meeting the FAA standard RSA for a full dimension RSA end. The Runway 27 End RSA is intended to provide protection in the event that an aircraft arriving (or departing and needs to abort the takeoff) on Runway 9 fails to stop before the end of the paved runway surface or runway threshold (an overrun) or in the event that an aircraft arriving on Runway 27 lands short of the runway threshold (an undershoot). The existing RSA for the Runway 27 End is approximately 150 feet long and 500 feet wide and has an inclined safety area (ISA), a graded transition to mean low water to the east (**Figure 2-1**). While the ISA provides some additional degree of safety, as discussed in Section 2.2 of Chapter 2, *Project Purpose and Need*, the existing RSA for Runway 27 does not provide the level of protection required by the FAA's current Airport Design Advisory Circular.[3]

A 20-foot-wide paved airport perimeter road is located within the Runway 27 End RSA. The perimeter road is used by Airport maintenance vehicles, security and emergency vehicles such as firefighting trucks, State Police, Massport Operations, the FAA, and construction vehicles. The perimeter road provides a vital link to key locations around the airfield and is necessary for airport operations, security and emergency access, and will have to be maintained.

3.1.1 Runway Use

Runway 9-27 is used for both aircraft arrivals and departures in both northeast/southwest and northwest/southeast runway use configurations. Runway 9-27 serves as the primary jet departure runway in the northeast, southeast, and northwest winds, or flows and also serves as the primary arrival runway in the southwest and northwest flows. Runway 27 is equipped with an instrument landing system (ILS) approach with visibility minimums down to 1½ miles. Runway 9 allows for visual approaches only and is rarely used for arrivals.

In 2019, approximately 30 percent of all jet aircraft departures occurred on Runway 9, while approximately 12 percent of all jet aircraft departures and 22 percent of all jet aircraft arrivals occurred on Runway 27 (**Table 3-1**).[4] Runway use data for 2020 are not considered as representative of typical operating conditions for

3 United States Department of Transportation, Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13A, Airport Design, Consolidated Change 1*, September 28, 2012.
4 Massachusetts Port Authority, Boston-Logan International Airport 2018/2019 Environmental Data Report, December 2020.

Logan Airport due to the effects of the COVID-19 pandemic which substantially reduced overall Airport activity. Additionally, Runway 9-27 was closed between May 26 and August 7, 2020 to allow for the entire runway to be rehabilitated. As part of that project, the Runway 27 End was raised approximately 10 inches to bring the runway into compliance with current FAA design standards and to accommodate sea level rise.

Table 3-1 Runway Use by Jet Aircraft (2019)

	Runway									
	4L	**4R**	**9**	**14[1]**	**15R**	**22L**	**22R**	**27**	**32[1]**	**33L**
Departures	0%	4%	30%	0%	4%	2%	28%	12%	0	20%
Arrivals	4%	28%	0%	0%	<1%	29%	<1%	22%	2%	15%

Source: Boston Logan International Airport 2018/2019 Environmental Data Report, Table 6-5, p 6-18.
Runway 14-32 opened in December 2006. (Runway 14-32 is unidirectional with no arrivals to Runway 14 and no departures from Runway 32).
1 Runway 14-32 is a unidirectional runway with landings and departures on the Runway 32 End only.

Table 3-2 Runway 9-27 Aircraft Fleet Mix (2019) and Runway Use

Arrivals												
Runway	**Heavy Jets A[1]**		**Heavy Jets B[2]**		**Light Jets A[3]**		**Light Jets B[4]**		**Regional Jets[5]**		**Non-jets[6]**	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
27	4.35%	9.25%	15.18%	3.61%	31.39%	17.66%	24.24%	16.48%	19.87%	22.07%	4.05%	11.37%
Total	*4.35%*	*9.25%*	*15.18%*	*3.61%*	*31.39%*	*17.66%*	*24.24%*	*16.48%*	*19.87%*	*22.07%*	*4.05%*	*11.37%*
Departures												
Runway	**Heavy Jets A[1]**		**Heavy Jets B[2]**		**Light Jets A[3]**		**Light JetsB[4]**		**Regional Jets[5]**		**Non-jets[6]**	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
9	5.74%	0.77%	18.92%	15.05%	26.49%	16.25%	32.97%	20.55%	38.51%	26.27%	18.72%	8.00%
27	0.08%	0.00%	6.85%	1.86%	10.55%	23.13%	11.56%	20.33%	11.27%	20.64%	5.16%	3.55%
Total	*5.82%*	*0.77%*	*25.77%*	*16.91%*	*37.04%*	*39.38%*	*44.53%*	*40.88%*	*49.78%*	*46.91%*	*23.88%*	*11.55%*

Source: *Boston-Logan International Airport 2018/2019 Environmental Data Report*, December 2020. Appendix H, Table H-5a.
Heavy Jets A (ADG V to ADG VI) = B747s, A340s, A380s
Heavy Jets B (ADG IV to ADG V) = B767s, B777s, B787s, A300s, A310s, A330s, A350s, MD-11s
Light Jets A (ADG III) = B717s, B737-800s, MD-90s
Light Jets B (ADG III to ADG IV) = B737s, B757s, A319s, A320s, MD-80s, E190
Regional Jet (ADG II to ADG III) = E135, E145, E170, E175, CRJ2, CRJ7, CRJ9, J328 and Corporate Jets
Non-Jets (ADG I to ADG III) = Turboprops and Piston Aircraft

The runway is designed to handle a wide range of aircraft from the heavy wide body commercial jets (B747, B777, B787, A330/430/350) to the smaller commuter aircraft. **Table 3-2** shows the mix of aircraft using Runway 9-27. Reflecting the fleet mix at Logan Airport, Runway 9-27 is primarily used by narrow body (light) domestic jets; however, the runway does accommodate long haul, heavy aircraft serving international markets

(e.g., Boeing 747 and 777).[5] In 2019, as shown in **Table 3-2**, Runway 9-27 accommodated a mix of the heavy commercial jet aircraft, light jet, and regional operations both during the day and night.

3.1.2 Critical Design Aircraft

A key factor for RSA projects with EMAS is confirming the critical design aircraft (CDA), which will be used to calculate the size of the EMAS bed and the EMAS block configuration as per *Advisory Circular 150/5220-22, Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*. Determination of CDA takes into account factors such as maximum takeoff weight, approach speed, and number of annual operations (> 500 operations). For EMAS, the critical aircraft is defined as that aircraft (using the associated runway) that imposes the greatest demand upon the stopping ability of the EMAS. This is usually, though not always, the heaviest/largest aircraft that regularly uses the runway. EMAS performance is dependent not only on aircraft weight, but landing gear configuration and tire pressure. In addition to the critical aircraft, the current and future fleet mix using the runway is considered in the EMAS design to assess the capability to stop aircraft at a minimum of 70 knots (standard EMAS) or a minimum of 40 knots (non-standard EMAS).[6,7]

The FAA has approved the existing and future CDA for Runway 9-27 as the Boeing 747-400 aircraft as documented in its approval of the Boston Logan Airport Layout Plan narrative report. The CDA will be confirmed as the design proceeds. When calculating the size of the EMAS bed, consideration will be given to the entire aircraft fleet expected to use Runway 9-27.

3.2 Alternatives Screening Criteria

The FAA and Massport used the FAA design and other criteria in the RIM/Runway 27 RSA Alternatives Study to identify feasible and reasonable alternatives for enhancing the RSA at the end of Runway 27. The criteria include the following:

- **Provide overrun and undershoot protection for aircraft consistent with the FAA design criteria.** The alternative must achieve the purpose and need for the Project: it must provide protection in the event that an aircraft arriving (or aborting a departure) on Runway 9 fails to stop before the Runway 27 threshold (overrun) or if an aircraft arriving on Runway 27 lands short of the runway threshold (undershoot). The level of protection provided must be consistent with the FAA design criteria for a full dimension RSA of 1,000 feet long for an overrun and 600 feet long for an undershoot, or provide the equivalent with an EMAS bed, as described in Section 2.4 of Chapter 2, *Project Purpose and Need*.
- **Preserve airfield utility and efficiency.** The alternative must maintain the utility and operational efficiency of the airfield. This includes the ability of Runway 9-27 to accommodate RDC D-V aircraft, as discussed in Section 2.3 of Chapter 2, *Project Purpose and Need*. In 2012, the FAA declared "[T]he FAA does not require an airport operator to reduce the length of the runway or declare its length to be less than the actual pavement length to meet runway safety area standards if there is an operational impact

5 In 2019, 125,631 operations used the Runway 9-27, 21 percent were ADG I (non-jets) and II (regional jets) aircraft, 72 percent ADG III (light jets A and B, regional jets, non-jets), 5 percent ADG IV (heavy jets B and light jets B), 2 percent ADG V (heavy jets A and B), and 0.01 percent of aircraft were ADG VI (heavy jets A).

6 AC 150/5000-17, Critical Aircraft and Regular Use Determination, Section 3.10 and AC 150/5220-22, Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns.

7 When there is insufficient RSA available for a standard EMAS, the EMAS must be designed to achieve the maximum deceleration of the design aircraft within the available runway safety area. However, a 40-knot minimum exit speed must be used for the design of a non-standard EMAS. As per AC 150/5220-22B, Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns, 27 September 2012, pp 4.

to the airport. An example of an adverse operational impact would be an airport's inability to accommodate its current or planned aircraft fleet."[8]

- **Retain perimeter road.** The selected alternative must retain or relocate the existing perimeter road. The perimeter road provides a vital link to key locations around the airfield and is necessary for Airport operations and emergency access.
- **Adhere to runway injunction requirements.** Over the years, local courts have issued Logan Airport-specific injunctions that prohibit moving the runway threshold locations of Runways 4L, 22R and 9; accordingly, the selected alternative must be consistent with these injunctions. The process to lift the existing injunction would likely require a several-year court review process and the outcome is not guaranteed.
- **Avoid major impacts to the navigation channel in Winthrop.** The navigation channel east of Runway 27 is narrow. The U.S. Army Corps of Engineers (USACE) regulates impacts to navigation channels under the Rivers and Harbors Act and it is unlikely the USACE would issue a permit for any major impact to the channel; thus, the alternative must avoid major impacts to the channel. Coordination with the U.S. Coast Guard is underway.
- **Avoid and minimize environmental impacts.** The alternatives should avoid and minimize environmental impacts where possible, for example, by selecting another alternative that meets the FAA design standards, and results in fewer environmental impacts.

3.3 Description and Screening of Alternatives

This section describes the alternatives considered by the FAA and Massport for enhancing the Runway 27 End RSA in the RIM/Runway 27 RSA Alternatives Study and the results of applying the screening process and criteria described above in Section 3.2. The Runway 27 End RSA in the RIM/Runway 27 RSA Alternatives Study evaluated six build alternatives to bring the Runway 27 RSA into conformance with the FAA design standards. These alternatives, as well as a No-Build alternative, are described below:

- Alternative 1 Declared Distances
- Alternative 2 Displaced Threshold Markings
- Alternative 3A Full RSA in Boston Harbor, Fill Option
- Alternative 3B Full RSA in Boston Harbor, Deck Option
- Alternative 4A EMAS on 500-Foot-Wide Deck
- Alternative 4B EMAS on 306-Foot-Wide Deck
- No-Build Alternative

8 FAA AC 150/5220-22B, Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns, September 27, 2012, p. 1. A similar statement is contained in the FAA's March 2005 "Report to Congress on the Impact to Airports through the Implementation of Declared Distances and/or Reduction in the Length of Runways to Comply with FAA Runway Safety Area Standards."

3.3.1 Alternative 1 – Declared Distances Alternative

3.3.1.1 Description of Alternative 1

Declared distances represent the available runway lengths for takeoff and landing and can sometimes vary from the actual paved length of a runway. It is achieved primarily by changing the pavement markings on the runway. Alternative 1 would apply declared distances to the current 7,001-foot Runway 9-27 to provide a full dimension RSA within the existing runway footprint (**Figure 3-1**[9]). Use of declared distances would reduce the runway lengths available for arrival and departure operations on Runway 9-27 in order to lengthen the RSA for the Runway 27 End. Aircraft arriving on Runway 27 would have a reduction of 450 feet of runway length, while aircraft departing on Runway 9 would see a reduction of 850 feet of runway length. The reduction of distance available for stopping and takeoff due to the declared distances could require aircraft to reduce their weight to comply with regulations. Weight reduction would be accomplished by aircraft operators and airlines lightening their load by reducing the number of passengers, the cargo on-board, and/or the aircraft's fuel load. A more likely scenario is that pilots would request the use of alternative runways thus severely impacting Airport efficiency as well as shifting flights and noise to other runways. This would impact ADG III, IV, and V aircraft. In essence, this strategy could achieve standard RSA dimensions by reducing the available runway length while meeting regulatory standards, but there is no functional safety enhancement achieved by using declared distances.

3.3.1.2 Results of Alternative 1 Screening

Alternative 1 provides overrun and undershoot protection consistent with the FAA design criteria. It does not affect the perimeter road, the runway injunctions, the navigation channel, or environmental resources. It would, however, have detrimental effects on airfield utility and efficiency. The FAA and Massport determined this alternative would be unacceptable because it would substantially reduce the utility and efficiency of the airfield by shortening the useable length of Runway 9-27, thereby having the following effects:

- Impose weight restrictions on ADG III, IV, and V aircraft, resulting in reduced payloads and/or a reduction in fuel load. This could negatively impact service to longer haul destinations (both domestic and international); this would affect about 49,000 operations or 80 percent of the aircraft departing Runway 9.
- Reduce the usefulness of Taxiway E and could result in aircraft arriving on Runway 27 crossing Runway 4R-22L to access either Taxiway M or K instead of Taxiway E. This could:
    - Increase the time it takes for aircraft to exit the runway and thereby decrease arrival capacity on Runway 27;
    - Decrease departure capacity on Runway 22L;
    - Cause congestion in the vicinity of Taxiway K and M from aircraft in queue to cross Runway 4L-22R on Taxiway K; and

9 Figures 3-1 through 3-6 are from Massport, Boston Logan Airport, *Runway Incursion Mitigation Study, Runway 9-27 Runway Safety Area (RSA) Alternatives Study*, January 8, 2019. See Attachment D.

  - Result in aircraft having to go around the approach end of Runway 4L via Taxiway M to Taxiway B for Runway 27 arrivals if the queue backs up beyond the Runway 27 hold-line safety area marking.

- Likely shift flights (and noise) to other runways.
- Adversely impact the northeast and southwest flow capacities, which constitute approximately 60 percent of the Airport's operating flows in the summer months.

Alternative 1 does not affect the perimeter road, the navigation channel, nor environmental resources.

3.3.1.3 Conclusion – Alternative 1 Eliminated

Alternative 1 was eliminated from further consideration because it would adversely affect airfield operations by reducing the length of available runway, thereby imposing weight restrictions on a substantial proportion of the aircraft that use Runway 9-27. This would adversely affect airfield operating efficiency, and negatively impact the majority of the Airport's operating flows in the summer months. See Section 1.3.1 in Attachment D for more detailed information.

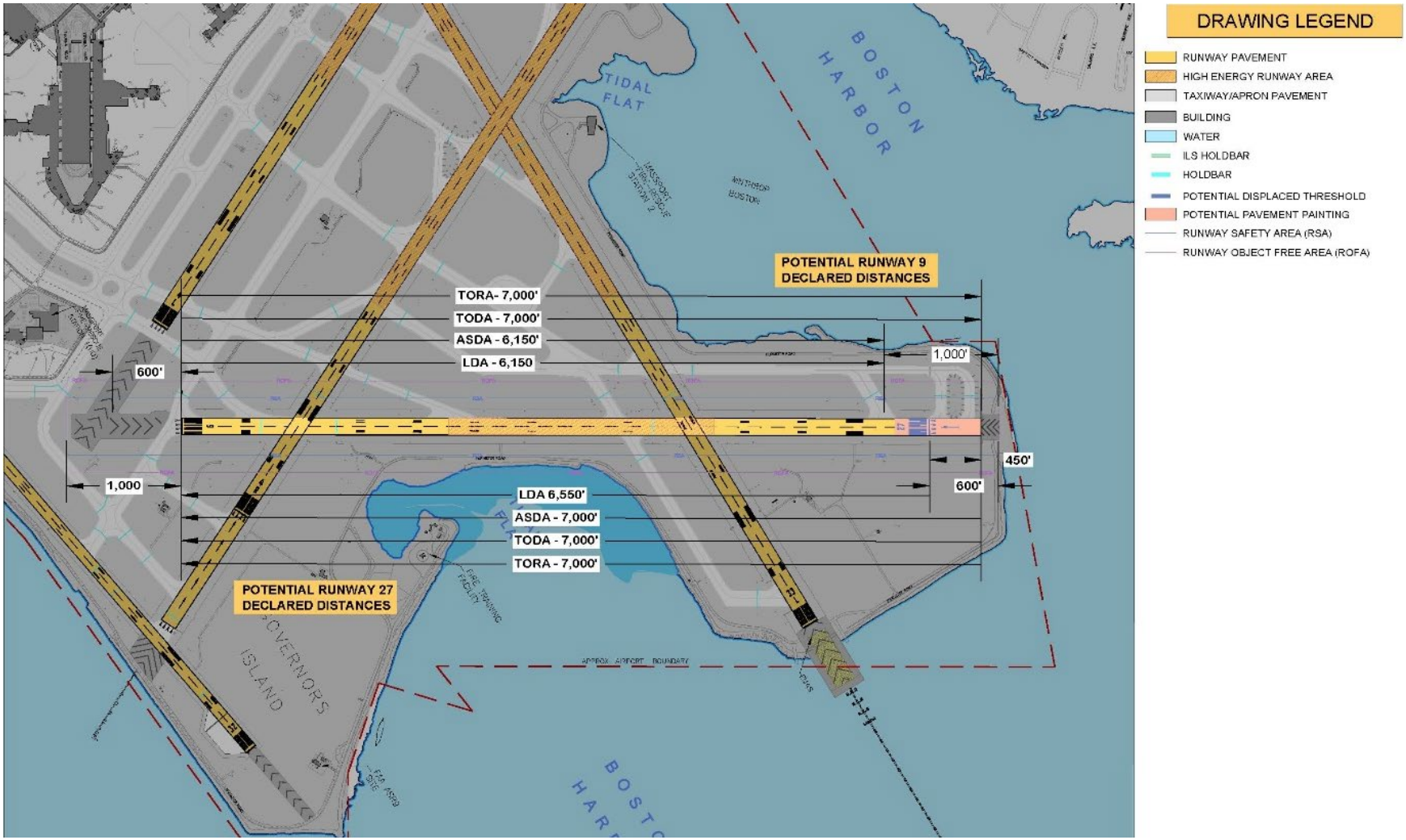


Figure 3-1 Alternative 1 – Declared Distances

3.3.2 Alternative 2 – Displaced Threshold Markings Alternative

3.3.2.1 Description of Alternative 2

Displaced thresholds are typically used to give arriving aircraft adequate clearance over an obstruction while still allowing departing aircraft the maximum amount of runway available for takeoffs. Alternative 2 would require shifting the Runway 9 threshold to the west by 195 feet to maintain the full 7,001 feet of runway length for arrivals and departures on Runway 9-27 **(Figure 3-2)**. This would be accomplished by restriping the Runway 9 departure end to change runway pavement markings. Under this alternative, Runway 27 would still not meet the 1,000 feet RSA standard but would decrease the deficiency to 655 feet.

3.3.2.2 Results of Alternative 2 Screening

The FAA and Massport determined Alternative 2 would not be acceptable for the following reasons:

- It does not provide the standard RSA beyond the runway end, but rather provides a modest increase, which is not consistent with the FAA design criteria.
- Shifting the Runway 9 threshold is currently prohibited by a court injunction. The process to lift the existing injunction would likely require a several-year court review process and the outcome is not guaranteed.
- The distances for aircraft to decelerate before entering Taxiway E would decrease, potentially resulting in aircraft entering the taxiway at higher speed.

Alternative 2 does not affect the perimeter road, the navigation channel, nor environmental resources.

3.3.2.3 Conclusion - Alternative 2 Eliminated

Alternative 2 was eliminated from further consideration because it would not result in Runway 9-27 meeting FAA's design requirements for the RSA and it would likely require a lengthy court review to remove the injunction, which may not be successful. See Section 1.3.2 in Attachment D for additional details.

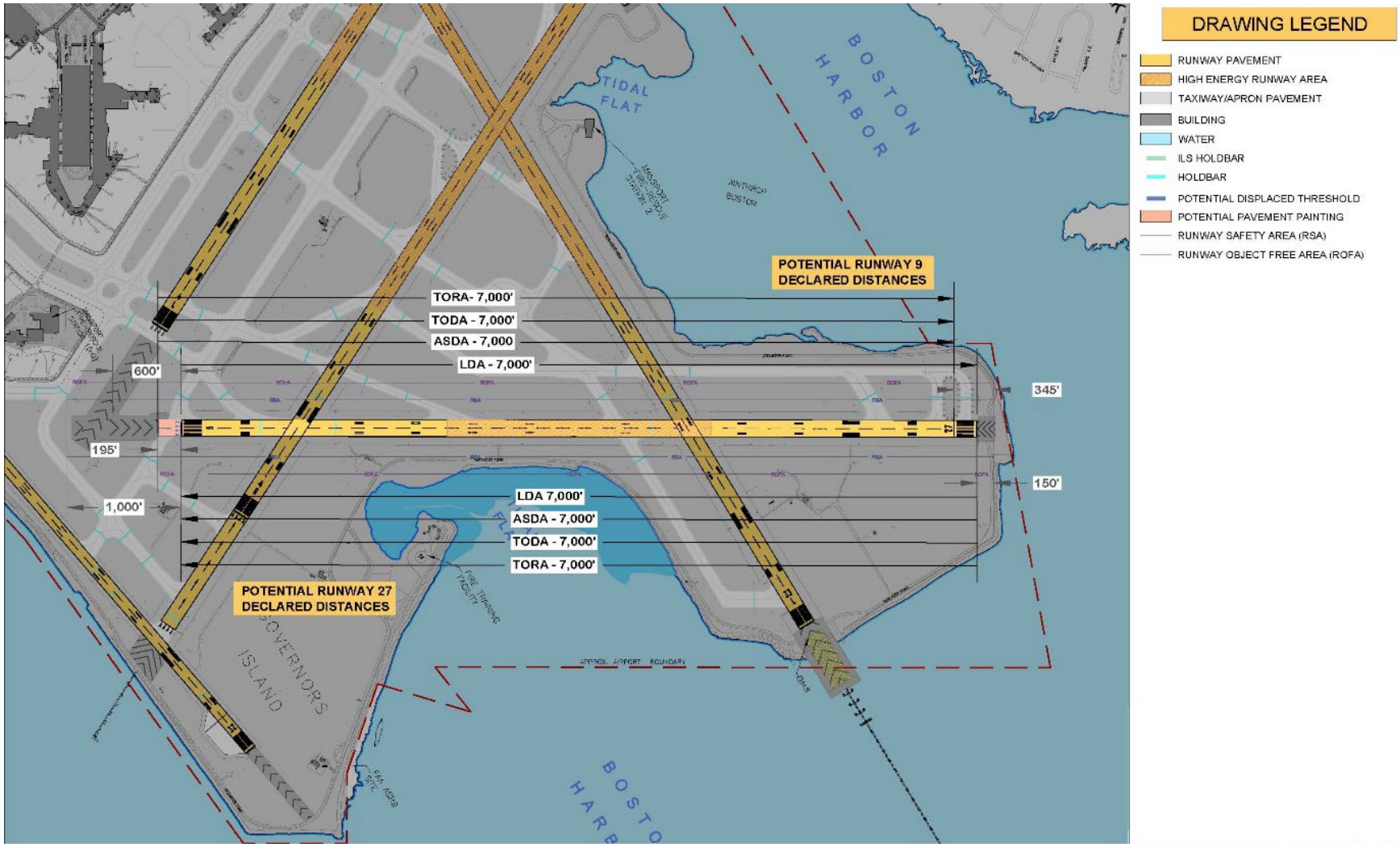


Figure 3-2 Alternative 2 – Displaced Threshold Marking

3.3.3 Alternative 3A - Full RSA in Boston Harbor, Fill Option

3.3.3.1 Description of Alternative 3A

Alternative 3A would extend the existing RSA from 150 feet long to the full 1,000 feet, creating a full dimension RSA, of which approximately 850 feet would extend into Boston Harbor (**Figure 3-3**). The RSA extension would be constructed on compacted fill, creating a flat, graded area free of objects. This alternative would provide a fully compliant standard RSA for both overrun and undershoot. Over 425,000 square feet (nearly 10 acres) of surface area would be required along with a riprap and sheet piling wall surrounding the RSA perimeter. Accounting for the average depths of 25 feet, approximately 375,000 cubic yards of fill would be needed. This alternative would provide a more permanent solution and would not compromise the aircraft takeoff and landing performance that displaced thresholds or declared distances limitations would create.

Alternative 3A would not require relocating the existing threshold, runway lights, or signs. It will not impact the taxiway configuration or the existing perimeter road. This alternative would maintain the full 7,001 feet of runway length for arrivals and departures on Runway 27 and for departures on Runway 9.

3.3.3.2 Results of Alternative 3A Screening

Alternative 3A would provide overrun and undershoot protection consistent with the FAA design criteria and it preserves airfield utility and efficiency, as well as the perimeter road. It would not affect the runway injunctions. However, the FAA and Massport determined this alternative would be unacceptable for the following reasons:

- Under this alternative, the RSA at the Runway 27 End would comply with the FAA design standards while maintaining operational capacity of the airfield. However, Alternative 3A would have more substantial environmental impacts than the alternatives considered, as noted in Section 3.2.4 through Section 3.2.6. As noted in Sections 3.3.4 through 3.3.6, other alternatives that meet the Project purpose and need would have substantially reduced environmental impacts.
- The RSA would extend substantially into the navigation channel and it is unlikely a permit could be obtained for this alternative under the Rivers and Harbors Act. It would have permanent and construction impacts to marine intertidal and subtidal areas (collectively tidelands), shellfish habitat, finfish habitat, terrestrial and marine threatened and endangered species habitat, and coastal floodplain. Alternative 3A would impact the armored shoreline supporting blue mussels and nearshore subtidal areas supporting softshell clam, razor clams, surf clams, and European oysters, due to construction into the harbor.

3.3.3.3 Conclusion – Alternative 3A Eliminated

Alternative 3A was eliminated from further consideration because of the significant marine resource and harbor navigation impacts, and an equivalent level of safety could be achieved with substantially less environmental impacts. It is unlikely a permit for work in the navigation channel and other marine resource areas could be obtained if another alternative has fewer impacts (see Section 1.3.3 in Attachment D for additional details).

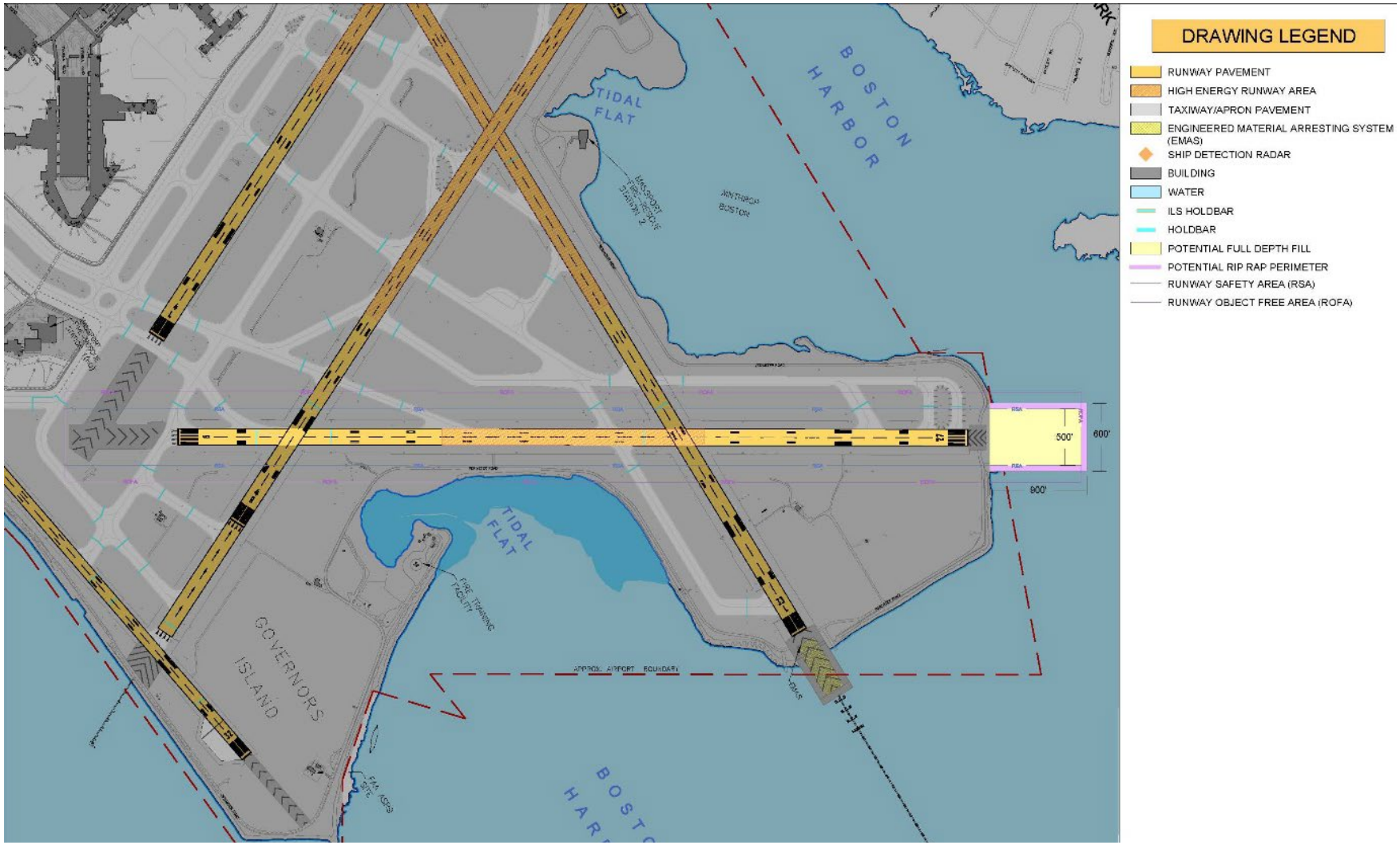


Figure 3-3 Alternative 3A – Full RSA in Boston Harbor, Fill Option

3.3.4 Alternative 3B - Full RSA in Boston Harbor, Deck Option

3.3.4.1 Description of Alternative 3B

Alternative 3B would extend the length of the existing RSA from 150 feet to 1,000 feet, of which approximately 850 feet would extend into Boston Harbor on a pile-supported deck, creating a flat, graded area free of objects or vegetation (**Figure 3-4**). This would provide a fully compliant, full dimension RSA for both overrun and undershoot. While minimizing the fill associated with Alternative 3A, the deck would create approximately 425,000 square feet (nearly 10 acres) of water sheet coverage, and require riprap along the bank and an extensive number of piling and/or caissons for deck structural support. Alternative 3B would maintain the full 7,001 feet of runway length for arrivals and departures on Runway 27 and for departures on Runway 9. This alternative would not require the relocation of the existing threshold, runway lights, signs, or existing perimeter road.

3.3.4.2 Results of Alternative 3B Screening

Alternative 3B would provide overrun and undershoot protection consistent with the FAA design criteria and would preserve airfield utility and efficiency, as well as the perimeter road. It would not affect the runway injunctions. However, the FAA and Massport determined that this alternative would be unacceptable for the following reasons:

- Due to impacts to the navigation channel, it is unlikely permits could be obtained for this alternative under the Rivers and Harbors Act.
- While this alternative would have less environmental impact than Alternative 3A because the footprint of pilings and/or drilled shafts for deck structural support would be less than the footprint of solid fill for the entire RSA, the water sheet coverage and impact area would still extend over nearly 10 acres. As noted in Sections 3.3.5 and 3.3.6, other alternatives that meets the Project purpose and need would have fewer environmental and navigation impacts. This alternative would have permanent and construction impacts to marine intertidal and subtidal areas (collectively tidelands), shellfish habitat, finfish habitat, terrestrial and marine threatened and endangered species habitat, and coastal floodplain. This alternative would likely impact the armored shoreline supporting blue mussels and nearshore subtidal areas supporting softshell clam, razor clams, surf clams, and European oysters, due to construction into the harbor.

3.3.4.3 Conclusion – Alternative 3B Eliminated

Alternative 3B was eliminated from further consideration because of the significant marine resource and harbor navigation impacts and the fact that an equivalent level of safety could be achieved with significantly reduced environmental impacts. Although Alternative 3B would meet the Project purpose and need, it would have the second largest environmental impact of the alternatives considered of those that meet the Project purpose and need. It is unlikely a permit for work in the navigation channel and other marine resource areas could be obtained because other alternatives would have fewer impacts (see Section 1.3.3 in Attachment D for additional details).

Figure 3-4 Alternative 3B – Full RSA in Boston Harbor, Deck Option

3.3.5 Alternative 4A – EMAS on 500-Foot-Wide Deck

3.3.5.1 Description of Alternative 4A

Alternative 4A extends the length of the existing RSA from 150 feet to a maximum of 650 feet, with a 500-foot-wide deck (**Figure 3-5**). The EMAS would be 600 feet long and 300 feet wide and would be constructed with setback distance as determined during the EMAS design (50 feet setback assumed in the RIM/Runway 9-27 RSA Alternatives Study in Attachment D). This alternative complies with FAA's RSA undershoot requirements. As discussed in Section 2.5, the RIM/Runway 9-27 RSA Alternatives Study assumed the Alternative 4A EMAS bed is similar to the length and width of the Runway 33L EMAS. The 600-foot EMAS bed is approximate and corresponds to the FAA minimum RSA length for undershoot purposes, and the RSA cannot be less than this length independent of the EMAS requirements.

The final deck and EMAS design and dimensions will be confirmed during future design, using an updated fleet mix and the proprietary model. This alternative's EMAS system would be partially supported on land, and an approximately 500-foot long by 500-foot wide deck structure. The deck would start 150 feet east of the Runway 27 threshold and extend 500 feet into Boston Harbor, resulting in a surface area of 325,000 square feet, of which 250,000 square feet (approximately 6 acres) would be over the harbor. The deck would be supported by pilings or caissons. The perimeter road would be realigned such that it is relocated so it is between the Runway 27 threshold and the beginning of the EMAS bed.

3.3.5.2 Results of Alternative 4A Screening

Alternative 4A would meet the FAA's RSA design requirements for an EMAS bed and a standard RSA, preserve airfield efficiency and utility, and not affect the runway injunctions. The perimeter road would be realigned to be located in front of the EMAS bed. The FAA and Massport determined Alternative 4A would not advance for the following reasons:

- While this alternative would have less environmental impact than Alternatives 3A and 3B with smaller footprints of the deck over Boston Harbor and less impact to the navigation channel, the water sheet coverage and impact area for Alternative 4A would still extend over nearly 6 acres.
- Alternative 4A would likely impact the marine intertidal and subtidal areas (collectively tidelands), shellfish habitat, finfish habitat, terrestrial and marine threatened and endangered species habitat, and coastal floodplain, armored shoreline supporting blue mussels and nearshore subtidal areas supporting softshell clam, razor clams, surf clams, and European oysters, due to construction in the harbor, and these impacts will be greater than Alternative 4B (see Section 3.3.6).

3.3.5.3 Conclusion – Alternative 4A Eliminated

Alternative 4A was eliminated from further consideration because the 500-foot-wide deck has greater navigation channel and environmental impacts compared to Alternative 4B. Alternative 4A complies with FAA design requirements for a standard EMAS, maintains airfield utility and efficiency, retains the perimeter road, and would not affect runway injunctions. It is unlikely a permit for work in the navigation channel and other marine resource areas could be obtained when another alternative would have fewer impacts (Section 1.3.4 in Attachment D for additional details).

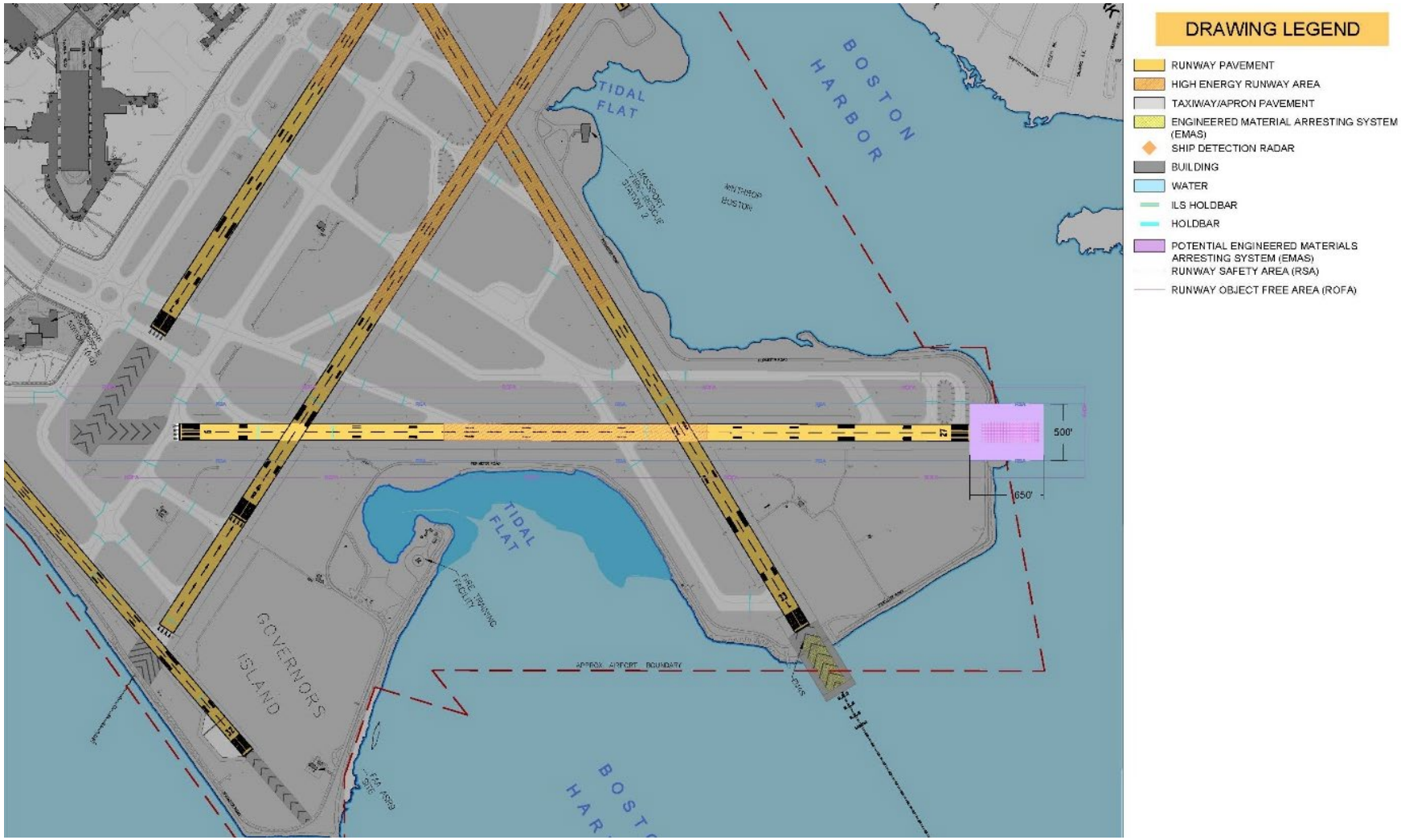


Figure 3-5 Alternative 4A – EMAS on 500-Foot-Wide Deck

3.3.6 Alternative 4B - EMAS on 306-Foot-Wide Deck (Preferred Alternative)

3.3.6.1 Description of Alternative 4B

Alternative 4B would extend the length of the existing RSA from 150 feet up to a maximum of 650 feet, on a 306-foot-wide deck that would incorporate an EMAS bed to provide the highest level of aircraft safety without reducing the operational capability of the airfield while also minimizing environmental impacts **(Figure 3-6)**. The RSA would be constructed with a setback distance as determined/confirmed during the EMAS design as noted in Alternative 4A.

