DRAFT ENVIRONMENTAL IMPACT REPORT
EEA# 16433

Runway 27 End Runway Safety Area Improvements Project

Boston Logan International Airport

EAST BOSTON, MASSACHUSETTS

PREPARED FOR

Massachusetts Port Authority

PREPARED BY

06.2022

PREPARED FOR

Massachusetts Port Authority

PREPARED BY

Vanasse Hangen Brustlin, Inc.

WSP USA, Inc.

IN PARTNERSHIP WITH

Harris Miller Miller & Hanson, Inc.

Cover image: NearMap March 23, 2022

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

June 30, 2022

The Honorable Beth Card, 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
Draft Environmental Impact Report EEA #16433

Dear Secretary Card and Director Kim:

On behalf of the Massachusetts Port Authority (Massport), we are pleased to submit the *Draft Environmental Impact Report* (DEIR) for the Boston Logan International Airport Runway 27 End Safety Area Improvements Project (the Project) for public review in accordance with the Massachusetts Environmental Policy Act (MEPA) regulations. This document responds to all requirements of the *Environmental Notification Form* (ENF) Certificate issued on October 8, 2021.

As was outlined in the ENF, Massport has a continuing program of enhancing airfield safety at all its airports, including enhancing the runway safety area (RSA) at Runway 27 End at Boston Logan International Airport (Logan Airport). Federal Aviation Administration (FAA) policy requires that Massport enhance the RSA, to the extent feasible, to be consistent with the current FAA airport design criteria for RSAs and to improve rescue access in the event of an emergency. **RSAs are safety features at the ends and sides of runways, which do not extend the usable length of the runways or affect airport operations, including the number or types of aircraft that can operate at Logan Airport.**

Because of Logan Airport's location, surrounded on three sides by Boston Harbor, any improvement to the Runway 27 End RSA would require work in the marine intertidal and subtidal areas. Massport has worked closely with the FAA on the conceptual design of the proposed safety improvements to avoid and minimize impacts; however, there are no feasible alternatives that both meet FAA safety requirements and avoid marine resource impacts. Recognizing this at the outset, Massport proactively reached out to key local, state, and federal resource agencies well in advance of any regulatory filings to begin the development of mitigation strategies, while continuing to explore impact avoidance opportunities. The DEIR describes the purpose of and need for the proposed safety improvements, the alternatives considered, potential environmental impacts, and mitigation strategies for the Proposed Project. The document also describes how the runway operates and why the proposed RSA safety solution is appropriate for this Runway End.

To minimize environmental impacts to Boston Harbor, in 2019, the FAA determined the preferred option to enhance the Runway 27 End RSA is an approximately 650-foot long by 306-foot-wide RSA on a pile-supported deck with an Engineered Materials Arresting System (EMAS) installed on the deck. Because of the unique environmental setting and the extraordinary cost of the type of structure proposed, the FAA approved the narrowing of the pile-supported deck from the required 500-feet wide to a 300-feet wide deck (the actual width of the deck would be 306 feet to allow for safety rails) as past projects have shown that this would provide an equivalent level of safety as a full-dimensional RSA. An EMAS is constructed of collapsible concrete blocks with predictable deceleration forces. Under an emergency, when an aircraft rolls into an EMAS, 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 in this area, it is expected that the 306-foot-wide deck would extend approximately 450 feet over Boston Harbor. The Proposed Project will not lengthen the existing Runway 9-27 nor change how it operates – this is a safety enhancement only.

Through use of EMAS and the narrowing of the deck, the Project would reduce coastal impacts, while at the same time significantly enhancing the safety for Logan Airport's air passengers. Since the Project, once completed, would not change how Logan Airport operates, this DEIR focuses on measures to avoid and minimize construction-period impacts and associated mitigation.

As a result of the ongoing agency coordination, Massport has received detailed input regarding the Project permitting. This DEIR addresses key regulatory issues and Massport will continue refining the Project design through the development of the Final EIR (FEIR) and future environmental permitting. Construction of the proposed RSA enhancements will also require review by the FAA under the National Environmental Policy Act (NEPA). We expect the FAA to use the DEIR findings to determine the appropriate level of NEPA review. In the event the FAA determines the need for an Environmental Assessment (EA), it is possible that the federal EA could be combined with the FEIR.

For MEPA review and public comment, the 30-day public comment period for the DEIR would begin on July 8, 2022, with the publication of the next Environmental Monitor, and would end on August 8, 2022. Parties on the distribution list are being sent a link to an electronic copy of the DEIR and the document will be available for inspection at several public libraries and on Massport's website (https://www.massport.com/logan-airport/about-logan/environmental-reports/). As has been done in the past, Massport will voluntarily hold a public meeting at 6:00 PM on Wednesday, July 20, 2022 to discuss the DEIR findings and the expected process for the Final EIR, the FAA NEPA document and follow-on federal, state, and local permitting. Consistent with evolving MEPA guidance on outreach with environmental justice (EJ) populations, the DEIR describes outreach to date and in the future. The meeting will be streamed in English and Spanish.

Massport hopes that you and other reviewers of the DEIR find the document informative and that it provides a solid basis for the anticipated remaining reports and final permitting. We look forward to your review and to close consultation with you and other reviewers in the coming weeks. I can be reached at 617-568-3524 or by email at sdalzell@massport.com.

Sincerely,

Massachusetts Port Authority

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

cc: S. Dennechuk, F. Leo, B. Washburn, Massport
C. Quaine, L. Lesperance, R. Doucette, FAA
Kristen Bergassi, VHB
Marla Engel, WSP

This Page Intentionally Left Blank.

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

30 de junio de 2022:

Honorable Beth Card, Secretaria
Tori Kim, director de la oficina de la MEPA
Oficina Ejecutiva de Energía y Asuntos Ambientales
Attn: Revisor de la MEPA
100 Cambridge Street, Suite 900
Boston, Massachusetts 02114

Asunto: Aeropuerto Internacional Logan de Boston
Proyecto de mejoras en el área de seguridad al final de la pista 27
Informe preliminar de impacto ambiental EEA N.º 16433

Estimada secretaria, Card y director, Kim:

En nombre de la autoridad portuaria de Massachusetts (Massport), nos complace presentar el *Informe preliminar de impacto ambiental* (DEIR) para el Proyecto de mejora de la zona de seguridad del final de la pista 27 del aeropuerto internacional Logan de Boston (el Proyecto) para la revisión pública de acuerdo con las reglamentaciones de la Ley de Política Ambiental de Massachusetts (MEPA). Este documento cumple con todos los requisitos del certificado del *Formulario de notificación ambiental* (ENF) emitido el 8 de octubre de 2021.

Como se indicó en el ENF, Massport cuenta con un programa continuo de mejoras de la seguridad de los aeródromos en todos sus aeropuertos, incluida la mejora en el área de seguridad de la pista (RSA) al final de la pista 27 del aeropuerto internacional Logan de Boston (aeropuerto Logan). La política de la Administración Federal de Aviación (FAA) exige que Massport mejore la RSA, en la medida de lo posible, para que sea compatible con los criterios actuales de diseño de aeropuertos de la FAA para las RSA y para mejorar el acceso para un rescate en caso de emergencia. **Las RSA son elementos de seguridad ubicados en los extremos y laterales de las pistas, que no amplían la longitud útil de las pistas ni afectan a las operaciones aeroportuarias, incluidas la cantidad o los tipos de aviones que pueden operar en el aeropuerto Logan.**

Debido a la ubicación del aeropuerto Logan, rodeado en tres de sus extremos por el puerto de Boston, cualquier mejora en la RSA del final de la pista 27 supondría trabajos en las zonas marinas intermareales y submareales. Massport ha trabajado en estrecha colaboración con la FAA en el diseño conceptual de las mejoras de seguridad previstas a fin de evitar y minimizar los impactos; sin embargo, no hay alternativas viables para que cumplan con los requisitos de seguridad de la FAA y eviten los impactos en los recursos marinos. Sabiendo esto desde un comienzo, Massport se comunicó, de manera proactiva, con los principales organismos de recursos locales, estatales y federales mucho antes de que se presentaran las presentaciones reglamentarias, para comenzar a desarrollar estrategias de mitigación, al tiempo que se evaluaban oportunidades para evitar el impacto. El DEIR describe el propósito y la necesidad de las mejoras de seguridad propuestas, las alternativas que se analizaron, los posibles impactos ambientales y las estrategias de mitigación para el proyecto propuesto. El documento también describe cómo funciona la pista y por qué la solución de seguridad propuesta de la RSA es adecuada para este fin de pista.