The RSA deck would be supported by pilings and/or caissons starting on land for approximately 150 feet, then extending 450 to 500 feet into the harbor. This will result in a surface area of approximately 198,900 square feet, of which approximately 153,000 square feet (approximately 3.5 acres) would be over the harbor. Based on the Runway 33L end RSA, the EMAS would be approximately 500 feet in length and approximately 170 feet in width, with final dimensions to be confirmed during project design.

The existing perimeter road in this area would be shifted to a position between the end of the Runway 27 and the beginning of the EMAS bed as was done for the Runway 33L RSA.

3.3.6.2 Results of Alternative 4B Screening

The FAA and Massport determined that Alternative 4B would be advanced for further consideration for the following reasons:

- It provides the highest level of aircraft safety, while maintaining airfield utility and efficiency and retaining the perimeter road, with some realignment required.
- Alternative 4B would have fewer harbor impacts than any of the other alternatives that achieve the purpose and need (Alternatives 3A, 3B, and 4A), including impacts to marine resources and the adjacent navigation channel.
- Alternative 4B would likely impact the marine intertidal and subtidal areas (collectively tidelands), shellfish habitat, finfish habitat, terrestrial and marine threatened and endangered species habitat, and coastal floodplain, armored shoreline supporting blue mussels and nearshore subtidal areas supporting softshell clam, razor clams, surf clams, and European oysters, due to construction in the harbor, but has the fewest environmental impacts of the alternatives that extend the RSA into Boston Harbor and still meets the Project purpose and need.
- It would not affect the runway injunctions.

3.3.6.3 Conclusion – Alternative 4B Selected

The FAA and Massport selected Alternative 4B (EMAS on 306-foot-wide deck) as the Preferred Alternative. This alternative was selected because it would provide overrun and undershoot protection and the highest level of aircraft safety, while maintaining the airfield utility and efficiency, and adhering to the runway injunction requirements. It would do so with reduced impacts to environmental resources in Boston Harbor and the navigation channel, compared to the other alternatives that would achieve all of the screening criteria. The deck foundation structure, and dimensions of the EMAS bed would be determined in future design.

3.3.7 No-Build Alternative

Both the MEPA and NEPA environmental review processes require the Preferred Alternative be compared to the No-Build Alternative (No-Build) (**Figure 3-7**). The No-Build Alternative assumes Runway 9-27 RSA enhancements to safety would not be made. The No-Build Alternative would have no effect on airfield utility and efficiency, the perimeter road, or runway injunctions. It would avoid environmental impacts and impacts to the navigation channel.

As required by MEPA, a No-Build Alternative is used as the baseline against which to evaluate the environmental impacts of the alternatives carried forward for analysis in the DEIR and NEPA process. In accordance with the requirements of MEPA, this alternative is retained for further analysis for comparative purposes only within the environmental review process. Although the No-Build Alternative does not impact the environment, this alternative does not address the primary safety purpose and need of the Project.

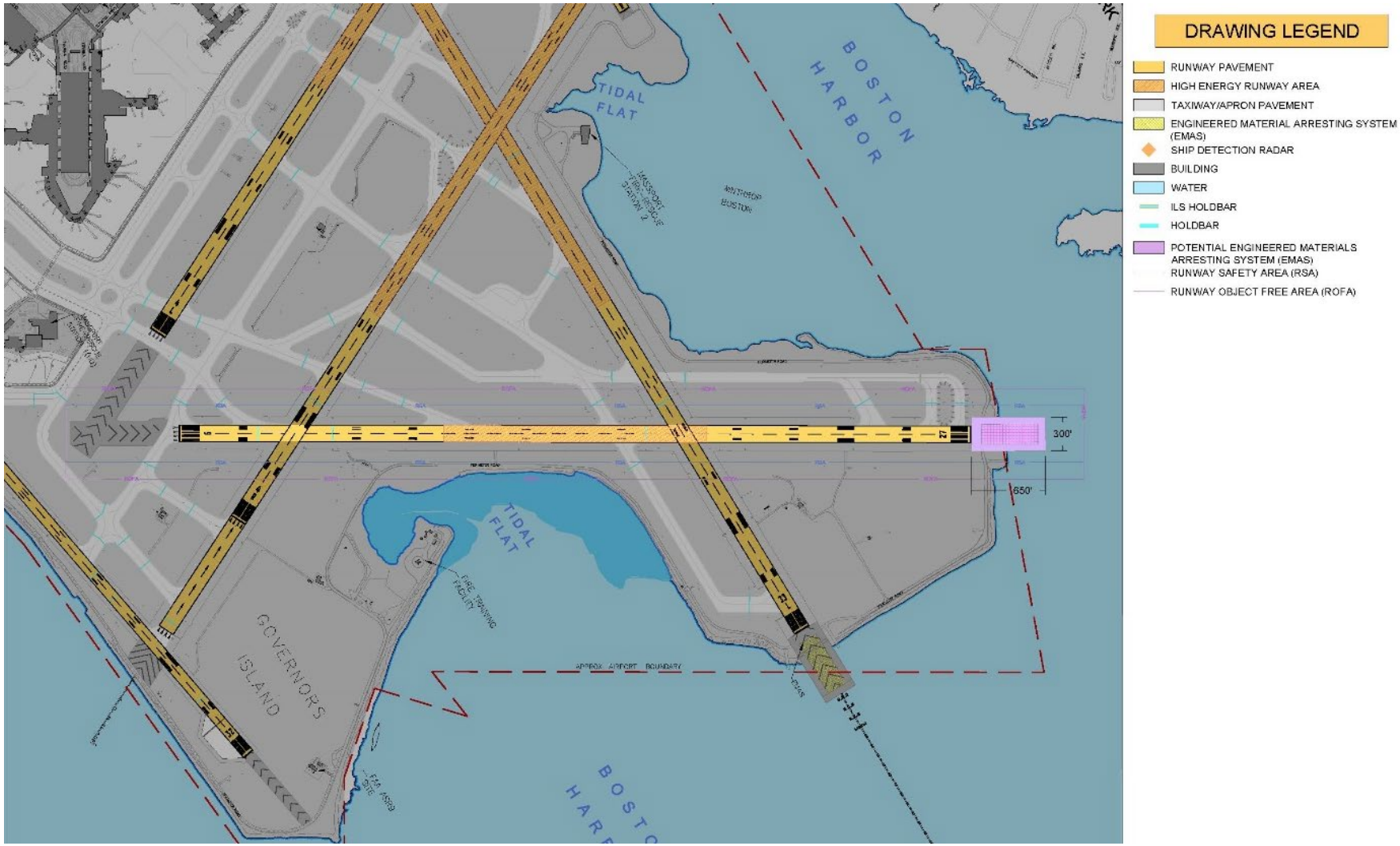


Figure 3-6 Alternative 4B – EMAS on 306-Foot-Wide Deck (Preferred Alternative)

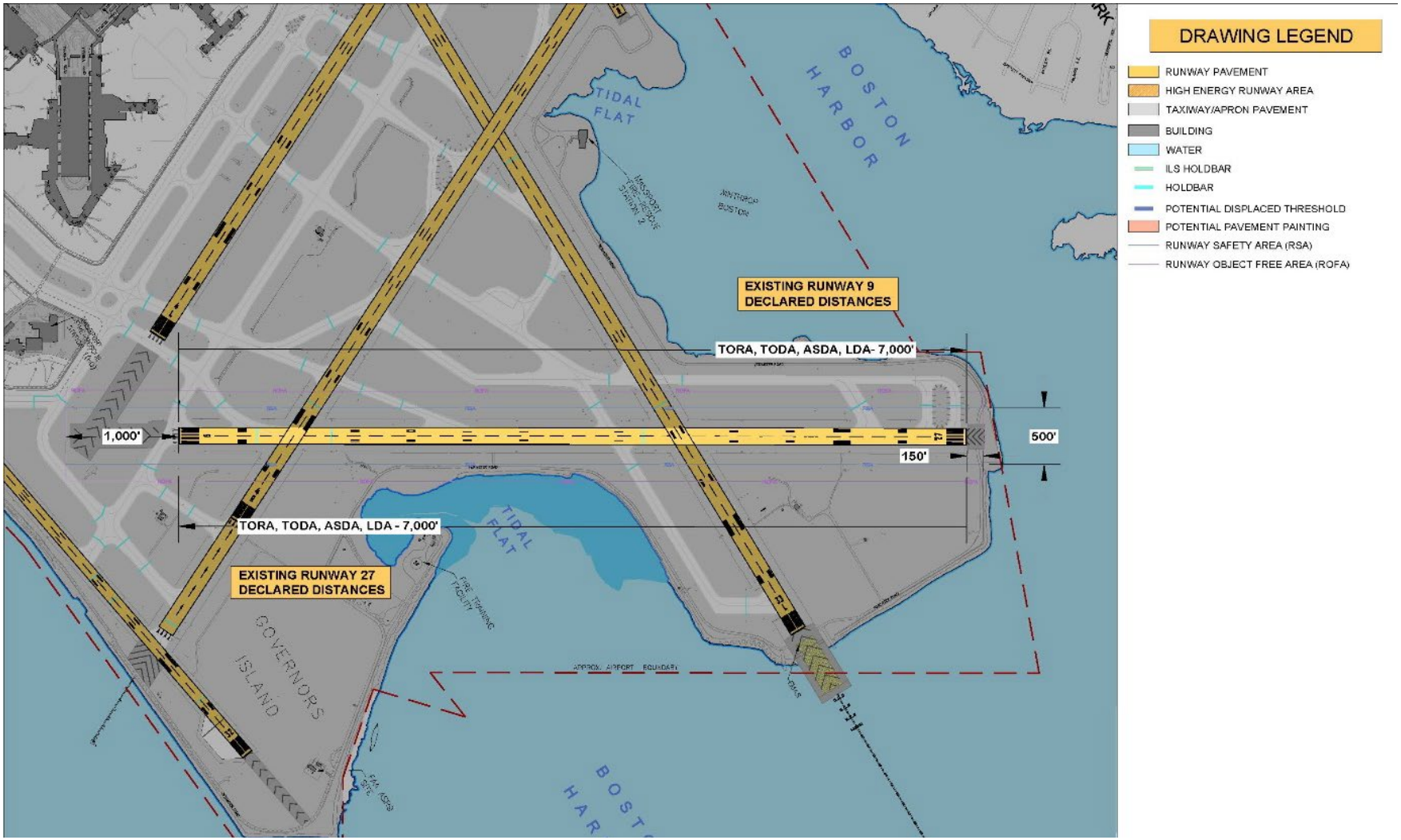


Figure 3-7 No-Build Alternative

3.4 Summary of Runway 27 End RSA Alternatives Analysis

This section summarizes the results of the analysis of the RSA build alternatives. Five Runway 27 End RSA improvement alternatives have been considered and dismissed from further review as they either (1) don't meet the project purpose and need or (2) have greater impacts than the Preferred Alternative (Alternative 4B). Accordingly, the following alternatives are not planned to be advanced in the DEIR:

- **Alternative 1**: Declared Distances
- **Alternative 2**: Displaced Threshold Markings
- **Alternative 3A**: Full RSA in Boston Harbor, Fill Option
- **Alternative 3B**: Full RSA in Boston Harbor, Deck Option
- **Alternative 4A**: EMAS on 500-Foot-Wide Deck

The Preferred Alternative, Alternative 4B, will advance for further evaluation by the FAA and Massport and will be subject to detailed analysis in the DEIR. In accordance with the requirements of MEPA, the Runway 9-27 No-Build Alternative will be advanced for comparative purposes within the ensuing environmental review process.

Alternative 4B (EMAS on 306-foot-wide deck) was selected because it would provide overrun and undershoot protection consistent with the FAA design criteria and the highest level of aircraft safety, while maintaining the airfield utility and efficiency, and adhering to the runway injunction requirements. It would do so with reduced impacts to environmental resources in Boston Harbor and the navigation channel, compared to the other alternatives that would provide overrun and undershoot protection consistent with the FAA design criteria.

3.5 Proposed Deck Support Alternatives and Evaluation Process

The analysis described in the prior sections documents the selection by the FAA and Massport of Alternative 4B, EMAS on 306-foot-wide deck, as the Preferred Alternative. As described in Chapter 2, *Project Purpose and Need*, as design proceeds, the deck length needs to be confirmed and the foundation design of the deck will need to be determined, as will the size and configuration of the EMAS bed. Based on the construction of the Runway33L deck and associated EMAS bed and requirements for rescue vehicle maneuvering, it is anticipated that the length from the runway threshold will not exceed 650 feet. Consideration will be given to wave/storm stability, tidal action and scouring and requirements for a 75-year design life. This section identifies alternatives for supporting the deck that will be evaluated in the DEIR and NEPA process in an effort to select the least damaging practicable alternative for the deck support system. The dimensions and form of EMAS bed will be calculated by the EMAS manufacturer based on the anticipated aircraft fleet mix and runway use.

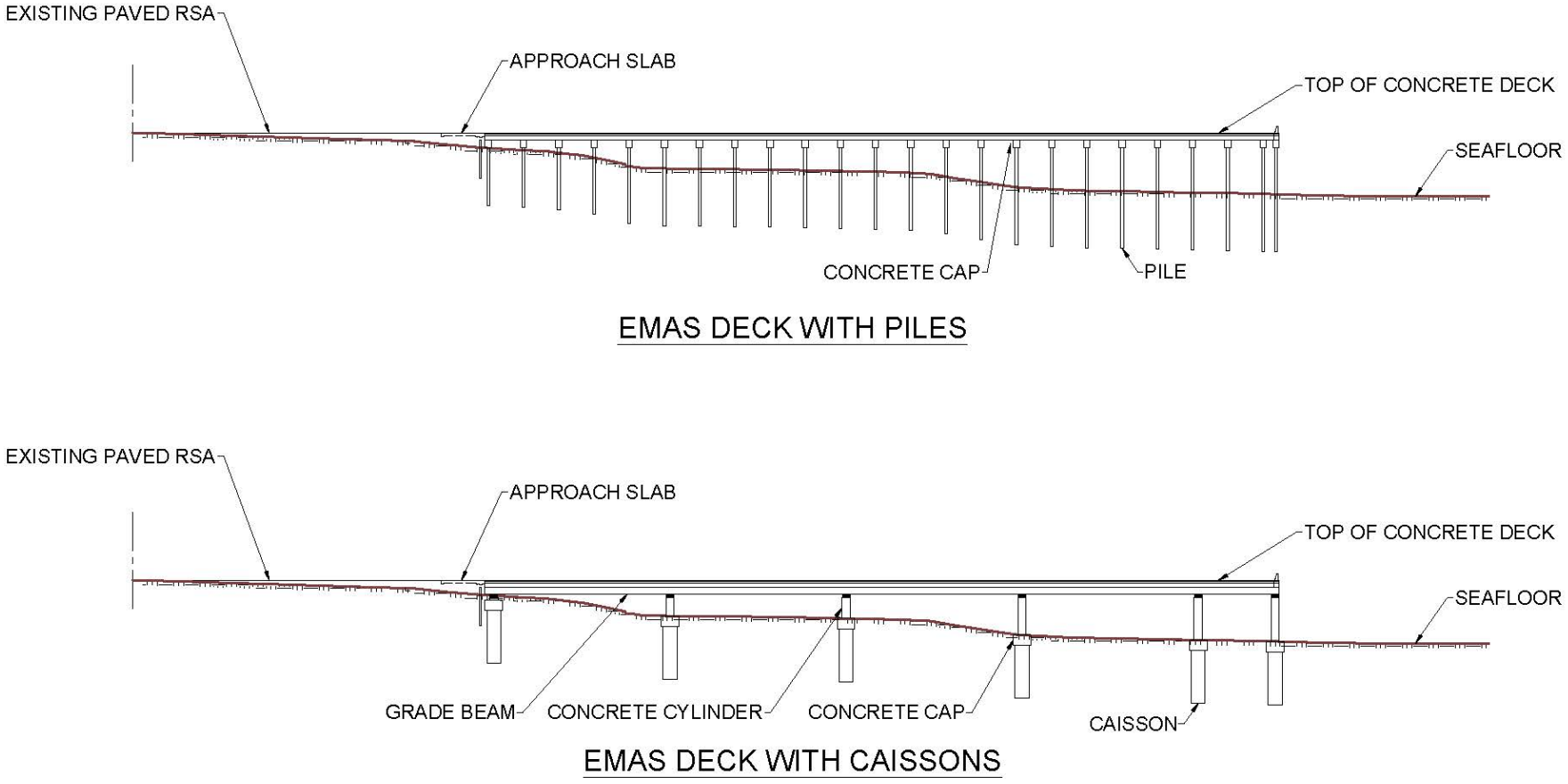
3.5.1 Development of Deck Support Alternatives

Alternatives for supporting the deck (the deck "substructure") will be developed and presented in the DEIR. Any substructure alternative must be structurally sufficient to support the deck, the EMAS, an aircraft, and emergency vehicles. The substructure must also be designed to withstand the most severe anticipated coastal storm events and sea level rise.

Factors that may differ among the deck support alternatives are number, size, and spacing (span) of the supporting elements. The supporting elements are the vertical columns on which the proposed structure, the RSA deck, is constructed. The two primary types of supporting elements are piles and caissons (also referred to as drilled shafts). Piles are long, typically circular or square elements of between 12 to 36 inches in diameter or width. They are made from precast concrete or steel, are transported to the construction site, and are driven into the ground using vibration or impact (pile driving). Caissons are typically, but not always, much larger (circular and 3 to 12 feet in diameter) and are typically constructed on the project site; a hole is drilled into the bedrock into which structural steel and concrete is cast or placed. Once the borehole reaches the required depth, a steel reinforcing cage is lowered into the borehole and concrete is pumped into the hole, creating a column that can then be used to support a structure, such as the RSA deck. The number and spacing of the supporting elements are dependent on the structural load they must support and the size and strength of the individual elements. For example, the RSA deck could be supported by many small diameter piles spaced close together or by fewer, larger diameter caissons spaced farther apart, as illustrated in **Figure 3-8**.

In developing the deck substructure alternatives, consideration will also be given to constructability issues, including minimizing runway closures, airfield disruptions, and construction impacts to environmental resources, surrounding neighborhoods, and the navigation channel.

Figure 3-8. Examples of Potential Substructure Supporting Elements (Not to Scale)



3.5.2 Evaluation of Deck Support Alternatives

The analysis of deck support alternatives will focus on short-term construction and permanent environmental impacts, and constructability considerations.

The differing substructure and deck arrangements could vary in their impact to the environment based primarily on the number and size of the piles or caissons. These elements could result in temporary construction and permanent impacts to the environmental resources present within the footprint of the deck and the surrounding area. These resources are identified and discussed in Chapter 4, *Environmental Resources, Impacts and Permits Required*, and include marine intertidal and subtidal areas (collectively tidelands), shellfish habitat, finfish habitat, terrestrial and marine threatened and endangered species habitat, and coastal floodplain.

The deck substructural supporting elements in the water column may also alter the flow of water, which could result in scour along the bases of the piles or caissons. It is also possible that other structural elements, such as the deck, may have some impact to the water column, depending upon the slope and/or depth of the superstructure supporting the deck above the piles or caissons. The DEIR will evaluate and report the following impacts for the deck support alternatives:

- **Wetland Resource Area Impacts**. For each deck support alternative, permanent impacts to wetland resource areas will be calculated; these include the footprint of the piles or caissons and impact to the seabed, and shading created by the deck within each resource area. The total area of the seabed or intertidal area that would be disturbed by the piles or caissons within each wetland resource area will be identified. It should be noted the shaded area (i.e., total deck area) of each of the deck support alternatives may be different since each deck support has different configurations. Studies following the construction of the Runway 33L RSA did document a benefit to mussels from shading.
- **Water Flow and Scour Impacts.** The impact of the substructure support elements to the water flow, and thereby potential for scour will be evaluated. Environmental effects such as the pilings influence on current speed and direction, sediment dispersion, and scour will be determined based on existing data collected at the site and hydrodynamic modeling. The modeling will use bathymetry and topography data to analyze three-dimensional changes in the current flow, which will be used to calculate predicted scour depth, length, and volume.

3.5.3 EMAS Bed Alternatives

Massport is currently working with an EMAS manufacturer to determine the length and configuration of the EMAS bed and blocks, based on the critical design aircraft and other design factors. The final length of the EMAS bed will in turn determine the length of the deck; however, the deck is not expected to exceed 650 feet. This will be further described in the DEIR.

4 Environmental Resources, Impacts, and Permits Required

This chapter describes the existing environmental conditions at the end of Runway 27, and identifies environmental resources that could be potentially affected by, and those not affected by, the proposed Runway 27 End RSA improvements for the proposed Project. An initial discussion of resiliency issues and project design elements in consideration of sea level rise are presented in Section 4.4. This chapter also identifies future technical studies and regulatory permits anticipated for the Project. This chapter provides an outline for future technical studies.

The DEIR and NEPA review process will identify opportunities for mitigation of any unavoidable permanent and temporary construction impacts to each resource. This will form the basis for the Draft Section 61 Findings as required by MEPA and the FAA's findings under NEPA.

4.1 Existing Conditions

Construction of proposed RSA improvements will involve work in upland and marine resource areas. Existing conditions and environmental resources within, and in the vicinity of, the Project Area are described, as are the research and surveys conducted to document the presence of those resources.

The proposed Project Area is at the eastern end of Runway 9-27 (**Figure 1-1**). The Project Area extends easterly into Boston Harbor within the City of Boston. The upland areas have a flat topography characterized as maintained airfield grasses interspersed by paved runways, taxiways, and a perimeter roadway. Numerous aircraft navigational aids, including small buildings, antennas, lights, and other equipment, exist within the maintained grass areas along the runway and taxiways, many with paved access paths or driveways. The proposed limits of work of the Project are depicted in **Figure 4-1**.

The eastern end of Runway 27 extends on a peninsula into Boston Harbor with the high tide line approximately 200 feet from the runway threshold (see **Figure 4-1**). The shoreline at this runway end is configured as an Inclined Safety Area (ISA) and is armored with crushed stone and along the perimeter, a stone-filled geogrid mattress. The slope of the shoreline is as steep as 5:1 but generally has a gentler slope. Constructed in the early

1990s, the ISA ends at the mean low water (MLW) line.[1] Bathymetry beyond the MLW is fairly consistent along the eastern shoreline adjacent to the Project Area. From MLW, the seabed consists of smooth sandy mud or mud sediment that gently slopes down 4 feet over approximately 170 feet, followed by a short steep drop of six feet in 30 feet and then gently slopes down again 5 feet in 170 feet to the limit of the proposed RSA deck. The seabed surface is relatively flat north to south with no observed features (such as ledge, rocks, or rocky areas). The land elevations range from approximately 15.7 feet[2] at the runway threshold to -22 feet at the northeastern corner of the proposed RSA. Water depths are 0 feet at MLW to approximately 17 feet deep at the end of the proposed Runway 27 End RSA improvements.

The marine waters within the Project Area are federally regulated Navigable Waters of the U.S. which includes tidal waters subject to the ebb and flow of the tide shoreward to the mean high water (MHW) line. These waters are subject to Section 10 of the Rivers and Harbors Act of 1899, and Section 404 of the U.S. Clean Water Act.

Portions of the proposed Runway 27 End RSA improvements will also occur within state regulated resource areas including Land Subject to Tidal Action and Land Subject to Coastal Storm Flowage, Coastal Beach, Land Containing Shellfish, and Land Under the Ocean (**Figure 4** of ENF Form and **Figure 4-2**), as defined by the Massachusetts Wetlands Protection Act (WPA) regulations (310 CMR 10.00 et seq.). A regulated buffer zone extends 100 feet landward from the upper limit of Coastal Beach.

The forthcoming DEIR and NEPA review document will identify and map all wetland resource areas by type, including adjacent off-site wetlands potentially affected by the Project. The resource maps will include information on wetlands subject to federal and state jurisdiction and will be accompanied by a narrative description of each wetland resource area identifying the significance of its resource values. This detailed mapping will form the basis for assessing the environmental consequences of the proposed Project.

1 Mean Low Water is the average of all the low water heights observed over the 19-year National Tidal Datum Epoch (1983 to 2001).
2 The datum used for this project is North American Vertical Datum (NAVD) 1988.

FIGURE 4-1: Overall Project Area **Runway 27 End RSA Improvements Project**

Proposed Limits of Work

0 250 500 1000 Feet

Sources: WSP, Nearmap Imagery March 2021

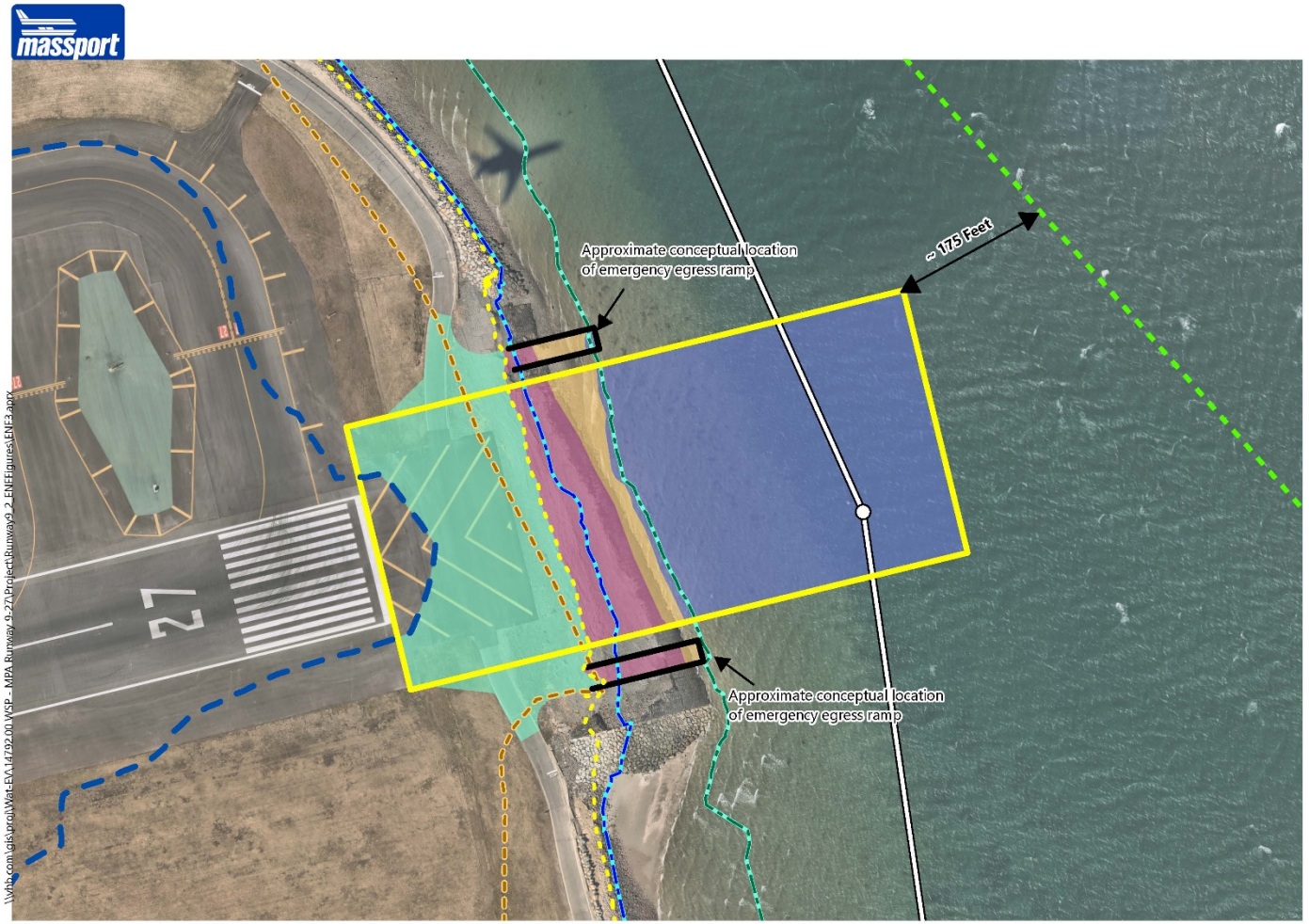


FIGURE 4-2: Resource Areas within Preliminary Project Footprint **Runway 27 End RSA Improvements Project**

4.1.1 Marine Resources

Marine resources in the vicinity of the proposed Project include the shoreline, intertidal, and subtidal areas. These areas support marine plants, algae, fish, shellfish, and invertebrate species. The Project Area was surveyed in spring 2021 to document the presence/absence of intertidal plants, shellfish resources, subtidal eelgrass, and benthic communities. National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) records were accessed to identify fish species with designated essential fish habitat (EFH) in the vicinity of the Project Area and Boston Harbor.

There are no vegetated intertidal wetlands (salt marsh) present within the Project footprint. An area of salt marsh was identified to the north of the Project Area, approximately 740 feet from the proposed Runway 27 End RSA. Furthermore, although the intertidal zone around the Project Area consists of a man-made rocky substrate, no attached intertidal algae (*Ascophyllum nodosum* or *Fucus vesiculosus*) is present. The Massachusetts Department of Environmental Protection (MassDEP) Seagrass GIS data layers were viewed for known areas of eelgrass in the vicinity of the Project Area. The nearest mapped eelgrass beds were off Runway 33L, approximately 900 feet south of the Project Area. Since eelgrass beds were known to be in the vicinity of the Project Area, a side scan sonar and underwater video survey of the Project Area was conducted to determine if eelgrass would be impacted by the proposed RSA deck. Based on video transects conducted in June 2021, there is no eelgrass (*Zostera marina*) within or immediately adjacent to the proposed Project footprint.

4.1.1.1 Benthic Communities

A survey of benthic communities on June 10, 2021 included side scan sonar, a video survey of the seabed, and bottom sediment grab samples to collect benthic invertebrates. Bottom sediment samples off the end of Runway 27, collected in April 2021, were used to characterize the seabed sediment for the future engineering design and scour analysis. In general, the seabed sediment in deeper waters consists of silt/clay sediment, while the area in shallower waters contains some sand.

Figure 4-3 Benthic Grab Sampler

Methodology

The benthic survey consisted of taking four bottom grab samples of sediment (B27-1, B27-2. B27-3, and B27-4) from a research vessel within the footprint of the proposed Project (See **Figure 4-3** and **4-4**). The bottom samples were collected with a Ted Young modified VanVeen grab. The grab collected 0.04 square meters of bottom surface. All samples were collected in the subtidal area, within the footprint of the proposed Project. Station B27-4 was located slightly inshore of the other samples in an area that is exposed during extreme low water events.

FIGURE 4-4: Benthic and Shellfish Sample Locations

Runway 27 End RSA Improvements Project

Project Area
Mussel Bed Location
Benthic Samples
Shellfish Survey Location

0 125 250 500 Feet

Sources: VHB 2021, ESRI, Nearmap Imagery March 2021

The collected sediment samples were sieved on the boat with pumped seawater and a 0.5 millimeter brass sieve to remove the mud and fine sand from the sample and retain any invertebrates or other benthic animals. The sieved material was then placed in separate labeled jars and preserved with 70 percent ethyl alcohol. A wooden tongue depressor with the station number written in pencil was also placed in the jar with the sample. The collected samples were returned to the office and sorted using a binocular dissecting microscope to separate the invertebrates from the sediment or plant debris. The separated animals were then identified to the family level, if possible. The collected animals were kept in 70 percent ethyl alcohol.

Findings

The Station B27-1, B27-2, and B27-3 exhibited a mud sediment with a thin (centimeter) oxidized layer of light gray mud on the surface and black reduced mud below. When sieved, the collected material was mostly fragments of decomposed saltmarsh grasses. Station B27-4 was the shallower station and had a higher sand content with a light brown oxidized layer over black reduced sandy mud. When sieved, the retained material was mostly coarser sand and worm tubes. Most of the collected sediment easily washed through the sieve and only a small percentage of the overall grab volume of benthic organisms and other debris was retained. The findings of sorting of the collected invertebrates will be provided in the forthcoming DEIR and NEPA review document, along with a discussion of the potential impacts to the benthic community associated with the proposed Project.

4.1.1.2 Shellfish

The Runway 27 End is within the Massachusetts Division of Marine Fisheries (DMF) Conditionally Restricted shellfish growing areas GBH5.2 and GBH5.3 and Restricted growing area GBH5.0. An intertidal shellfish survey was conducted on April 29, 2021 during an extremely low tide event (-7.3 feet).

Methodology

A shellfish survey of the Project Area was conducted during an extreme low tidal event that exposed a broad sand flat below MLW which is normally submerged. The shellfish sampling was primarily intended to evaluate the Project Area for the presence of a soft shell clam (*Mya arenaria*) population, an important commercial species. MLW is at the base of the existing shoreline stabilization stone and riprap, and the armored intertidal area above MLW is not suitable for soft shell clams. Sampling for shellfish was conducted within the exposed sand flat using a 0.25 meter^2 polyvinylchloride pipe quadrat (50 centimeters on a side). The first 2 to 3 centimeters of the quadrat was collected separately and sieved through screening for seed clams that may be present. The next 6 to 8 inches within the quadrat was collected for larger or adult specimens. The collected sediment was sieved through 0.25-inch mesh to separate any shellfish or other animals. Four sampling sites were inspected, one on either side of the proposed Project and two within the footprint of the Project Area (**Figure 4-4**). The rocky shoreline was also visually inspected for the presence of blue mussels (*Mytilus edulis*), also a valuable commercial species. Blue mussels attach to the surface of hard surfaces within the intertidal area so could be present within the armored shoreline.

Coordination was conducted with the DMF to identify shellfish species that may be found in the vicinity of the Project Area. A coordination call occurred on April 23, 2021 with the DMF to discuss the Project and the proposed shellfish sampling program. The DMF noted the flats surrounding Logan Airport provide habitat for

soft shell clams (*Mya arenaria*), razor clams (*Ensis directus*), and blue mussels (*Mytilus edulis*), which are commercially and recreationally important species of shellfish. DMF representatives noted that the survey would likely find a few razor clams, but may not find live specimens of soft shell clams since the clams have been dying off throughout Boston Harbor over the past decade due to disease. DMF representatives noted that there may be some juvenile clams, but the adults would be more likely to have died as a result of the disease. DMF representatives suggested looking for paired clam shells (dead) as clams tend to settle where they spawn in clusters. DMF also suggested selectively collecting the upper centimeter of sediment and look for small post set clams.

The recommendations from DMF were followed in the completion of the shellfish survey. The comments from the DMF were also found to reflect the findings of the shellfish field survey. Very few small soft shell clams were collected. An area of numerous paired adult shells was observed and Station S27-2 was located in the midst of the dead shellfish but only one small soft shell clam was collected.

Impacts to shellfish growing areas will be identified and mitigation (if needed) will be developed in consultation with the DMF. The DEIR and NEPA review document will record this coordination and lessons learned from the Runway 33L RSA deck where an enhancement to blue mussel habitat was reported within several years of construction.

Findings

The shellfish survey identified the presence of soft shell clams and razor clams within the sandy substrate below MLW, but they were present in low numbers off the Runway 27 End (**Table 4-1**). Dead adult soft shell clams were observed in several areas (**Figure 4-5**) including in the vicinity of Station S27-2.

Table 4-1 Results of Shellfish Survey

Station	Number Soft shell Clams	No./Sq. Meter	Number Razor Clams	No./Sq. Meter	Other
S27-1	2 (0.7 and 0.5 cm)	8	2 (5 and 2 cm)	8	■ 1 surf clam (*Spisula solidissima*) (.5 cm) ■ Polychaete worms
S27-2	0	0	0	0	■ 28 hermit crabs (*Pagurus* sp.) ■ 1 shrimp (*Crangon* sp.) ■ Polychaete worms ■ Large adult surf clam nearby
S27-3	1 (0.8 cm)	4	0	0	■ Polychaete worms
S27-4	1 (0.5 cm)	4	0	0	■ Polychaete worms

Source: VHB, April 2021

Blue mussels (*Mytilus edulis*) are also present attached to the armoring rock along the shoreline north of the proposed RSA in a band between low tide and high tide (**Figure 4-4**). Mussels were observed nestled between the rocks above MLW north of the proposed Project. The site will be revisited and investigated in the future in support of the DEIR and NEPA process.