Para minimizar los impactos ambientales en el puerto de Boston, en 2019, la FAA determinó que la mejor opción para mejorar la RSA al final de la pista 27 es una RSA de aproximadamente 650 pies de largo por 306 pies de ancho sobre una cubierta apoyada en pilotes con un sistema mecanizado de detención de materiales (EMAS) instalado en la cubierta. Debido a la particularidad del contexto ambiental y al costo excepcional del tipo de estructura propuesta, la FAA aprobó que la cubierta apoyada en pilotes se redujera de los 500 pies de ancho requeridos a una cubierta de 300 pies de ancho (el ancho real de la cubierta sería de 306 pies para permitir barreras de detención), ya que los proyectos anteriores demostraron que esto ofrecería el mismo nivel de seguridad que una RSA con las dimensiones completas. El EMAS se construye con bloques de hormigón que se aplastan con fuerzas de desaceleración predecibles. En caso de emergencia, cuando una aeronave avanza sobre el EMAS, los neumáticos de la aeronave aplastan el hormigón aligerado y logran frenarla y así minimizar los posibles daños a la aeronave. Debido a las irregularidades de la costa en esta zona, se prevé que la cubierta de 306- pies de ancho se extienda aproximadamente 450 pies sobre el puerto de Boston. El proyecto propuesto no extenderá la actual pista 9-27 ni cambiará su funcionamiento; se trata únicamente de una mejora de la seguridad.

Mediante el uso del EMAS y la reducción de la cubierta, el proyecto lograría minimizar los impactos costeros y, al mismo tiempo, mejoraría considerablemente la seguridad de los pasajeros en el aeropuerto Logan. Dado que el proyecto, una vez completado, no modificaría el funcionamiento del aeropuerto Logan, este DEIR se centra en las medidas para evitar y minimizar los impactos durante el período de construcción y la mitigación correspondiente.

Como resultado de la coordinación permanente entre organismos, Massport ha recibido información detallada sobre la aprobación del proyecto. Este DEIR aborda cuestiones reglamentarias esenciales y Massport continuará perfeccionando el diseño del proyecto mediante el desarrollo del EIR final (FEIR) y la tramitación de los futuros permisos ambientales. La construcción de las mejoras propuestas en la RSA también requerirá la revisión por parte de la FAA en virtud de la Ley de Política Medioambiental Nacional (NEPA). Esperamos que la FAA se base en las conclusiones del DEIR para determinar el nivel correspondiente de revisión de la NEPA. En caso de que la FAA establezca la necesidad de realizar una Evaluación Ambiental (EA), es posible que la EA federal se combine con el FEIR.

En cuanto a la revisión de la MEPA y los comentarios del público, el período de 30 días para comentarios públicos sobre el DEIR comenzaría el 8 de julio de 2022, con la publicación del próximo supervisor ambiental, y terminaría el 8 de agosto de 2022. Las partes que figuran en la lista de distribución recibirán un enlace a una copia electrónica del DEIR y podrán consultar el documento en varias bibliotecas públicas y en el sitio web de Massport (https://www.massport.com/logan-airport/about-logan/environmental-reports/). Como se hizo anteriormente, Massport celebrará voluntariamente una reunión pública a las 6 p. m. el miércoles 20 de julio de 2022 para hablar sobre las conclusiones del DEIR y el proceso previsto para el EIR final, el documento NEPA de la FAA y los permisos federales, estatales y locales posteriores. En línea con la evolución de las directrices de la

MEPA sobre la divulgación entre las poblaciones de Justicia ambiental, el DEIR describe la difusión hasta la fecha y en el futuro. La reunión se transmitirá en directo en inglés y español.

Massport espera que usted y otros revisores del DEIR consideren que el documento es informativo y que ofrece una base sólida para los informes restantes previstos y la aprobación final. Quedamos a la espera de su revisión y esperamos poder finalizar la consulta con usted y otros revisores en las próximas semanas. Se puede comunicar conmigo llamando al 617-568-3524 o enviando un correo electrónico a sdalzell@massport.com.

Atentamente.

Massachusetts Port Authority

Stewart Dalzell, subdirector
Departamento de Planificación Ambiental y Permisos, Planificación Estratégica y de Negocios

cc: S. Dennechuk, F. Leo, B. Washburn, Massport
C. Quaine, L. Lesperance, R. Doucette, FAA
Kristen Bergassi, VHB
Marla Engel, WSP

This Page Intentionally Left Blank.

Table of Contents

Appendices

List of Figures

List of Tables

Acronyms

Acronym	Definition
AAC	Aircraft Approach Category
AC	Advisory Circular
ACEC	Massachusetts Area of Critical Environmental Concern
ACS	American Community Survey
ADCP	Acoustic Doppler Current Profiler
ADG	Airplane Design Group
ADT	Average Daily Traffic
AEDT	Aviation Environmental Design Tool
AHT	Annual High Tide
AHW	Annual High Water
APE	Area of Potential Effect
AP-42	U.S. Environmental Protection Agency's Compilation of Air Emissions Factors
ARFF	Aircraft Rescue and Firefighting
ASDA	Accelerate-Stop Distance Available
AUL	Activity and Use Limitations
BCC	Boston Conservation Commission
BFE	Base Flood Elevation
BG	Block group
BOS	Boston Logan International Airport
BMP	Best Management Practice
BUAR	Massachusetts Board of Underwater and Archaeological Resources
CAA	Clean Air Act
CBRU	Coastal Barrier Resource Unit
CDA	Critical Design Aircraft
CFR	Code of Federal Regulations
CGP	Construction General Permit
CIP	Cast-in-place
CMP	Construction Management Plan
CMR	Code of Massachusetts Regulations
CO	Carbon monoxide
CT	Census tract
CWA	Clean Water Act
CZM	Massachusetts Office of Coastal Zone Management
CZMA	Coastal Zone Management Act
dB	Decibel
dBA	A-weighted sound level

DEIR	Draft Environmental Impact Report
DMF	Massachusetts Division of Marine Fisheries
DNL	Day-Night Average Sound Level
DOT OIG	U.S. Department of Transportation Office of Inspector General
DPA	Commonwealth Designated Port Area
DPH	Massachusetts Department of Public Health
EA	Environmental Assessment
EDR	Environmental Data Report
EEA	Executive Office of Energy and Environmental Affairs
EFH	Essential Fish Habitat
EH	Estimated habitat
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EJ	Environmental Justice
EMAS	Engineered Materials Arresting System
ENF	Environmental Notification Form
EO	Executive Order
ESA	Endangered Species Act
ESPR	Environmental Status and Planning Report
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FEIR	Final Environmental Impact Report
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
GHG	Greenhouse Gas
GIS	Global Information System
GWSA	Global Warming Solution Act
HAPC	Habitat Area of Particular Concern
ILS	Instrument Landing System
ISA	Inclined Safety Area
LAHSO	Land and Hold Short Operations
LDA	Landing Distance Available
L_{dn}	A-weighted equivalent level that accounts for all sound energy occurring over a 24-hour period
L_{eq}	The equivalent sound level which averages the background sound levels with short term transient sound levels and provides a uniform method for comparing sound levels that vary over time
L_{max}	Maximum sound level
LSCSF	Land Subject to Coastal Storm Flowage
LSTA	Land Subject to Tidal Action
LUO	Land Under the Ocean
LUHPPL	Land Use With Higher Potential Pollutant Load
L_{10}	A-weighted sound level which is exceeded 10 percent of the time during a specified period

MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
Massport	Massachusetts Port Authority
MCAC	Massport Community Advisory Committee
MCP	Massachusetts Contingency Plan
MEPA	Massachusetts Environmental Policy Act
MGC	Massachusetts General Court
MGL	Massachusetts General Law
MHC	Massachusetts Historical Commission
MHW	Mean High Water
MLLW	Mean Lower Low Water
MLW	Mean Low Water
MOVES3	U.S. Environmental Protection Agency's Motor Vehicle Emissions Simulator model
MTOW	Maximum Takeoff Weight
NAAQS	National Ambient Air Quality Standards
NAVD	North American Vertical Datum
NEPA	National Environmental Policy Act
NERO	Northeast Regional Office
NHESP	Massachusetts Natural Heritage and Endangered Species Program
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NOx	Nitrogen oxides
NO_2	Nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NPL	National Priority List
NPS	Nonpoint source
ORW	Outstanding resource water
O_3	Ozone
Pb	Lead
PCB	Polychlorinated Biphenyl
PH	Priority Habitat
$PM_{2.5}$	Fine particulate matter
PM_{10}	Particulate matter
PVC	Polyvinyl chloride
RDC	Runway Design Code
REIL	Runway End Identified Lights
RIM	Runway Incursion Mitigation
RMAT	Resilient Massachusetts Action Team
ROFA	Runway Object Free Area
RPZ	Runway Protection Zone
RSA	Runway Safety Area
SAS	Special Aquatic Site
SAV	Submerged Aquatic Vegetation

SHMCAP	State Hazard Mitigation and Climate Adaptation Plan
SHPO	State Historic Preservation Office
SIP	Massachusetts State Implementation Plan
SOx	Sulfur oxides
SO2	Sulfur dioxide
SR	Service Road
SWPPP	Stormwater Pollution Prevention Plan
TMDL	Total Maximum Daily Load
TODA	Takeoff Distance Available
TORA	Takeoff Run Available
TOY	Time-of-Year
TSS	Total suspended solids
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VMT	Vehicle Miles Traveled
VOC	Volatile organic compound
WPA	Massachusetts Wetlands Protection Act
WRAP	Western Regional Air Partnership
WRP	MassDEP Waterways Regulation Program

ES

Executive Summary

ES.1 Introduction

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 (refer to **Figure ES-1)**. The proposed Runway 27 End RSA Improvements Project (the Project or the Proposed Project) is required to meet the RSA design criteria in the Federal Aviation Administration's (FAA) Advisory Circular (AC) 150/5300-13B, *Airport Design*,[1] and to enhance rescue access in the event of an emergency**. The Project would improve safety but would not extend the runway nor have any effect on normal runway operations, runway capacity, or types of aircraft that use the runway.**

ES.1.1 MEPA Process Status Summary

On August 31, 2021, Massport filed an Environmental Notification Form (ENF) with the Executive Office of Energy and Environmental Affairs (EEA) in accordance with the Massachusetts Environmental Policy Act (MEPA) and its implementing regulations specified in 301 Code of Massachusetts Regulations (CMR) 11.00. The ENF was circulated to interested parties and a Public Notice of Environmental Review was published on September 2, 2021. A virtual public consultation session on the ENF was held on September 22, 2021 to receive comments on the Project, and for the EEA and FAA to determine the scope for an Environmental Impact Report (EIR). The EEA Secretary issued a Certificate on the ENF on October 8, 2021, confirming the need to prepare an EIR and describing the Draft EIR scope elements.

1 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022.

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

Sources: VHB 2021, ESRI, Nearmap Imagery March 2022

ES.1.2 Public and Agency Coordination

In coordination with the FAA, Massport obtained public input throughout the scoping, planning, and analysis of the Project. In the spirit of the new pending MEPA requirements for projects within 1 mile of an Environmental Justice (EJ) community, Massport voluntarily held a virtual pre-ENF filing public meeting on June 29, 2021 after reaching out to local and state elected officials, representatives in East Boston and Winthrop, the Massport Community Advisory Committee (MCAC), and community interest groups. Notice of the meeting, along with a Project summary, was placed in English and Spanish in the *East Boston Times*, *Winthrop Transcript*, *El Mundo*, and on Massport's website. The meeting was attended by representatives from State Representative Adrian Madaro's office, the City of Boston, the Town of Winthrop, and by various community interest groups and private citizens.

Since the filing of the ENF, Massport has continued to coordinate with environmental agencies interested in the Project. In addition to an agency briefing in early 2021, meetings were held in the Spring of 2022 with the U.S. Coast Guard (USCG), U.S. Environmental Protection Agency (USEPA), National Oceanic and Atmospheric Administration (NOAA) Fisheries Service, Massachusetts Natural Heritage and Endangered Species Program (NHESP), Massachusetts Department of Environmental Protection (MassDEP), Massachusetts Division of Marine Fisheries (DMF), Massachusetts Office of Coastal Management (CZM), and the Boston Conservation Commission (BCC). Because of the Project's close proximity to the Town of Winthrop, Massport also provided a separate briefing to the Winthrop Conservation Commission.

ES.2 Project Description and Purpose

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 Runway 27 End consistent with the FAA requirements. **This Project is a required FAA safety project that would not extend the runway or have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway.**

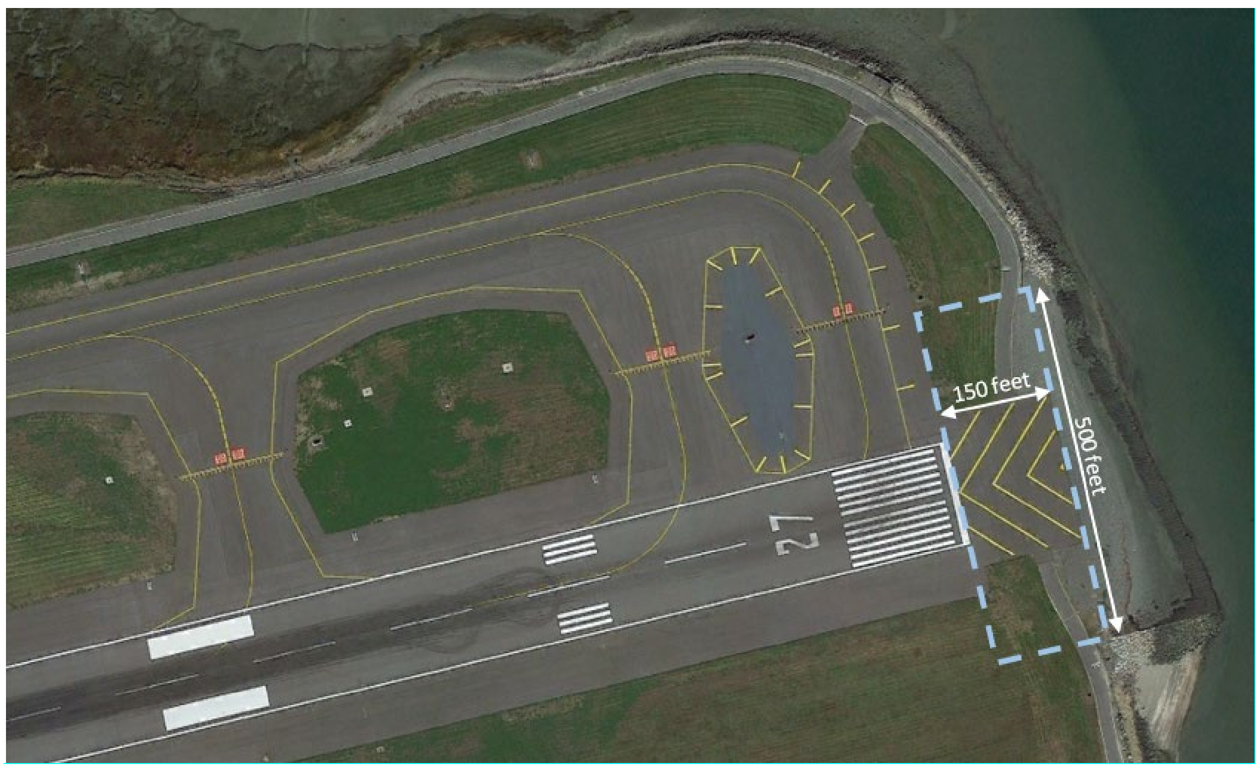
An RSA is a flat surface surrounding the runway that is clear of obstructions. The FAA requires airports to provide RSAs at runway ends and on the sides of a runway to reduce the risk of injury to persons and damage to aircraft in the event of an overrun (an arriving aircraft fails to stop before the 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 proposed Runway 27 End RSA Improvements Project would advance an overriding public interest of safety consistent with Title 49 of U.S. Code Section 47101, which states "that the safe operation of the airport and airway system is the highest aviation priority."[2]