Figure 4-5 Dead Adult Soft Shell Clams

4.1.1.3 Finfish

Finfish are highly mobile and different species can be seasonal residents or full time residents within Boston Harbor. Coastal fish species use Boston Harbor for a variety of life stages including breeding, nursery, feeding, and general habitat. The DMF conducts inshore bottom trawl surveys in the spring and fall in Massachusetts Bay and around the coastal waters of Massachusetts. The results of the 2019 DMF surveys collected 58 finfish species in the spring and 69 species in the fall and overall collected 77 different species. These included sharks, rays, and squid. None of the DMF trawl sampling stations are conducted within Boston Harbor but several stations are offshore in Massachusetts Bay. These surveys are trawls primarily collecting ground fish and not designed to collect pelagic fish although some pelagic species were collected. Although no trawl sampling was conducted within Boston Harbor, it is likely many of these species periodically migrate in and out of Boston Harbor, or use Boston Harbor for breeding, nursery and feeding. The sandy/muddy substrate habitat at the Project Area and the associated benthic invertebrates could support suitable habitat for these finfish species. The video survey for eelgrass (discussed below) although not intended as a survey for finfish species, did capture photographs of juvenile winter flounder (*Pleuronectes americanus*), juvenile longhorn sculpin (*Myoxocephalus octodecimspinosus*), northern pipefish (*Syngnathus fuscus*), winter skate (*Raja ocellatus*), and an unidentified juvenile blenny-like fish.

In conformance with the 1996 amendments to the Magnuson -Stevens Fishery Management and Conservation Act, NOAA Fisheries has designated EFH within marine, estuarine, and freshwaters of the U.S. that includes Boston Harbor. Designated EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Based on the NOAA Fisheries EFH Mapper program[3], within Boston Harbor, EFH has been designated for one or more life stages of 27 species. **Table 4-2** lists the 26 finfish and one shellfish species with supporting habitat for one or more life stages in Boston Harbor.

All but three of the EFH species were collected by the DMF trawl survey. Two of the species not collected in the DMF trawl survey were pelagic species (Bluefin tuna and White shark) and the ground fish, Atlantic wolffish.

The Project Area is also within a designated Habitat Area of Particular Concern (HAPC) for juvenile Atlantic cod, which is a subset of the designated EFH for Atlantic cod. The HAPC extends from the Maine/Canadian border to the Rhode Island/Connecticut border from 0 to 20 meters from MLW and includes all of Boston Harbor. The HAPC recognizes the importance of rocky bottom inshore areas for juvenile Atlantic cod, for feeding opportunities on benthic invertebrates, and protection from predators. The Project Area does not

3 NOAA Essential Fish Habitat Mapper Web Site (https://www.habitat.noaa.gov/application/efhmapper/index.html); Data Query Tool (Accessed July 8, 2021)

support a rocky substrate but is habitat to benthic invertebrates that could provide feeding opportunity for several EFH species.

Only three of the EFH species were not collected by the DMF during its spring/fall groundfish survey, including White shark, Bluefin tuna, and Atlantic wolffish.

Table 4-2 Essential Fish Habitat List of Species and Life Stages

Common Name	Scientific Name	Life Stages
Atlantic wolffish	*Anarhichas lupus*	Eggs, Larvae, Juvenile, Adult
haddock	*Melanogrammus aeglefinus*	Juvenile
winter flounder	*Pseudopleuronectes americanus*	Eggs, Larvae, Juvenile, Adult
little skate	*Leucoraja erinacea*	Juvenile, Adult
ocean pout	*Macrozoarces americanus*	Eggs, Juvenile, Adult
Atlantic sea herring	*Clupea harengus*	Larvae, Juvenile, Adult
Atlantic cod	*Gadus morhua*	Eggs, Larvae, Juvenile, Adult
Pollock	*Pollachius virens*	Eggs, Larvae, Juvenile
red hake	*Urophycis chuss*	Eggs, Larvae, Juvenile, Adult
silver hake	*Merluccius bilinearis*	Eggs, Larvae, Adult
yellowtail flounder	*Pleuronectes ferruginea*	Eggs, Larvae, Juvenile, Adult
white hake	*Urophycis tenuis*	Eggs, Larvae, Juvenile, Adult
windowpane flounder	*Scopthalmus aquosus*	Eggs, Larvae, Juvenile, Adult
winter skate	*Leucoraja ocellata*	Juvenile, Adult
American plaice	*Hippoglossoides platessoides*	Eggs, Larvae, Juvenile, Adult
Thorny skate	*Amblyraja radiata*	Juvenile
Bluefin tuna	*Thunnus thynnus*	Adult
White shark	*Carcharodon carcharias*	Juvenile, Adult
Northern shortfin squid	*Illex illecebrosus*	Adult
Longfin inshore squid	*Loligo pealei*	Juvenile, Adult
Atlantic mackerel	*Scomber scombrus*	Eggs, Larvae, Juvenile, Adult
Bluefish	*Pomatomus saltatrix*	Juvenile, Adult
Atlantic butterfish	*Peprilus triacanthus*	Eggs, Larvae, Adult
Spine dogfish	*Squalus acanthias*	Sub Adult Females, Adult
Atlantic surfclam	*Spisula solidissima*	Juvenile, Adult
Scup	*Stenotomus chrysops*	Juvenile, Adult
black sea bass	*Centropristis striata*	Adult

Source: NOAA Essential Fish Habitat Mapper Web Site (https://www.habitat.noaa.gov/application/efhmapper/index.html); Data Query Tool (Accessed July 8, 2021)

4.1.1.4 Eelgrass

Areas of eelgrass (*Zostra marina)* (submerged aquatic vegetation or SAV) have been mapped by MassDEP to the south beyond the Project Area, off the end of Runway 33L.

Methodology

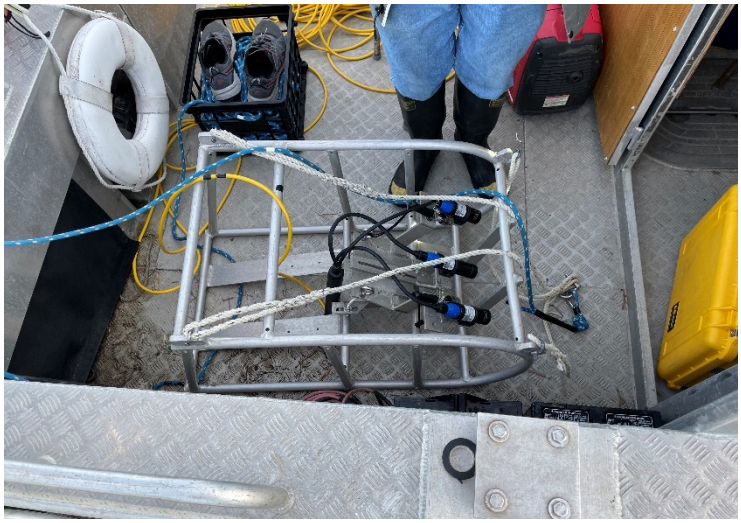


Figure 4-6 Seabed Video Camera Sled

A survey was conducted by the project team on June 10, 2021 to determine if eelgrass was present within the Project Area and included the use of side scan sonar and underwater video to determine if any SAV is present within the Runway 27 Project Area. The entire Project Area was first scanned with a Humminbird™ side scan sonar to determine if any eelgrass signature could be identified on the seabed. Composite views of the output tracks from the Humminbird™ Side Scan Sonar of the Project Area is provided in Attachment F (*Eelgrass Survey Report Runway 9-27 Safety Area Logan International Airport, Boston, Massachusetts*, by CR Environmental Inc.). Several areas on the seabed were identified as potential locations for eelgrass. Once the sonar scan of the Project Area was complete, a video sled was deployed with lights, a video camera, and a GoPro™ camera to document the conditions of the seabed (**Figure 4-6**). The video camera and lights were linked by a data cable to the research vessel with a live video feed displayed on board. The GoPro™ camera was set to periodically take still pictures. The sled was lowered into the water offshore of the Project Area, and wind and currents allowed the vessel to drift toward shore during the filming. Each drift track lasted 5 to 10 minutes. When the water became too shallow for the research vessel, the sled was recovered aboard the vessel, the vessel was repositioned offshore and the video sled redeployed on the new track. Twelve video tracks (**Figure 4-7**) were taken and reviewed for the presence of eelgrass. The video tracks were specifically aligned to observe the side scan sonar of potential eelgrass signatures that had been previously identified.

Findings

The vast majority of the video tracks within the proposed Project showed no evidence of eelgrass. Several photos were taken as screen shots from the video or by the GoPro™ camera that appeared to be blades of eelgrass (see Attachment F - Eelgrass Survey Report Plates: TR-8, Photos C and D; TR-9 Photo D; TR-10 Photo F; TR-11 Photos C and D; and TR-12 Photo D). However, all were determined to be dead leaves lying on the seabed and were not rooted.

As part of the survey, the video did identify the presence of numerous clusters of solitary tunicates or sea squirts (*Styela* sp. or *Mogula* sp.). Although solitary, they were clustered and attached to live or dead shells of European oysters (*Ostera edulis*). The oysters were observed to be well distributed in small clusters of several individuals throughout the Project Area. Several large clusters of brown kelp (*Saccharina latissimi*) were

encountered and also attached to large shells. On several occasions, the video sled was pulled off the bottom to clear the kelp from the equipment.

Other video observations were the presence of numerous spider crabs (*Libinia* sp.), green crabs (*Carcinus maenas*), rock crabs (*Cancer* sp.), several juvenile flounder and other fish species, and swarms of swimming Mysids, a small shrimplike species.

Review of the survey results will be coordinated with the DMF and the conclusions of that coordination will be presented in the DEIR and NEPA review document.

4.1.1.5 Marine Protected Species

Massport coordinated with the U.S. Fish and Wildlife Service (USFWS), NOAA Fisheries Service, and the DMF to identify other protected species that may be found in the vicinity of the proposed Project. An April 1, 2021 response from the USFWS stated it does not expect the species and habitats, over which it has jurisdiction, to occur in the area affected by the Project.

The NOAA Fisheries Service is responsible for the protection of sea turtles, marine mammals, and several anadromous fish species, which are federally protected species. Massport will conduct Endangered Species Act, Section 7 consultation, and continue coordination with NOAA Fisheries regarding potential Project impacts. The results of the Section 7 consultation with NOAA Fisheries will be discussed in the DEIR and NEPA review document and will discuss the manner that any special conditions, if any, will be addressed during the construction phase of the RSA improvements.

The responsibility for protected marine species is managed by the Massachusetts Natural Heritage and Endangered Species Program (NHESP). The NHESP has not designated any priority or estimated habitat of protected marine species offshore of Logan Airport. However, Atlantic sturgeon (fish), five sea turtles, and five whales are listed by the NHESP and may occasionally enter Boston Harbor. Massport will continue to coordinate with DMF and NHESP regarding protection of marine species

4.1.1.6 Navigation Channels

The eastern threshold end of Runway 9-27 is within approximately 150 feet of MHW.[4] Based on marine navigation charts,[5] the Project Area is adjacent to marked navigation channels leading to the Winthrop Basin and the entrance to Belle Island Inlet (**Figure 4-2**). The navigation channel extends northwest to southeast offshore of the eastern side of the Airport. The western side of the channel is designated by green buoys (cans) C "1" and C "7" adjacent to the Project Area. The legislated Airport Security Zone extends 500 feet seaward of the top of Bank and includes the entire footprint of the proposed RSA deck. A 250-foot inner Security Zone **(Figure 4-2**) is marked by a series of white buoys surrounding the waterside perimeter of Logan Airport, including the area adjacent to the Runway 27 End RSA.

4 Mean High Water is the average of all the high water heights observed over the 19-year National Tidal Datum Epoch (1983 to 2001).
5 Navigation Chart: 13272, Boston Inner Harbor Edition 55, October 1, 2019.

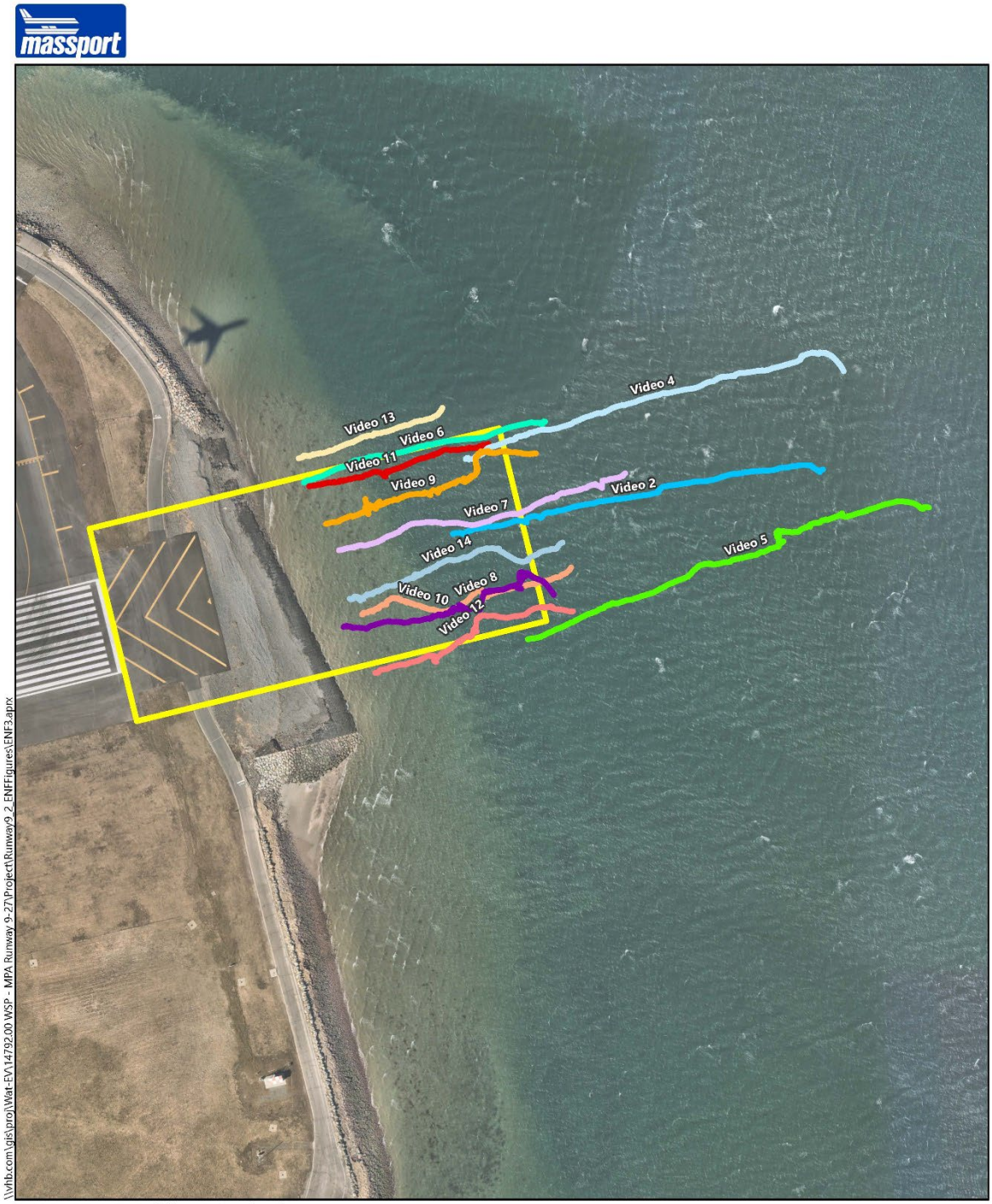


FIGURE 4-7: Video Tracks for Eelgrass Survey (June 10, 2021)

Runway 27 End RSA Improvements Project

4.1.2 Upland Resources

Permanent impact to grass areas of the upland portion of the Project Area are expected to be minimal. The upland portion of the Project Area will primarily be impacted by temporary construction period activities. Some of the upland grassland portions of the Project Area may be permanently impacted by the RSA deck and realignment of the perimeter roadway. The Project Area was surveyed to characterize the habitat and the potential wildlife species that could be impacted. The survey primarily considered habitat and potential impacts to upland sandpiper and eastern meadowlark, two avian species listed by the NHESP as endangered and of special concern, respectively. Portions of the preliminary construction site include grassland areas mapped by NHESP as protected habitat. Massport will strive to have no net loss of protect grassland habitat.

4.1.2.1 Methodology

On April 29, 2021, environmental scientists examined the proposed limits of work and surrounding areas to document habitat conditions and determine the likelihood that either eastern meadowlark or the upland sandpiper may be present. Additionally, visual and auditory observations of bird species were documented for both upland areas and adjacent coastal features.

4.1.2.2 Findings

The areas within the Project Area consist primarily of mowed and maintained grassy areas along the runways, taxiways, and the adjacent perimeter roadway (**Figure 4-1**) that are required to be regularly mowed by FAA regulations. Typical vegetation consists of various grasses and plantain (*Plantago* sp.), Pennsylvania sedge (*Carex pennsylvanica*), clover (*Trifolium* sp.), little bluestem (*Schizachyrium scoparium*), mullein (*Verbascum thapsus*), and dandelion (*Taraxacum officinale*). Small drainage ditches, stormwater management features, signage, and safety lighting systems are within the vegetated areas along the runways. The Project Area is surrounded by coastal features associated with Boston Harbor including rocky shorelines, exposed tidal flats, and off to the northern side of the Project Area, an area of salt marsh dominated by saltmarsh cordgrass (*Spartina alterniflora*) and common reed (*Phragmites australis*). Based on vegetation conditions and surrounding areas, favorable habitat conditions appear to exist for both eastern meadowlark and upland sandpiper along the runway, and within the potential Project Area construction laydown areas, though none were observed during this site investigation. **Table 4-3** lists the avian species seen or heard during the April 29, 2021 site inspection.

Table 4-3 Avian Survey Results

Species Observed (*Scientific Name*)	
Killdeer (*Charadrius vociferus*)	Herring gull (*Larus argentatus*)
Savannah sparrow (*Passerculus sandwichensis*)	Willet (*Tringa semipalmata*)
Horned lark (*Eremophila alpestris*)	Double-crested cormorant (*Phalacrocorax auritus*)
American oystercatcher (*Haematopus palliatus*)	European starling (*Sturnus vulgaris*)
Long-tailed duck (*Clangula hyemalis*)	Red-tailed hawk (*Buteo jamaicensis*)
White-winged scoter (*Melanitta deglandi*)	Fish crow (*Corvus ossifragus*)
Red-winged blackbird (*Agelaius phoeniceus)*	

Source: VHB, April 29, 2021

4.1.3 Protected Species

Review of the 2021 Massachusetts Natural Heritage Atlas indicates there is Priority Habitat (PH 1322) in the Runway 27 Project Area (**Figure 3** in ENF Form). In its letter dated April 23, 2021, NHESP reported the Project Area is within a priority habitat for state-listed protected avian species including: upland sandpiper (*Bartramia longicauda*), which is listed as endangered in Massachusetts, and Eastern meadowlark (*Sturnella magna*), which is listed as special concern. Although NHESP is nearing completion of the revised 2021 Massachusetts Natural Heritage Atlas, a review of the draft maps did not indicate changes within the project footprint. The DEIR will include an updated assessment based on the latest mapping.

According to NHESP:

Eastern Meadowlarks are most common in native grasslands, prairies, and savannah. They prefer moderately tall grasslands with abundant litter cover, a high proportion of grass, moderate to high forb density, and low coverage of woody vegetation. Various types of open habitats are utilized, such as tallgrass prairie, xeric grassland, and cultural grasslands, hayfields, and airports.[6] *The upland sandpiper inhabits large expanses of open grassy uplands, wet meadows, old fields, and pastures. In Massachusetts it is restricted to open expanses of grassy fields, hay fields, and mown grassy strips adjacent to runways and taxiways of airports and military bases.*[7]

Massport will continue coordination for Massachusetts Endangered Species Act with the NHESP to determine if the proposed work, including construction phase activities, would alter NHESP Priority Habitat of a protected species, evaluate the effects on the local population, and determine if a Conservation and Management Permit is required for the proposed work. The DEIR and NEPA review document will also consider potential impacts to the shorebird habitat at and adjacent to the Project Area, and the nearby Snake Island in Winthrop. While the proposed safety improvements will not change runway operations or the type of aircraft that can use Runway 9-27, construction of the RSA has the potential to temporarily disturb shorebird habitat near shore and in the vicinity of the Project Area and at nearby Snake Island. The DEIR and NEPA review document will record this coordination and any potential impacts and construction-phase mitigation.

4.1.4 Community Resources

Based on the updated 2021 Environmental Justice Policy of the Executive Office of Energy an Environmental Affairs,[8] there are environmental justice (EJ) communities present within a one-mile radius of the Project, and wider East Boston and Winthrop neighborhoods in the vicinity of the Project Area beyond the one-mile radius. In particular, within one mile of the Project Area, one census block group in Winthrop and the census block group in East Boston that includes Logan Airport itself meet Massachusetts EJ criteria for minority populations. Beyond the one-mile radius in East Boston and Winthrop, there are block groups that meet Massachusetts EJ criteria for minority, low income, and/or English isolation populations. A more complete demographic analysis will be included in the DEIR, and Massport will continue to coordinate with MEPA and adjacent EJ and non-EJ communities on outreach.

6 https://www.mass.gov/doc/eastern-meadowlark/download
7 https://www.mass.gov/doc/upland-sandpiper/download
8 https://www.mass.gov/doc/environmental-justice-policy6242021-update/download

4.2 Resources Potentially Impacted

The proposed Runway 27 End RSA improvements are expected to have direct or indirect, short - or long-term impacts to coastal and upland resources as described below.

4.2.1 Direct Impacts

The proposed RSA improvements, as described in Chapter 3, *Alternatives Considered*, of this ENF, would require construction within coastal wetland resource areas. Use of a pile-supported (or alternative foundations) deck is proposed to minimize project impacts. Experience with the existing Runway 33L RSA deck has demonstrated there is minimal impact to soft shell clam habitat (primarily the pilings footprint) and the deck presence enhanced the Blue Mussel habitat by reducing exposure to direct sunlight and desiccation during low tide cycles.

The Proposed Action, Alternative 4B, would likely result in impacts to the following coastal wetland resources, intertidal, and benthic community habitat (see **Table 4-4**). These impacts will be confirmed in the DEIR and NEPA review document which will be informed by a higher level of design and greater specificity of deck foundation structure.

- **Land Subject to Tidal Action** – Approximately 38,000 square feet of Land Subject to Tidal Action would be beneath the pile-supported deck. Land Subject to Tidal Action would be lost only where the RSA deck abutment or pilings (or alternative foundations) are installed beneath the deck. This includes the area between MLW and the high tide line (highest predicted tide elevation for the calendar year) and also includes the area of Coastal Beach.
- **Land Subject to Coastal Storm Flowage** – Approximately 64,800 square feet of Land Subject to Coastal Storm Flowage would be altered by the modifications to the runway and the deck approach slab.
- **Coastal Beach** – A narrow rocky beach is present below the constructed geogrid stabilized shoreline. This is above the MLW line and is within Land Subject to Tidal Action. Approximately 10,100 square feet of Coastal Beach will be beneath the RSA deck or altered by the proposed emergency egress ramps.
- **Land Under the Ocean** – Approximately 107,200 square feet of Land Under the Ocean would be beneath the pile-supported deck. Land Under the Ocean would only be lost where pilings (or alternative foundations) are installed beneath the deck.
- **Land Containing Shellfish** – Approximately 117,300 square feet of Land Containing Shellfish would be beneath the pile-supported deck. Land Containing Shellfish would only be lost where pilings (or alternative foundations) are installed. Land Containing Shellfish is also coincident with Coastal Beach and Land Under the Ocean. The structures below the MHW in the future would provide substrate for attached and mobile intertidal and subtidal invertebrates including blue mussels.

Table 4-4 State and Federal Resource Impact Areas

Massachusetts Resource Area	Federal Resource Area	Estimated[1] Area of Impact (sq. ft.)
Land Subject to Tidal Action (includes Coastal Beach)	Navigable Water of the U.S.	38,000
Land Subject to Coastal Storm Flowage	100-year Floodplain	64,800
Coastal Beach	Navigable Water of the U.S.	10,100
Land Under the Ocean	Navigable Water of the U.S.	107,200
Land Containing Shellfish (includes Coastal Beach and Land Under the Ocean)	Navigable Water of the U.S.	117,300

Source: VHB, 2021
1 Based on a design similar to that of Runway 33L. The specific design of the RSA improvements will be provided in the DEIR and impacts will be updated.

- **Navigation Channel –** The proposed RSA would extend beyond the shoreline adjacent to the existing navigation channel. Preliminary analysis has determined the proposed RSA deck would be approximately 175 feet away from the navigation channel at its closest point and would not be expected to adversely affect recreational or commercial boating within this area of Boston Harbor. A detailed analysis will be conducted for the DEIR and as part of the NEPA process.

The DEIR and NEPA review document will confirm quantities for all direct impacts to wetland resources associated with proposed RSA enhancements at the Runway 27 End, including Land Subject to Tidal Action, Land Subject to Coastal Storm Flowage, Land Under the Ocean, and Coastal Beach, and any potential direct impacts to adjacent resources such as Land Containing Shellfish or SAV. Impacts evaluated will include direct impacts from filling, excavation, dredging, installation of structures, and shadowing by structures.

None of these impacts are anticipated to disproportionately impact EJ communities, as these resources are not known to be particularly or disproportionately utilized by such communities. Any potential impacts would be experienced by EJ and non-EJ communities alike and not rise to the level of high and adverse impacts.

4.2.2 Indirect Impacts

The Proposed Action (Alternative 4B) would result in some changes to coastal processes, though substantially less than a FAA standard RSA on a filled structure (Alternative 3A) or the larger pile-supported pier structures initially considered (Alternatives 3B and 4A) and dismissed from further evaluation. Coastal processes include wave action, tidal circulation, erosion, scour, and accretion. Compared to a filled structure, the pile-supported structure would have little to no impact on waves, tidal circulation, and flow. Waves and currents would generally move unimpeded under the pile-supported deck with some reduction in speed due to the presence of the piles. The DEIR and NEPA review document will include a detailed analysis of the preferred pier support structure (number and types of pilings, caissons, etc.). That analysis will include assessment of potential effects on scour and accretion of the harbor bottom and adjacent shoreline.

Changes to coastal processes in the vicinity of the deck could result in indirect impacts to coastal resources and to benthic organisms. There could also be a potential change in productivity of Land Containing Shellfish beneath the deck due to a potential change in the distribution of sediment. If there was a change in sediment depth from scour or accretion, shellfish are able to move vertically within the sediment in response to the tides. Provided the scour or accretion of the sediment was not too sudden, shellfish individuals would be able to adjust their position to adapt to the changing conditions. Shellfish habitat would continue to be available as filter feeders and detritivores would not likely be substantially affected by shadowing of the proposed deck.

Changes to water circulation patterns at the end of Runway 27 will be assessed using a computer model that simulates the currents in the areas around the safety area deck and adjacent areas. The model will be built on previous hydrological model applications to Boston Harbor and calibrated using field measurements of local currents at the end of the runway and sediment-grain-size analysis in the impact area. Patterns of sediment scour and accretion will be calculated from the model, using sediment-grain-size characteristics, wind and tide-induced currents, and bottom velocities to estimate the potential for scour and accretion in the areas around the airport property and adjacent navigation channel. These findings will be documented in the DEIR and NEPA review document.

4.2.3 Navigational Impacts

The proposed RSA deck will extend into Boston Harbor approximately 360 feet beyond MLW. The proposed RSA deck at its closest point to the western edge of the navigation channel is approximately 175 feet outside the limits of the channel. Based on experience with the Runway 33L RSA deck, construction equipment and construction barges for the Project are likely to extend outside the limits of the proposed RSA deck. As planning and design advances, the DEIR will analyze the potential for temporary incursions into the channel during construction. Coordination with the U.S. Coast Guard will be conducted before and during the construction phase of the Project to ensure appropriate navigation lighting and notice to mariners is provided to the boating public. As currently planned, the RSA deck will not be within the navigation channel and lighting will be installed on the RSA deck to properly designate the structure for boaters.

4.2.4 Construction-Period Impacts

Most of the construction activity of the proposed Project will take place from barges in Boston Harbor. Landside improvements would primarily include paving and any associated earthwork and Engineered Materials Arresting System (EMAS) installation.

4.2.4.1 Water Quality

Construction activities such as pile-driving or caisson installation could temporarily affect water quality/suspended sediments in the immediate vicinity of the Project Area. Construction in adjacent upland areas will be managed to minimize short-term increases in suspended solids in the immediate vicinity of the proposed Project. Any construction will follow a comprehensive Soil Erosion and Sediment Control Plan to minimize temporary impacts. Installation of the deck support system will avoid impacts associated with dredging to remove unsuitable substrate materials needed for the fill structure options.

4.2.4.2 Coastal Resources

Coastal resources and benthic organisms in the immediate vicinity of the proposed Project Area could be temporarily impacted by short-term construction activities. Barges will be used to construct the deck and install the pier support structures in Boston Harbor. Moving barges to the construction site and anchoring the barges in place during construction could temporarily affect marine resources in the immediate vicinity of the construction site. However, it is anticipated that once construction is complete, these resources would quickly recover. As was experienced with the construction of the Runway 33L RSA deck, construction will be undertaken in a way that minimizes impacts to resources.

4.2.4.3 Noise

Construction could also result in short-term increases in noise (from construction equipment and pile-driving, etc.) and air emissions from construction equipment. These increases would be temporary in nature, minor, and at least 3,000 feet from the nearest residences and other sensitive receptors. Massport's established construction mitigation procedures and learned lessons from the Runway 33L RSA deck construction will be followed during construction.

Noise from construction activities associated with the Project will be evaluated based on average day-night levels (DNL). DNL values will be estimated based on phasing and usage factors for construction equipment needed during the build-out period. Construction noise DNL values will be compared to ambient noise, and the resulting exposure levels will be assessed for significance. Given the location of the Project on the airfield and proximity to the surrounding community, limitations on the hours of construction would be similar to those implemented on the Runway 33L safety area improvements project and on any airfield work occurring north of Runway 15R-33L. Specific attention will be paid to EJ communities.

When the type of construction has been determined (drilled shafts, driven piles, etc.), an assessment will be conducted that includes possible mitigation techniques specific to that form of construction to further diminish noise generated as a result of the Project. City of Boston noise standards will be used as criteria for this assessment. If driven piles are selected, noise reduction procedures will be discussed to protect fishery resources as employed in the construction of the Runway 33L safety area improvements.

4.2.4.4 Air Quality

Since this safety Project will not change how Logan Airport operates, an operational air quality analysis will not be conducted. However, the DEIR will conduct an emissions inventory of construction-related emissions associated with the proposed Project, including emissions from mobile sources such as construction equipment and fugitive dust. The emissions inventory will consider carbon monoxide (CO), volatile organic compounds (VOCs), nitrogen oxides (NOx), sulfur oxides (SOx), and particulate matter (PM_{10} and $PM_{2.5}$). The air quality assessment will not include greenhouse gas (GHG) emissions as there are no operational changes proposed as part of this Project. While the Project is subject to the EEA Greenhouse Gas Emissions Policy (May 5, 2010), the Policy does not require the quantification of GHG emissions related to construction activities and therefore no analysis is required unless specifically scoped by MEPA. The Policy states that projects that may involve generation of a large amount of construction-related trips would need to quantify the construction impacts. As this project is not expected to generate an usually large amount of construction trips, quantification of GHG emissions is not needed.

4.2.4.5 Environmental Justice (EJ) Communities

As presented in Section 4.1.4 and **Figure 5** of the ENF Form, there are EJ communities within the one-mile radius of the Project. Given the minor construction-period impacts described above, no high and adverse impacts are anticipated that would disproportionately impact EJ communities. Any short-term construction impacts would be anticipated to be experienced by EJ and non-EJ communities alike. The DEIR will include more specific analyses on potential construction impacts to EJ communities, specifically related to air and noise. The Construction Management Plan (CMP) mitigation practices (described below) will be developed to ensure that EJ communities do not experience disproportionate or high and adverse impacts. Massport will continue to coordinate with MEPA and EJ communities on outreach, as described in Section 1.7 of Chapter 1, *Introduction and Project Overview*.

4.2.4.6 Traffic

As described above, the majority of the proposed Project will be constructed via equipment based on a barge on the water. Landside improvements (paving and EMAS installation) could lead to a minimal increase in vehicular traffic but it would be less than the typical annual airfield safety rehabilitation project.

4.2.4.7 Construction Management Plan (CMP)

The DEIR and NEPA review document will include a draft CMP describing Project activities, their schedule, and sequencing for the proposed RSA enhancements at the runway end. The CMP will include Project-specific Best Management Practices (BMPs) to avoid and minimize adverse environmental impacts, and will address potential mitigation related to land disturbance, wetlands, and rare species impacts, noise, dust, vehicle emissions, and construction debris. The CMP will stipulate any construction phase time-of-year restrictions identified by regulatory and resource agencies to protect upland or marine resources. Massport's construction mitigation guidelines to contractors, as well as construction period mitigation measures employed on other airport projects and from the FAA's guidance, will form the basis for developing mitigation strategies. The CMP will include a disposal plan for excess construction materials, and will consider on-site recycling. Specific quantitative analysis of short-term construction period impacts will be conducted for noise and air quality as described above.

4.3 Resources Not Affected

The proposed Runway 27 End RSA improvements would not result in changes in aircraft operations nor runway use. Therefore, the proposed enhancements would not change Logan Airport's existing or future noise levels or air emissions. With the exception of the construction phase, there would be no increases in vehicular traffic on- or off-airport. Accordingly, high and adverse and disproportionate impacts on EJ communities are not anticipated.

Once constructed, the proposed RSA would also have no effect on harbor pollutant loading. Pollutant loading from impervious surfaces is dependent on the vehicular traffic and any activities conducted on those surfaces. Without these sources, paved surfaces do not generate total suspended solids or other typical roadway pollutants. Although airports often contain some sources of higher potential pollutant loads, the proposed RSA operation or construction would not change any existing potential pollutant sources, introduce any new

pollutant sources, or otherwise involve potential pollutant sources. The Project would take place in locations that do not generate vehicular pollutant loads and does not propose any new uses in these areas.

The proposed Project would not increase vehicular traffic on the perimeter road, would not increase existing air operations, and would not increase the risk of spills or other contamination. None of the defined higher pollutant loading sources associated with Airport operation are present in the areas to be modified. Therefore, the Project does not involve any land uses with higher potential pollutant loads and would not affect pollutant loading from Logan Airport.

With the exception of badged access by shellfishers licensed by the DMF, there is no public access within the Project area due to Logan Airport's legislated security zone. Access to the area by licensed shellfishers would not be affected by Project implementation. No known historic or archaeological resources would be affected by project construction or operation.

4.4 Climate Change Adaptation and Resiliency

Massport's facilities, including Logan Airport and other maritime facilities in Boston, are increasingly susceptible to flooding hazards caused by extreme storms and rising sea levels as a result of climate change. Since 2014, Massport has incorporated floodproofing design guidelines into its capital planning and real estate development processes to make its infrastructure and operations more resilient to these anticipated flooding threats. Massport's resiliency program is both progressive and adaptive. As Project design and analyses advance, Massport will integrate consideration of climate change adaptation and resiliency where possible within FAA design guidelines for these safety enhancements.

In 2020, Massport performed a safety rehabilitation of Runway 9-27 to improve the surface of the runway. As part of this project, the Runway 9-27 profile was reviewed and adjusted consistent with current FAA design standards. As part of that effort, and with the knowledge that some type of improvement to the Runway 27 End safety area would be upcoming, the runway threshold was raised 10 inches from its existing elevation. This adjustment was made to account for any potential safety area construction extending out into Boston Harbor and sea level rise. The raise in elevation was made to the extent practicable in relation to the remainder of the airfield as FAA has set criteria and requirements in relation to grade change. The raise in elevation results in a deck which would be higher than the Runway 4R light pier and Runway 33 safety area deck. The Runway 27 End RSA deck will be designed for a 75-year life.

See Attachment E for additional MEPA resiliency documentation including the Resilient Massachusetts Action Team (RMAT) output report.

4.5 Permits Required

The proposed RSA will consist of construction of a structure within federal, state, and local jurisdictional areas. Boston Harbor is a Navigable Water of the U.S. and placement of a structure or filling within Boston Harbor will be subject to federal regulation pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. The shoreline within the Project footprint consists of Land Subject to Tidal Action and Land

Under the Ocean and is subject to regulation pursuant to several state regulatory programs. The anticipated approvals that are required are outlined below.

4.5.1 Federal

The proposed Project must receive approval pursuant to several federal environmental regulations.

4.5.1.1 National Environmental Policy Act (NEPA)

Although not a permit, the Project must be evaluated pursuant to FAA's NEPA regulations. If FAA determines the need for the preparation of an Environmental Assessment (EA) it could be combined with the Draft or Final EIR pursuant to MEPA.

4.5.1.2 Section 10/Section 404

The proposed Project would require fill materials and/or structures to be placed below the extreme high water line and the footprint of the Project exceeds one acre; therefore, the Project will require an Individual Section 10/ 404 permit from the U.S. Army Corps of Engineers (USACE). The authority for these permits is Section 10 of the Rivers and Harbors Act for any structures or work within tidal waters up to MHW, and Section 404 of the Clean Water Act for placing fill or dredged material up to the extreme high water line or within adjacent wetlands.

Prerequisites for the USACE issuance of a permit are the Section 401 Water Quality Certificate issued by MassDEP and a Coastal Zone Consistency Statement from the Massachusetts Coastal Zone Management Program (CZM). Regulatory review will be coordinated with other federal and state review agencies including the U.S. Environmental Protection Agency (EPA), the USFWS, the NOAA Fisheries Service, and MassDEP.

4.5.1.3 NOAA Fisheries Service Section 7 Consultation

The NOAA Fisheries Service is responsible for a number of protected marine species, including sea turtles, marine mammals, and some anadromous fish species. Preliminary coordination with NOAA Fisheries Service has been conducted and a formal Section 7 Consultation will be conducted to assess potential impacts to protected marine species.

4.5.1.4 U.S. Coast Guard Coordination

Construction activities within navigable waters that do not involve a bridge do not require a Section 9 permit from the U.S. Coast Guard but do require coordination to ensure construction activities are conducted safely and consider navigability issues. Massport will coordinate with the U.S. Coast Guard to include any specific construction and notification procedures, and navigational lighting on construction equipment in the Project specifications.

4.5.2 State

Several environmental regulatory programs administered by Massachusetts will be required for his Project.

4.5.2.1 Coastal Zone Management Consistency

As discussed above, the USACE authorization would require an approved Coastal Zone Management Consistency Statement demonstrating the proposed RSA enhancements are consistent with the approved Massachusetts Coastal Zone Management Plan. Similar to the previous work at Runway 33L, Massport believes that the Runway 27 RSA enhancements can be designed and constructed to be consistent with all of the CZM Program Policies as set forth in 301 CMR 21.00. The DEIR and NEPA review document will provide a draft Consistency Statement.