2 U.S. Code, Title 49, Subtitle VII, Part B, Chapter 471, Subchapter I, Section 47101 – Policies, (a) General (1),

In November 2005, Congress mandated that all commercial service airports (including Logan Airport) improve their RSAs to meet FAA minimum standards, to the extent feasible, by 2015.[3] On March 3, 2009, the U.S. Department of Transportation Office of Inspector General (DOT OIG) released a report[4] indicating that, while the FAA had made significant progress in improving RSAs, further action is needed. The DOT OIG report recommended that the FAA take action at 11 of the nation's largest airports, which includes Logan Airport. Logan Airport receives federal funding for airport improvement projects and is therefore federally obligated to meet the RSA design criteria.[5]

Logan Airport Runway 9-27 is 7,001 feet long and 150 feet wide. The FAA design standards require a standard RSA measuring 1,000 feet long beyond each end of the runway and 500 feet wide.[6] As shown in **Figure ES-1**, the Runway 27 End (east end of Runway 9-27) is on the northeastern edge of the airfield, adjacent to Boston Harbor. While the RSA at the west end of Runway 9-27 (Runway 9 End) meets the FAA design requirement, the RSA at the east end (Runway 27 End) is only 150 feet long and therefore does not meet the RSA length requirement of 1,000 feet for a full dimension RSA (refer to **Figure ES-2**).

Figure ES-2 Runway 27 End - Existing Runway Safety Area



3 Congressional Bill H.R. 3058: *Transportation, Treasury, Housing and Urban Development, the Judiciary, the District of Columbia, and Independent Agencies Appropriations Act, 2006*; Public Law 109–115, November 30, 2005, 119 STAT. 2401.

4 U.S. Department of Transportation, 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.

5 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022.

6 U.S. Department of Transportation, Federal Aviation Administration, Standard Operating Procedure 8.00, Runway Safety Area Determination, Appendix B: RSA Determination Form, "Runway 27 End RSA Improvements Project, Boston Logan International Airport," signed January 2019.

ES.3 Alternatives Considered

In 2017, the FAA directed Massport to conduct a *Boston Logan Airport Runway Incursion Mitigation Study/ Runway 9-27 Runway Safety Area (RSA) Alternatives Study* to determine feasible and reasonable alternatives to bring the Runway 27 End RSA into compliance.[7] Six build alternatives and the No-Build Alternative were evaluated in the Tier 1 Alternatives Screening as summarized in **Table ES-1**.

Table ES-1 Tier 1 Alternatives Screening Results

	Alternative						
Screening Criteria	**1 Declared Distances[1]**	**2 Displaced Thresholds**	**3A Full RSA, Fill**	**3B Full RSA, Deck**	**4A EMAS[2] on 500' Deck**	**4B EMAS[2] on 306' Deck**	**No-Build**
Provide overrun and undershoot protection for aircraft consistent with the FAA design criteria	Green	Red	Green	Green	Green	Green	Red
Preserve airfield utility and efficiency	Red	Green	Green	Green	Green	Green	Green
Retain perimeter road	Green	Green	Green	Green	Green	Green	Green
Avoid triggering runway injunction requirements	Green	Red	Green	Green	Green	Green	Green
Avoid impacts to the navigation channel	Green	Green	Red	Red	Red	Green	Green
Avoid and minimize environmental impacts	Green	Green	Red	Red	Red	Orange	Green

Key:
- Green indicates that the criterion is met and/or that no negative effect is anticipated; the alternative is favorable in comparison to the other alternatives.
- Orange indicates that the criterion is partially met and/or that there is some negative effect anticipated.
- Red indicates that the criterion is not met and/or that a negative effect is anticipated; the alternative is not favorable in comparison to the other alternatives.

1 Although RSA Alternative 1 scored positively against several screening criteria, it would adversely affect airfield operations and pose takeoff limitations.
2 An Engineered Materials Arresting System (EMAS) is a bed of energy-absorbing material. In an emergency, if an aircraft rolls into an EMAS, the aircraft is slowed down in a way that minimizes damage to the aircraft and potential injuries to passengers and crew members.

Based on the findings of the Study, the FAA concluded that Alternative 4B, which consists of an approximately 650-foot-long RSA with an Engineered Materials Arresting System (EMAS) on a 306-foot-wide deck, was the Preferred Alternative. An EMAS is a bed of energy-absorbing material; in an emergency, if an aircraft rolls onto the EMAS, it is slowed down in a way that minimizes damage to the aircraft and potential injuries. An EMAS is often used when a full-dimension RSA is not possible due to lack of available land or to minimize environmental impacts; an EMAS provides an FAA-approved level of safety equivalent to an RSA built to the full-length dimensions. A No-Build Alternative was also carried forward as part of the environmental review process, consistent with MEPA requirements.

7 U.S. Department of Transportation, Federal Aviation Administration, Standard Operating Procedure 8.00, *Runway Safety Area Determination*, Appendix B: *RSA Determination Form*, "Runway 27 End RSA Improvements Project, Boston Logan International Airport," signed January 2019.

A second-tier alternatives evaluation was conducted to determine the appropriate deck support structure. Two types of support structures were considered: piles and caissons/drilled shafts. Piles are long, circular or square elements made from precast concrete that would be driven into the ground using vibration or impact (pile driving). Caissons, which are circular columns typically much larger than piles, would involve drilling a hole into the bedrock into which structural steel would be placed and concrete pumped to form a column.

Four alternatives for supporting the RSA deck at the end of Runway 27 were identified and evaluated, as summarized in **Table ES-2.**

Table ES-2 Tier 2 Screening Results of Deck Support Alternatives

Screening Criteria	Deck Support Alternatives			
	Alternative 1: 416 Piles	Alternative 2: 326 Piles	Alternative 3: 160 Caissons	Alternative 4: 128 Caissons
Coastal Wetlands Resource Area Impact:				
Permanent total footprint of piles/caissons (total square feet)	1,160	910	3,140	2,510
Permanent total scour (total cubic yards)	380	340	1,060	1,120
Runway Closure/Airfield Disruption: Can construction be completed in 120 days or less?	No	Yes	No	No

The analysis found that Deck Support Alternative 2 would have the least impact on environmental resources and could be constructed with the least operational impacts to the airfield. Deck Support Alternative 2 was carried forward as the Proposed Project for further analysis, along with the No-Build Alternative.

ES.4 Summary of Proposed Improvements

As shown in **Figure ES-3**, the Project would construct a 600-foot-long RSA with an EMAS on a pile-supported deck (approximately 450 feet long by 306 feet wide). The Project would consist of the following components:

- Extending the existing Runway 27 End RSA to accommodate a steel sheet pile wall at the inshore limit of the deck to prevent settlement and erosion of the upland areas;
- Installing a transition slab spanning from the land to the pile-supported structure;
- Installing a deck structure approximately 450 feet long and 306 feet wide (an area of approximately 137,700 square feet [3.2 acres]), supported by 326 twenty-inch square concrete piles;
- Installing an EMAS approximately 500-feet long by 170-feet wide located within the RSA deck;
- Straightening and realigning the existing 20-foot-wide airport perimeter road to enhance vehicular sight lines and situational awareness;
- Installing two emergency access ramps, one on each side of the proposed deck; and
- Add life rings on the sides and end of the deck to enhance access in and out of the water in an emergency.