4.5.2.2 Water Quality Certification

Water Quality Certification is required from MassDEP pursuant to Section 401 of the Clean Water Act to demonstrate that any Section 404 permit issued by the USACE would not violate state water quality standards. This permit cannot be issued until a final Order of Conditions is issued by the Boston Conservation Commission or MassDEP.

State water quality standards contained in 314 CMR 9.00 and 314 CMR 4.00 apply to any dredging or fill placed within Boston Harbor. This authorization will also consider the potential temporary construction-period increases in sedimentation and turbidity from the in-water construction activities. As indicated in Sections 4.2 and 4.3, the RSA deck is not anticipated to significantly change surface drainage patterns as compared to existing conditions. The RSA deck would add new impervious areas over Boston Harbor; however, it would not serve as a source of pollutants as the RSA would only be used in the event of an aircraft emergency and therefore any runoff would consist of clean rainwater or snow. During winter months, the RSA deck would not be treated with sand or deicing chemical.

The DEIR and NEPA review document will provide a drainage analysis and a detailed description of the proposed stormwater management measures for the Runway 27 End and will demonstrate how the Project meets MassDEP's Stormwater Management Policy and applicable standards. The DEIR and NEPA review document will identify the size and location of any required stormwater system features and will demonstrate how the proposed RSA enhancements are consistent with Logan Airport's stormwater management practices and the requirements of the current National Pollutant Discharge Elimination System (NPDES) Permit issued for Logan Airport.

4.5.2.3 Chapter 91 Waterways Program

In accordance with Massport's Chapter 91 exemption for activities at Logan Airport (310 CMR 9.03 (3)b), only those portions of the proposed RSA enhancements seaward of MHW would require a Chapter 91 license. Consistent with the RSA project at the Runway 33L End, Massport believes these areas can be designed and constructed in compliance with the applicable regulatory standards and that the proposed RSA enhancements serve a public purpose by enhancing aviation safety. Similar to Runway 33L RSA improvements, the proposed Runway 27 End RSA improvements are assumed to be determined a non-water dependent use by MassDEP and would not be able to meet the provisions of 310 CMR 9.51 through 9.54 and would therefore be expected to need a variance.

For those portions of the Project within Chapter 91 jurisdiction, the waterways regulations at 310 CMR 9.05 require MassDEP to issue a license for any construction within tidelands, after considering a project's impacts

on the preservation of rights held by the Commonwealth in trust for the public. The regulations at 310 CMR 9.31 establish two general standards for any Chapter 91 license:

- The project must meet the basic requirements listed in 310 CMR 9.31(1); and
- The project must serve a proper public purpose (310 CMR 9.31(2)).

The area in which work is proposed is not currently fully accessible to the public and would not be accessible to the public for the foreseeable future. These areas are within the state-legislated Logan Airport security zone restrictions on public access. This security zone extends 500 feet seaward of MHW. As stated above, access by licensed and badged shellfishers would not be affected by the Project.

4.5.2.4 Massachusetts Natural Heritage and Endangered Species Program

The Project will be within a designated polygon of Priority Habitat for upland sandpiper and eastern meadowlark. The NHESP will be consulted through the permitting process to determine if a Conservation and Management Permit is required for the Project. If required, an application for this Permit will be prepared and submitted to NHESP for review and approval.

4.5.3 Municipal

Portions of the proposed Runway 27 RSA enhancement will occur within Land Subject to Tidal Action, Land Subject to Coastal Storm Flowage, Land Containing Shellfish, and Land Under the Ocean (**Figure 4, and Figure 4-2**), as defined by Massachusetts Wetlands Protection Act (WPA) regulations (310 CMR 10.00 et seq.). Administration of the WPA has been delegated to the Boston Conservation Commission.

4.5.3.1 Massachusetts Wetlands Protection Act (WPA) – Order of Conditions

The proposed Runway 27 RSA improvements would require work within the jurisdiction of the Massachusetts WPA, as it would affect Land Subject to Tidal Action, Land Subject to Coastal Storm Flowage, Coastal Beach, Land Containing Shellfish, Land Under the Ocean and buffer zone to Coastal Bank. Massport will prepare and file a Notice of Intent with the Boston Conservation Commission to obtain an Order of Conditions pursuant to the WPA to allow the Project to proceed. The proposed Project will not require a variance under the WPA.

4.5.4 Other Permits and Approvals

The proposed RSA enhancements will also require completion and submittal of a Notice of Intent to the EPA for coverage under the NPDES Construction General Permit for stormwater discharge from construction activities.

Attachment B- Distribution List

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Distribution

The ENF will be circulated and distributed in accordance with 301 CMR 11.16 (2). This distribution list also includes representatives of governmental agencies and community groups and/or local residents interested with activities at Logan Airport. The 'N' indicates Massport mailed a notice of availability. The 'E' indicates Massport emailed an electronic link to the ENF. The 'P' indicates Massport mailed a printed copy of the ENF.

This ENF is available on Massport's website (www.massport.com). Printed copies of the ENF may be requested from Stewart Dalzell, telephone (617) 568-3524, email: sdalzell@massport.com. Printed copies are available for review at the following public libraries.

	Library	Address		Library	Address
P	Boston Public Library Main Branch	700 Boylston Street Boston, MA 02116	P	Chelsea Public Library	569 Broadway Chelsea, MA 02150
P	Boston Public Library Charlestown Branch	179 Main Street Charlestown, MA 02129	P	Revere Public Library	179 Beach Street Revere, MA 02151
P	Boston Public Library East Boston Branch	365 S. Bremen Street East Boston, MA 02128	P	Winthrop Public Library	2 Metcalf Square Winthrop, MA 02151

Federal Government

■ United States Senators and Representatives

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Boston, MA 02203

N The Honorable Katherine Clark
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Malden, MA 02148

N The Honorable Stephen F. Lynch
Attn: Nicholas Zaferakis
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Boston Transportation Department

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Harborview Community Association
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[N] Robert Pulsifer
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Boston Harbor Now
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[N] Frank Kerr
Hull Neighbors for Quiet Skies
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Hull, MA 02045

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Attachment C- Agency Consultation

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U.S Fish and Wildlife Service

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March 29, 2021

David Simmons, Acting Supervisor
New England Field Office
U.S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, NH 03301-50087

Re: Massport/Logan Airport Runway 9/27 Safety Area Project

Dear Supervisor Simmons:

The Massachusetts Port Authority (Massport) is collecting environmental data in support of an upcoming study of Runway Safety Area (RSA) improvements at the approach end to Runway 9/27 at Boston Logan International Airport (Figure 1). This information will be used in project documentation for both the National Environmental Policy Act (NEPA) review by the Federal Aviation Administration (FAA) and the Massachusetts Environmental Policy Act (MEPA) and subsequent federal, state, and local permitting. As part of our early coordination and as a follow-up to our agency briefing on February 23, 2021, we are reaching out to your office to solicit any initial input and to confirm our understanding of U.S. Fish and Wildlife Service protected resources in the project area.

The proposed safety project aims to enhance the existing RSA by constructing a pile-supported deck that would extend out over Boston Harbor similar to the RSA deck at the Runway 33L approach end. While design of the RSA is still in the conceptual phase, FAA has determined that the portion of the RSA extending over Boston Harbor can be no smaller than 306 feet wide by between 450-500 feet long (depending on the specific point along the irregular Coastal Bank). A focus of the early design work will be on the design of the deck structural support (pilings, caissons, construction methods, etc.). The purpose of the project is to provide an additional measure of safety and better meet FAA federal runway safety standards.

In addition to a new deck over Boston Harbor, there would be limited disturbance of upland areas along the perimeter of the airfield and along the armored bulkhead to allow the new deck to meet existing airfield grades.

The attached figure illustrates the project area being studied. Please review the enclosed materials at your earliest convenience, and provide written comments on any federally protected threatened and endangered wildlife or fishery species or other species of concern that may be present in the project area.

If you have any questions or require additional information, please do not hesitate to contact me at (617) 568-3524 or by email at sdalzell@massport.com.

Sincerely,

Massachusetts Port Authority

Stewart Dalzell, Deputy Director
Environmental Planning and Permitting

CC: S. Dennechuk, B. Washburn/Massport
R. Doucette/FAA
C. Lurie, K. Bergassi/VHB
M. Engel/WSP

Attachment: Annotated Project Area Aerial Photograph

Logan Runway-End 27 Site Location

From: Simmons, David <david_simmons@fws.gov>
Sent: Thursday, April 1, 2021 5:15 PM
To: Dalzell, Stewart <SDalzell@massport.com>
Cc: SDennechuk <SDennechuk@massport.com>; Bergassi, Kristen <KBergassi@VHB.com>; Engel, Marla <Marla.Engel@wsp.com>; 'richard.doucette@faa.gov' <richard.doucette@faa.gov>; Washburn, Bradford <bwashburn@massport.com>
Subject: RE: [EXTERNAL] Massport/Logan RSA Project - Data Request

Hi Stewart,
Thank you for keeping me in the loop on this project. At this point, I do not see much of a role for the U.S. Fish and Wildlife Service, as I do not expect the species and habitats for which we have jurisdiction to occur in the area that likely would be affected by the project. Please let me know if you have questions and/or you need a response on letterhead. Regards,
David

From: Dalzell, Stewart <SDalzell@massport.com>
Sent: Wednesday, March 31, 2021 10:36 AM
To: Simmons, David <david_simmons@fws.gov>
Cc: Dennechuk, Sarah <SDennechuk@massport.com>; ENV SP Kristen P. Bergassi (kbergassi@vhb.com) <kbergassi@vhb.com>; Engel, Marla <Marla.Engel@wsp.com>; 'richard.doucette@faa.gov' <richard.doucette@faa.gov>; Washburn, Bradford <BWashburn@massport.com>
Subject: [EXTERNAL] Massport/Logan RSA Project - Data Request

Dear Mr. Simmons, as you are aware, Massport is collecting data in support of the upcoming study of Runway Safety Area (RSA) enhancements at the approach end to Runway 9/27 at Logan Airport. This information will be used in project documentation for both NEPA and MEPA review and subsequent federal, state, and local permitting. As part of our early coordination, and as a follow-up to our initial agency briefing on February 23, 2021, we are reaching out to your office to solicit any initial input. The attached letter provides additional project information.

Thank you for your attention to this request.

I can be reached at 617-594-5731 or by email at sdalzell@massport.com

Sincerely,

Stewart Dalzell, Deputy Director
Environmental Planning & Permitting
Massport

Natural Heritage and Endangered Species Program

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March 29, 2021

Ms. Amy Hoenig
Endangered Species Review Biologist
Natural Heritage and Endangered Species Program
MA Division of Fisheries and Wildlife
1 Rabbit Hill Road
Westborough, MA 01581

Re: Massport/Logan Airport Runway 9/27 Safety Area Project

Dear Ms. Hoenig,

The Massachusetts Port Authority (Massport) is collecting environmental data in support of an upcoming study of Runway Safety Area (RSA) enhancements at the approach end to Runway 9/27 at Boston Logan International Airport (Figure 1). This information will be used in project documentation for both the National Environmental Policy Act (NEPA) review by the Federal Aviation Administration (FAA) and the Massachusetts Environmental Policy Act (MEPA) and subsequent federal, state, and local permitting. As part of our early coordination and as a follow-up to our agency briefing on February 23, 2021, we are reaching out to your office to solicit any initial input and to confirm our understanding of NHESP protected resources in the project area.

The proposed safety project aims to enhance the existing RSA by constructing a pile-supported deck that would extend out over Boston Harbor similar to the RSA deck at the Runway 33L approach end. While design of the RSA is still in the conceptual phase, FAA has determined that the portion of the RSA extending over Boston Harbor can be no smaller than 306 feet wide by between 450-500 feet long (depending on the specific point along the irregular Coastal Bank). A focus of the early design work will be on the design of the deck structural support (pilings, caissons, construction methods, etc.). The purpose of the project is to provide an additional measure of safety and better meet FAA federal runway safety standards.

In addition to a new deck over Boston Harbor, there would be limited disturbance of upland areas along the perimeter of the airfield and along the armored bulkhead to allow the new deck to meet existing airfield grades. Based on our review of the Massachusetts Natural Heritage Atlas (13th Edition, October 2017) and regular Massport coordination with your office, we understand that portions of the upland grassland areas on the airfield are mapped as Priority Habitat under the Massachusetts Endangered Species Act (MESA), including areas proximate to the RSA project site (PH 1365). We can anticipate that there may be grading required in a portion of the grassland, but we expect that to be a temporary disturbance and Massport's goal would be to avoid or minimize any permanent grassland impacts.

As a follow-up to the February 23rd project briefing, you also noted a NHESP interest in the adjacent Snake Island habitat (PH 1344) with regard to potential RSA project construction impacts. That is an issue we plan to add to the study.

We would appreciate your review of this request and the attached Request for State-listed Species Information, and written confirmation of the state-listed protected wildlife, fisheries or plant Endangered (E), Threatened (T) or Species of Special Concern (SC) species that may be present in the project area.

The attached figure illustrates the general project site. Please review the enclosed materials at your earliest convenience, and provide written comments on any resources of interest that may be present in the project area. If you have any questions or require additional information, please do not hesitate to contact me at (617) 568-3524 or by email at sdalzell@massport.com.

Sincerely,

Massachusetts Port Authority

Stewart Dalzell, Deputy Director
Environmental Planning and Permitting

CC: S. Dennechuk, B. Washburn/Massport
C. Lurie, K. Bergassi/VHB
M. Engel/WSP

Attachments: Annotated Project Area Aerial Photograph
NHESP Data Request Form

Logan Runway-End 27 Site Location

Priority & Estimated habitats (14th Edition Natural Heritage Atlas, August 1, 2017)

Request for State-listed Species Information

Please complete this form to request state-listed species information from the Natural Heritage & Endangered Species Program for a particular location (please submit only one project per form).

Fee: $50.00, Payable to Comm. of MA – NHESP (as required in 321 CMR 10.17(3))
No fee required if request is for conservation purposes or habitat management *and* you are a non-profit conservation group, government agency or are working with a government agency.

Requestor Information

Name: Stewart Dalzell Affiliation: Massport

Address: One Harborside Drive, Suite 200N

City: East Boston State: MA Zip Code: 02128

Daytime Phone: 617-568-3524 Ext. Email address: sdalzell@massport.com

Project Information

Project or Site Name: Logan Airport Runway 9/27 Safety Area Project

Location: Boston Logan International Airport Town: Boston/Winthrop, MA

Name of Landowner or Project Proponent (if different from Requestor): Massport

Acreage of the Property: 2,400 acres (Logan Airport)

Description of Proposed Project and Current Site Conditions: (If necessary attach additional sheet)

Construction of pile-supported Runway Safety Area (RSA) deck

Required: Enclose a map with the site location clearly marked and centered on the page.

Please **mail** this completed form, a topographic map, and fee (if applicable) to the above address, Attn: Regulatory Review.

If no fee is required, you can email the information to natural.heritage@state.ma.us.

A written response will be returned within 30 days of receipt of all information required.

Logan Runway-End 27 Site Location (USGS Topo)

April 23, 2021

Stewart Dalzell
Massachusetts Port Authority
One Harborside Drive
East Boston MA 02128

RE: Project Location: Logan International Airport runway 9/27 safety area
Town: BOSTON
NHESP Tracking No.: 21-40134

To Whom It May Concern:

Thank you for contacting the Natural Heritage and Endangered Species Program of the MA Division of Fisheries & Wildlife (the "Division") for information regarding state-listed rare species in the vicinity of the above referenced site. Based on the information provided, this project site, or a portion thereof, is located **within** *Priority Habitat 1365* (PH 1365) as indicated in the *Massachusetts Natural Heritage Atlas* (14th Edition) for the following state-listed rare species:

Scientific name	Common Name	Taxonomic Group	State Status
Bartramia longicauda	Upland Sandpiper	Bird	Endangered
Sturnella magna	Eastern Meadowlark	Bird	Special Concern

The species listed above are protected under the Massachusetts Endangered Species Act (MESA) (M.G.L. c. 131A) and its implementing regulations (321 CMR 10.00). State-listed wildlife are also protected under the state's Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and its implementing regulations (310 CMR 10.00). Fact sheets for most state-listed rare species can be found on our website (www.mass.gov/nhesp).

Please note that projects and activities located within Priority and/or Estimated Habitat **must** be reviewed by the Division for compliance with the state-listed rare species protection provisions of MESA (321 CMR 10.00) and/or the WPA (310 CMR 10.00).

Wetlands Protection Act (WPA)
If the project site is within Estimated Habitat and a Notice of Intent (NOI) is required, then a copy of the NOI must be submitted to the Division so that it is received at the same time as the local conservation commission. If the Division determines that the proposed project will adversely affect the actual Resource Area habitat of state-protected wildlife, then the proposed project may not be permitted (310 CMR 10.37, 10.58(4)(b) & 10.59). In such a case, the project proponent may request a consultation with the Division to discuss potential project design modifications that would avoid adverse effects to rare wildlife habitat.

A streamlined joint MESA/WPA review process is now available. When filing a Notice of Intent (NOI), the applicant may now file concurrently under the MESA on the same NOI form and qualify for a 30-day streamlined joint review. For a copy of the revised NOI form, please visit the MA Department of Environmental Protection's website: http://www.mass.gov/eea/agencies/massdep/service/approvals/wpa-form-3.html.

MA Endangered Species Act (MESA)

If the proposed project is located within Priority Habitat and is not exempt from review (see 321 CMR 10.14), then project plans, a fee, and other required materials must be sent to Natural Heritage Regulatory Review to determine whether a probable Take under the MA Endangered Species Act would occur (321 CMR 10.18). Please note that all proposed and anticipated development must be disclosed, as MESA does not allow project segmentation (321 CMR 10.16). For a MESA filing checklist and additional information please see our website: www.mass.gov/regulatory-review.

We recommend that rare species habitat concerns be addressed during the project design phase prior to submission of a formal MESA filing, as avoidance and minimization of impacts to rare species and their habitats is likely to expedite endangered species regulatory review.

This evaluation is based on the most recent information available in the Natural Heritage database, which is constantly being expanded and updated through ongoing research and inventory. If the purpose of your inquiry is to generate a species list to fulfill the federal Endangered Species Act (16 U.S.C. 1531 et seq.) information requirements for a permit, proposal, or authorization of any kind from a federal agency, we recommend that you contact the National Marine Fisheries Service at (978)281-9328 and use the U.S. Fish and Wildlife Service's Information for Planning and Conservation website (https://ecos.fws.gov/ipac). If you have any questions regarding this letter please contact Melany Cheeseman, Endangered Species Review Assistant, at (508) 389-6357.

Sincerely,

Everose Schlüter

Everose Schlüter, Ph.D.
Assistant Director

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NOAA Fisheries Service

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March 29, 2021

Environmental Reviewer
NOAA Fisheries Service
Greater Atlantic Regional Fisheries Office
Office of Protected Species
55 Great Republic Drive
Gloucester, MA, 01930

Re: Massport/Logan Airport Runway 9/27 Safety Area Project

Dear Reviewer:

The Massachusetts Port Authority (Massport) is collecting environmental data in support of an upcoming study of Runway Safety Area (RSA) enhancements at the approach end to Runway 9/27 at Boston Logan International Airport (Figure 1). This information will be used in project documentation for both the National Environmental Policy Act (NEPA) review by the Federal Aviation Administration (FAA) and the Massachusetts Environmental Policy Act (MEPA) and subsequent federal, state, and local permitting. As part of our early coordination and as a follow-up to our agency briefing on February 23, 2021, we are reaching out to your office to solicit any initial input and to confirm our understanding of NOAA protected resources in the project area.

The proposed safety project aims to enhance the existing RSA by constructing a pile-supported deck that would extend out over Boston Harbor similar to the RSA deck at the Runway 33L approach end. While design of the RSA is still in the conceptual phase, FAA has determined that the portion of the RSA extending over Boston Harbor can be no smaller than 306 feet wide by between 450-500 feet long (depending on the specific point along the irregular Coastal Bank). A focus of the early design work will be on the design of the deck structural support (pilings, caissons, construction methods, etc.). The purpose of the project is to provide an additional measure of safety and better meet FAA federal runway safety standards.

In addition to a new deck over Boston Harbor, there would be limited disturbance of upland areas along the perimeter of the airfield and along the armored bulkhead to allow the new deck to meet existing airfield grades.

The attached figure illustrates the project area being studied. Please review the enclosed materials at your earliest convenience, and provide written comments on any federally protected threatened and endangered wildlife or fishery species or other resources of interest that may be present in the project area.

If you have any questions or require additional information, please do not hesitate to contact me at (617) 568-3524 or by email at sdalzell@massport.com.

Sincerely,

Massachusetts Port Authority

Stewart Dalzell, Deputy Director
Environmental Planning and Permitting

S. Dennechuk, B. Washburn/Massport
R. Doucette/FAA
C. Lurie, K. Bergassi/VHB
M. Engel/WSP

Attachment: Annotated Project Area Aerial Photograph

Logan Runway-End 27 Site Location

From: Dalzell, Stewart
To: Kaitlyn Shaw - NOAA Federal
Cc: Bergassi, Kristen; Engel, Marla; Washburn, Bradford
Subject: [External] RE: Massport/Logan RSA Project - Data Request
Date: Friday, April 2, 2021 11:43:04 AM

Kaitlyn – Thank you for your prompt response; we will be addressing these issues as our planning and permitting moves forward. Stewart

From: Kaitlyn Shaw - NOAA Federal <kaitlyn.shaw@noaa.gov>
Sent: Thursday, April 1, 2021 3:05 PM
To: Dalzell, Stewart <SDalzell@massport.com>
Subject: Re: Massport/Logan RSA Project - Data Request

Hi Stewart,
Similarly to concerns expressed on the interagency call, we would like to see a pre construction eelgrass and benthic survey to confirm the habitats present.
Providing resource areas on project plans, including intertidal mudflat areas (which exist below MMLW or the extreme low tide line) would be beneficial for our eventual EFH consultation. Similarly to the 33L project I would anticipate offering a conservation recommendation of a TOY for winter flounder spawning and development, with no work from February 15 - June 30. In projects such as this, if adverse impacts to eelgrass, salt marsh and/or intertidal mudflat are anticipated, we typically request compensatory mitigation be provided for those impacts and that resource agencies are consulted when developing compensatory mitigation plans.
The aforementioned technical assistance is meant to help prepare for an eventual EFH consultation and further consultation will be required through the federal action agency during the permitting process.
Please let me know if you have questions.

Best,
Kaitlyn Shaw
Marine Resources Management Specialist
Habitat and Ecosystem Services Division
NOAA/ National Marine Fisheries Service
Gloucester, MA
Office: 978-282-8457
Pronouns: she/her/hers
kaitlyn.shaw@noaa.gov
www.nmfs.noaa.gov

On Wed, Mar 31, 2021 at 10:34 AM Dalzell, Stewart <SDalzell@massport.com> wrote:

Dear Reviewers, as you are aware, Massport is collecting data in support of the upcoming study of Runway Safety Area (RSA) enhancements at the approach end to Runway 9/27 at Logan Airport. This information will be used in project documentation for both NEPA and MEPA review and subsequent federal, state, and local permitting. As part of our early coordination, and as a follow-up to our initial agency briefing on February 23, 2021, we are reaching out to your office to solicit any initial input. The attached letter provides additional project information.

Thank you for your attention to this request.

I can be reached at 617-594-5731 or by email at sdalzell@massport.com

Sincerely,

Stewart Dalzell, Deputy Director

Environmental Planning & Permitting

Massport

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MA Division of Marine Fisheries

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March 29 2021

MA Division of Marine Fisheries
North Shore Office
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930

Re: Massport/Logan Airport Runway 9/27 Safety Area Project

Dear Reviewer:

The Massachusetts Port Authority (Massport) is collecting environmental data in support of an upcoming study of Runway Safety Area (RSA) enhancements at the approach end to Runway 9/27 at Boston Logan International Airport (Figure 1). This information will be used in project documentation for both the National Environmental Policy Act (NEPA) review by the Federal Aviation Administration (FAA) and the Massachusetts Environmental Policy Act (MEPA) and subsequent federal, state, and local permitting. As part of our early coordination and as a follow-up to our agency briefing on February 23, 2021, we are reaching out to your office to solicit any initial input and to confirm our understanding of protected resources in the project area.

The proposed safety project aims to enhance the existing RSA by constructing a pile-supported deck that would extend out over Boston Harbor similar to the RSA deck at the Runway 33L approach end. While design of the RSA is still in the conceptual phase, FAA has determined that the portion of the RSA extending over Boston Harbor can be no smaller than 306 feet wide by between 450-500 feet long (depending on the specific point along the irregular Coastal Bank). A focus of the early design work will be on the design of the deck structural support (pilings, caissons, construction methods, etc.). The purpose of the project is to provide an additional measure of safety and better meet FAA federal runway safety standards.

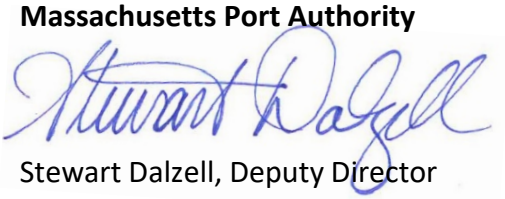
In addition to a new deck, there would be limited disturbance of upland areas along the perimeter of the airfield and along the armored bulkhead to allow the new deck to meet existing airfield grades. Based on our knowledge of the area, previous filings and review of available information, we understand that the general project area includes a number of important marine resources, including:

- Intertidal mudflats within DMF Shellfish Area GBH5.3
- Habitat for Winter flounder and other commercially and recreationally important fish
- Adjacent salt marsh (generally greater than 1,000 feet from the expected limits of construction)
- Adjacent eelgrass (generally greater than 1,000 feet from the expected limits of construction)

The attached figure illustrates the general project area being studied. Please review the enclosed materials at your earliest convenience and provide written comments on any marine resources of interest that may be present in the project area and should be considered during the environmental review process. If you have any questions or require additional information, please do not hesitate to contact me at (617) 568-3524 or by email at sdalzell@massport.com.

Sincerely,

Massachusetts Port Authority



Stewart Dalzell, Deputy Director
Environmental Planning and Permitting

CC: S. Dennechuk, B. Washburn/Massport
C. Lurie, K. Bergassi/VHB
M. Engel/WSP

Attachment: Annotated Project Area Aerial Photograph

Logan Runway-End 27 Site Location

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Board of Underwater Archaeological Resources

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March 29, 2021

David S. Robinson, Director
Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
Boston, MA 02114-2136

Re: Massport/Logan Airport Runway 9/27 Safety Area Project

Dear Director Robinson:

The Massachusetts Port Authority (Massport) is collecting data in support of the upcoming study of Runway Safety Area (RSA) enhancements at the approach end to Runway 9/27 at Boston Logan International Airport (Figure 1). This information will be used in project documentation for both the National Environmental Policy Act (NEPA) review by the Federal Aviation Administration (FAA) and the Massachusetts Environmental Policy Act (MEPA) and subsequent federal, state, and local permitting. As part of our early coordination, and as a follow-up to our initial agency briefing on February 23, 2021, we are reaching out to your office to solicit any initial input and to confirm our understanding that there are no known underwater archaeological resources in the immediate project area.

The proposed safety project aims at improving the existing RSA by constructing a pile-supported deck that would extend out over Boston Harbor similar to the RSA deck at the Runway 33L approach end. While design of the RSA is still in the conceptual phase, FAA has determined that the portion of the RSA extending over Boston Harbor can be no smaller than 306 feet wide by between 450-500 feet long (depending on the specific point along the irregular Coastal Bank). A focus of the early design work will be on the design of the deck structural support (pilings, caissons, construction methods, etc.). The purpose of the project is to provide an additional measure of safety and better meet FAA federal runway safety standards.

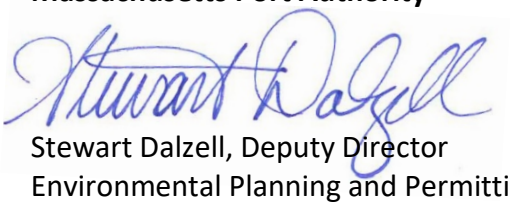
On behalf of Massport, we request that the Board of Underwater Archaeological Resources review the enclosed project area map at your earliest convenience and identify any marine archaeological resources of concern in the vicinity of the Project or provide any comments that the Board wishes to make at this time. Please note that we are also reaching out to the Massachusetts Historical Commission to get their input on possible historical or archaeological resources of note.

The attached figure illustrates the general project site.

If you have any questions or require additional information, please do not hesitate to contact me at (617) 568-3524 or by email at sdalzell@massport.com.

Sincerely,

Massachusetts Port Authority



Stewart Dalzell, Deputy Director
Environmental Planning and Permitting

Cc: B. Simon/SHPO
R. Doucette/FAA
S. Dennechuk, B. Washburn/Massport
C. Lurie, K. Bergassi/VHB
M. Engel/WSP

Attachment: Annotated Project Area Aerial Photograph

Logan Runway-End 27 Site Location

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Attachment D

- **FAA RSA Determination Form**
- **Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study**

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APPENDIX B. RSA DETERMINATION FORM

1. **LOCID:** BOS **City/State:** Boston, Massachusetts
2. **Airport Name:** General Edward Laurence Logan International Airport
3. **Runway:** 09/27
4. **DETERMINATION:**

☐ RSA Meets Standards

☐ The Existing RSA Does not meet standards but it is practicable to improve the RSA so that it will meet current standards.

☒ The existing RSA can be improved to enhance safety, but the RSA will still not meet current standards.

☐ The existing RSA does not meet current standards, and it is not practicable to improve the RSA.

5. ☒ **RSA Determination Replaces Previous Determination:** 06/06/2004

(Date of previous determination)

6. **Part 139 Airport:** ☒ OR **RSAI Attached (Non-Part 139 Airport):** ☐
7. **Visibility Minimums (check one):** ☐ >= ¾ NM ☐ < ¾ NM ___ Runway End
   ☐ >= ¾ NM ☐ < ¾ NM ___ Runway End
8. **Aircraft Approach Category/Airplane Design Group:** V
9. **RSA Standard (AC 150/5300-13):** 1000' Length 500' Width
10. ***Existing*** **RSA Dimensions measured from runway end, stopway end, or end of Landing Distance Available (LDA) or Accelerate Stop Distance Available (ASDA) if declared distances published in the Airport Facility Directory:**

Runway Apch End	Length (existing)	Width (existing)	Dimensions Uniform?
09	1000'	500'	Yes
27	150'	500'	Yes

11. **Selected Improvement Alternatives:**

a. All improvements complete (skip to item 14): ☐

b. Runway Length/Position Alternatives:

Rwy Apch End	Relocate	Shift	Realign	Shorten	Declared Distances	Other (specify)

Relocate = Move entire runway to new position

Shift = Move or slide existing runway along its longitudinal axis

Realign: Rotate runway axis

Declared Distances (if applicable)

Runway Apch End	TORA	TODA	LDA	ASDA

c. Expand/Grade RSA surface:

Runway Apch End	Acquire Land to Increase Size	Grade Surface	Install Standard EMAS (Full Dimension RSA)	Non-Standard EMAS (Non-Standard RSA)
27				300' wide deck with EMAS type product in the future

12. **Object Removal:**

Runway Apch End	Relocate Road/Highway	Relocate Utilities	Relocate Fencing	Other (specify)

NOTE: NAVAIDS are tracked in the RSAI database, or RSA Inventory, and addressed through a separate process. FAA-ATO Tech Ops issues an RSAI Project Compliance Notice when a non-standard, FAA-owned NAVAID is removed or retrofitted within an RSA. Completed ATO Technical Operations RSAI Project Compliance Notices must be attached to the RSAD.

13. **Supporting Documentation/Rationale:** This determination is based on the best, current available information. If information becomes available at a later date that can effect changes or revisions to this determination, the determination will be revised.

The following documentation supports this determination:

Attached	Supports RSAD	Type of Documentation
☐	☐	Runway Safety Area Inventory
☐	☐	Airport Master Record or Airport Facility Directory
☐	☐	Approved Airport Layout Plan Click here to enter text. (Date)
☐	☐	On-site verification by sponsor, State, ADO or Certification Inspector
☐	☐	NOAA/NGS Obstruction Chart
☐	☐	As-Built Construction Plans Click here to enter text. (Date)
☐	☐	Approved Airport Certification Manual
☐	☐	Financial Feasibility and Equivalency of Runway Safety Area Improvements and Engineered Material Arresting Systems Study (Order 5200.9)
☐	☐	Correspondence from Airport
☒	☐	Other (Specify) RSA analysis from planning study

14. **Narrative Documentation/Comments (summary of preferred RSA improvement alternative(s), summary of completed improvements, documentation of deviation from selected RSA improvement alternative, documentation of unusual circumstances etc.) (Attach additional sheets if necessary):**

The preceding sections have described several alternatives to address the RSA deviations from design standards for Runway 9-27. Based on consideration of these alternatives and their attributes and constraints, the preferred alternative for the resolution of RSA deficiencies on Runway 9-27 is the implementation of Alternative 4B – EMAS on a 300'-wide deck (the actual width of the deck would be 306' to allow for safety rails). This alternative is preferred as it will provide the highest level of aircraft safety without reducing the operational capability of the BOS airfield while also minimizing environmental impacts from additional construction in the harbor.

This preferred alternative recognizes the fact that EMAS is not currently available until at least 2021, pending the planned sunset of a legal agreement between EMASMAX and the FAA on the sales of the RunwaySafe EMAS system in the United States. However, considering this reality, all indications from FAA and airport industry resources have been that an EMAS system will be available once the legal agreement sunsets. The availability of the EMAS system will likely coincide with the completion of the estimated 2 to 3 year permitting process required for the EMAS deck (see below). This alternative closely follows the previously adopted mitigation for Runway 33L.

15. **Signatures:**

Kelly J. Slusarski — Date: 1/18/2019

Planning & Engineering Branch Manager

Gail B. Lattrell — Date: 1-23-2019

Acting, New England Region Airports Division Director

Boston Logan Airport

Runway Incursion Mitigation Study

Runway 9-27 Runway Safety Area (RSA) Alternatives Study

January 8, 2019

Final for FAA Review

Table of Contents

List of Exhibits

1.0 Runway 9-27 Runway Safety Area (RSA) Alternatives Study

1.1 Introduction

As part of the Boston Logan International Airport (BOS, or the Airport) Runway Incursion Mitigation Study and Comprehensive Airfield Geometry Analysis, the airfield was reviewed to identify locations where the airfield did not fully conform to current FAA dimensional criteria and design standards. RSA's for Runway 9-27, 4L-22R, 4R-22L were identified as not meeting current FAA design standards.

This study focuses on the Runway 9-27 RSA Alternatives. This analysis is intended to evaluate options to bring the Runway 9-27 RSA into substantial conformance with FAA design standards or, if that is not practicable, to further enhance compliance and the safety of flight activity on Runway 9-27 at BOS, reducing potential impacts to personal safety and property.

1.2 Background Information

The following section briefly overviews some topics of background information influencing this analysis, including:

1.2.1 RSA Requirements

1.2.2 Runway Utilization

1.2.3 Declared Distances Overview

1.2.4 Engineered Materials Arresting Systems (EMAS) Overview

1.2.5 Runway Injunction Considerations

1.2.6 Environmental Challenges

1.2.1 Runway Safety Area (RSA) Requirements

To the extent practicable, airports receiving federal funding for airport improvement projects are required to meet RSA design standards as detailed in Advisory Circular 150/5300-13A, Change 1, *Airport Design*.

RSA's are required to meet dimensional standards, longitudinal and lateral grade requirements and be free of objects and vegetation that could damage an aircraft in the event of an overrun, undershoot, or excursion. The RSA must be capable, under dry conditions, of supporting aircraft rescue and firefighting (ARFF) activity, and the

occasional passage of aircraft without causing structural damage to the aircraft. The FAA specifically precludes the granting of a Modification to Design Standards for a non-standard RSA in their criteria, requiring that RSA's be assessed through an RSA Determination of Practicability to identify the most practicable and feasible option for improving non-standard RSA's.

Runway 9-27 is classified as a Runway Design Code (RDC) D-V runway. The standard RSA dimensions for Runway 9-27 should be as follows:

RSA Length Beyond Departure End: 1,000'
RSA Length Prior to Threshold: 600'
RSA Width: 500'[1]

Acceptance of a recommended action through an RSA Determination of Practicability is only valid for five years before a reevaluation is required. A previous determination was made in 2004 regarding the practicability of meeting RSA requirements on Runway 9-27.

1.2.2 Runway Utilization

From an operational configuration perspective, Runway 9 and Runway 27 operations constituted approximately 31% of all operations at BOS in 2017. Although ADG V aircraft will tend to ask for Runway 4R for takeoff/landing or 22L for landing when in Northeast and Southwest flows, the potential impacts have become more critical over the last several years as ADG V aircraft use Runway 9-27 relatively frequently for arrivals in Northwest and Southwest flows. Based on a review of 2017 operations data as shown in **Table 1.1** below, of the 125,631 operations on Runway 9-27, approximately 10 operations were by ADG VI aircraft, 2,600 operations were by ADG V aircraft, 6,000 operations were by ADG IV aircraft, and 90,300 were by ADG III aircraft. The remaining operations were by ADG II and I.

Table 1.1 Runway 9-27 Utilization by ADG

Airplane Design Group	2017 Operations	Percentage
ADG I and II	26,700	21%
ADG III	90,300	72%
ADG IV	6,000	5%
ADG V	2,600	2%
ADG VI	10	0.01%
Source: BOS 2017 Operational Data		

[1] FAA Advisory Circular 150/5300-13A, Change One, Table 3-5

1.2.3 Declared Distances Overview

As set forth in Advisory Circular 150/5300-13A, Change 1, declared distances represent the maximum distances that are available and suitable for meeting the takeoff, rejected takeoff and required landing distances based on the performance requirements for turbine powered aircraft[2]. Declared distances may be used to:

- Obtain additional RSA and/or ROFA by restricting declared runway length.
- Mitigate incompatible land uses within the Runway Protection Zone (RPZ).
- Meet runway approach and/or departure surface clearance requirements.
- Mitigate environmental impacts.[3]
- Provide additional departure length by establishing clearways.

Four specific declared distance values are employed consisting of:

Takeoff Run Available (TORA) – the distance to accelerate from brake release to lift-off. The TORA must not exceed the length of the runway. The location of the Departure RPZ is tied to the declared end of the TORA, and land use compatibilities can influence a reduction in the TORA.

Takeoff Distance Available (TODA) – the distance to accelerate from brake release past lift-off to start of takeoff climb. The TODA can exceed the length of the runway if a designated clearway exists beyond the runway end in the direction of takeoff. If there is no clearway, then TODA cannot exceed the length of the runway. The length of the TODA can be limited by obstacles in the 40:1 instrument departure surface.

Based on a review of airport facility information there are no designated clearways on any of the runway ends at BOS.

Accelerate-Stop Distance Available (ASDA) – the distance to accelerate from brake release to the decision velocity (V_1) and then decelerate to a stop. The ASDA must not exceed the length of the runway, unless a designated stopway has been provided beyond the runway end in the direction of the attempted takeoff. When the standard RSA length beyond the end of a runway is not provided, additional RSA may be obtained beyond the ASDA by reducing the ASDA length to provide the standard RSA.

Landing Distance Available (LDA) – the distance from the landing threshold to complete the approach, touchdown and decelerate to a stop. The LDA must not exceed the length of the runway. Similar to ASDA, LDA is dependent on

[2] FAA Advisory Circular 150/5300-13A, Change One, Chapter Three, Section 322
[3] Ibid.

the length of RSA beyond runway end for overruns, but also considers having sufficient undershoot RSA length.

While not technically a declared distance value, a key factor in the available landing length is Land and Hold Short Operations (LAHSO). LAHSO operations are conducted frequently at BOS for operations on various runways. Available landing length may be reduced further than the declared LDA upon pilot acceptance of a landing clearance with LAHSO, and this available distance does not require the RSA requirements and clearances that LDA does.

Declared distances are typically employed where the full length of a runway may not be able to be used due to issues such as deficient RSA or ROFA length, or obstructions penetrating an approach or departure surface off one or both ends of a runway. As an example, the use of declared distances can be employed when runway pavement on one or both ends is not available for a landing operation but is available for takeoff operations in the opposite direction. In this case, the operational lengths are declared for each of the four noted categories. Subsequent sections will list the existing declared distances at the airport and identify the value or lack of value that adjusted declared distances may provide to address RSA provisions.

1.2.4 Engineered Materials Arresting System (EMAS) Overview

EMAS is an installation of energy-absorbing material based on the critical aircraft anticipated for a particular runway. EMAS functions by crushing under the weight of and surrounding an aircraft landing gear system as it enters and continues into the material bed, acting to safely stop an aircraft without significant damage to the aircraft. EMAS provides a potentially viable alternative in situations where land area is not available to provide the necessary room for a "full dimension RSA". EMAS has demonstrated effectiveness in arresting aircraft overruns. Since 1999 there have been a total of 13 incidents where EMAS has safely stopped overrunning aircraft[4]. A standard EMAS is designed to effectively stop an aircraft from a speed of 70 knots. The length of the EMAS bed varies based on the characteristics of the most critical aircraft anticipated to operate on the runway requiring the EMAS. Per the FAA, a standard EMAS provides a level of safety that is equivalent to a full dimension RSA.

Prior to September 2018, there were two manufacturers of EMAS products that met the FAA requirements set forth in Advisory Circular 150/5220-22B "Engineered Materials Arresting Systems for Aircraft Overruns". The first and most prevalent system used in the U.S. is **EMASMAX** which is composed of blocks of lightweight, crushable cellular concrete. The manufacturer of this specific system ceased the manufacturing of the blocks in September 2018. Most or all of the inventory of previously produced blocks have been sold. Repair of EMASMAX systems and older EMAS systems from the same manufacturer can only be repaired with the same technology block system so once the blocks are gone and production ceased, the

[4] https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=13754

ability to repair damage from equipment or aircraft will require a full replacement with an alternative EMAS technology. The lifecycle and maintenance requirements of this system generally dictate replacement every 10-20 years.

The **Runway Safe** EMAS is the second approved product and consists of a foamed silica bed made from recycled glass contained in a plastic mesh system anchored to pavement at the end of the runway. The silica bed is covered with a cement layer and treated with a sealant for weather protection. Four Runway Safe EMAS systems have been installed in the U.S., all of which are at Chicago's Midway Airport. Runway Safe is currently precluded from selling new systems in the U.S. until September 2020 stemming from a negotiated agreement with the manufacturer of the EMASMAX system.

As a part of the evaluation of RSA alternatives, reference is made to the requirements of FAA Order 5200.9, *Financial Feasibility and Equivalency of Runway Safety Area Improvements and Engineered Material Arresting Systems.* This order provides additional guidance on comparing RSA alternatives to EMAS to determine financial feasibility. This guidance is suggested for airports that display one or more of the criteria:

- The existing RSA determination indicates that the RSA does not meet full dimension RSA standards, but it is practicable for it to meet the standard through some other means.

- The runway serves air carriers at a commercial service airport or is required to meet FAA design standards under federal grant obligations.

- The runway serves aircraft with a maximum takeoff weight (MTOW) of 25,000 pounds or more.

- The width of the RSA or its length beyond the runway end is less than 90% of the RSA standard.

In the case of Runway 9-27 at BOS, one or more of the above criteria come into play. The subsequent RSA alternatives evaluations will expand upon the potential for EMAS where deemed applicable and will define the estimated dimensions of the system to either enhance or provide full equivalence for conforming with RSA requirements.

Because EMAS systems are not currently available, they cannot be considered a short-term mitigation measure for non-standard RSA's.

1.2.5 Runway Injunction Considerations

Over the years local courts have issued injunctions concerning the runway threshold locations of Runways 4L, 22R and 9 at BOS. The injunctions currently in place prohibit moving the Runway Thresholds on each of these three runways.

1.2.6 Environmental Challenges

Some alternatives considered as part of this RSA Study may present environmental challenges of varying complexities that must be factored into the evaluation process.

When environmental impacts cannot be avoided or minimized to meet the project purpose and need, some form of mitigation is typically required. Depending on habitat type and value, mitigation ratios are frequently 2:1 to 3:1 of the impact area. Because wetland resource areas also provide wildlife habit, consideration of off-airport mitigation should be considered to reduce wildlife hazard risks.

The following sections provide an overview of potential environmental issues to be considered.

1.2.6.1 Coastal Beach / Intertidal Flats and Shellfish Habitat

Logan Airport is surrounded on three sides by Boston Harbor and associated coastal resource areas that are protected under federal, state and local regulations. Coastal resource areas are located at the end of Runway 27. Construction activities in or adjacent to these protected waters warrant careful consideration of environmental issues.

The Runway 27 end is surrounded by coastal beach/intertidal flats which are protected under the Massachusetts Wetlands Protection Act (WPA) and the federal Clean Water Act. These areas are relatively flat and have limited vegetation consisting of areas of unconsolidated sand and mud that is exposed during low tide and underwater during high tide[5]. This area is considered habitat for Blue Mussel and Soft-Shell Clams (although currently Soft-Shell Clams are very limited in the Harbor due to disease). These areas around the coastal edge of Logan support a variety of wildlife that needs to be taken into consideration should actions involving placement of fill or other impacts occur. There is expected to be careful review and analysis of projects that have the potential to adversely impact shellfish habitat and separate mitigation strategies may be required.

1.2.6.2 Subtidal Areas

Alternatives recommending construction that extend into the harbor would also affect nearshore subtidal areas. These areas are also protected under the provisions of the Massachusetts WPA and the federal Clean Water Act. Eelgrass, a species of potential significance, is known to exist in the waters between Runway End 27 and 33L but has not been previously identified at the end of Runway 27. Eelgrass is a sensitive type of seagrass that is essential for fish breeding and supporting other marine life. It is

[5] http://www.mass.gov/envir/massbays/bhha_intertidalflats.htm

highly regulated by the State of Massachusetts and is noted as a Special Aquatic Site under U.S. Army Corps of Engineers jurisdiction per (Section 404(b)(1) guidelines.

1.2.6.3 Threatened and Endangered Species Habitat

A U.S. Fish & Wildlife Service Information for Planning and Consultation online review identified the Federally-threatened red knot (*Calidris canutus rufa*) and the Federally-endangered roseate tern (*Sterna dougallii dougallii*) as potentially occurring within Airport property. The majority of the airfield occurs within the Massachusetts Natural Heritage and Endangered Species Program (NHESP) demarcated Priority Habitats of Rare Species (PH 250). This area has been identified as potential habitat for the state-endangered upland sandpiper (*Bartramia longicauda*) and the state-threatened grasshopper sparrow (*Ammodramus savannarum*). In general, the grassland habitat of the Airport should be considered protected by federal and state regulation.

Any vegetated ground disturbances around Runway 9-27 will likely result in a "take" of threatened or endangered species habitat and will require state and potentially federal permits. Mitigation of temporary and permanent impacts is expected to be required.

Atlantic and short-nosed sturgeon are Federal and State endangered species in Massachusetts. Potential impacts to them must be considered under the US Endangered Species Act (ESA) and Massachusetts Endangered Species Act (MESA) for all proposed work in Boston Harbor. Work in Boston Harbor will require a Protected Species Assessment and consultation with the National Oceanic & Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS).

Four turtle species and two whale species are also listed under the ESA which, while uncommon, can be found in Boston Harbor. These species include the threatened Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead, green; and DPS of endangered Kemp's ridley, and endangered leatherback turtles. North Atlantic right whales and fin whales are both listed but are found further offshore.

Habitat for winter flounder and other species in Boston Harbor is protected under the Magnuson Stevens Conservation and Management Act. Any work in Boston Harbor will require an Essential Fish Habitat Assessment and consultation with NMFS and the Massachusetts Department of Marine Fisheries (DMF).

Additional coordination with NMFS will be necessary to assess potential impacts to species protected under the Marine Mammal Protection Act.

Mitigation for impacts to fish and marine mammal habitat generally includes restrictions on in-water work during spawning seasons, restrictions on siltation, and restrictions on underwater noise and vibration.

1.2.6.4 Floodplains

The area adjacent to the Runway 27 end is in the 100-year floodplain as defined by the Federal Emergency Management Agency (FEMA). Any reduction in flood storage as the result of projects will require mitigation.

1.2.6.5 Tidelands and Chapter 91

Certain alternatives also have potential to impact waterways and Commonwealth Tidelands around the Airport perimeter, which are protected by the Massachusetts Public Waterfront Act[6] (aka Chapter 91) and require authorization prior to implementation. Any work seaward of the mean high-water line surrounding Logan Airport requires authorization under Chapter 91. Actions requiring prior authorization generally include the placement or construction of any temporary or permanent structures, placement of fill in a waterway and the excavating or dredging of materials in any waters.

At the approach end to Runway 27, the mean low water line is roughly coincident with the Massport property boundary. As such, work in this area to improve the RSA would likely require work off Airport property in Commonwealth Tidelands. In this event, based on provisions of the Massport Enabling Act and the Ch. 91 regulations, authorization for construction of structures and use within Commonwealth Tidelands would be authorized through the Ch. 91 Licensing process which includes signature by the Governor.

1.2.6.6 Construction in Navigable Waters

The US Army Corps of Engineers regulates the construction of any structure in or over any navigable water of the United States under Section 10 of the Rivers and Harbors Act. The area to the northeast of Runway 9-27 includes an undefined navigation channel to several marinas in Winthrop, MA. Construction of any fill or structure in the harbor adjacent to the Runway 27 end will likely require a Section 10 review and permit. In addition to the physical construction, a security buffer is required adjacent to fill or structure thus the impact to the navigation channel could be greater. Due to the narrow and shallow channel in this area, if a structure extends too far from the existing shore it may not be permittable under Section 10.

1.2.6.7 Federal and State Environmental Policy Acts

Any RSA alternative other than the No Build alternative will require review under the National Environmental Policy Act (NEPA) and the Massachusetts Environmental Policy Act (MEPA). Both acts require a comprehensive review of potential impacts

[6] http://www.mass.gov/eea/agencies/massdep/water/watersheds/chapter-91-the-massachusetts-public-waterfront-act.html

of proposed actions. NEPA requires either a Categorical Exclusion (Cat-Ex) determination, or an Environmental Assessment (EA), and in some cases an Environmental Impact Statement (EIS). Before any construction can occur, an approved Cat-Ex, a Finding of No Significant Impact (FONSI) on an EA, or a Record of Decision (ROD) on an EIS are required under NEPA.

MEPA requires an Environmental Notification Form (ENF) and if warranted, a draft and final Environmental Impact Report (EIR).

The environmental areas considered in the NEPA and MEPA reviews include most of the areas discussed above. The NEPA and MEPA reviews can occur simultaneously and commonly take 18 months to 2 years (assuming an EIS is not required).

1.2.6.8 Previous Environmental Studies

Consideration of potential mitigation actions associated with RSA enhancements near the Runway 27 end has been informed by previous environmental analyses conducted as a part of other RSA mitigation actions that were performed at BOS. Environmental review and impact determinations were developed during the construction of the Engineered Materials Arresting System (EMAS) for Runway 33L, which involved much local, state, and Federal agency collaboration. As noted above, inter-tidal and subtidal areas are protected natural resources under federal and state regulations, and construction within these areas can be complex and challenging from an environmental perspective. In addition to demonstrating the least environmentally damaging practicable alternative, a critical element in securing approvals for the Runway 33L RSA deck in these sensitive coastal resource areas was documenting the public safety benefits of bringing that RSA up to current federal safety standards.

During the Runway 33L EMAS construction, there was an unavoidable loss of Eelgrass. The pile-supported deck structure on which the EMAS was placed blocked the sunlight needed for Eelgrass survival. [7] To offset this unavoidable loss, Massport was required by state and federal regulation to provide eelgrass mitigation at a replacement/loss ratio of 3:1.

The Runway 22R inclined safety area (ISA), which was constructed about five years ago, also faced similar environmental issues. The area beyond the runway end was comprised of salt marsh and shellfish habitat of approximately 63,000 square feet. For the Runway 22R ISA installation, the salt marsh had to be relocated with compensation given to environmental and economic losses. The salt marsh was reconstructed off-airport at a 2:1 replacement/loss ratio.

[7] http://www.airportimprovement.com/article/logan-intl-builds-concrete-pier-over-boston-harbor-support-runway-safety-area-extension

1.3 Runway 9-27 Alternatives

As part of the development of alternatives to mitigate deficiencies in RSA length and/or width, the existing lengths were utilized as the baseline for this alternatives analysis. It is important to note that portions of perimeter vehicle service roads currently cross the existing runway safety areas of Runway 27 due to the limited land available and that these roads are marked with stop signs and painted stop bars. Based on conversations between Massport and the FAA New England Region, we request that this existing vehicle control protocol be considered acceptable mitigation for the perimeter vehicle service roads within the RSA.

On the approach end of Runway 9 (West end of Runway) the current RSA meets the full dimension RSA standards. The RSA on the approach end of Runway 27 (east runway end) does not meet design standards for either RSA undershoot or overrun RSA criteria. The existing RSA on the Runway 27 end is 500 feet in width but provides only 150 feet of length[8] beyond the runway end. There is currently a vehicle service road that crosses the end of Runway 27 at approximately 85 feet from the threshold. As mentioned previously, we are requesting that the presence of stop signs/stop bars on the perimeter vehicle service road be considered mitigation for this deficiency. Based on this, the current Runway 27 RSA beyond the runway end is 850 feet deficient to meet a full dimension RSA to protect for aircraft overruns and 450 deficient to meet the undershoot RSA requirement of 600 feet.

Six (6) action alternatives, including two sub-alternatives, have been identified as potential options to provide the requisite safety area and are listed below, in addition to the no-action alternative.

(1) Declared Distances

- Employ declared distances to the current runway configuration to meet RSA requirements.

(2) Displaced Threshold Markings

- Additional RSA beyond the departure end of Runway 9 could be obtained through the use of displaced threshold markings at the Runway 9 threshold.

(3) Full RSA

- Fill and construct additional RSA to provide a minimum of 500 feet in width and extending a minimum of 850 feet into Boston Harbor to provide a full dimension RSA[9]. Both fill (Alternative 3A) and deck (Alternative 3B) options are explored

[8] 2004 RSA Determination, Airport Certification Manual

[9] NOTE: Additional width and length of the fill pad would be provided to accommodate the alignment of the airport perimeter roadway adjacent to the boundary of the RSA.

(4) EMAS

- Install a standard EMAS either on a 500' wide deck (Alternative 4A) or a 300' wide deck (Alternative 4B) into Boston Harbor to provide an equivalent level of RSA protection.[10]

(5) No Action

- The no-action alternative is also considered should none of the action alternatives be deemed to be feasible or practicable due to operational, environmental impacts, or from a financial feasibility perspective.

1.3.1 Runway 9-27 Alternative 1 - Declared Distances

The utilization of declared distances to mitigate potential RSA dimensional standard issues, non-compatible land uses in the RPZ or other constraints impacting a runway alignment has been broadly applied at numerous airports in the U.S. In the case of Boston's Runway 9-27, declared distances would be applied to the current 7,000-foot alignment to provide for a full dimension RSA without having to initiate construction in Boston Harbor off the east end of the runway. The existing declared distances for Runway 9 and Runway 27 as currently published are listed in **Table 1.2** below.

Table 1.2 Runway 9-27 Existing Declared Distances

	Runway 9 (ft)	Runway 27 (ft)
Takeoff Run Available (TORA)	7,000	7,000
Takeoff Distance Available (TODA)	7,000	7,000
Accelerate-Stop Distance Available (ASDA)	7,000	7,000
Landing Distance Available (LDA)	7,000	7,000

Source: Airport Master Record, 5010, BOS 1/3/2018.

Comparing the existing declared distances as published in the FAA 5010 Airport Master Record and listed in **Table 1.2** to the total length of Runway 9-27, indicates that no adjustment has been made to the declared distances for Runway 9-27 for the purposes of providing a standard RSA or ROFA. It has been assumed that these distances were based on the criteria set forth in AC 150/5300-13A or its predecessors and reflect the incorporation of any impacts associated with penetrations of the 40:1 departure surfaces would have on the location of the end of the TODA for each runway

[10] NOTE: the width and length of the fill pad or structure would also include sufficient area to accommodate the alignment of the airport perimeter roadway around the end of the EMAS bed.

end. In the case of departures on Runway 27, penetrations to the 40:1 departure surface have been mitigated by increasing the climb gradient from the standard 200' per nautical mile to over 477' per nautical mile, resulting in the TODA consisting of the full 7,000' length of the runway.

The ASDA and LDA values listed in Table 1.1 also indicate the full runway length being available for accelerate stop distance and landing distance despite the deficient length for full dimension overrun and undershoot RSA's on this runway end. The 2004 FAA RSA determination for this considered declared distances as a potential mitigation option. The full-length mitigation option was dismissed on the basis that providing the required RSA was not possible due to a lack of land off the eastern end of Runway 9-27. This factor likely provided the basis for the assumption that the entire 7,000-foot long runway would be available for ASDA and LDA despite the significant deficiencies in both overrun and undershoot RSA length.

Application of declared distances to achieve a standard RSA on the east end of Runway 9-27 would not impact the runway length values for TORA or TODA as values are correlated to whether obstacles penetrate the 40:1 departure surface or have incompatibilities with the departure RPZ. Declared distances would, however, trigger changes in the length of available runway for meeting ASDA and LDA from the values shown in Table 1.1 The resulting declared distances for TORA, TODA, ASDA and LDA that would provide a full dimension RSA on the east end of Runway 9-27 are listed in **Table 1.3** and depicted in **Exhibit 1.1**. TORA and TODA remain the full length of the runway, as their lengths are not tied to RSA length.[11] Utilization of declared distances would negatively impact the LDA on both Runway 9 and Runway 27.

Table 1.3 Runway 9-27 Proposed Declared Distances

	Runway 9 (ft)	Runway 27 (ft)
Takeoff Run Available (TORA)	7,000	7,000
Takeoff Distance Available (TODA)	7,000	7,000
Accelerate-Stop Distance Available (ASDA)[12]	6,150	7,000
Landing Distance Available (LDA)	6,150[13]	6,550[14]
Source: Kimley-Horn Analysis, May 2018		

[11] There is no indication in the airport facility directory or other materials of any designated clearway or stopway on this runway.

[12] Length of ASDA reduced to provide a 1,000' long by 500' wide RSA beyond the end of usable pavement.

[13] Length of LDA results from an 850' deficiency in the length of the RSA on east end of Runway 9-27

[14] Length of LDA on Runway 27 due to 450 feet deficiency of the undershoot RSA.

DRAWING LEGEND

- RUNWAY PAVEMENT
- HIGH ENERGY RUNWAY AREA
- TAXIWAY/APRON PAVEMENT
- BUILDING
- WATER
- ILS HOLDBAR
- HOLDBAR
- POTENTIAL DISPLACED THRESHOLD
- POTENTIAL PAVEMENT PAINTING
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)

POTENTIAL RUNWAY 9 DECLARED DISTANCES

TORA- 7,000'
TODA - 7,000'
ASDA - 6,150'
LDA - 6,150
600'
1,000'

POTENTIAL RUNWAY 27 DECLARED DISTANCES

1,000
LDA 6,550'
ASDA - 7,000'
TODA - 7,000'
TORA - 7,000'
450'
600'

TIDAL FLAT
BOSTON HARBOR
WINTHROP
BOSTON
MASSPORT FIRE-RESCUE STATION 2
MASSPORT FIRE-RESCUE STATION 1 (HQ)
PERIMETER ROAD
GOVERNORS ISLAND
FIRE TRAINING FACILITY
FAA ASR9 SITE
APPROX. AIRPORT BOUNDARY
EMAS
ROFA
RSA

DRAFT - NOT FOR PUBLIC DISSEMINATION

bostonlogan

GRAPHIC SCALE IN FEET
0 400 800 1600

NORTH

EXHIBIT 1.1
RUNWAY 9-27 RSA ALTERNATIVE 1 - DECLARED DISTANCES
DIMENSIONAL GAP ALTERNATIVES

The Runway 9 approach end has a compliant RSA prior to the landing threshold, thereby protecting aircraft landing operations in the event of a runway undershoot or, Runway 27 departure operations in the event of an overrun. However, due to the 850' RSA deficiency on the east end of the runway, both the ASDA and LDA would be reduced from 7,000' to 6,150' feet. When operating in the Runway 27 orientation, the LDA would be reduced from 7,000' to 6,550' and the landing threshold would be moved by 450' to the west to address the 450' length deficiency in the required 600' undershoot RSA. While the 450' reduction in LDA associated with Runway 27 landings would not preclude landings by the predominant narrow-body fleet of aircraft using the runway, it may affect runway occupancy times associated with Runway 27 arrivals and departure operations on Runway 22L due to aircraft not being able to exit at Taxiway E.

Shifting the Runway 27 threshold west by 450' reduces the available distance between the Runway 27 threshold and the exit point onto Taxiway E. Taxiway E is the most frequently used exit point for narrow-body aircraft landing on Runway 27 and the only available exit for aircraft landing on Runway 27 prior to the intersection with Runway 4R-22L and the LAHSO line. Implementing the declared distances alternative reduces the distance between the existing runway threshold and the lead in to Taxiway E from a current 4,260' to 3,810'. This loss of available length for touchdown and roll out has a very clear adverse impact on the utility of Taxiway E as an exit location for aircraft landing on Runway 27. A loss in available landing distance will measurably reduce the efficiency of the airfield. It would also result in aircraft entering Taxiway E at a higher speed which could increase the potential for an inadvertent crossing of the Runway 4R-22L hold bar and possible excursions.

An increased number of aircraft would not exit at Taxiway E due to the loss of length and these aircraft would be required to cross Runway 22L to exit at Taxiway M or K, resulting in increased occupancy time, degradation in arrival capacity on Runway 27 and potential impacts to departures on Runway 22L.

Table 1.4 Runway 9 Takeoff Utilization by ADG

Airplane Design Group	2017 Operations	Percentage
ADG I and II	9,829	20%
ADG III	36,237	74%
ADG IV	1,967	4%
ADG V	908	2%
ADG VI	0	0%

Source: BOS 2017 Operational Data

Virtually all ADG III, IV, and V aircraft departing on Runway 9 with an ASDA of 6,150' will be subject to a weight penalty. As can be seen in the **Table 1.4** above, this includes approximately 49,000 operations or 80% of the aircraft departing Runway

9. Boeing and Airbus Planning Characteristics for Airport Planning manuals were reviewed to obtain an indication of the impact to operational capability on a select portion of the narrow-body fleet that accounts for the predominate use of Runway 9-27. This review considered the following aircraft types: Airbus A320 and A321, Boeing 737-700, 737-800 and 737-900 and accounted for engine types, maximum engine thrust levels, dry runway conditions and two environmental temperatures consisting of both a standard 59-degree Fahrenheit day and standard day plus 15 degrees Celsius which equates to 86 degrees Fahrenheit. This group of aircraft accounts for about 35% of the yearly takeoff operations on Runway 9. **Table 1.5** displays the operational weight restrictions by select aircraft types that would be expected to occur if Runway 9 ASDA was shortened to 6,150'. ASDA is important because many airlines calculate their allowable departure weight based on the amount of ASDA available.

Table 1.5 Maximum Payloads - 6,150' Runway 9 Length

Aircraft and Engine Type	Maximum Takeoff Weight (MTOW)	Standard Day MTOW	Standard Day + 15C MTOW
Airbus (20% of R/W 9 Takeoff Operations)			
A321 - IAE V2500	206,132 lbs.	185,000 lbs.	182,500 lbs.
A321 - CFM56	206,132 lbs.	185,000 lbs.	182,000 lbs.
A320 – IAE V2500	174,165 lbs.	162,000 lbs.	160,500 lbs.
A320 – CFM56	174,165 lbs.	164,500 lbs.	160,000 lbs.
Boeing (15% of R/W 9 Takeoff Operations)			
737-700 – CFM56, 20K Thrust	154,500 lbs.	139,500 lbs.	136,000 lbs.
737-700 – CFM56, 26K Thrust	154,500 lbs.	**No Penalty**	**No Penalty**
737-800 – CFM56, 26K Thrust	174,200 lbs.	157,000 lbs.	154,000 lbs.
737-900 – CFM56, 24K Thrust	174,200 lbs.	146,500 lbs.	142,500 lbs.
737-900ER – CFM56, 26K Thrust	187,700 lbs.	156,000 lbs.	152,500 lbs.

Source: Boeing 737 Aircraft Planning Characteristics for Airport Planning Manual; Airbus A321 Aircraft Characteristics Airport and Maintenance Planning; Airbus A320 Aircraft Characteristics Airport and Maintenance Planning; Kimley Horn Analysis.

Loss of length for ASDA is problematic as ASDA is a key consideration in determining the allowable aircraft departure weight. It is a regulatory violation to operate an aircraft at a weight that would result in the calculated accelerate stop distance exceeding the length of the runway ASDA. As a result, a reduction in ASDA can trigger a reduction in fuel load (weight) and, hence stage length, or a reduction in payload (passengers or cargo), both of which are problematic to the commercial carriers. Given the current 7,000' length of Runway 9-27, an 850' reduction in the length of runway available for use can have a large impact on the utility of the runway for various aircraft models and for longer haul domestic and/or international markets, both of which are forecast to increase.

Table 1.5 documents the impacts that the reduction in ASDA has on the maximum takeoff weights of ADG III aircraft that comprise a significant percentage of the fleet at BOS and the aircraft fleet using Runway 9. Of the narrow-body aircraft models shown in the table, all but the high thrust version of the 737-700 require a reduction in takeoff weight to depart on Runway 9. Achieving this reduction could only be met by either reducing fuel load or payload. Reducing payload would be of considerable concern to the airlines that routinely utilize Runway 9 for departures.

Attributes of Runway 9-27 RSA Alternative 1

- Provides for a full-length RSA in both operational directions.
- Full 7,000' long TORA and TODA is retained and a 7,000' ASDA is retained for Runway 27 operations.
- Does not require new or additional construction.
- Would not incur the environmental impacts that are associated with the options involving constructing a full dimension RSA or a standard RSA using EMAS.
- Alternative 1 would generate little if any public response.

Constraints of Runway 9-27 Alternative 1

- Diminishes the viability of Taxiway E as an exit point when arriving on Runway 27, resulting in more aircraft crossing Runway 4R-22L to access either Taxiway M or K.
- Potential to increase runway occupancy times and decrease arrival capacity on Runway 27 due to loss of Taxiway E viability.
- Aircraft not exiting at Taxiway E would likely be directed to exit at either Taxiway M or Taxiway K, potentially increasing landing roll out times and operational delay.
- Loss of Taxiway E utility could trigger shifting most arriving aircraft to taxi to Taxiway K, potentially causing congestion in the vicinity of Taxiway K and M if aircraft are in queue to hold for crossing Runway 4L-22R on Taxiway K. It could also result in aircraft having to go-around for Runway 27 arrivals if the queue backs up beyond the Runway 27 holdbar.
- Weight restrictions may adversely impact airlines operating ADG III, IV, and V aircraft by triggering reduced payloads and/or a reduction in fuel load which could impact service by these aircraft to longer haul destinations

(both domestic and international) and accounts for about 49,000 operations or 80% of the aircraft departing Runway 9.

- Poses negative impact on Northeast and Southwest flow capacities, which constitute approximately 60% of the airport's operating flows in the summer months.

Alternative 1 Summary:

Based on the preceding discussion, a full dimension RSA could be achieved off both ends of Runway 9-27 through the application of declared distances. However, the impacts to operational flows and efficiency, airfield capacity and the downgrading of the capability of Runway 9-27 to serve its intended purpose and meet the operational demands of a large segment of the air carrier fleet at BOS call into question Alternative 1 as a viable option for addressing the current non-standard RSA condition.

1.3.2 Alternative 2 - Runway Threshold Markings at Runway 9 Departure End

Alternative 2 is an incremental RSA improvement alternative that does not provide full requisite RSA dimensions, but provides for additional RSA length beyond the departure end of Runway 9 where it is currently 850 feet deficient for overruns.

Currently, Taxiway M is aligned with the departure end of Runway 9. This alternative would restripe the aligned taxiway with runway pavement markings as if it were a displaced threshold, and shift the start point of the declared distances for departures on Runway 9 west by approximately 195 feet. This shift would not provide for any change to the operational runway length in either direction. However, because the start and end points of the TORA, TODA, and ASDA would be further west, an additional 195 feet of RSA overrun beyond the departure end can be obtained, reducing the deficiency from 850 feet to 655 feet. Alternative 2 is depicted in **Exhibit 1.2.**

Attributes of Runway 9-27 Alternative 2

- Provides a moderate increase in available overrun protection for departures on Runway 9, which is heavily utilized for departures in northeast flow.
- Would likely result in minimal cost and construction impacts.
- Has side benefit of addressing an existing Runway Incursion Mitigation criteria deficiency of an aligned taxiway at this location.

DRAWING LEGEND

- RUNWAY PAVEMENT
- HIGH ENERGY RUNWAY AREA
- TAXIWAY/APRON PAVEMENT
- BUILDING
- WATER
- ILS HOLDBAR
- HOLDBAR
- POTENTIAL DISPLACED THRESHOLD
- POTENTIAL PAVEMENT PAINTING
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)

POTENTIAL RUNWAY 9 DECLARED DISTANCES

TORA- 7,000'
TODA - 7,000'
ASDA - 7,000
LDA - 7,000'

600'
345'

POTENTIAL RUNWAY 27 DECLARED DISTANCES

LDA 7,000'
ASDA - 7,000'
TODA - 7,000'
TORA - 7,000'

195'
1,000'
150'

TIDAL FLAT
BOSTON HARBOR
WINTHROP BOSTON
MASSPORT FIRE–RESCUE STATION 2
MASSPORT FIRE–RESCUE STATION 1 (HQ)
GOVERNORS ISLAND
FIRE TRAINING FACILITY
FAA ASR9 SITE
APPROX. AIRPORT BOUNDARY
EMAS
PERIMETER ROAD
TERMINAL ROAD
BARTLETT PARKWAY
BARTLETT RD.
ORLANDO AVE.
ROSSIDE AVE.
ROFA
RSA

DRAFT - NOT FOR PUBLIC DISSEMINATION

GRAPHIC SCALE IN FEET
0 400 800 1600

NORTH

EXHIBIT 1.2
RUNWAY 9-27 RSA ALTERNATIVE 2 - DISPLACED THRESHOLD
DIMENSIONAL GAP ALTERNATIVES

Constraints of Runway 9-27 Alternative 2

- Alternative 2 does not provide the requisite safety area of 1,000 feet beyond the runway end, but rather provides a modest increase.

- The shifting of the Runway 9 threshold would require an estimated two to three-year court review process to lift the existing injunction. The outcome is not guaranteed.

1.3.3 Alternatives 3A and 3B – Full Dimension RSA

This alternative would require fill necessary to create a relatively flat, graded area free of objects or vegetation that has the potential to damage aircraft for the dimensions necessary for the RSA. With a width of 500 feet and an additional length required of 850 feet, this would require an additional 45,000 square yards of RSA surface area along with a riprap and sheet piling wall surrounding the perimeter. Riprap provides for wave dispersion against water or ice erosion in bodies of water and will assist in preserving the RSA fill.

To estimate the amount of fill required for the RSA, the average of the harbor depths within the area of the RSA was calculated from NOAA navigation charts and added to the elevation of Runway 27, which is 14 feet AMSL. The harbor averages 11 feet, which equates to a total average depth of 25 feet requiring fill. Accounting for the necessary RSA length and width, an estimated amount of fill needed would be around 375,000 cubic yards. In addition to this requirement, the RSA would need to have a riprap buffer zone to protect from damage by the current in the harbor. Alternative 3A is a full-dimension RSA built in fill and is depicted in **Exhibit 1.3A.** Alternative 3B is a deck version of the full-dimension RSA and is depicted in **Exhibit 1.3B.**

Fill materials would be delivered to the site by barge or trucked from storage areas on the Airport and the majority of the construction related actions would be conducted from the water including the driving of sheet piling and placement of stone riprap and the development of the filled RSA pad.

Attributes of Runway 9-27 RSA Alternatives 3A and 3B

- Provides a fully-compliant RSA for both overrun and undershoot through placement of fill and rip rap protection or a deck in the harbor.

- Offers a more permanent solution without compromising aircraft takeoff and landing performance with declared distances limitations.

- Enhances safety for Runway 27 landings and Runway 9 departures, as Runway 9-27 is used extensively for these operations in various flows.

Constraints of Runway 9-27 Alternative 3A and 3B

- Would require an extensive environmental impact review process due to both permanent and construction impacts to coastal bank / intertidal flats, shellfish habitat, subtidal areas, terrestrial and marine threatened and endangered species, flood plains, and tidelands. Alternative 3A will have the largest impacts of any alternative considered.

- Likely to require environmental mitigation at a 2:1 or 3:1 rate of replacement.

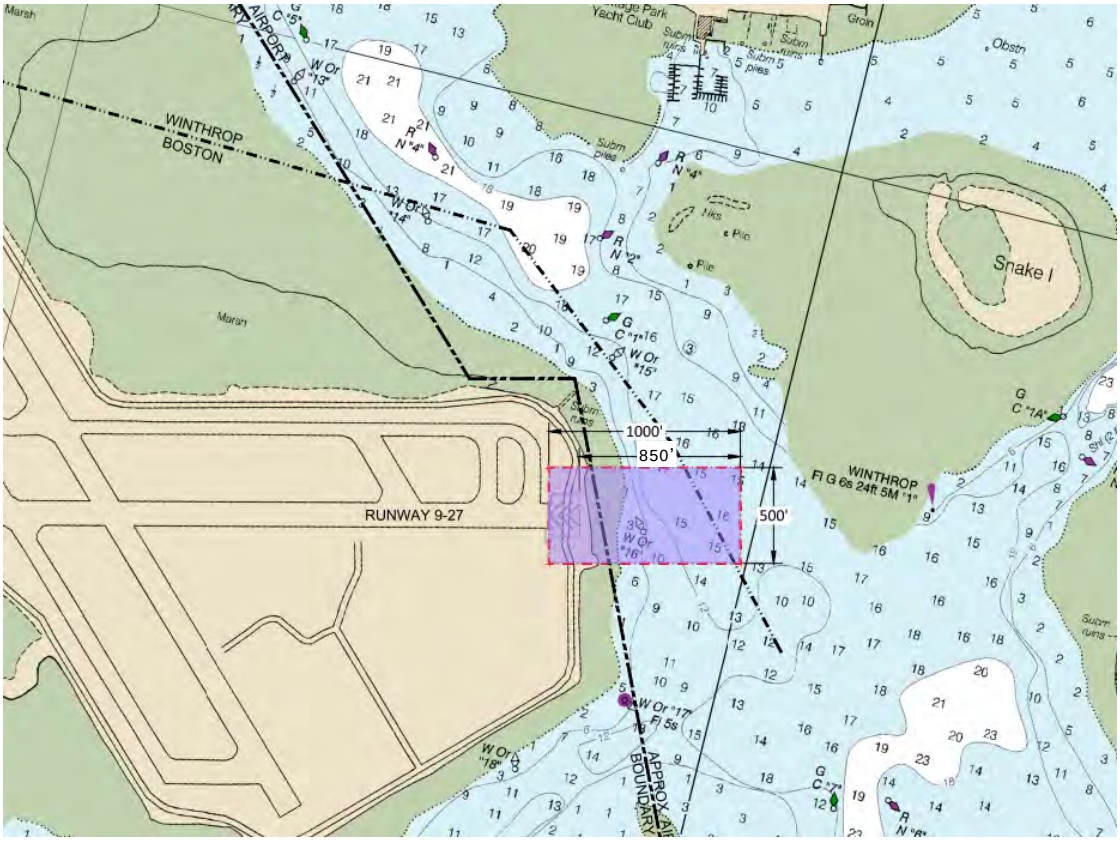
- Very high cost (Alternative 3B is likely more costly than 3A).

- Potential for operational disruption as part of construction due to the need for barges and cranes (Alternative 3B will likely take longer to construct than Alternative 3A)

- Both Alternatives would be subject to lengthy community outreach process.

- Both Alternatives would impact portions of the Winthrop navigation channel (shown below) and would likely be unpermittable.