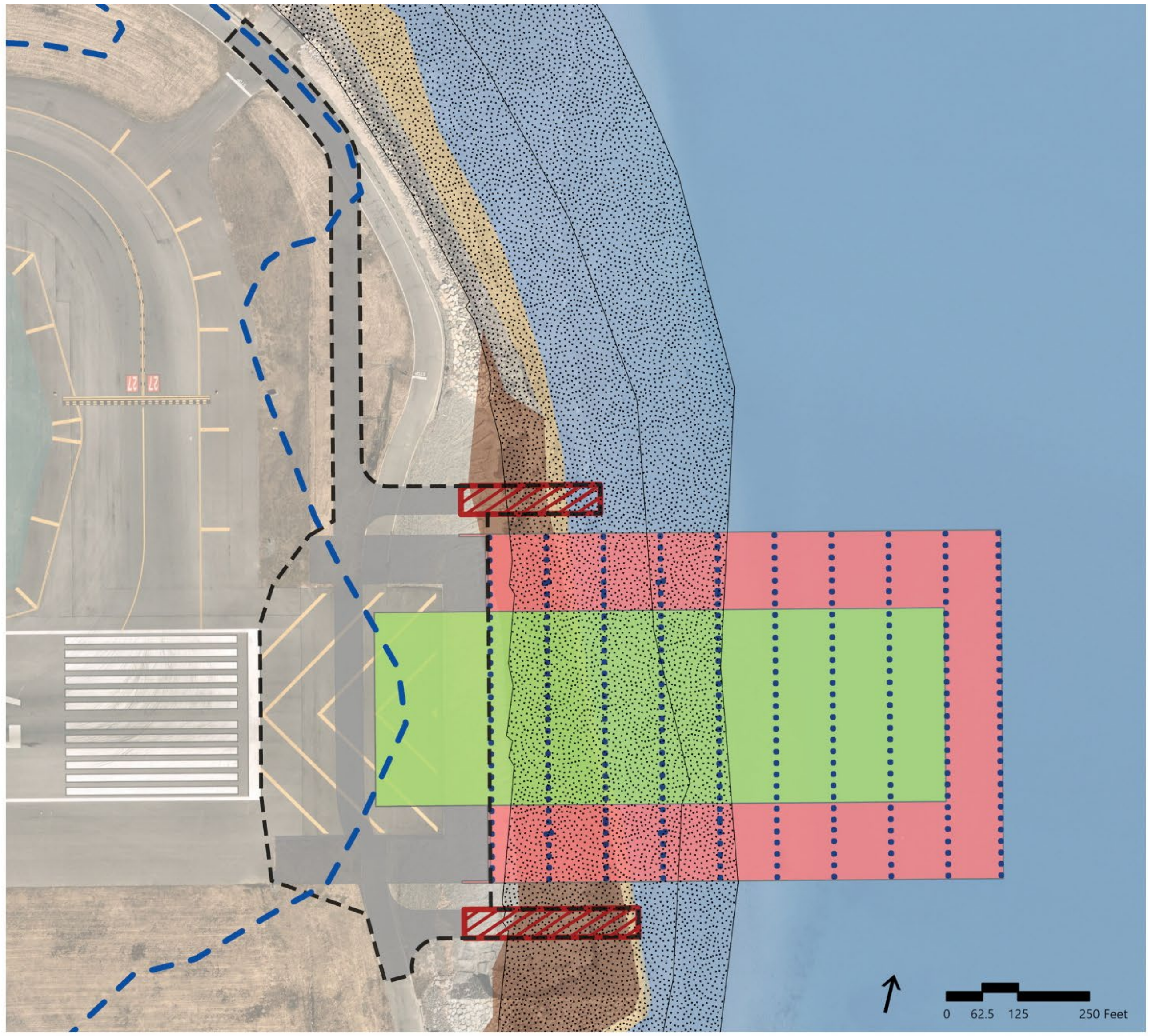
ES.5 Environmental Impacts

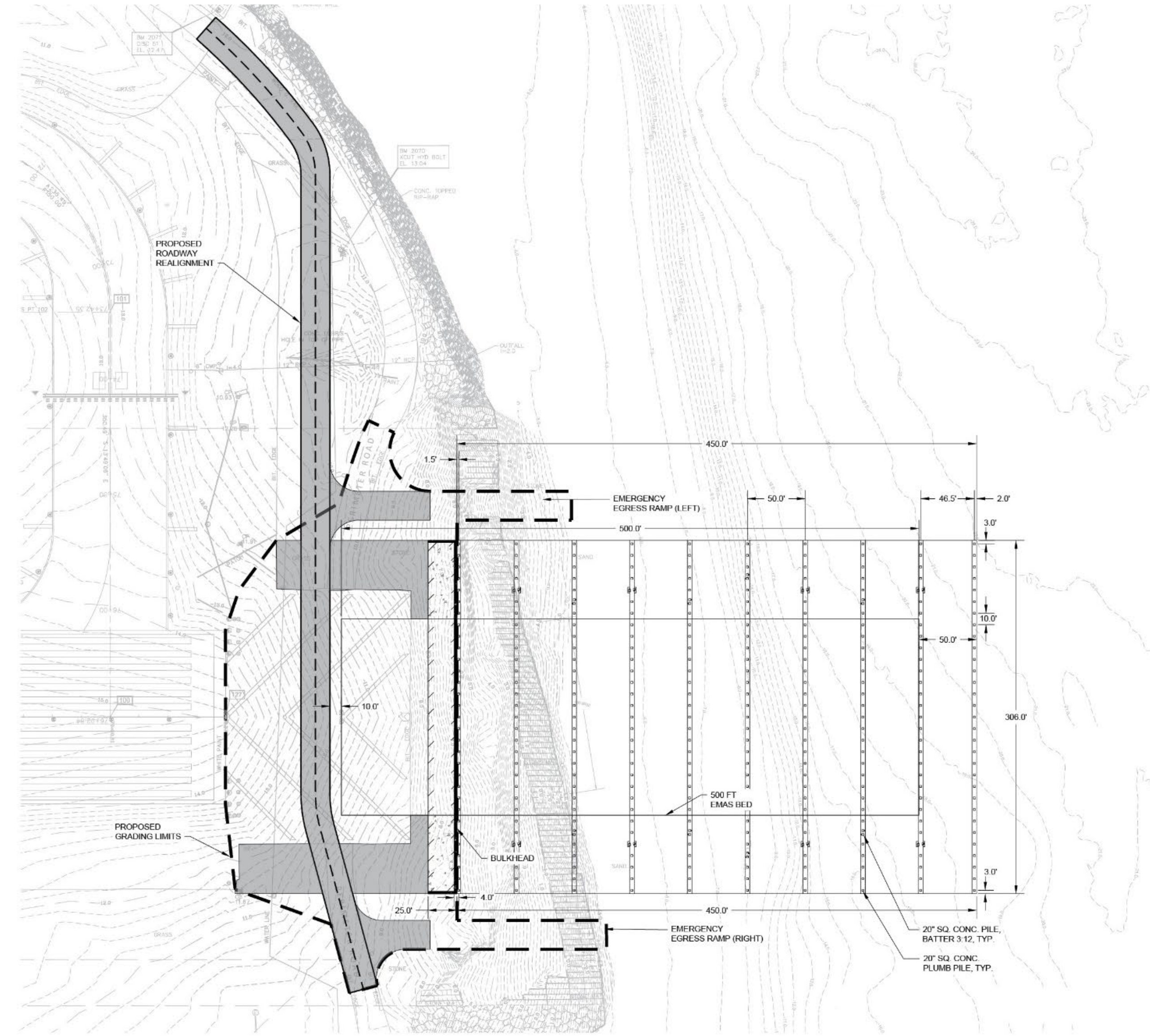
The Project would result in minimal, but direct impacts to coastal resources, habitat, and plants (refer to **Table ES-3**). Coastal resources in the footprint of the Project are shown in **Figure ES-4**. Construction would result in temporary, minor increases in noise, emissions of air pollutants, water quality effects (turbidity), and surface traffic. As previously noted, **the Project would not extend the runway or have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway**. The only alternative that would avoid impacts to environmental resources is the No-Build Alternative. However, the No-Build Alternative is not acceptable because it does not meet the FAA's RSA requirements.