Proposed Full RSA Dimensions Within Ship Channel Vicinity



Source: McFarland Johnson, 2018
NOAA Office of Coast Survey

DRAWING LEGEND

- RUNWAY PAVEMENT
- HIGH ENERGY RUNWAY AREA
- TAXIWAY/APRON PAVEMENT
- ENGINEERED MATERIAL ARRESTING SYSTEM (EMAS)
- SHIP DETECTION RADAR
- BUILDING
- WATER
- ILS HOLDBAR
- HOLDBAR
- POTENTIAL FULL DEPTH FILL
- POTENTIAL RIP RAP PERIMETER
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)

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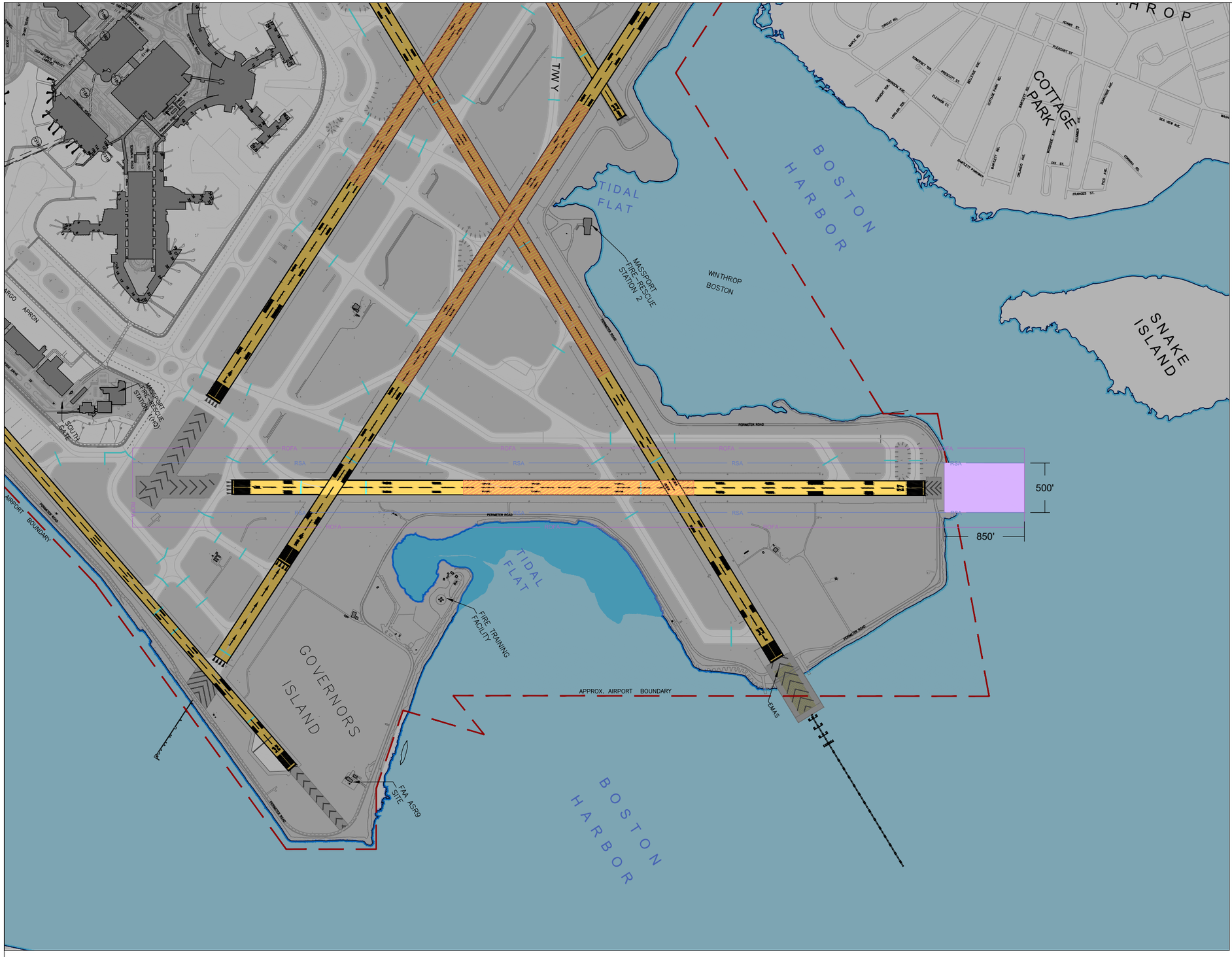
GRAPHIC SCALE IN FEET
0 400 800 1600

NORTH

EXHIBIT 1.3A
RUNWAY 9-27 RSA ALTERNATIVE 3A - FILL
DIMENSIONAL GAP ALTERNATIVES



DRAWING LEGEND

- RUNWAY PAVEMENT
- HIGH ENERGY RUNWAY AREA
- TAXIWAY/APRON PAVEMENT
- ENGINEERED MATERIAL ARRESTING SYSTEM (EMAS)
- SHIP DETECTION RADAR
- BUILDING
- WATER
- ILS HOLDBAR
- HOLDBAR
- POTENTIAL FULL DECK
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)

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GRAPHIC SCALE IN FEET
0 500 1000 2000

NORTH

EXHIBIT 1.3B
RUNWAY 9-27 RSA ALTERNATIVE 3B - FULL DECK
DIMENSIONAL GAP ALTERNATIVES

1.3.4 Alternatives 4A and 4B – Construct EMAS on Deck

As previously described, the FAA accepts an EMAS as providing an equivalent level of safety as provided by a full dimension (500' wide, 1,000' beyond runway end) RSA and does so in a shorter distance off the end of a runway. At BOS, the east end of Runway 9-27 is only 150' from Boston Harbor and while environmental issues might render it highly challenging and costly, EMAS has the potential of providing the requisite protection in the event of an overshoot or undershoot of a runway end, while minimizing to the extent practicable the impact to environmental features in Boston Harbor. Two sub-alternatives for Alternative 4 were considered, one for a full-width installation on a deck (4A) and one for a reduced width to 300' similar to the existing Runway 33L installation (4B). These alternatives are collectively discussed as "Alternative 4" in this section as the fundamental concept behind Alternative 4 is a standard EMAS bed.

EMAS Bed Length Considerations

The length of the EMAS bed is determined based upon the fleet mix of aircraft operating on the affiliated runway. The airport reference code as shown on the current BOS Airport Layout Plan (ALP) is D-V meaning that the airport is intended to accommodate the requirements of aircraft in approach category D (approach speeds of 141 knots but less than 166 knots) and airplane design group V (wingspans of at least 171' but less than 214'). A query of Runway 9-27 operations from calendar year 2017 identified that there were over 2,600 ADG V operations operating on the runway. This meets the definition for determining the critical aircraft grouping for a given runway as ADG V aircraft operations exceed 500 annual itinerant operations. It is expected that ADG V aircraft will continue to utilize Runway 9-27 with similar frequency in the future. The aircraft fleet mix to be used for EMAS design will be determined during the conceptual design and permitting process.

A review of Airbus and Boeing Planning Characteristics manuals for the Airbus A330, A340, and A350 along with the Boeing B777, B747 and B787 found that the noted aircraft models would incur significant load penalties on a 7,000-foot runway at sea level both on warmer days and on a 59-degree standard day, however, many of these aircraft are high-performance and are operating on relatively short stage lengths compared to their full range. Additionally, many ADG V aircraft operating on Runway 9-27 are arrivals that land on Runway 27. For purposes of this analysis, initial options have been based on accommodating a runway overrun by a B777 aircraft departing on Runway 9 or an undershoot of a B777 landing on Runway 27.

It is recognized that the size of the EMAS needed for this aircraft and either the fill pad or deck supporting the EMAS bed would be longer than that required for an ADG-IV or ADG-III aircraft, which comprise the vast majority of the aircraft using this runway. Thus, as impacts associated with development of the EMAS are identified, it is likely that the ultimate length of the facility may be less than that associated with an EMAS for a larger design aircraft.

FAA has developed EMAS length charts and incorporated these into Advisory Circular 150/5220.22B, Engineered Materials Arresting Systems for Aircraft Overruns, however these were prepared for only seven aircraft models and only to provide examples. The aircraft cited in Appendix 2 of the circular listed example aircraft as shown below in **Table 1.6.** While these provide an idea of EMAS lengths based on a 70-knot excursion speed, they cannot be used to accurately infer EMAS length requirements for other aircraft models. Defining the length of the required EMAS bed requires access to specific aircraft design data on the configuration and operational characteristics of the critical design aircraft that will operate on the runway. Unfortunately, this computer model is not publicly available and limits the ability to fully analyze the EMAS requirements for most aircraft.

Table 1.6 - Representative EMAS Bed Length by Aircraft Type

Aircraft	Design Group	Gross Weight (lbs.)	Landing Gear Configuration	EMAS Bed Length
CRJ 200	II	53,000	Dual Wheel	325 feet
Gulfstream G-III	II	67,700	Dual Wheel	425 feet
Douglas DC-9	III	114,000	Dual Wheel	375 feet
Boeing 737-400	III	150,000	Dual Wheel	390 feet
Boeing 757-200	IV	255,000	Double Dual Tandem Wheel	450 feet
Douglas DC-10	IV	455,000	Double Dual Tandem Wheel	520 feet
Boeing 747	V	875,000	Quad Double Dual Tandem Wheel	575 feet

Source: Advisory Circular 150/5220.22B, Aircraft Planning Characteristics Manuals.

Given the inability to define the exact length of EMAS bed for an aircraft other than those above, it was decided to use the same EMAS configuration constructed on the approach end of Runway 33L. The Runway 33L EMAS was constructed based on the requirements for the aircraft fleet mix proposed to use the runway, including the B747-400, and was built to provide for both overrun and undershoot protection. While it is possible that the length of this facility could be more than required for aircraft operating on Runway 27, this cannot be fully verified without access to the computer model. The value of using the Runway 33L EMAS as a conceptual template for analysis is that it represents a completed EMAS concept constructed at BOS proximate to the Runway 27 end that was planned taking into consideration the specific environmental factors, operational considerations, construction techniques and regulatory interpretations that were addressed as a part of the Runway 33L EMAS program and, as such, provides an excellent foundation for understanding the realities that an EMAS on Runway 9-27 would have to consider.

At the time that the Runway 33L EMAS was being considered, FAA criteria indicated that EMAS was adequate for addressing the RSA length requirement but did not provide a basis for a reduction in the required width of a RSA. The FAA and Massport, after consideration of the potential cost and impact of providing the full width for a Runway 33L RSA, worked together to reduce the width of the Runway 33L EMAS deck from the required 500' to a width of 306' (300' wide deck plus an additional 6' for safety rails). A reduction below 300' was not accepted due to the need to provide adequate room adjacent to the EMAS bed for the maneuvering of emergency vehicles in the event of an incident and for construction equipment should the bed require repair.

The final lengths of the Runway 33L EMAS are approximately 600' for the Setback and EMAS bed and 50' for emergency and maintenance vehicle access for a total length of 650' from the runway threshold to the end of the deck. The 600' corresponds to the FAA minimum RSA length for undershoot purposes and the RSA cannot be less than this length independent of the EMAS requirements.

Based on the usage of the Runway 33L EMAS as a prototype EMAS for evaluation purposes, the proposed improvements that would occur on the east end of Runway 9-27 are depicted in **Exhibit 1.4(A)** and **Exhibit 1.4(B).** Exhibit 1.4(A) depicts the EMAS installation on a 500'-wide deck, and Exhibit 1.4(B) depicts an EMAS installation on a 300'-wide deck. These improvements provide the requisite protection for the required 600' of undershoot RSA and would fully address the ability to stop a 70-knot overrun consistent with the design requirements for a standard EMAS.

Alternative 4A and 4B Elements

- A proposed deck structure commencing 150' east of the Runway 27 threshold and extending 500' feet to the east, maintaining a width of 500 for Alternative 4A or 300 feet for Alternative 4B.[15] This provides a surface area of approximately 150,000 for Alternative 4A or 250,000 square feet for Alternative 4B. The structure provides area for the EMAS bed and for access to all sides of the EMAS bed for emergency vehicles and responders. The proposed deck would be supported by pilings similar to the configuration used in the construction of the Runway 33L RSA.

- An EMAS bed of approximately 500' in length by 170' in width beyond the east end of the runway along the extended runway centerline would be constructed beginning after the setback distance as determined during the EMAS design (50' assumed in this study).

[15] Based on clarification of criteria provided by the FAA New England Region, a standard EMAS mitigates both the length and width requirements of a full dimension RSA.

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- WATER
- ILS HOLDBAR
- HOLDBAR
- POTENTIAL ENGINEERED MATERIALS ARRESTING SYSTEM (EMAS)
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)

BOSTON HARBOR
TIDAL FLAT
WINTHROP
BOSTON
MASSPORT FIRE-RESCUE STATION 2
MASSPORT FIRE-RESCUE STATION 1 (HQ)
PERIMETER ROAD
RSA
ROFA
500'
650'
TIDAL FLAT
FIRE TRAINING FACILITY
GOVERNORS ISLAND
APPROX. AIRPORT BOUNDARY
EMAS
FAA ASR9 SITE
BOSTON HARBOR

GRAPHIC SCALE IN FEET
0 400 800 1600

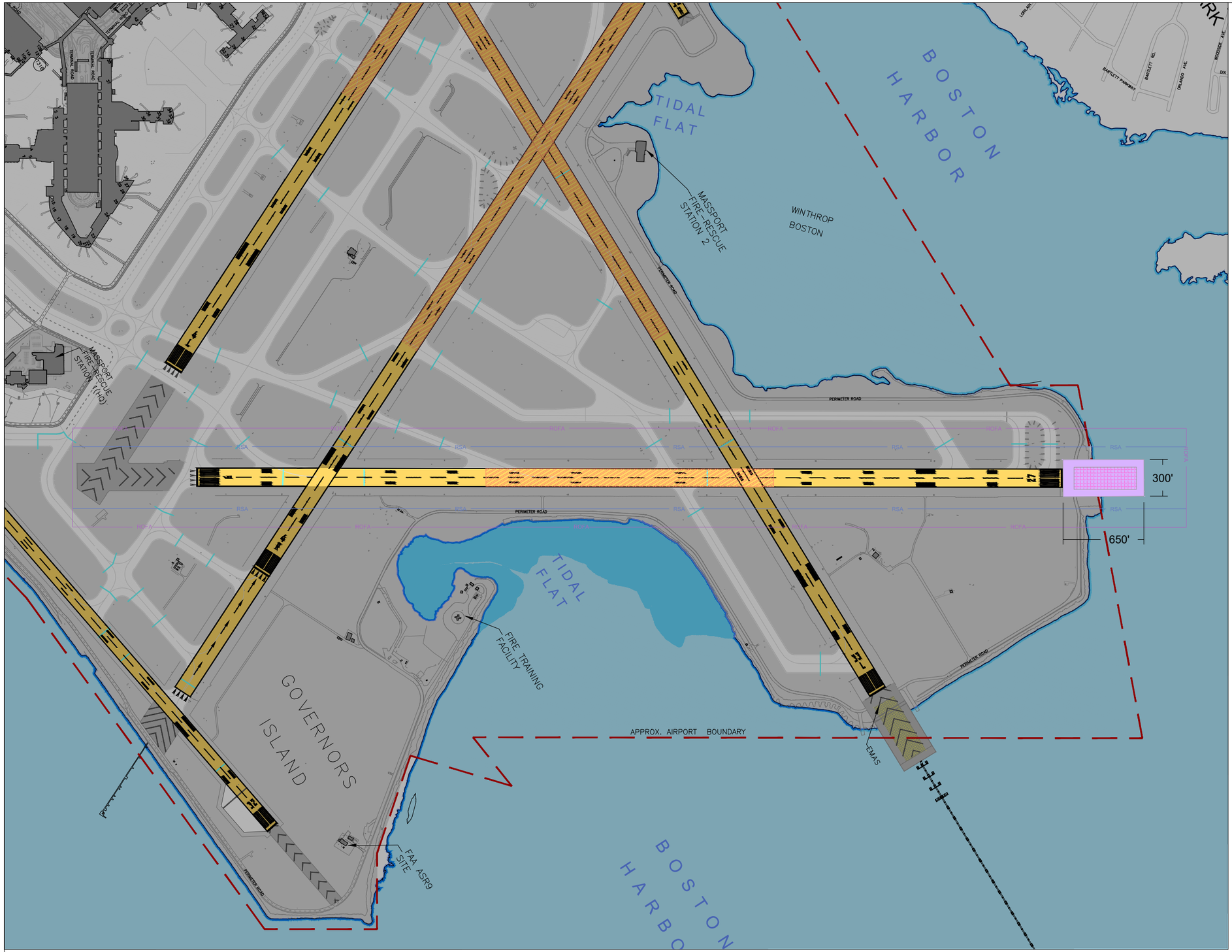
NORTH

DRAFT - NOT FOR PUBLIC DISSEMINATION

EXHIBIT 1.4A

RUNWAY 9-27 RSA ALTERNATIVE 4A - EMAS

DIMENSIONAL GAP ALTERNATIVES



DRAWING LEGEND

- RUNWAY PAVEMENT
- HIGH ENERGY RUNWAY AREA
- TAXIWAY/APRON PAVEMENT
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- SHIP DETECTION RADAR
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- ILS HOLDBAR
- HOLDBAR
- POTENTIAL ENGINEERED MATERIALS ARRESTING SYSTEM (EMAS)
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)

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GRAPHIC SCALE IN FEET
0 400 800 1600

NORTH

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EXHIBIT 1.4B

RUNWAY 9-27 RSA ALTERNATIVE 4B - EMAS

DIMENSIONAL GAP ALTERNATIVES

- A relocated secure airport perimeter roadway crossing between the Runway 27 end of runway and the beginning of the EMAS bed. This roadway would require installation of stop signs prior to entering the Runway Object Free Area and active communication with the ATCT for permission to enter runway protected areas and cross the runway alignment.

- If the FAA were to require relocation of the Perimeter Roadway to lie outside of the Runway 9-27 ROFA, a separate bridge structure approximately 1,765 feet in length extending over the harbor would be required to keep the roadway outside of both the ROFA and the RSA.

Alternatives 4A and 4B incorporate assumptions based on analysis and decisions made during the Runway 33L EMAS development program and environmental overview. It also provides a standard EMAS which meets the requirements for a safety area for the east end of Runway 9-27 while reducing, to the extent practicable, impacts to the environmental resources along the shoreline and in the waters of Boston Harbor, and to navigation within the harbor and to adjacent communities.

The attributes and the constraints/limitations of Alternative 4 are outlined below.

Attributes of Alternatives 4A and 4B

Alternative 4 has the benefit of being informed by the construction of a similar RSA improvement on the Runway 33L end, and incorporates assumptions based on analyses undertaken, and decisions made during the Runway 33L EMAS development program and environmental overview. Alternative 4 provides a standard EMAS which meets the requirements for a RSA on the east end of Runway 9-27 and does so while reducing, to the extent practicable, impacts to environmental resources along the shoreline and in the waters of Boston Harbor. Additional attributes include the following:

- Provides for both undershoot and overrun RSA protection consistent with what was previously implemented on Runway 33L.

- Development of EMAS RSA improvements have a strong aviation safety basis that is supported by significant research defining the rationale for the need for safety areas and a history at airports nationwide of incidents supporting the need for the RSA.

- Utilizes a deck and pile-supported structure, rather than a solid fill structure reducing direct impacts to coastal wetlands and environmental resources compared to impacts associated with a fill option.

- Would have less impact on the navigational channel than a full-length RSA.

Constraints of Alternative 4A and 4B

- It is reasonable to expect adverse community response to the proposed construction activities off the end the Runway 27 end of the runway.
- Would require an extensive environmental impact review process due to impacts to coastal bank / intertidal flats, shellfish habitat, subtidal areas, terrestrial and marine threatened and endangered species, flood plains, and tidelands. The impacts would be the less than for Alternatives 3A and 3B. Alternative 4B would have fewer impacts than Alternative 4A.
- Current uncertainty about the availability of EMAS bed materials given the cessation of manufacture of EMAS blocks by EMASMAX, and an agreement between Zodiac, Runway Safe and FAA that precludes Runway Safe from installing their EMAS product until 2021.
- Would impact portions of the Winthrop navigation channel but would likely be permittable.

1.3.5 Runway 9-27 Alternative 5 - No-Action Alternative

This alternative would retain existing conditions based on the rationale set forth in the FAA's 2004 Runway Safety Area Determination and not implement any improvements to reduce the extent of the non-standard condition or remove the condition entirely. This would retain the existing RSA dimensions which are 500 feet wide and 150 feet in length beyond the east end of Runway 9-27. According to the FAA, RSA standards cannot be modified or waived and a continuous evaluation of all practicable alternatives for improving RSA conformity are required. The No-Action/No-Build Alternative, depicted in **Exhibit 1.5**, assumes that Runway 27 enhancements would not occur and routine maintenance at the airport would continue.

Although the No-Action alternative does not have any environmental impacts due to construction, this alternative does not provide adequate safety area to prevent, in case of an aircraft undershoot or overrun, the aircraft from entering the harbor. A plane crash in the harbor would have a large negative impact on virtually all the regulated resources.

DRAWING LEGEND

- RUNWAY PAVEMENT
- HIGH ENERGY RUNWAY AREA
- TAXIWAY/APRON PAVEMENT
- BUILDING
- WATER
- ILS HOLDBAR
- HOLDBAR
- POTENTIAL DISPLACED THRESHOLD
- POTENTIAL PAVEMENT PAINTING
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)

EXISTING RUNWAY 9 DECLARED DISTANCES

TORA, TODA, ASDA, LDA- 7,000'

1,000'

500'

150'

TORA, TODA, ASDA, LDA - 7,000'

EXISTING RUNWAY 27 DECLARED DISTANCES

TIDAL FLAT

BOSTON HARBOR

WINTHROP BOSTON

MASSPORT FIRE–RESCUE STATION 2

MASSPORT FIRE–RESCUE STATION 1 (HQ)

GOVERNORS ISLAND

FIRE TRAINING FACILITY

FAA ASR9 SITE

APPROX. AIRPORT BOUNDARY

EMAS

PERIMETER ROAD

TERMINAL ROAD

ROFA

RSA

DRAFT - NOT FOR PUBLIC DISSEMINATION

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GRAPHIC SCALE IN FEET

0 400 800 1600

NORTH

EXHIBIT 1.5

RUNWAY 9-27 RSA ALTERNATIVE 5 - NO ACTION

DIMENSIONAL GAP ALTERNATIVES

1.4 Preferred Alternative

The preceding sections have described several alternatives to address the RSA deviations from design standards for Runway 9-27. Based on consideration of these alternatives and their attributes and constraints, the preferred alternative for the resolution of RSA deficiencies on Runway 9-27 is the implementation of **Alternative 4B – EMAS on a 300'-wide deck** (the actual width of the deck would be 306' to allow for safety rails). This alternative is preferred as it will provide the highest level of aircraft safety without reducing the operational capability of the BOS airfield while also minimizing environmental impacts from additional construction in the harbor.

This preferred alternative recognizes the fact that EMAS is not currently available until at least 2021, pending the planned sunset of a legal agreement between EMASMAX and the FAA on the sales of the RunwaySafe EMAS system in the United States. However, considering this reality, all indications from FAA and airport industry resources have been that an EMAS system will be available once the legal agreement sunsets. The availability of the EMAS system will likely coincide with the completion of the estimated 2 to 3 year permitting process required for the EMAS deck (see below). This alternative closely follows the previously adopted mitigation for Runway 33L.

Considerations

Alternative 1 is not preferred as it would result in a reduction in the operational capability of Runway 9-27 such that many aircraft would require weight penalties for departures on Runway 9 with a reduction in ASDA to approximately 6,150'. The resulting reduction in LDA on Runway 27 would also likely pose impact to runway occupancy time and airfield capacity through the reduction of rollout distance available to the existing Taxiway E exit point.

Alternative 2 was also considered as a near-term incremental improvement in order to gain an RSA beyond the departure end of Runway 9 in advance of implementing an EMAS system by creating a displaced threshold and shifting the start end of Runway 9 takeoffs approximately 195 feet to the west. However, this improvement would require an estimated two to three-year court review process due to existing injunction agreements for Runway 9 which could delay the implementation of this improvement such that it could ultimately nearly coincide with the implementation of the recommended alternative. It should be noted that the improvements described in Alternative 2 are still being considered as part of the overall RIM geometric alternatives for this study to mitigate an existing aligned taxiway at Runway 9.

Alternative 3A is not preferred due to the likely high environmental impact and required habitat and species mitigation from the fill of the harbor. Both Alternative 3A and 3B are not preferred because their impacts to the adjacent navigation channel are unlikely to be permittable.

Environmental Review and Permitting for the Preferred Alternative

Alternative 4B will result in construction on upland and in the marine environment. A brief overview of the environmental review and permitting process is outlined below:

Federal Approvals and Permits

- NEPA – Likely an EA and FONSI
- US Army Corps of Engineers Section 10 (Navigable Waterways)
    - National Marine Fisheries – Protected Species Assessment, Essential Fish Habitat Assessment, and Marine Mammal Assessment
- US Army Corps of Engineers Section 404 (Wetlands)
- Coastal Zone Management (CZM) – Determination

State and Local Approvals and Permits

- MEPA – ENF and Likely Draft and Final EIR
- MA Wetlands Protection Act (via Boston Cons. Comm. and MassDEP)
- Water Quality Certificate (MassDEP 401 WQC)
- Chapter 91 (Structures Below Mean High Tide) (MassDEP)
- Mass. Endangered Species Act – Possible Conservation Permit

It is anticipated that the environmental review and approval process would take 1 ½ to 2 years for the NEPA/MEPA review and another 1 ½ to 2 years for permitting, for a total of 3 to 4 years.

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Attachment E- MEPA Resiliency Documentation

- **Resilient Massachusetts Action Team (RMAT) Cover Sheet**
- **RMAT Tool Output Report**
- **Climate Change Adaptation and Resiliency ENF Questions**

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Massport Logan Runway 27 End RSA Improvements Project

Attachment E RMAT Cover Sheet

Under the leadership of the MA Executive Office of Energy and Environmental Affairs (EEA) and the MA Emergency Management Agency (MEMA), the *Resilient MA Action Team* (RMAT) monitors and tracks and offers guidance on implementation of the State Hazard Mitigation and Climate Adaptation Plan (SHMCAP). The RMAT process is designed to provide:

- a preliminary climate change exposure and risk rating;
- recommended climate resilience design standards for projects with physical assets; and,
- guidelines with best practices to support implementation.

In collaboration with the MEPA Office and as part of the *MEPA Interim Protocol on Climate Change Adaptation and Resiliency*, Massport has voluntarily prepared the following RMAT analysis for the proposed Runway 27 End Runway Safety area (RSA) Improvements Project in advance of the October 1, 2021 date when the protocol will formally go into effect.

While the RMAT Tool is not yet fully capable of addressing unique structures like a RSA, it does provide helpful information of assessing the climate risks of the Project. The following pages include the input data Massport entered into the online form and the RMAT output.

As ENF readers review this information, it is important to understand that the proposed RSA is required by the Federal Aviation Administration (FAA) and will be constructed partially on land and partially on a deck over Boston Harbor. Due to FAA design guidelines, its maximum elevation above Mean Sea Level is tied directly to existing runway and taxiway elevations. Its runway-end position cannot be adjusted beyond the FAA design specifications.

The RSA will be designed for a 75-year life and will consider current and future climate change and sea level rise to the maximum extent practicable.

In the unlikely event the RSA deck is flooded, Runway 9-27 would be taken out of service until safe operating conditions can resume. The RSA will not be occupied other than for periodic maintenance or in the event of an aviation emergency at that location.

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RMAT Climate Resilience Design Standards Tool Project Report

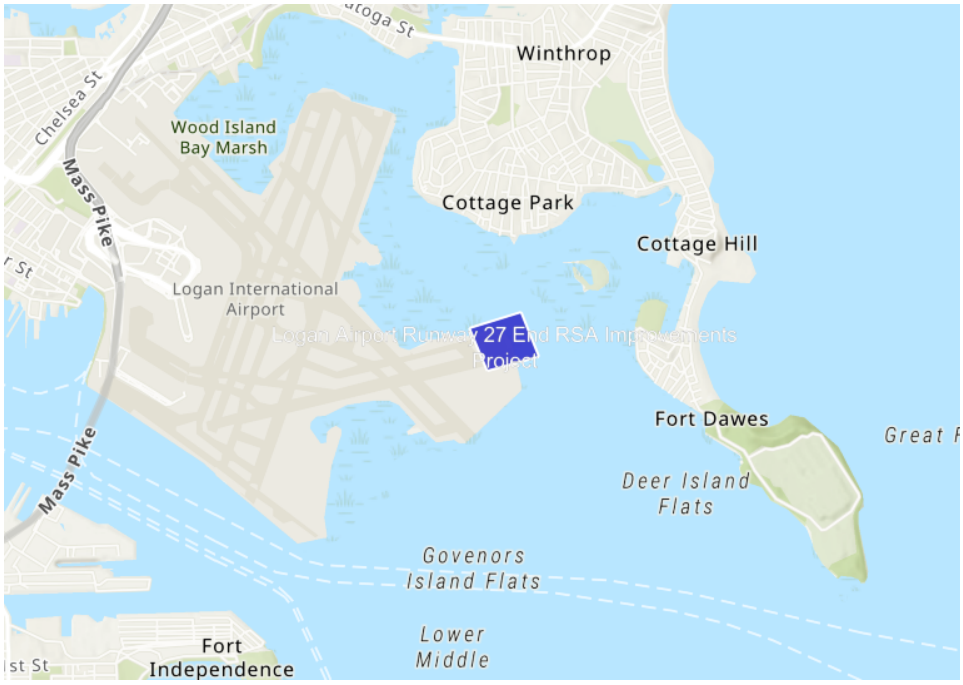
Logan Airport Runway 27 End RSA Improvements Project
Date Created: 7/28/2021 11:14:38 AM Created By: lballou

Project Summary

Link to Project

Estimated Construction Cost: $110000000.00
Useful Life: 2090 - 2099

Ecosystem Benefits	Scores
Project Score	Low
Exposure	**Scores**
Sea Level Rise/Storm Surge	High Exposure
Extreme Precipitation - Urban Flooding	High Exposure
Extreme Precipitation - Riverine Flooding	Not Exposed
Extreme Heat	High Exposure



Asset Summary

Number of Assets: 1

Asset Risk	Sea Level Rise/Storm Surge	Extreme Precipitation - Urban Flooding	Extreme Precipitation - Riverine Flooding	Extreme Heat
Runway Safety Area & Deck	High Risk	High Risk	Low Risk	High Risk

Project Outputs

	Target Planning Horizon	Intermediate Planning Horizon	Percentile	Return Period	Tier
Sea Level Rise/Storm Surge					
Runway Safety Area & Deck	2070	2050		100-yr (1%)	Tier 2
Extreme Precipitation					
Runway Safety Area & Deck	2070			25-yr (4%)	Tier 2
Extreme Heat					
Runway Safety Area & Deck	2070		50th		Tier 2

Scoring Rationale - Exposure

Sea Level Rise/Storm Surge

This project received a "High Exposure" because of the following:

- Located within the predicted mean high water shoreline by 2030
- Exposed to the 1% annual coastal flood event as early as 2030
- Historic coastal flooding at project site

Extreme Precipitation - Urban Flooding

This project received a "High Exposure" because of the following:

- Historic flooding at the project site
- Increased impervious area
- Projected increase in rainfall within project's useful life

Extreme Precipitation - Riverine Flooding

This project received a "Not Exposed" because of the following:

- No historic riverine flooding at project site
- Not exposed to riverine flooding within the project's useful life

Extreme Heat

This project received a "High Exposure" because of the following:

- 30+ days increase in days over 90 deg. F within project's useful life
- Increased impervious area
- Located within 100 ft of existing water body

Scoring Rationale - Asset Risk Scoring

Asset - Runway Safety Area & Deck
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable during natural hazard event, but must be accessible/operable within one day after natural hazard event
- Loss/inoperability of the asset would have impacts limited to local area and/or municipality
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is between $30 million and $100 million
- There are no hazardous materials in the asset

Project Design Standards Output

Asset: Runway Safety Area & Deck — Infrastructure

Sea Level Rise/Storm Surge — High Risk

Target Planning Horizon: 2070
Intermediate Planning Horizon: 2050
Return Period: 100-yr (1%)

Applicable Design Criteria

Tiered Methodology: Tier 2 (Link)

Tidal Benchmarks: Yes
Stillwater Elevation: Yes
Design Flood Elevation (DFE): Yes
Wave Heights: Yes
Duration of Flooding: Yes
Design Flood Velocity: Yes
Wave Forces: Yes
Scour or Erosion: Yes

Extreme Precipitation — High Risk

Target Planning Horizon: 2070
Return Period: 25-yr (4%)

Applicable Design Criteria

Tiered Methodology: Tier 2 (Link)

Total Precipitation Depth for 24-hour Design Storms: Yes
Peak Intensity for 24-hour Design Storms: Yes
Riverine Peak Discharge: No
Riverine Peak Flood Elevation: No
Duration of Flooding for Design Storm: Yes
Flood Pathways: No

Extreme Heat — High Risk

Target Planning Horizon: 2070

Percentile: 50th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 2 (Link)

Annual/Summer/Winter Average Temperature: Yes
Heat Index: Yes
Days Per Year With Max Temperature > 95°F: Yes
Days Per Year With Max Temperature > 90°F: Yes
Days Per Year With Max Temperature < 32°F: Yes
Number of Heat Waves Per Year: Yes
Average Heat Wave Duration (Days): Yes
Cooling Degree Days (Base = 65°F): No
Heating Degree Days (Base = 65°F): No
Growing Degree Days: No

Project Inputs

Core Project Information	
Name:	Logan Airport Runway 27 End RSA Improvements Project
Given the expected useful life of the project, through what year do you estimate the project to last (i.e. before a major reconstruction/renovation)?	2090 - 2099
Location of Project:	Boston
Estimated Capital Cost:	$110,000,000
Entity Submitting Project:	Massachusetts Department of Transportation / Department of Transportation
Is this project being submitted as part of a state grant application?	No
Which grant program?	
Is climate resiliency a core objective of this project?	No
Is this project being submitted as part of the state capital planning process?	No
Is this project being submitted as part of a regulatory review process?	Yes
Brief Project Description:	The Massachusetts Port Authority (Massport) is proposing to improve the runway safety area (RSA) at the end of Runway 27 at Logan Airport. The improvements are part of a continuing safety program and are required by the Federal Aviation Administration (FAA) to enhance the RSA, to the extent feasible, to be consistent with the FAA's current airport design standards for RSAs and to enhance rescue access in the event of an emergency. This project is subject to MEPA review and meets a mandatory EIR threshold: 11.03(3)(a)5. Provided that a Chapter 91 License is required, New non-water dependent use or Expansion of an existing non-water dependent structure, provided the use or structure occupies one or more acres of waterways or tidelands; and 11.03(3)(b)1.f. alteration of one half or more acres of any other wetlands.
Project Ecosystem Benefits	
Provides flood protection through green infrastructure or nature-based solutions	No
Provides storm damage mitigation	Yes
Provides groundwater recharge	No
Protects public water supply	No
Filters stormwater	No
Improves water quality	No
Promotes decarbonization	No
Enables carbon sequestration	No
Provides oxygen production	No
Improves air quality	No
Prevents pollution	No
Remediates existing sources of pollution	No
Protects fisheries, wildlife, and plant habitat	No
Protects land containing shellfish	No
Provides pollination	No
Provides recreation	No
Provides cultural resources/education	No
Project Climate Exposure	
Does the project site have a history of coastal flooding?	Yes
Does the project site have a history of flooding during extreme precipitation events (unrelated to water/sewer damages)?	Yes
Does the project site have a history of riverine flooding?	No
Does the project result in a net increase in impervious area of the site?	Yes
Are existing trees being removed as part of the proposed project?	No

Project Assets

Asset: Runway Safety Area & Deck
Asset Type: Transportation
Asset Sub-Type: Other Transportation
Construction Type: Major Repair/Retrofit
Construction Year: 2025
Useful Life: 74

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure may be inaccessible/inoperable during natural hazard event, but must be accessible/operable within one day after natural hazard event.

Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts would be limited to local area and/or municipality

Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 5,000 people

Identify if the infrastructure is located within an environmental justice community or provides services to vulnerable populations.
The infrastructure is not located in an environmental justice community and does not provide services to vulnearble populations

Will the infrastructure reduce the risk of flooding?
No

If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would not be expected to result in injuries

If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
There are no hazardous materials in the infrastructure

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Minor – Inoperability will not likely affect other facilities, assets, or buildings

If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Between $30 million and $100 million

Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
No impact on surrounding natural resources is expected

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure is not expected to reduce the ability to maintain government services

What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
No Impact

Climate Change Adaptation and Resiliency Strategies

I. Has the project taken measures to adapt to climate change for any of the climate parameters analyzed in the RMAT Climate Resilience Design Standards Tool (sea level rise/storm surge, extreme precipitation (urban or riverine flooding), extreme heat)? Yes _**X**_ No __

Note: Climate adaptation and resiliency strategies include actions that seek to reduce vulnerability to anticipated climate risks and improve resiliency for future climate conditions. Examples of climate adaptation and resiliency strategies include flood barriers, increased stormwater infiltration, living shorelines, elevated infrastructure, increased tree canopy, etc. Projects should address any planning priorities identified by the affected municipality through the Municipal Vulnerability Preparedness (MVP) program or other planning efforts, and should consider a flexible adaptive pathways approach, an adaptation best practice that encourages design strategies that adapt over time to respond to changing climate conditions. General guidance and best practices for designing for climate risk are available here.

A. If no, explain why.

B. If yes, describe the measures the project will take, including identifying the planning horizon and climate data used in designing project components. If applicable, specify the return period and design storm used (e.g., 100-year, 24-hour storm).

The Runway 27 End was raised approximately 10 inches to bring the runway into compliance with current Federal Aviation Administration (FAA) design standards and to accommodate sea level rise. Additionally, the deck substructure will be designed to withstand anticipated severe coastal storm events and sea level rise. In order to comply with FAA design standards, the runway safety area (RSA) cannot be elevated above the runway surface.

C. Is the project contributing to regional adaptation strategies? __ Yes _**X**_ No; If yes, describe.

II. Has the Proponent considered alternative locations for the project in light of climate change risks?___ Yes ___ No _**X**_

A. If no, explain why.

The safety improvements must be constructed at the end of Runway 27, consistent with current FAA requirements. Alternative locations were not considered due to the nature of the Project. The purpose of the Project is to enhance safety for aircraft and their passengers using Runway 27.

B. If yes, describe alternatives considered.

III. Is the project located in Land Subject to Coastal Storm Flowage (LSCSF) or Bordering Land Subject to Flooding (BLSF) as defined in the Wetlands Protection Act? Yes _**X**_ No___; If yes, describe how/whether proposed changes to the site's topography (including the addition of fill) will result in changes to

floodwater flow paths and/or velocities that could impact adjacent properties or the functioning of the floodplain. General guidance on providing this analysis can be found in the CZM/MassDEP Coastal Wetlands Manual, available here.

The Project would not result in changes to floodwater flow paths and/or velocities that could impact adjacent properties. The Project is located at the end of Runway 27, which is adjacent to Boston Harbor. The RSA deck would be supported by pilings and/or caissons starting on land for approximately 150 feet and will then extend approximately 450 to 500 feet into the harbor. The Project is unlikely to significantly impact the coastal floodplain. Project impacts will be studied in greater detail in the Draft Environmental Impact Report (DEIR).

Attachment F- Eelgrass Survey Report

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EELGRASS SURVEY REPORT
RUNWAY 9-27 SAFETY AREA
LOGAN INTERNATIONAL AIRPORT
BOSTON, MASSACHUSETTS

European oyster, tunicates, and hermit crab on the seabed of the proposed Runway 9-27 Safety Area Seafloor

Prepared By:

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639 Boxberry Hill Road
East Falmouth, MA 02536

Prepared For:

VHB
101 Walnut Street
PO Box 9151
Watertown, MA 02472-4026

July 2021

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FIGURES

1.0 INTRODUCTION

On June 10, 2021, CR Environmental, Inc. (CR) conducted an eelgrass (*Zostera marina*) survey and grab sampling for Vanasse Hangen Bruslin, Inc. (VHB) at the proposed Runway 9-27 safety area extension, Logan International Airport, Boston, Massachusetts. The eelgrass survey consisted of a combination of side scan sonar and underwater video. This approach provided multiple lines of evidence to identify and accurately map the extent of any eelgrass within the Runway 9-27 safety area survey boundary as designated by VHB. Sediment grab samples were collected for VHB at four stations for benthic and grain size analyses.

2.0 METHODS

2.1 Vessel and Navigation

Vessel operations were performed from CR's 25-foot custom aluminum survey boat, *Cyprinodon*, with a large enclosed pilothouse, benches for survey equipment, over-the-side transducer boom, and 110 and 12 volt power supplies.

Navigation was accomplished using a Hemisphere VS330 Real-time Kinematic Global Positioning System (RTK GPS). The horizontal accuracy of the navigation system is approximately 1.0 centimeter horizontally and 2 centimeters vertically (Root Mean Squared 1-sigma). Horizontal accuracy in differential or float mode is approximately 1 foot. RTK corrections were provided via NTRIP internet connection by KeyNet GPS, Inc.

The RTK GPS was serially interfaced to a shipboard computer running HYPACK 2015 hydrographic surveying software. During the survey, this system calculated X and Y positions in the desired grid system (MA State Plane, NAD83, US Foot), recorded the depth and navigation data, and provided a steering display for the vessel captain. HYPACK also depicted the progress of the survey using georeferenced imagery (e.g. an orthophoto) as a background file, ensuring that the entire study area was adequately insonified.

2.2 Side Scan Sonar Methods

2.2.1 Side scan sonar data acquisition

Full side scan sonar bottom coverage of the study area was acquired using the boat mounted Humminbird Helix 10 side scan sonar system. Side scan sonar data were collected along thirty one shore parallel track lines spaced 20 to 30 feet apart depending upon water depth. This provided over 200% overlapping coverage. Data were trimmed to provide the best quality. The data coverage extends over 1200 feet beyond the existing Runway 9-27 end, and 530 feet past the proposed runway safety area. Data were collected at a 1200 kHz frequency using swath width and manual gain settings that were adjusted before the survey to get the best quality data. The data were recorded on a SD card which was then backed up onto a survey laptop once the survey was completed.

2.2.2 Side scan sonar processing

Processing of side scan data was accomplished using SARHAWK software. The data were uploaded from the SD card into a SARHAWK project using a set of default processing filters to smooth and remove the water column portion of the records. CR Environmental used side scan data that extended 48 feet to port and starboard. Settings were then fine-tuned to create the best side scan mosaic, selecting 15 of the 31 side scan sonar data sets. The side scan mosaic was then loaded into an ARC GIS project for figure production.

Using SARHAWK software, a contact report was produced of targets and bottom features at the site. The contact report includes coordinates for each contact as well as high resolution imagery for each target. A series of representative georeferenced images were exported from the SARHAWK software contact report.

2.3 Underwater Video Methods

2.3.1 Underwater video data acquisition

To confirm the presence of any submerged aquatic vegetation (SAV) indicated by the side scan sonar system, and to document macroinvertebrate, and fish species, underwater video data were collected along 12 transects located within and adjacent to the designated survey area.

Underwater video data were collected with CR's portable towed video sled consisting of a lightweight aluminum frame, Outland Technologies' high-resolution low light color camera, and two wide-angle LED video lights with variable output control. The video camera was cabled to an OTI-960 DVR recorder and a high resolution daylight monitor at the surface. As a back-up video system, a GoPro Hero 4 video camera mounted in a Cyclops deep water housing was mounted below the OTI camera and programmed to record HD video at 1080P, 30 frames per second, and take 12 megapixel still frames every 10 seconds. The video sled was raised and lowered with a stern mounted davit and electric lobster pot hauler and the height of the system above the seabed continually adjusted to achieve the best bottom coverage and video quality. The video sled was operated in a drift mode and the vessel speed varied between 0.5 and 1 knot. Mounted lasers, set 25 centimeters (cm) apart on the video sled frame were used for scaling purposes. The GPS antennae was mounted on the davit and cable out (layback) was recorded. The layback, offset from the video sled to the GPS antennae, was entered into the HYPACK survey software to provide the corrected video sled position.

2.3.2 Underwater video data processing

The underwater video data were reviewed by a marine biologist at the CR office, and the presence or absence of eelgrass, the bottom substrate and observed biota were noted. Eight representative underwater video screen captures were created for each of the 12 video transects.

2.4 Sediment Grab Sampling Methods

Sediment grab samples for benthic community analysis and sediment grain size were collected at four stations within the proposed runway safety area (Figure 5). Sediment was collected at each station with a Ted Young 0.04 m^2 modified Van Veen grab sampler and the position recorded with a Hemisphere VS330 RTK GPS. The first grab sample at each station was sieved onboard with a 500 micron sieve, transferred to plastic jars and preserved in 70% alcohol. The second grab at each station was collected for grain size through the upper doors of the sampler and stored in one gallon zip lock baggies. All samples were provided to the VHB benthic scientist aboard the vessel. Benthic invertebrate and grain size results are reported elsewhere.

3.0 RESULTS

3.1 Side Scan Sonar Eelgrass Mapping Results

The side scan sonar mosaic showing coverage at the Runway 9-27 safety area was comprised of 15 overlapping transects (Figure 1). The mosaic was broken into a higher resolution inshore image (Figure 2) that covers the designated survey area and imagery for the surveyed area further offshore (Figure 3).

The side scan sonar imagery was lighter inshore indicating a smoother bottom, and darker and more irregular offshore indicating a rougher bottom. Initial inspection of the side scan sonar data did not reveal any obvious bottom signatures resembling eelgrass beds in the survey area. The irregular darker bottom signatures labelled in Figures 2 and 3 could indicate the presence of submerged aquatic vegetation or seafloor epifauna but ground truthing with the underwater video was required for further characterization.

Representative bottom features are labelled on Figures 2 and 3 and shown in more detail in Appendix A. Identifiable features included erosion control matting and rock jetty along the shoreline, isolated tires, and multiple lobster pots offshore.

3.2 Underwater Video Eelgrass Ground Truth Results

The twelve underwater video sled track lines are shown on an orthophoto background (Figure 4A) and a NOAA nautical chart (Figure 4B). Video footage was taken from offshore to inshore. No eelgrass beds were observed within the Runway 9-27 safety area or further offshore. A few individual eelgrass strands were observed mid-transect at TR-8, TR-9, TR-10, and TR-11 (Figures 4A and 4B, and Plates). Representative underwater screen captures showing bottom substrate and biota observed along transects are provided on Plates TR-2, and TR-4 through TR-14.

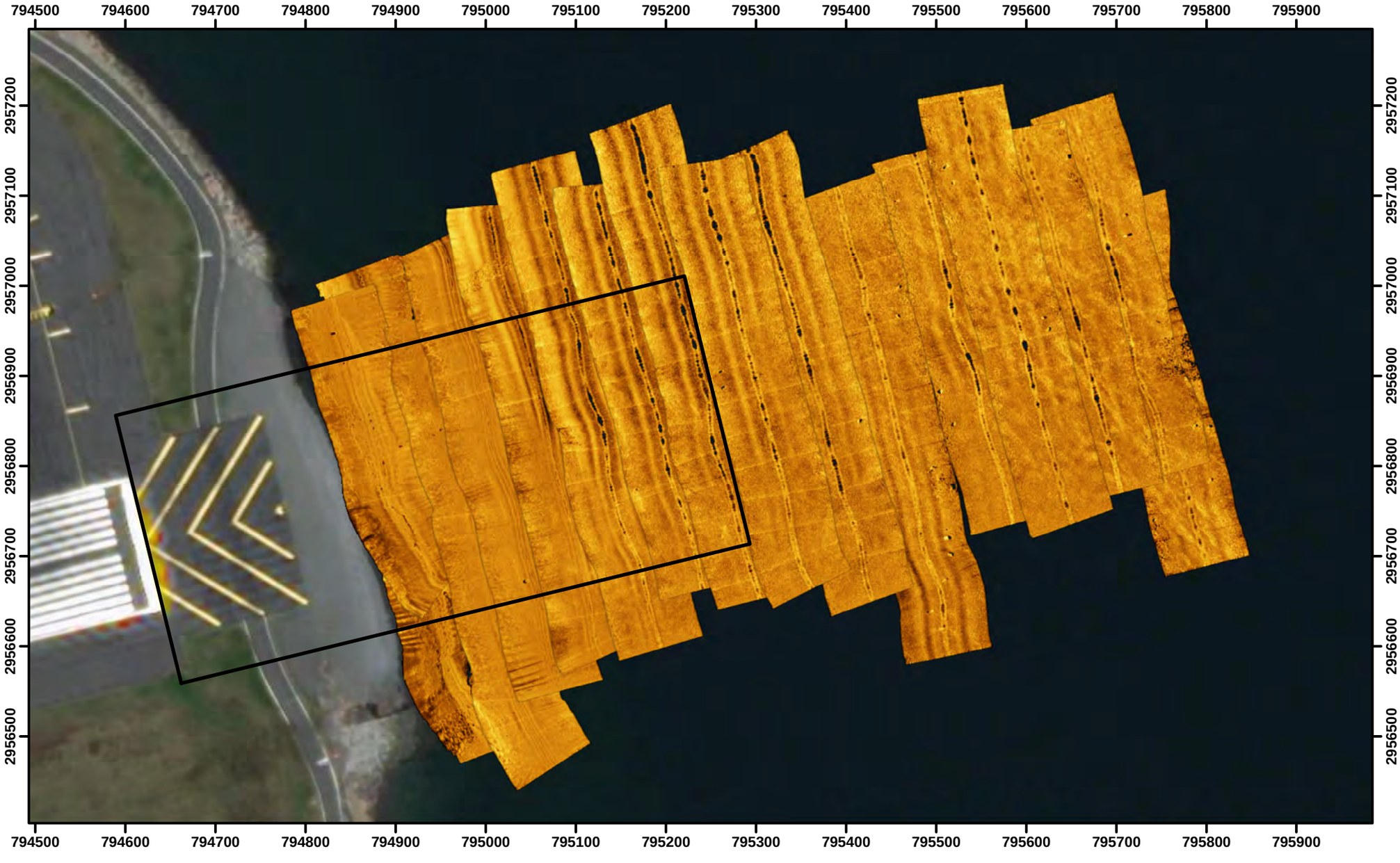
The underwater video data showed that the darker irregular features on the side scan imagery that extended from the eastern end of the area surveyed to the outer half of the runway safety area (Figures 2 and 3) was attributed to patches of European oysters (*Ostrea edulis*), sea grapes (*Molgula manhattensis*), breadcrumb sponge *(Halichondia panicea*e), kelp (*Laminaria longicruris*), and sea lettuce (*Ulva lactuca*). This sandy mud bottom provided ideal habitat for spider crabs (*Libinia emarginata),* green crabs (*Carcinus maenas*), and rock crabs (*Cancer borealis*). The inshore half of the Runway 9-27 safety area transitioned to a flat featureless sandy seabed, and the predominant species include hermit crabs (*Pagurus longicarpus*) and mysid shrimp (*Mysis* sp.). The mysid shrimp were abundant throughout the inshore survey area and are an excellent food source for juvenile fish. Fish species observed included juvenile winter flounder (*Pleuronectes americanus*), juvenile longhorn sculpin (*Myoxocephalus octodecimspinosus*), northern pipefish (*Syngnathus fuscus*), winter skate (*Raja ocellatus*) and an unidentified juvenile blenny-like fish,

A total of seventeen macroinvertebrate species, five fish species, and three algal species were observed during the survey operation. Dominant macroinvertebrates by order of abundance included long-clawed hermit crabs, sea grapes, European oysters, spider crabs green crabs, rock crabs, and breadcrumb sponge. Other macroinvertebrate species observed in low numbers included amphipods (*Ampelisca* sp.), orange-footed sea cucumber (*Cucumaria frondosa*), orange tunicate (*Botrylloides* sp.), sand shrimp (*Crangon septemspinos*a), northern lobster

(*Homarus americanus*), Jonah crabs (*Cancer borealis*), and periwinkle (*Littorina littorea*). Besides kelp and sea lettuce, some branching red algae (Rhodophyta) were observed.

4.0 DISCUSSION

Eelgrass has not been previously mapped in waters at the end of Runway 9-27. The side scan sonar and underwater video data collected off the end of Runway 9-27 at Logan International Airport confirmed that no eelgrass beds are present within the proposed runway safety area. The inshore seabed is a flat featureless sandy bottom transitioning offshore to a sandy mud bottom with patches of European oysters, tunicates, and macro algae. European oysters were imported to Maine for aquaculture in the 1950s and since then have been introduced to several Massachusetts sites including Boston Harbor reportedly to improve water quality. The only other commercial species observed during the survey operation were juvenile winter flounder, rock crabs, Jonah crabs, and northern lobster.



Logan International Airport Runway 9-27 Safety Area
Side Scan Sonar Coverage
Boston, Massachusetts

www.crenvironmental.com

N
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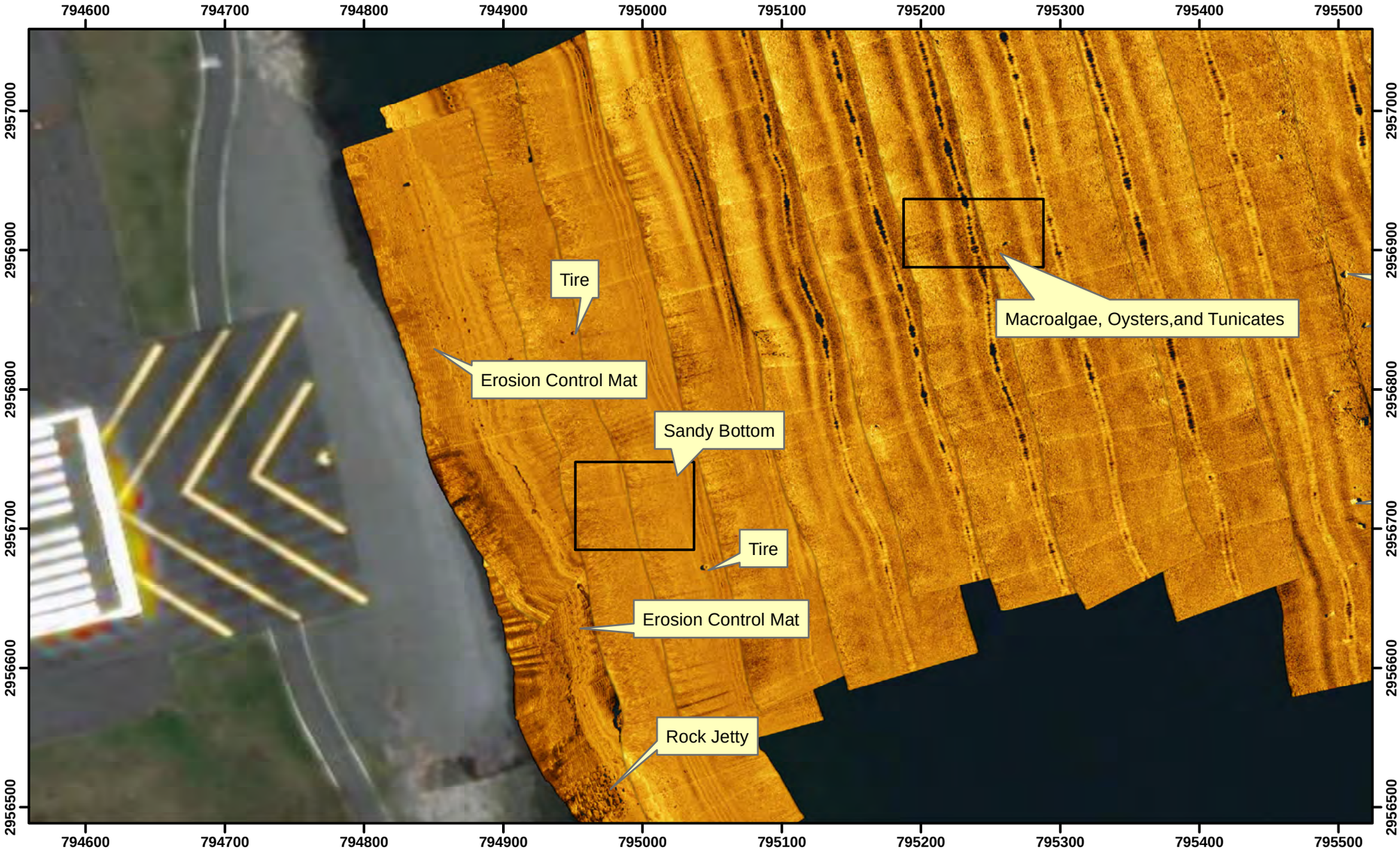
S

NOTES:
1) Sidescan Sonar Humminbird Helix 10 1200 kHz frequency
2) Grid MA State Plane MA Mainland, NAD 83, US Feet
3) Survey conducted on 6/3/2021

Feet
0 100 200

Figure 1



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Logan International Airport Runway 9-27 Safety Area
Side Scan Sonar Mosaic-INSHORE
Boston, Massachusetts

N
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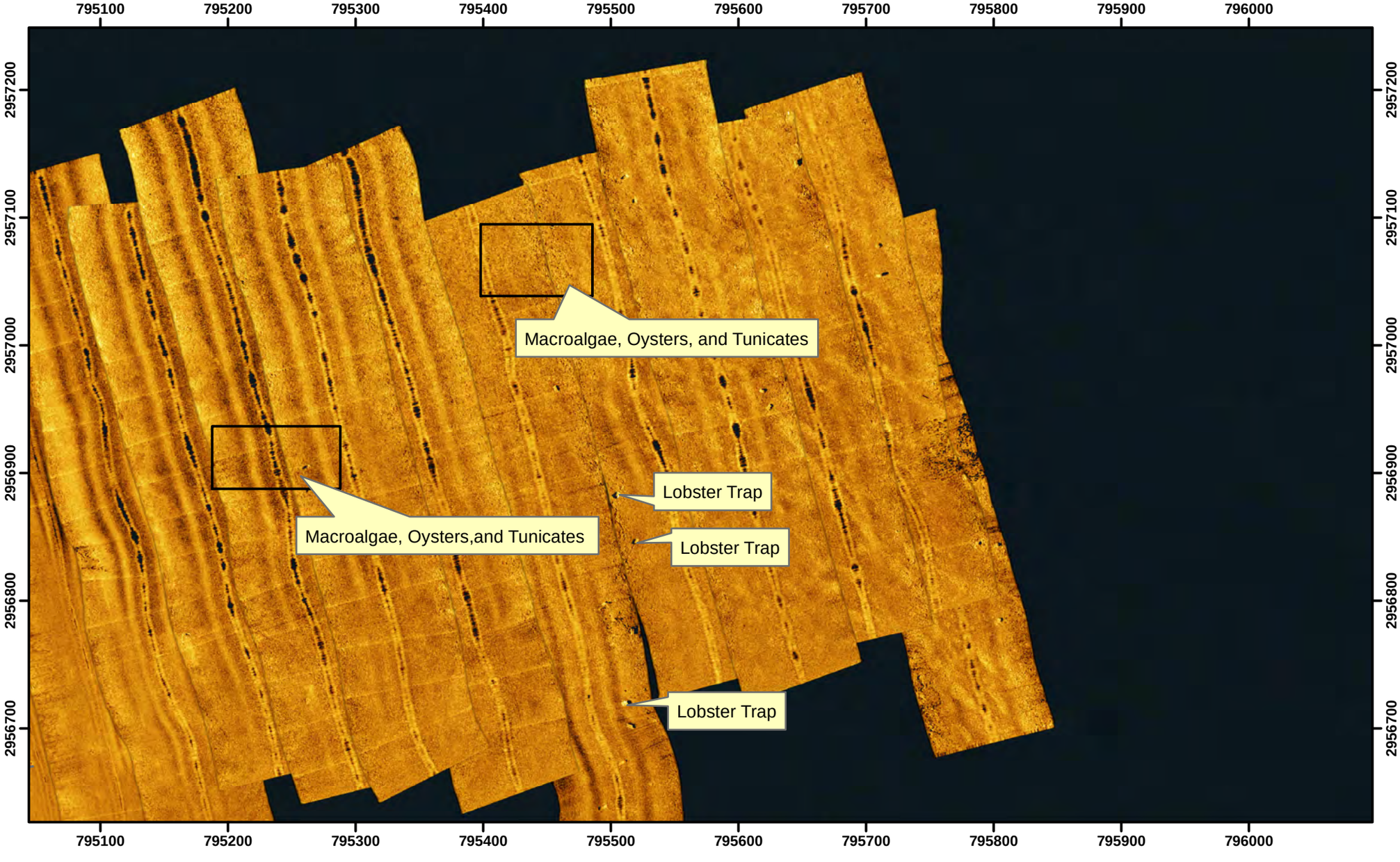
S

NOTES:
1) Sidescan Sonar Humminbird Helix 10 1200 kHz frequency
2) Grid MA State Plane MA Mainland, NAD 83, US Feet
3) Survey conducted on 6/3/2021

Feet
0 50 100

Figure 2



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Logan International Airport Runway 9-27
Side Scan Sonar Mosaic-OFFSHORE
Boston, Massachusetts

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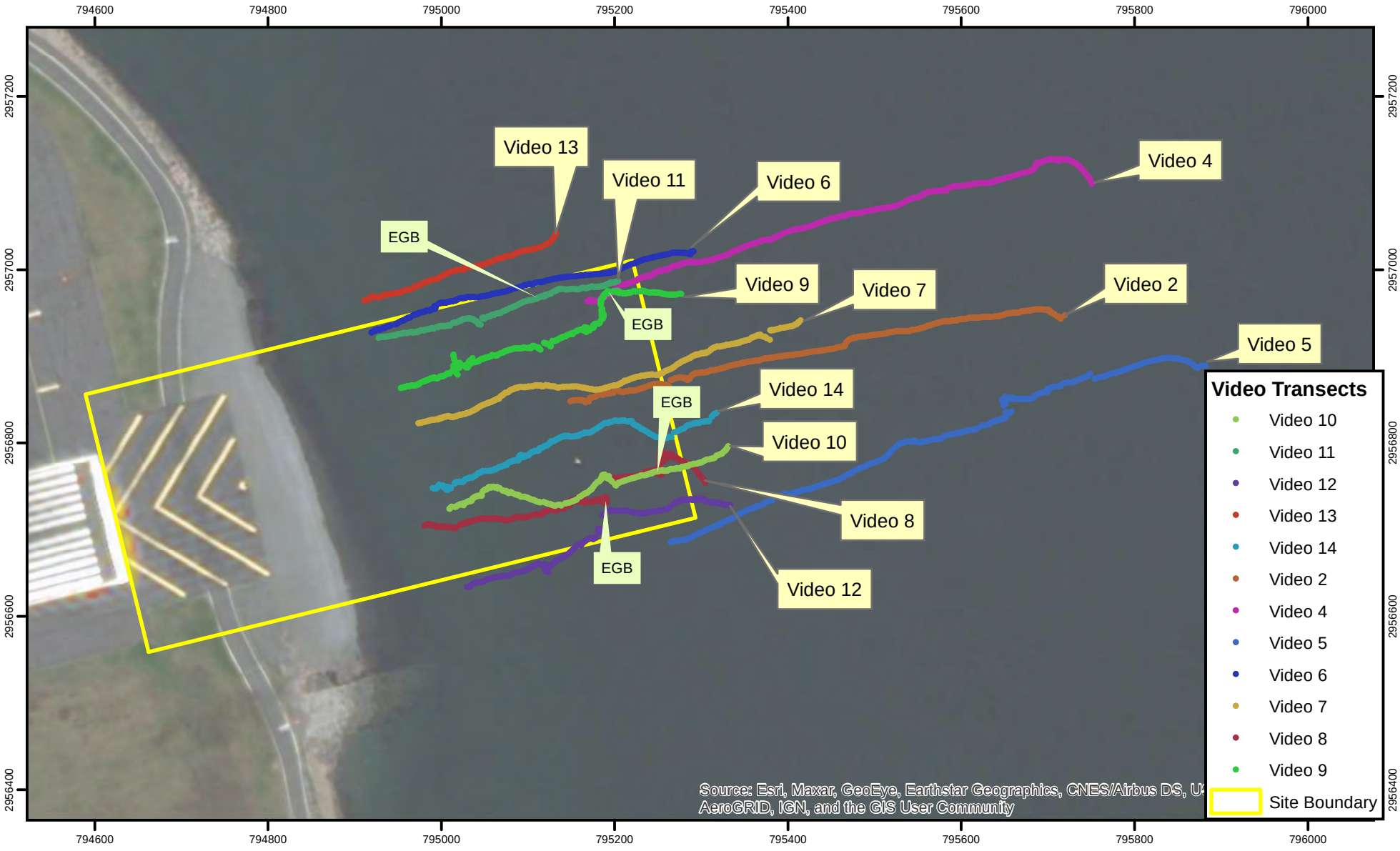
W E
S

NOTES:
1) Sidescan Sonar Humminbird Helix 10 1200 kHz frequency
2) Grid MA State Plane MA Mainland, NAD 83, US Feet
3) Survey conducted on 6/3/2021

Feet
0 60 120

Figure 3



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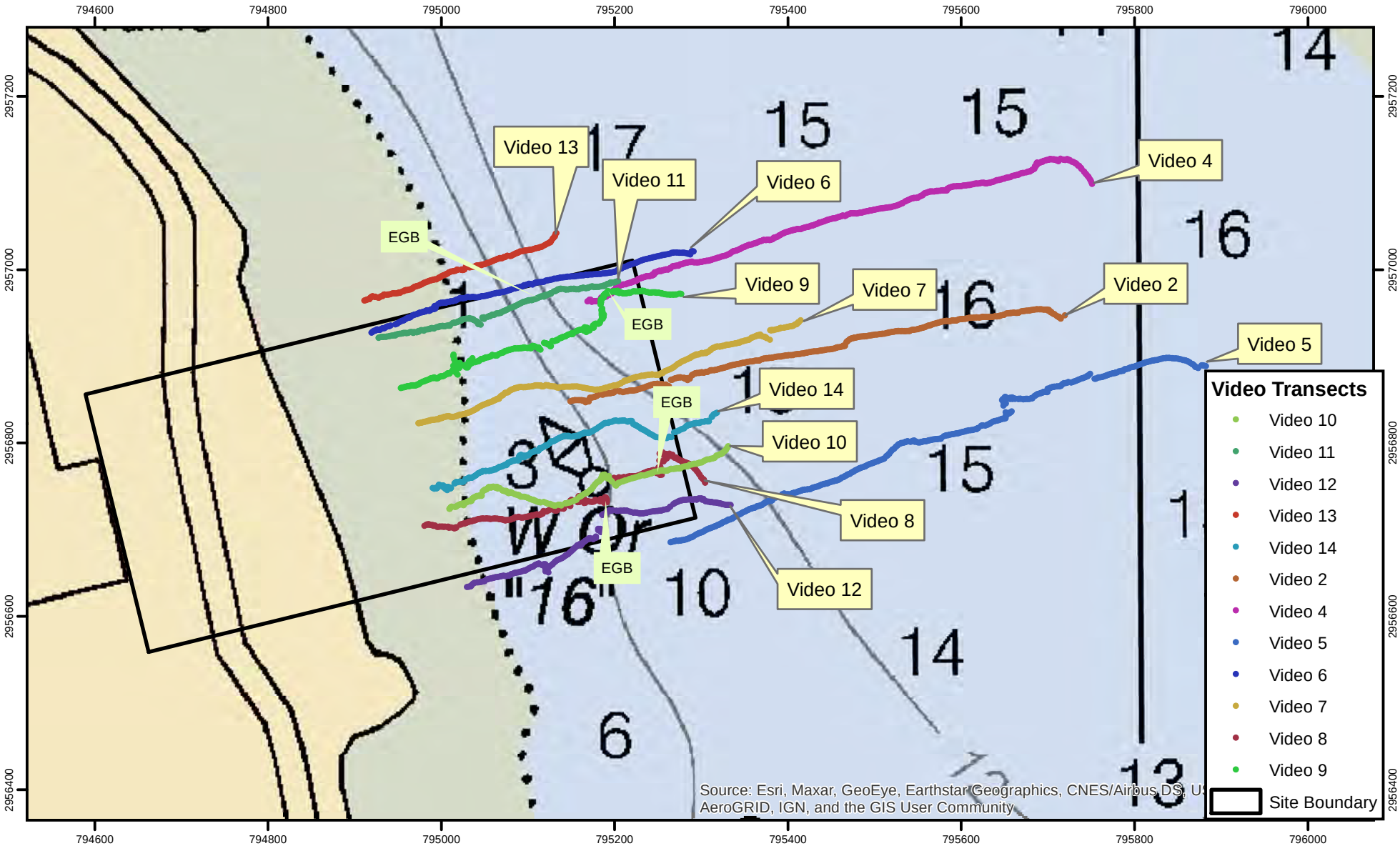
LOGAN INTERNATIONAL AIRPORT VIDEO TRACKLINES
Runway 9-27 Safety Area Improvements Project
Boston, Massachusetts
(Labels indicate the start of recording)

N
W E
S

NOTES:
1) Survey conducted June 10, 2021.
2) Grid MA State Plane NAD 83 US Ft
3) EGB = Eelgrass Blade
4) No video tracklines for Video 1 and 3

Feet
0 100 200

Figure 4A



VIDEO TRACKLINES OVER NAUTICAL CHART
Runway 9-27 Safety Area Logan International Airport
(Labels indicate the start of recording, water depths in feet below MLLW)

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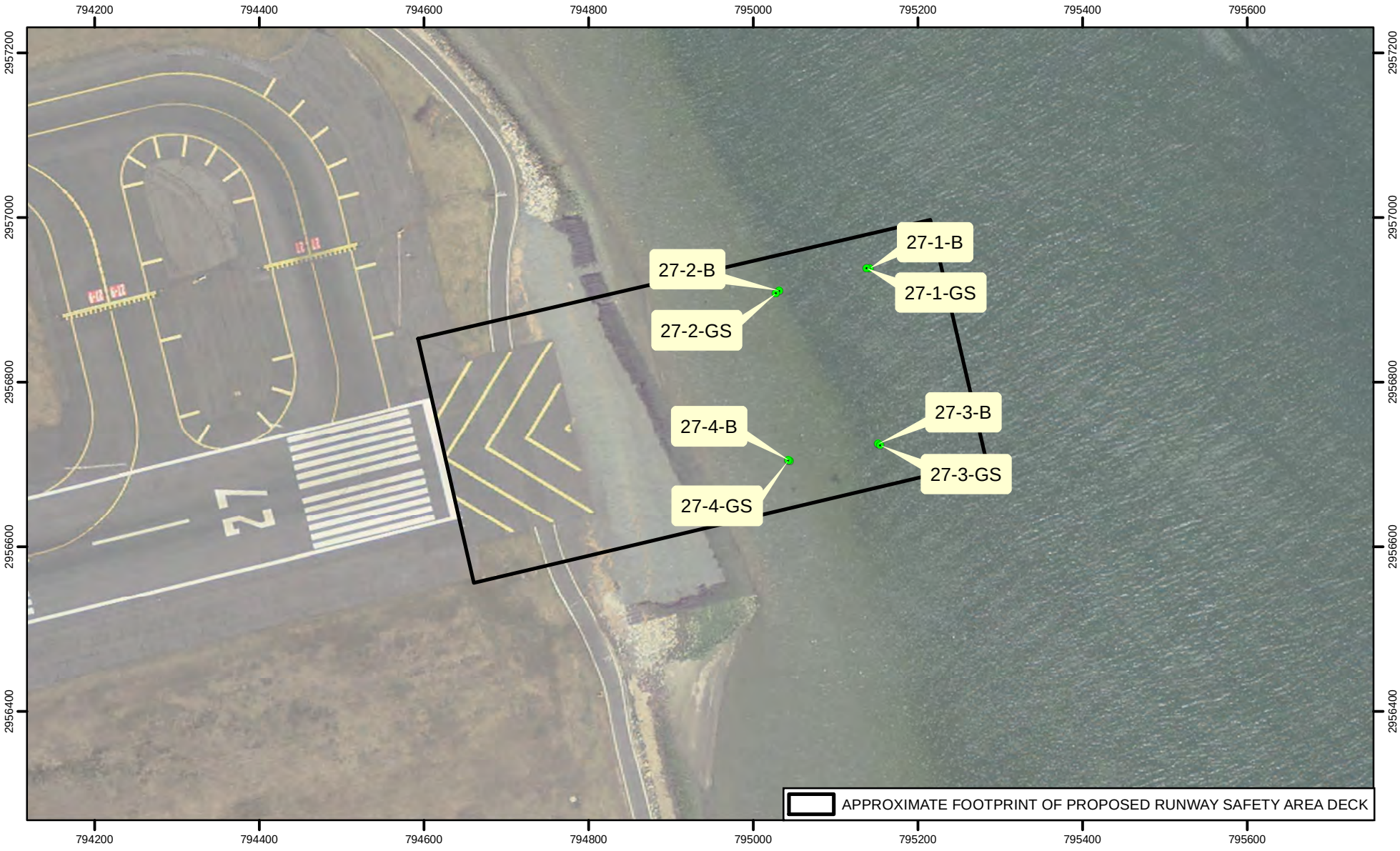
NOTES:
1) Survey conducted June 10, 2021.
2) Grid MA State Plane NAD 83 US Ft
3) EGB = Eelgrass Blade
4) No video tracklines for Video 1 and 3

Feet
0 100 200

Figure 4B



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SEDIMENT GRAB SAMPLE STATIONS
Runway 9-27 Safety Area Logan International Airport
Boston, Massachusetts

N
W E
S

NOTES:
1) Survey conducted June 10, 2021.
2) Grid MA State Plane NAD 83 US Ft

Feet
0 80 160

Figure 5

PLATES

REPRESENTATIVE UNDERWATER VIDEO SCREEN CAPTURES

ALONG TRANSECTS WITHIN AND IN THE VICINITY

OF THE RUNWAY 9-27 SAFETY AREA

A Sea Grapes, Sea Lettuce, Kelp

B Juvenile Blenny

C European Oyster, Sea Grapes, Spider Crab

D Hermit Crab

E Sea Grapes, European Oyster, Breadcrumb Sponge

F Sea Grapes, Tunicates

G European Oyster, Sea Grapes, Macro Algae

H Spider Crab

Plate TR-2 Representative Biota Underwater Video Transect 2 Runway 9-27 Logan International Airport

A European Oysters, Breadcrumb Sponge, Tunicates

B Green Crab, Sea Lettuce

C Sea Grapes, European Oysters, Breadcrumb Sponge

D Breadcrumb Sponge, Sea Grapes

E European Oysters, Sea Grapes, Hermit Crabs

F Jonah Crabs mating

G Spider Crab, large colony of Sea Grapes

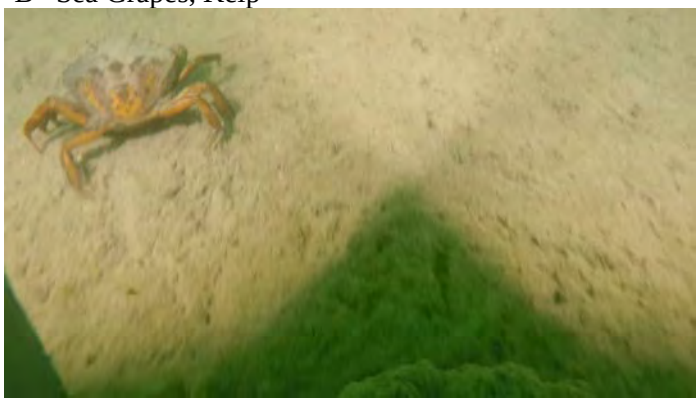
H European Oysters, Sea Grapes, Sponge

Plate TR-4 Representative Biota Underwater Video Transect 4 Runway 9-27 Logan International Airport

A Sea Grapes

B Sea Grapes, Kelp

C Sea Grapes, Spider Crab



D Green Crab

E Spider Crab

F Sea Grapes, Tunicates

G European Oysters, Sea Grapes

H Sand Shrimp, Kelp

Plate TR-5 Representative Biota Underwater Video Transect 5 Runway 9-27 Logan International Airport