Table ES-3 Summary of Potential Impacts

Category	Adverse Effect (yes/no)
Coastal Resources	**Yes.** The RSA deck pilings would alter about 880 square feet of Land Subject to Tidal Action and Land Under the Ocean, including Coastal Bank, Coastal Beach/Tidal Flats, and Land Containing Shellfish. An additional 9,460 square feet of previously disturbed coastal resources would be altered to construct the two emergency ramps. No changes are anticipated in wave direction, velocity, or erosion or deposition. Minor scour effects near each piling would be anticipated.
Air Quality	**No.** There would be no change to aircraft operations, type of aircraft, or location in which aircraft operate.
Tidelands/ Public Benefits and Navigation	**No.** The Project is within the Legislated Logan Airport Security Zone and would not limit vessel navigation outside the deck or between the deck and the navigation channel. The RSA deck would be no higher than the existing shoreline and the view is not anticipated to be noticeably different.
Finfish Resources	**No.** Some finfish habitat would be displaced by the pilings. However, the pilings would offer new hard substrate for encrusting marine animals and algae, providing additional feeding habitat for fish.
State-Listed Species	**Possible.** A portion of the Project is in priority upland habitat for two grassland bird species: the upland sandpiper (*Bartramia longicauda*) [State endangered] and Eastern meadowlark (*Sturnella magna*) [State special concern]. The NHESP is reviewing the Project to determine if any potential adverse impacts to these species are anticipated.
Federally Listed Species	**Not Likely.** No adverse impacts to federally listed species under U.S. Fish and Wildlife Service (USFWS) jurisdiction (terrestrial species) are anticipated. Consultation with NOAA Fisheries is ongoing (marine species).
Stormwater and Water Quality	**No.** There are no new stormwater conveyances or discharges of untreated stormwater. The Project is not anticipated to result in a higher pollutant load or increase in total suspended solids.
Historic and Archaeological	**No.** No historic or archaeological resources (including marine) were identified in the area of potential effect.
Hazardous Materials and Solid Waste	**No.** No sites within the Study Area are listed on the USEPA's National Priorities List or in the MassDEP's online database.
Climate Change	**No.** The Project Site is within an area of elevated risk from sea level rise/storm surges, extreme precipitation, and extreme heat. The RSA deck would be designed to withstand anticipated coastal storms and sea level rise. The Project is not anticipated to increase climate risk to other properties in the vicinity. Other than temporarily during construction, the Project would not increase greenhouse gas emissions.
Environmental Justice (EJ)	**No.** There are three census block groups within a one-mile radius of the Project Site; each contains EJ minority populations; these EJ communities in the Town of Winthrop would not be disproportionately affected by the Project. There are no vulnerable health criteria at a community level for Winthrop.

Category	Adverse Effect (yes/no)
Construction	**Yes.** Construction would result in short-term increases in noise, air emissions, turbidity, and surface traffic. Noise: Construction noise anticipated for 120 days (during two separate 60-day periods). Massport will employ noise-dampening measures during pile driving to minimize noise impacts, where possible. Air Quality: Emissions of air pollutants during construction would be below *de minimis* levels. Water Quality: Turbidity may be generated during installation of piles and could temporarily affect water quality in a localized area. A turbidity curtain would be deployed to contain sediment resuspended during pile driving. Surface Transportation: Most materials, equipment, and personnel would be transported by marine vessel and would not substantially contribute to surface traffic. Construction vehicles would be prohibited from local roads.





326 20-Inch Square Concrete Piles

The pile configuration includes:

- 326 total piles (294 vertical piles and 32 batter piles)
- 20-inch square concrete piles driven to rock in 10 bents[1] of 31 piles each
- Bents spaced 50 feet apart and piles within each bent spaced 11 feet apart

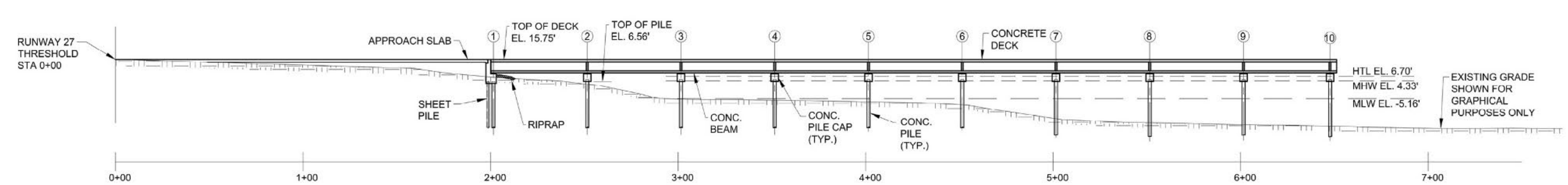


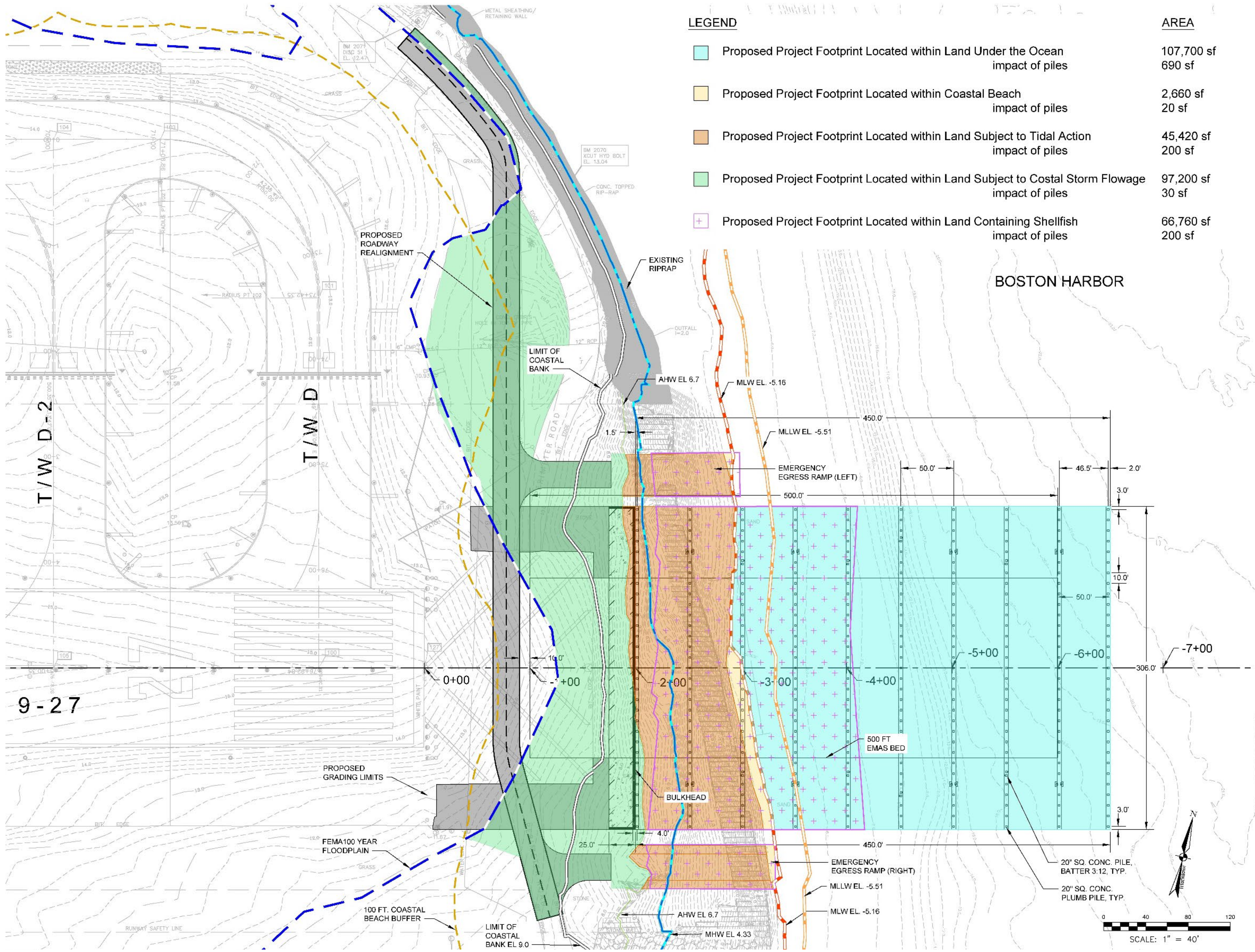
FIGURE ES-3: RSA Deck Support Alternative 2 **Runway 27 End RSA Improvements Project**

- Proposed Grading Limits
- Pile-Supported Deck
- Proposed Engineered Materials Arresting System (EMAS) Bed
- Proposed Pavement
- Proposed Piles
- Proposed Caissons
- Proposed Approach Slab
- Proposed Emergency Ramp
- Coastal Beach
- Land Under Ocean
- Land Subject to Tidal Action
- Federal Emergency Management Agency (FEMA) 100-Year Flood Level
- Land Containing Shellfish

1 A bent is an array of piles in a row and fastened together at the top by a pile cap.

\\vhb\gbl\proj\Wat-EV\14792.00 WSP - MPA Runway 9-27\Reports\DEIR-EA\Drafts\Figures

Figure ES-4 Coastal Resources within Project Site



ES.6 Mitigation Measures

Measures to mitigate potential impacts associated with the Project were identified. Construction mitigation measures would be incorporated into contract documents and specifications governing construction activities. Construction activities would comply with FAA Advisory Circular 150/5370-10H, *Standard Specifications for Construction of Airports*.[8] On-site resident engineers and inspectors would monitor construction activities to ensure mitigation measures are implemented. **Table ES-4** summarizes the proposed mitigation measures.

Table ES-4 Proposed Mitigation Measures and Commitments

Environmental Categories	Mitigation Measure	Implementation Schedule
Land Containing Shellfish	Provide mitigation fee for off-site restoration.	Prior to Construction
Habitat	Replace lost upland grass habitat, where possible.	During Construction
	Implement winter flounder Time-of-Year (TOY) restriction from February 1 to June 30 for in-water construction activities.	During Construction
Coastal Wetlands	Provide in-lieu fee (U.S. Army Corps of Engineers [USACE]) for impacts to mud flat	Following Permitting
Water Quality	Develop and implement a comprehensive Soil Erosion and Sediment Control Plan in accordance with NPDESand MassDEP standards.	During Construction
	Apply water to dry soil to prevent fugitive dust.	During Construction
	Stabilize any highly erosive soils with erosion control blankets and other stabilization methods, as necessary.	During Construction
	Use sediment control methods (such as silt fences and hay bales) to prevent silt and sediment entering the stormwater system and waterways.	During Construction
	Maintain equipment to prevent oil and fuel leaks.	During Construction
	Silt curtains around pile installation and silt fencing.	During Construction
Noise	Maintain mufflers on construction equipment in accordance with Occupational Safety and Health Administration (OSHA) standards.	During Construction
	Minimize engine idling in accordance with Massachusetts anti-idling regulations.	During Construction
	Fit any air-powered equipment with pneumatic exhaust silencers.	During Construction
	Minimize nighttime construction.	During Construction
	Minimize noise during pile driving activities where possible.	During Construction
Transportation	Limit construction traffic to federal or state highways or Logan Airport roadways, prohibiting use of any East Boston roadways by construction vehicles.	During Construction
	Implement construction worker vehicle trip management techniques.	During Construction

8 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5370-10H, *Standard Specifications for Construction of Airports*, December 2018.

Environmental Categories	Mitigation Measure	Implementation Schedule
Air Quality and Greenhouse Gas Emissions	Keep truck idling to a minimum in accordance with Massachusetts anti-idling regulations.	During Construction
	Retrofit appropriate diesel construction equipment with diesel oxidation catalysts and/or particulate filters.	During Construction
	Implement construction worker vehicle trip management techniques.	During Construction
Hazardous Materials and Solid Waste	Pre-characterize any materials before disposal (if any) to determine course of action for removal.	During Construction

ES.7 Permits and Approvals

The Proposed Project would require various local, state, and federal environmental permits prior to construction. Full review of the Project by regulatory and resource agencies, and the public would occur during the permitting process. 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. Boston Harbor is a Navigable Water of the U.S. and placement of a structure or filling within Boston Harbor is subject to federal regulation pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. **Table ES-5** summarizes the anticipated permits and approvals.

Table ES-5 Anticipated Project Permits and Approvals

Agency/Department	Permit/Approval/Action
Federal	
Federal Aviation Administration (FAA)	■ National Environmental Policy Act (NEPA)
U.S Army Corps of Engineers (USACE)	■ Section 10 of the Rivers and Harbors Act ■ Section 404 of the Clean Water Act
National Oceanic and Atmospheric Administration (NOAA) Fisheries Service	■ Section 7 Endangered Species Consultation
U.S Coast Guard (USCG)	■ Navigation Coordination
U.S. Environmental Protection Agency (USEPA)	■ National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP)
Commonwealth of Massachusetts	
Executive Office of Energy and Environmental Affairs (EEA)	■ MEPA Review ■ Public Benefit Determination
Massachusetts Office of Coastal Zone Management (CZM)	■ Consistency Statement with Massachusetts Coastal Zone Management Plan
Massachusetts Department of Environmental Protection (MassDEP)	■ Individual Section 401 Water Quality Certification ■ Chapter 91 Waterways Program License Modification

Agency/Department	Permit/Approval/Action
Massachusetts Natural Heritage and Endangered Species Program (NHESP)	■ Conservation and Management Permit (if required)
City of Boston	
Boston Conservation Commission (BCC)	■ Massachusetts Wetlands Protection Act (WPA) Order of Conditions

Note: This is a preliminary list of local, state and federal permits and approvals that may be sought for the Project. This list is based on current information about the Project and is subject to change as the design of the Project evolves.

ES.8 ENF Certificate Requirements

The Secretary's Certificate on the ENF required specific information to be included in the Draft Environmental Impact Report (DEIR). **Table ES-6** lists the general requirements of the Certificate and where in the DEIR that information can be found.

Table ES-6 Environmental Notification Form Certificate Requirements

Requirement	DEIR Section
Describe existing and proposed conditions, project's impacts, avoidance, minimization, and mitigation measures	Chapter 4, Chapter 5, and Chapter 7
Follow Section 11.07 of MEPA regulations and demonstrate avoidance, minimization, and mitigation to reduce damage to the environment	Entire document and Chapter 7
Identify any changes since ENF filing	Section 1.1.1
Describe federal, state, and local permitting and review requirements	Section 1.4
Provide detailed site plans for existing and post-development conditions	Chapter 3, Chapter 4, Figure 2-1, Figure 3-5, Figure 3-10, Figure 4-2, and Figure 4-3
Discuss the injunction preventing Alternative 2	Section 3.2.2.2
Describe the Alternative Analysis for selecting the preferred deck support alternative	Section 3.3
Quantify environmental impacts of each deck support alternative	Section 3.3.1
Describe criteria used and dismissed in Alternatives Analysis	Section 3.2.1 and Section 3.3.2
Describe structural sufficiency for deck support alternatives	Section 3.3.1
Design support structures for resilience for severe coastal storms and sea level rise	Section 3.3.1
Discuss construction period impacts to environmental resources as well as runway closures, airfield disruptions, surrounding neighborhoods and navigation channel	Section 3.3.2
Describe the EJ Outreach Plan	Section 6.7
Evaluate and discuss vulnerabilities faced by EJ populations	Section 6.4
Discuss any disproportionate impacts to surrounding EJ populations	Section 5.10 and Section 6.4
Describe stormwater mitigation measures	Section 7.2.1
Discuss performance standards for wetland resource areas	Section 5.2.1
Discuss hydrological modeling results	Section 5.2.2
Discuss plan for any shellfish mitigation and coordinate with DMF	Section 7.2.1

Requirement	DEIR Section
Discuss the alternatives considered and dismissed and mitigation measures proposed to protect public interests in waterways	Section 3.2, Section 3.3, and Chapter 7
Show location of and areal amount of flowed tidelands impacted	Section 5.3.1, Section 7.3.1.2, and Figure 4-2
Discuss project's consistency with public benefits and how project meets standards for non-water dependent use project	Section 5.3 and Section 7.3.1.2
Discuss impacts to state-listed species	Section 5.4 and Section 5.5
Discuss potential impacts of Climate Change	Section 5.9
Provide estimated timeline of construction	Section 3.4.4.2
Provide draft Construction Management Plan and best management practices	Appendix H
Discuss the Stormwater Pollution Prevention Plan	Chapter 7.3.1.3
Discuss stormwater management measures to be implemented during construction	Chapter 7.3.1.3 and Appendix H
Discuss proposed mitigation measures	Chapter 7
Provide responses to ENF comments	Appendix A
Provide Circulation List	Appendix B

ES

Resumen ejecutivo

ES.1 Introducción

La autoridad portuaria de Massachusetts (Massport) propone mejorar el área de seguridad de la pista (RSA) en el extremo de la pista 27 del aeropuerto internacional Logan de Boston (aeropuerto Logan o el aeropuerto), adyacente al puerto de Boston (consulte la **Figura ES-1**). El proyecto propuesto de mejoras en la RSA al final de la pista 27 (el proyecto o el proyecto propuesto) se debe llevar a cabo para cumplir con los criterios de diseño de la RSA establecidos en la Circular Consultiva (AC) 150/5300-13B *Diseño de Aeropuertos*,[1] de la Administración Federal de Aviación (FAA), y para mejorar el acceso de rescate en caso de emergencia. **El proyecto mejoraría la seguridad, pero no ampliaría la pista ni tendría efecto alguno en las operaciones habituales de la pista, la capacidad o los tipos de aeronaves que pueden transitar.**