A Macro Algae

B European Oysters, Sea Grapes, Lobster

C Sea Grape Colonies

D European Oyster

E Juvenile Flounder

F Mysid Shrimp Abundant

G Flat sand bottom, Hermit Crabs

H Hermit Crabs

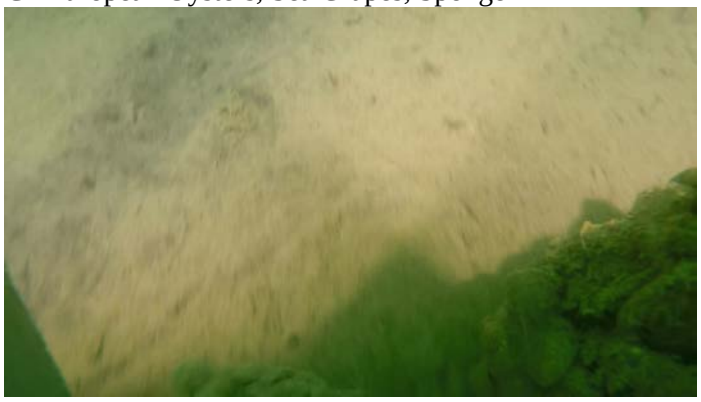
Plate TR-6 Representative Biota Underwater Video Transect 6 Runway 9-27 Logan International Airport

A Northern Kelp with holdfast

B Northern Skate

C European Oysters, Sea Grapes, Sponge

D Abundant Macro Algae



E Mysid Shrimp

F Green Crab

G Flat sand bottom, Kelp holdfast

H Hermit Crab

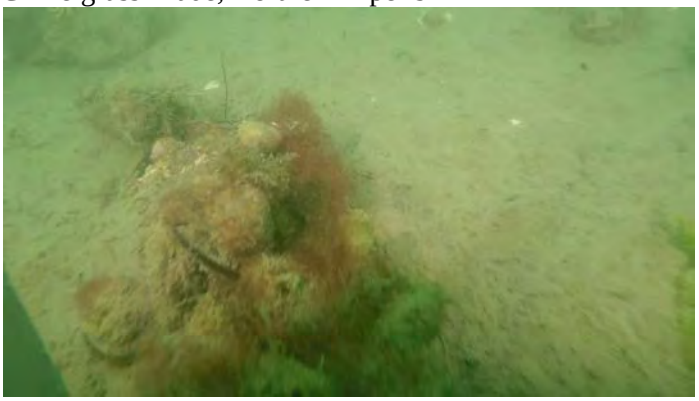
Plate TR-7 Representative Biota Underwater Video Transect 7 Runway 9-27 Logan International Airport

A Spider Crab

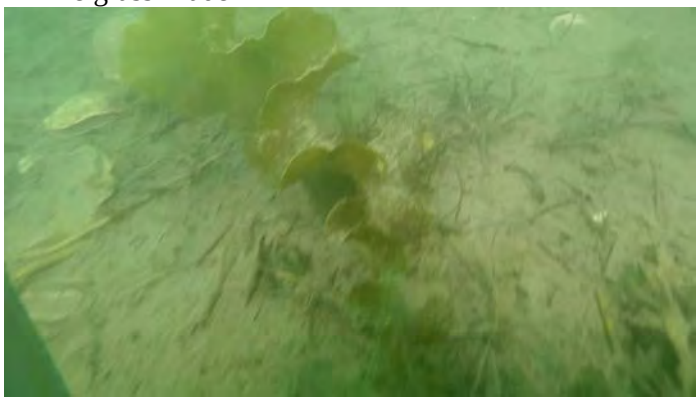
B Kelp, Hermit Crab

C Eelgrass Blade, Northern Pipefish

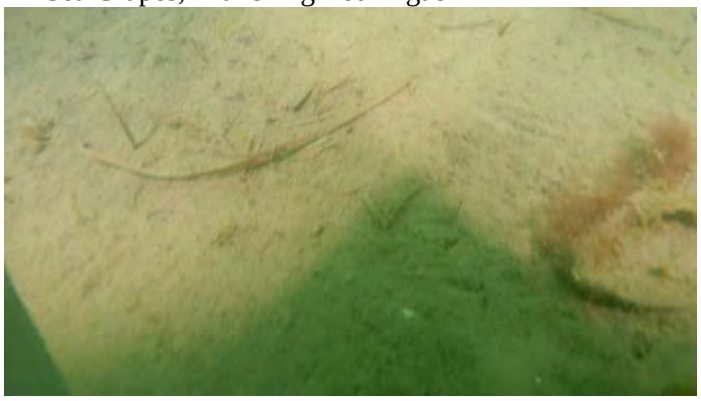
D Eelgrass Blade



E Sea Grapes, Branching Red Algae



F Northern Kelp



G Amphipod Tubes

H Green Crab

Plate TR-8 Representative Biota Underwater Video Transect 8 Runway 9-27 Logan International Airport

A Dense Macro Algae, Kelp

B European Oyster, Kelp

C Green Crab

D Eelgrass Blades

E Rock Crabs

F Hermit Crab with Sea Fur

G Hermit Crab, Periwinkle

H Hermit Crabs

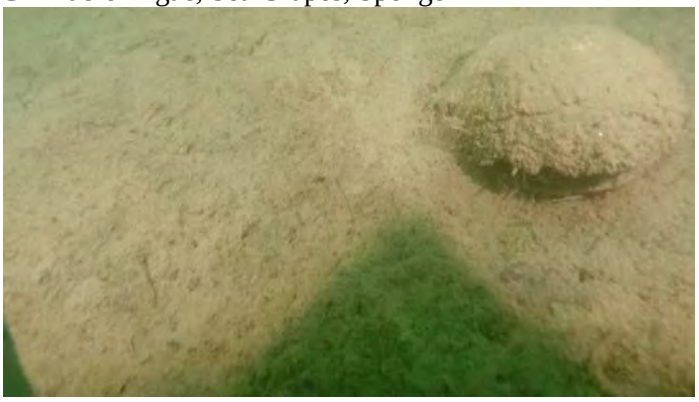
Plate TR-9 Representative Biota Underwater Video Transect 9 Runway 9-27 Logan International Airport

A Spider Crab

B Sea Cucumber, Sea Grapes, Hermit Crab

C Macro Algae, Sea Grapes, Sponge

D Large Colony Sea Grapes



E European Oyster

F Eelgrass Blade

G Bivalve Siphon

H Hermit Crabs

Plate TR-10 Representative Biota Underwater Video Transect 10 Runway 9-27 Logan International Airport

A Sea Grapes, Colonial Tunicates, Sea Cucumber

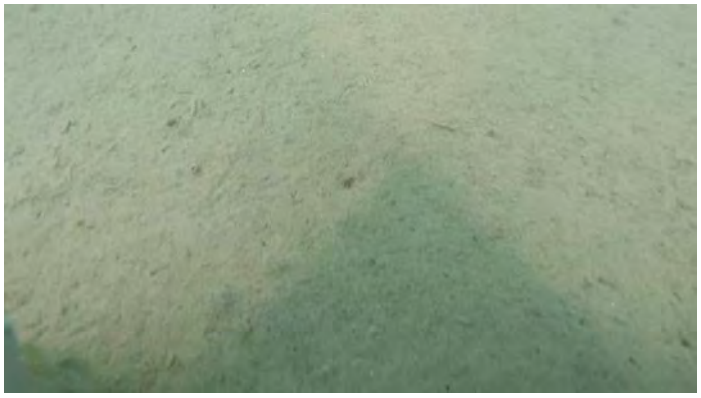
B Hermit Crabs

C Eelgrass Blades

D Dead Eelgrass Strands

E Rock Crabs in burrow

F Hermit Crab, Amphipod Tubes



G Flat Sand Bottom

H Periwinkle, Branching Red Algae

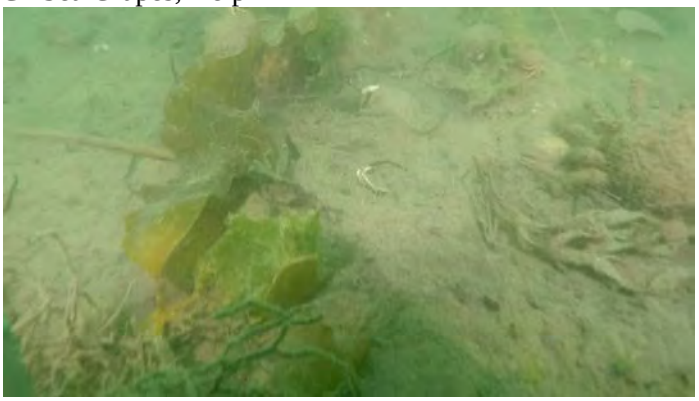
Plate TR-11 Representative Biota Underwater Video Transect 11 Runway 9-27 Logan International Airport

A Dense Macro Algae

B Sea Grapes

C Sea Grapes, Kelp

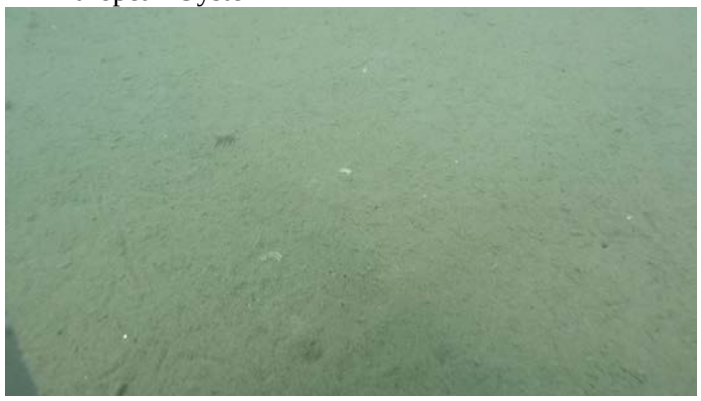
D Eelgrass Blade



E Sea Grapes, Macro Algae

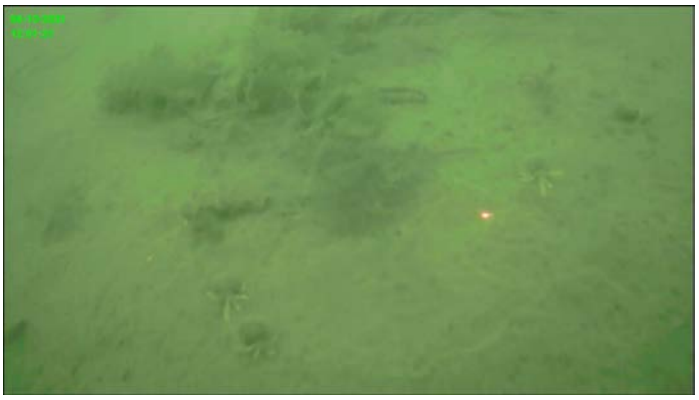
F European Oyster

G European Oyster



H Flat Sand Bottom

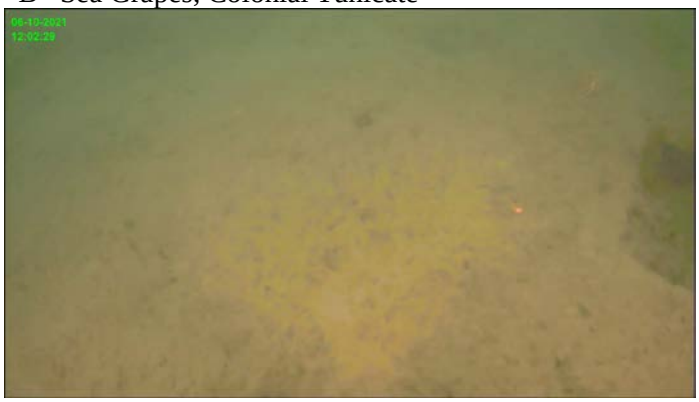
Plate TR-12 Representative Biota Underwater Video Transect 12 Runway 9-27 Logan International Airport



A Hermit Crabs

B Sea Grapes, Colonial Tunicate

C European Oyster

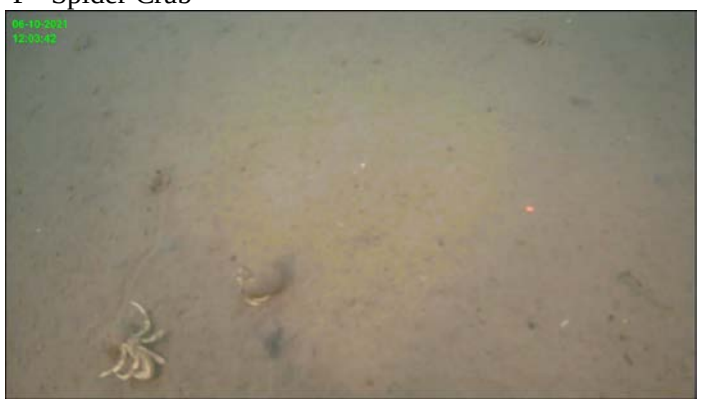


D Crab burrow

E Rock Crabs in burrow

F Spider Crab

G Hermit Crab



H Hermit Crabs

Plate TR-13 Representative Biota Underwater Video Transect 13 Runway 9-27 Logan International Airport

A Northern Kelp

B Sea Grapes, Macro Algae, Sponge

C Sea Grapes, European Oyster

D Northern Kelp, Hermit Crab

E European Oyster

F Northern Kelp

G Green Crab in burrow

H Hermit Crabs

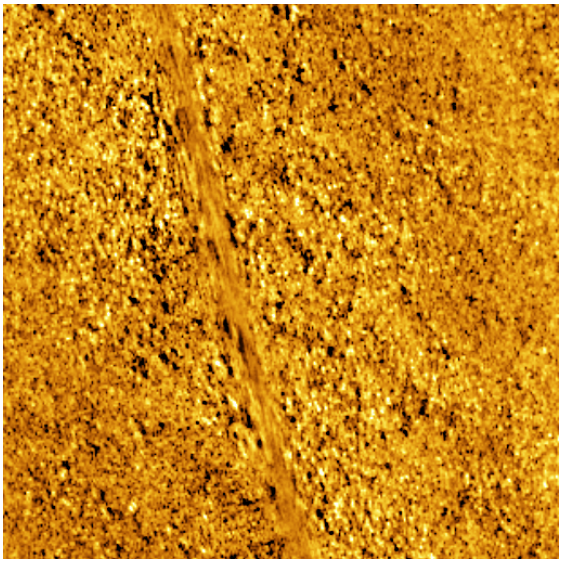
Plate TR-14 Representative Biota Underwater Video Transect 14 Runway 9-27 Logan International Airport

APPENDIX A

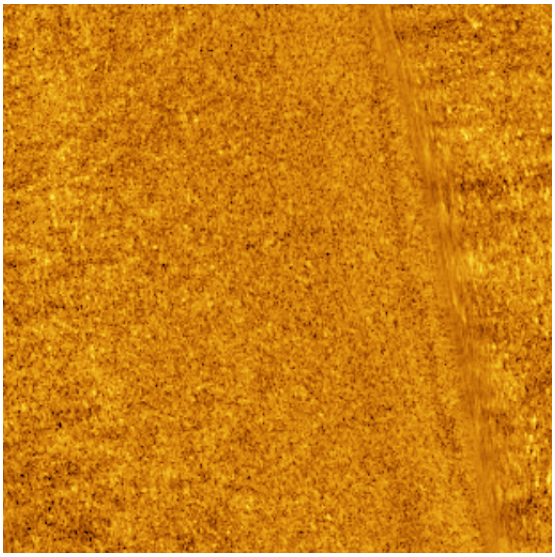
HUMMINBIRD HELIX REPRESENTATIVE SIDESCAN SONAR TARGETS AND BOTTOM FEATURES

LOGAN INTERNATIONAL AIRPORT
RUNWAY 9-27 SAFETY AREA, BOSTON, MA

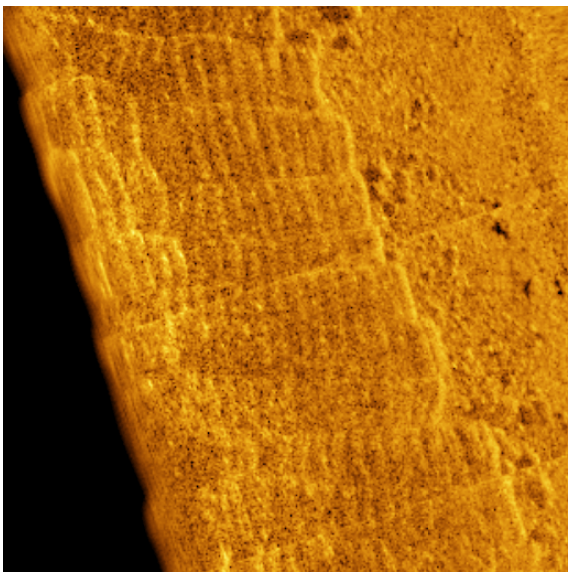
PLATE 1 Inshore Targets in the Vicinity of the Runway 9-27 Safety Area



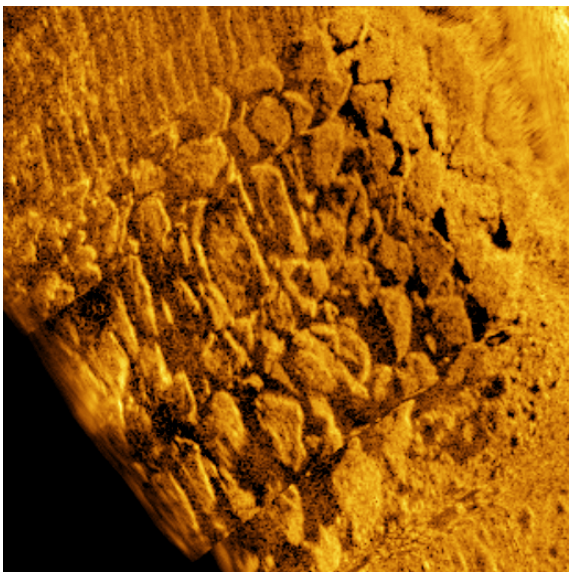
Macroalgea, Oysters, and Tunicate Bottom



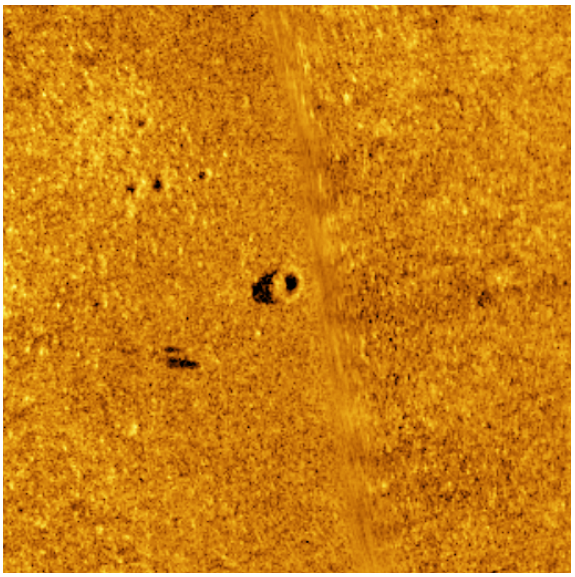
Sandy Bare Bottom



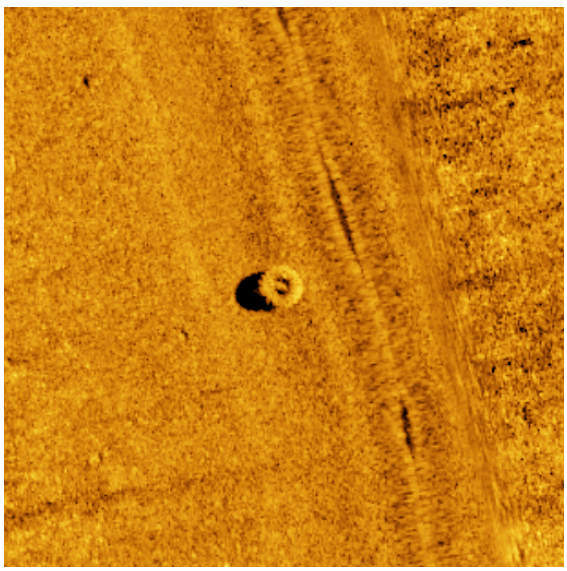
Shoreline Erosion Control Matting



Rock/Boulder Jetty

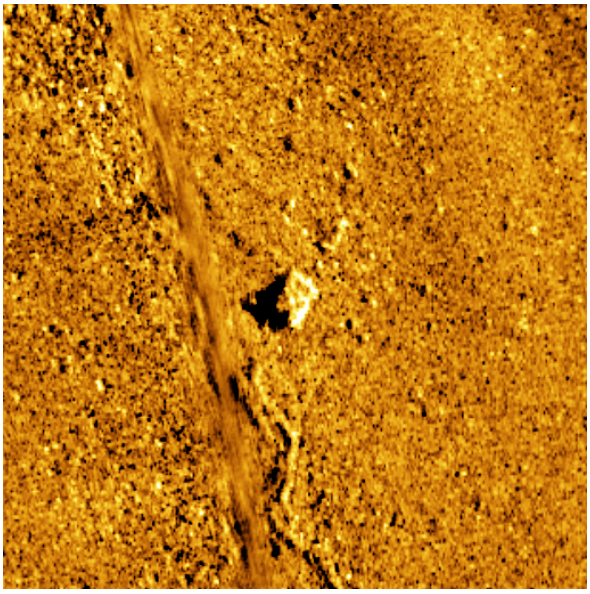


Tire

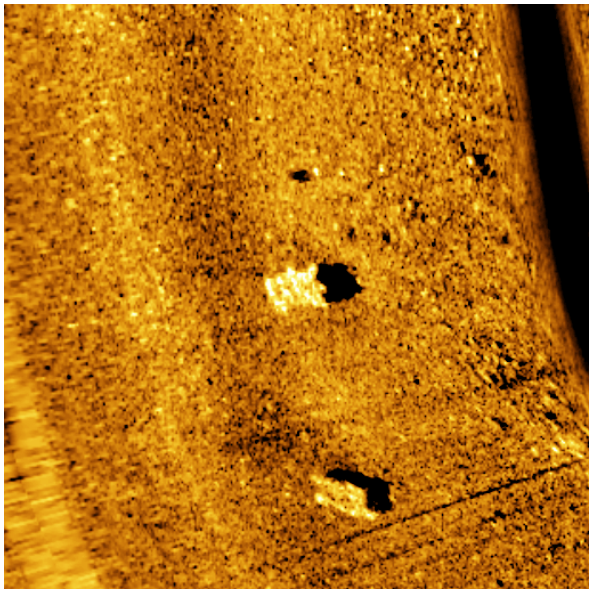


Tire

PLATE 2 Offshore Targets



Lobster Trap



Lobster Traps

Attachment G- ENF Pre-Filing Project Summary in English and Spanish

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Boston Logan International Airport

Logan Runway 27 Runway Safety Area (RSA) Enhancements Project

PROJECT SUMMARY

Project Overview. The Massachusetts Port Authority (Massport) proposes to enhance the runway safety area (RSA) at the end of Runway 27 at Boston Logan International Airport. The proposed improvements are part of a continuing Federal Aviation Administration (FAA) safety program required to enhance the RSA, to the extent feasible, to be compliant with FAA's current airport design standards and to enhance rescue access in the event of an airfield emergency. **RSAs are safety improvements and do not extend runways or have any effect on normal runway operations, runway capacity, or types of aircraft using the runway**.

The eastern end of Runway 9/27 (Figure 1) does not meet the current FAA design standards for length as this runway was constructed before the current FAA design standards were in place. Runway Safety Areas are typically level areas 1,000 feet long by 500 feet wide that surround the runway. RSAs may be shorter in length if an Engineered Materials Arresting System (EMAS) is installed at the runway end to provide an equivalent level of safety. EMAS is a bed of crushable concrete blocks that when run over, slow down and can safely stop an airplane during an emergency.

Based on the 2019 FAA determination for this runway, the preferred RSA enhancement option for preliminary design and permitting will be construction of a 306-foot wide pile-supported deck (or pier) extending 650 feet from the existing runway threshold, with an EMAS installed on the deck. Because of the irregular shoreline at this area, it is expected that the 306-foot wide deck would extend to the northeast over Boston Harbor between 450 to 500-feet. Massport previously constructed a similar RSA deck in 2011/2012 at the eastern end of Runway 15R/33L. The proposed Runway 27 RSA deck will not include an extended approach light pier as exists at the Runway-end 33L RSA deck.

Anticipated Construction Impacts. As was experienced for the construction of the Runway 33L RSA deck, there will be some permanent impacts to the nearshore harbor habitat by installation of the deck support system (expected to be pilings or caissons). There will also be a range of typical temporary construction impacts including construction vehicle trips, equipment noise and emissions, etc. The safety area deck is expected to be constructed primarily from the water using barge-mounted equipment. Although no detailed construction schedule has been developed, some phases of deck construction will require periodic runway shutdowns to safely accommodate the barge(s) and other construction equipment. Runway shutdowns often result in a temporary shifting of runway utilization subject to wind and weather patterns. Because RSA

improvements are purely safety enhancements and do not impact runway operational capabilities, there will be no changes to runway utilization as the result of this project once construction is completed.

Construction Mitigation Measures. A range of environmental controls will be implemented during project construction, including:

- Construction equipment noise reduction mitigation measures
- Time of year (TOY) limitations for in-water construction activities to protect fish habitat
- Limited work hours – primarily daylight hours
- Construction vehicles restricted from local roads (standard practice for all projects)
- Community construction hotline

Climate Change/Resiliency. This safety project must be designed to connect with the existing airfield runway/taxiway network. The deck will be constructed with a 75-year design life and designed to withstand predicted sea level rise and more frequent and intense storm events.

Greenhouse Gas (GHG) Impacts. The completed safety project will not change how the runway or airfield operates and will not affect which aircraft can operate on Runway 9/27; therefore there will be no difference in GHG emissions with or without the project. There will be temporary increases in construction equipment emissions; those emissions will be assessed in the **Draft Environmental Assessment/Environmental Impact Report** (Draft EA/EIR) expected to be filed in 2022.

Permit Requirements. Based on the current concept design, RSA construction may require the following environmental reviews and permits:

Federal

- National Environmental Policy Act (NEPA): *Environmental Assessment (FAA)*
- US Army Corps of Engineers: *Section 10/404 permit*

State

- Massachusetts Environmental Policy Act (MEPA) Review: *Environmental Notification Form (ENF) and Environmental Impact Report (EIR)*
- Massachusetts Department of Environmental Protection*:*
    - *MA Wetlands Protection Act Compliance*

- *Chapter 91 License*
- *401 Water Quality Certification*

- MA Office of Coastal Zone Management*: Federal Consistency Statement*

Local

- Boston Conservation Commission: *MA Wetlands Protection Act Compliance*

Anticipated Environmental Review and Construction Schedule

• MEPA ENF filing	Late Summer 2021
• Draft EA/EIR	Late 2021/Early 2022
• Final EA/EIR	Mid-2022
• NEPA/MEPA decisions issued	Fall 2022
• File permit applications	2021-2022
• All permits/approvals issued	Summer 2023
• Final Design	2023 – 2024
• Construction	2025 – 2026

Outreach and Communications

In preparation for this meeting, Massport has reached out to local and state elected officials, representatives in East Boston and Winthrop, The Massport Community Advisory Committee (MCAC), and a range of area community groups surrounding the project site. Notice of the meeting has been placed in the East Boston Times, Winthrop Transcript, El Mundo, and on Massport's website at http://www.massport.com/logan-airport/about-logan/environmental-reports/. This pre-filing enhanced outreach is being conducted in acknowledgement of the project's proximity to environmental justice communities surrounding Logan Airport. These communities are identified by the state Executive Office of Energy and Environmental Affairs (EEA) based on minority population, income and English isolation or a combination of these factors.

Boston Logan International Airport

Logan Runway 27 RSA Enhancements Project

Figure 1 – **Runway 27 Runway Safety Area Project Location**

Aeropuerto Internacional Logan de Boston

Proyecto de mejora de la zona de seguridad de la pista 27 del Aeropuerto Internacional Logan de Boston (RSA)

Resumen del proyecto

Descripción general del proyecto. La Autoridad Portuaria de Massachusetts (Massport) propone hacer mejoras en el área de seguridad de la pista (RSA, por sus siglas en inglés) al final de la pista 27 del Aeropuerto Internacional Logan de Boston. Las mejoras propuestas son parte de un programa de seguridad permanente de la Administración Federal de Aviación (FAA) requerido para mejorar el RSA, en la medida de lo posible, para cumplir con los estándares de diseño de aeropuertos de la FAA y mejorar el acceso para una operación de rescate en caso de una emergencia en la zona del aeródromo. **Se trata de mejoras de seguridad en el RSA; no incluyen la ampliación de las pistas ni tienen efecto alguno en las operaciones habituales de la pista, la capacidad o los tipos de aeronaves que pueden transitar.**

El extremo este de la pista 9/27 (Figura 1) no cumple con los estándares de diseño actuales de la FAA en cuanto a la longitud, ya que esta pista se construyó antes de que entraran en vigencia los estándares de diseño actuales de la FAA. Las zonas de seguridad de la pista son, por lo general, zonas niveladas de 1000 pies de largo por 500 pies de ancho que rodean la pista. Si se instala un sistema mecanizado de detención de materiales (EMAS) al final de la pista, el RSA puede tener una extensión menor para brindar el mismo nivel de seguridad. El EMAS es una plataforma de bloques de hormigón triturables que, al aplastarse, logran frenar y detener un avión, de manera segura, durante una emergencia.

Sobre la base de la determinación de la FAA de 2019 para esta pista, la opción preferida de mejora el RSA para el diseño y los permisos preliminares será la construcción de una cubierta (o un muelle) apoyada en pilotes de 306 pies de ancho, que se extenderá a lo largo de 650 pies desde el umbral de la pista actual, con un EMAS instalado en la cubierta. Debido a las irregularidades de la costa en esta zona, se prevé que la cubierta de 306 pies de ancho se extienda hacia el noreste, entre 450 y 500 pies sobre el puerto de Boston. En 2011/2012, Massport construyó una cubierta similar en el RSA, en el extremo este de la pista 15R/33L. La cubierta propuesta para el RSA de la pista 27 no incluirá un muelle extendido con luces de aproximación, como en el caso de la cubierta de la RSA en el extremo de la pista 33L.

Impactos previstos de la construcción. Al igual que sucedió durante la construcción de la cubierta en el RSA de la pista 33L, el hábitat portuario cercano a la costa sufrirá un impacto permanente debido a la instalación del sistema de soporte de la cubierta (se prevé que sean

pilotes o encofrados). Asimismo, se espera una serie de impactos característicos de una obra de construcción temporaria, como el traslado de la maquinaria de construcción, ruidos y emisiones de los equipos, etcétera. La cubierta de la zona de seguridad se construirá principalmente desde el agua utilizando equipos instalados en barcazas. Aunque no se ha elaborado un calendario de construcción detallado, algunas etapas de la construcción de la cubierta exigirán cierres periódicos de pistas para trasladar, de manera segura, la(s) barcaza(s) y otros equipos de construcción. El cierre de pistas suele ocasionar un cambio temporal del uso de la pista según los patrones climáticos y de viento. Debido a que se tratan únicamente de mejoras de seguridad y no afectan la capacidad operativa de la pista, no habrá cambios en el uso de la pista como resultado de este proyecto una vez finalizada la obra de construcción.

Medidas para atenuar el impacto de la construcción. Durante la implementación del proyecto, se aplicarán una serie de controles ambientales, entre ellos:

- Medidas para disminuir el ruido de los equipos de construcción
- Limitaciones en épocas del año (TOY, por sus siglas en inglés) para las actividades de construcción en el agua a fin de proteger el hábitat de los peces.
- Horas de trabajo limitadas, principalmente durante el día
- Restricciones para el traslado de la maquinaria de construcción en las carreteras locales (práctica habitual para todos los proyectos)
- Línea directa para la comunidad

Capacidad de adaptación ante el cambio climático. El diseño de este proyecto de seguridad debe conectarse con la red de pistas de aterrizaje/pistas de rodaje en el aeródromo. El diseño de construcción de la cubierta está previsto para tener una vida útil de 75 años y resistir el aumento previsto del nivel del mar y las tormentas más frecuentes e intensas.

Impacto de los gases de efecto invernadero (GEI). Una vez finalizado el proyecto de mejora de la seguridad, no habrá cambios en el funcionamiento de la pista o del aeródromo y no se limitará el tipo de aeronaves que pueden operar en la pista 9/27; por lo tanto, este proyecto no afectará las emisiones de GEI. Se observarán aumentos temporales en las emisiones de la maquinaria de construcción; esas emisiones se analizarán en la **Evaluación Ambiental/Informe de Impacto Ambiental** (EA/EIR preliminar), cuya presentación se prevé para 2022.

Requisitos para obtener los permisos. Sobre la base del diseño conceptual actual, la construcción del RSA puede requerir las siguientes revisiones y permisos ambientales:

Federales

- Ley de Política Medioambiental Nacional (NEPA): *Evaluación ambiental (FAA)*

- Cuerpo de Ingenieros del Ejército de los Estados Unidos: *Permiso de la sección 10/404*

Estatales

- Revisión de la Ley de Políticas Ambientales de Massachusetts (MEPA): *Formulario de notificación ambiental (ENF) y Informe de impacto ambiental (EIR)*
- Departamento de Protección Ambiental de Massachusetts:
    - *Cumplimiento de la Ley de Protección de Humedales de MA*
    - *Licencia del Capítulo 91*
    - *Certificación de la calidad del agua de la sección 401*
- Oficina de Gestión de la Zona Costera de MA: *Declaración de congruencia federal*

Locales

- Comisión de Conservación de Boston: *Cumplimiento de la Ley de Protección de Humedales de MA*

Cronograma de revisión ambiental y construcción previstos

• Presentación del ENF conforme a la MEPA	Fin del verano de 2021
• EA/EIR preliminar	Fin de 2021/Principio de 2022
• Proyecto final EA/EIR	Mediados de 2022
• Decisiones emitidas de acuerdo con la NEPA/MEPA	Otoño de 2022
• Presentación de solicitudes de permisos	2021-2022
• Todos los permisos/autorizaciones emitidos	Verano de 2023
• Diseño final	2023 – 2024
• Construcción	2025 – 2026

Divulgación y comunicaciones

A fin de organizar esta reunión, Massport se ha puesto en contacto con los funcionarios electos locales y estatales, los representantes de East Boston y Winthrop, el Comité Asesor de la Comunidad de Massport (MCAC) y una serie de grupos comunitarios de la zona en los

alrededores del sitio del proyecto. La convocatoria a la reunión se publicó en el East Boston Times, Winthrop Transcript y El Mundo y en el sitio web de Massport en http://www.massport.com/logan-airport/about-logan/environmental-reports/. Se decidió ampliar la divulgación previa a la presentación debido a la proximidad del proyecto a las comunidades de justicia ambiental en los alrededores del aeropuerto Logan. Estas comunidades han sido identificadas por la Oficina Ejecutiva de Energía y Asuntos Ambientales (EEA) del estado en función de la población minoritaria, los ingresos y el aislamiento por no dominar el inglés o una combinación de estos factores.

Aeropuerto Internacional Logan de Boston

Proyecto de mejora de la zona de seguridad de la pista 27 de Logan (RSA)

Figura 1 - **Zona de seguridad de la pista 27 sitio del proyecto**

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Attachment H- ENF Public Notice

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Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs

MEPA Office

100 Cambridge St., Suite 900
Boston, MA 02114
Telephone 617-626-1020

PUBLIC NOTICE OF ENVIRONMENTAL REVIEW

PROJECT: Boston Logan International Airport Runway 27 End Runway Safety Area Improvements Project

LOCATION: East Boston, MA

PROPONENT: Massachusetts Port Authority (Massport)

The undersigned is submitting an Environmental Notification Form ("ENF") to the Secretary of Energy & Environmental Affairs on or before August 31, 2021

This will initiate review of the above project pursuant to the Massachusetts Environmental Policy Act ("MEPA", M.G.L. c. 30, s.s. 61-62I). Copies of the ENF may be obtained from:

Stewart Dalzell, Deputy Director, Environmental Planning & Permitting
617-568-3524
SDalzell@massport.com

Electronic copies of the ENF are also being sent to the Conservation Commission and Planning Board of Boston**.**

The Secretary of Energy & Environmental Affairs will publish notice of the ENF in the Environmental Monitor, will receive public comments on the project for 20 days, and will then decide, within ten days, if an Environmental Impact Report is needed. A site visit and/or remote consultation session on the project may also be scheduled. All persons wishing to comment on the project, or to be notified of a site visit and/or remote consultation session, should email MEPA@mass.gov. Mail correspondence will continue to be accepted, though responses may be delayed. Mail correspondence should be direct to the Secretary of Energy & Environmental Affairs, 100 Cambridge St., Suite 900, Boston, Massachusetts 02114, Attention: MEPA Office, referencing the above project.

By Massport

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Mancomunidad de Massachusetts
Oficina Ejecutiva de Energía y Asuntos Ambientales

MEPA Office

100 Cambridge St., Suite 900
Boston, MA 02114
Teléfono: 617-626-1020

AVISO PÚBLICO DE REVISIÓN MEDIOAMBIENTAL

PROYECTO: Aeropuerto Internacional de Boston Logan Pista 27 Proyecto de Mejoras de Seguridad del Área Terminal de la Pista

UBICACIÓN: East Boston, MA

PROPONENTE: Massachusetts Port Authority (Massport)

El abajo firmante presentará un Formulario de notificación medioambiental («ENF», por sus siglas en inglés) a la Secretaría de Energía y Asuntos Ambientales el 31 de agosto de 2021, o antes.

Esto dará inicio a la revisión del proyecto antes mencionado conforme a la Ley de Políticas Medioambientales de Massachusetts («MEPA», Leyes Generales de Massachusetts, capítulo 30, secciones 61-62I). Pueden solicitarse copias del formulario a:

Stewart Dalzell, subdirector, Planificación Ambiental y Permisos
617-568-3524
SDalzell@massport.com

Las copias electrónicas del ENF también se envían a la Comisión de Conservación y Dirección de Planificación de Boston**.**

La Secretaría de Energía y Asuntos Ambientales publicará un aviso del formulario ENF en el Monitor Ambiental, recibirá comentarios públicos sobre el proyecto durante 20 días y luego decidirá, en un plazo de diez días, si hace falta un Informe de impacto ambiental. También podrían programarse una visita al lugar de las obras y una sesión de consulta sobre el proyecto. Las personas interesadas en dar su opinión sobre el proyecto o en recibir un aviso sobre una visita al lugar o una sesión de consulta deben enviar un correo electrónico a MEPA@mass.gov. Seguimos aceptando correspondencia por correo, aunque las respuestas por este medio pueden demorarse. La correspondencia por correo debe dirigirse a: Secretary of Energy & Environmental Affairs, 100 Cambridge St., Suite 900, Boston, Massachusetts 02114, Attention: MEPA Office, mencionando el proyecto anterior.

Presentado por Massport

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