ES.1.1 Resumen del estado del proceso en virtud de la MEPA

El 31 de agosto de 2021, Massport presentó un Formulario de notificación ambiental (ENF) a la Oficina ejecutiva de energía y asuntos ambientales (EEA) de acuerdo con la Ley de Políticas Ambientales de Massachusetts (MEPA) y sus reglamentaciones de aplicación detalladas en el título 301, sección 11.00, del Código de Reglamentaciones de Massachusetts (CMR). El ENF se distribuyó entre las partes interesadas y el 2 de septiembre de 2021, se publicó un aviso público de revisión ambiental. El 22 de septiembre de 2021, se celebró una sesión de consulta pública virtual sobre el ENF para recibir comentarios sobre el Proyecto, y para que la EEA y la FAA determinaran el alcance de un informe de impacto ambiental (EIR). El 8 de octubre de 2021, la Secretaría de la EEA emitió un certificado sobre el ENF en el que se confirmó la necesidad de elaborar un EIR y se describieron los elementos del alcance del proyecto preliminar de EIR.

1 Ministerio de Transporte de los EE. UU., Administración Federal de Aviación, Circular de asesoramiento 150/5300-13B, *Diseño de aeropuertos*, 31 de marzo de 2022.

FIGURA S-1: Vista aérea del aeropuerto Logan

Emplazamiento propuesto del proyecto
Línea de propiedad del aeropuerto Logan

Proyecto de mejoras en el área de seguridad al final de la pista 27

0 1250 2500 5000 Pies

Fuentes: VHB 2021, ESRI, Nearmap Imagery marzo 2022

ES.1.2 Coordinación con el público y los organismos

Junto con la FAA, Massport recibió las opiniones del público durante todo el proceso de definición, planificación y análisis del proyecto. De acuerdo con el espíritu de los nuevos requisitos pendientes de la MEPA para los proyectos en un radio de una milla de una comunidad de justicia ambiental (JA), Massport celebró, de manera voluntaria, una reunión pública virtual previa a la presentación del ENF el 29 de junio de 2021 después de haberse 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 grupos de interés de la comunidad. La convocatoria a la reunión, junto con un resumen del proyecto, se publicaron en inglés y español, en el *East Boston Times*, *Winthrop Transcript*, *El Mundo* y en el sitio web de Massport. A la reunión asistieron representantes de la oficina del representante estatal, Adrian Madaro, de la ciudad de Boston, de la localidad de Winthrop y de varios grupos de interés de la comunidad y ciudadanos particulares.

Desde la presentación del ENF, Massport ha continuado trabajando en coordinación con los organismos ambientales interesados en el proyecto. Además, en la primavera de 2022 se celebraron reuniones con la Guardia Costera de los Estados Unidos (USCG), la Agencia de Protección Ambiental de los Estados Unidos (USEPA), la Dirección de Pesca de la Administración Nacional Oceánica y Atmosférica (NOAA), el Programa de Patrimonio Natural y Especies en Peligro de Massachusetts (NHESP), el Departamento de Protección Ambiental de Massachusetts (MassDEP), la División de Pesca Marítima de Massachusetts (DMF), la Oficina de Gestión de Zonas Costera de Massachusetts (CZM) y la Comisión de Conservación de Boston (BCC). Debido a la proximidad del proyecto a la localidad de Winthrop, Massport también organizó una sesión informativa por separado para la Comisión de Conservación de Winthrop.

ES.2 Descripción y propósito del proyecto

El objetivo del proyecto es mejorar la seguridad de las aeronaves y sus pasajeros en situaciones de emergencia mediante la construcción de mejoras en el área de seguridad al final de la pista 27 de acuerdo con los requisitos de la FAA. **Este es un proyecto de seguridad requerido por la FAA que no ampliaría la pista ni tendría efecto alguno en las operaciones habituales de la pista, la capacidad o los tipos de aeronaves que pueden transitar.**

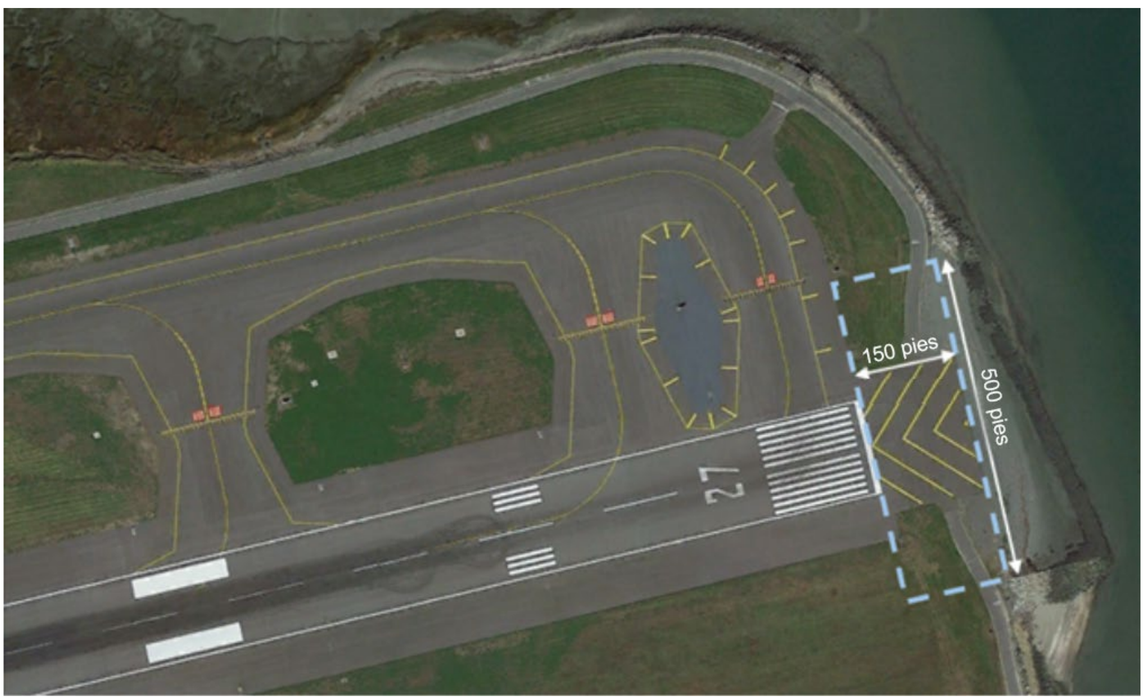
La RSA es una superficie plana que rodea la pista, libre de obstáculos. La FAA exige a los aeropuertos que dispongan de una RSA en los extremos y laterales de las pistas para reducir el riesgo de lesiones en las personas y daños en las aeronaves en caso de un aterrizaje demasiado largo (cuando una aeronave aterriza y no logra detenerse antes del final de la pista), un aterrizaje demasiado corto (cuando la aeronave inicia el aterrizaje antes del comienzo de la superficie pavimentada) o cuando se desvía hacia uno de los laterales de la pista. El proyecto propuesto de mejoras de la RSA en el final de la pista 27 promovería un interés público primordial en la seguridad en consonancia con el título 49 de la sección 47101 del Código de los Estados Unidos, que establece "que el funcionamiento seguro del aeropuerto y de las rutas aéreas es la máxima prioridad de la aviación". [2]

2 Código de los Estados Unidos, título 49, subtítulo VII, parte B, capítulo 471, subcapítulo I, sección 47101 – Políticas, (a) Generalidades (1).

En noviembre de 2005, el Congreso ordenó que todos los aeropuertos que prestan servicios comerciales (incluido el aeropuerto Logan) mejoren sus RSA para cumplir con las normas mínimas de la FAA antes de 2015, en la medida de lo posible.[3] El 3 de marzo de 2009, la oficina del inspector general del Ministerio de Transporte de EE. UU. (DOT OIG) publicó un informe [4]según el cual si bien la FAA había logrado un progreso significativo en la mejora de las RSA, era necesario adoptar otras medidas. El informe de la DOT OIG recomendó que la FAA implementara medidas en 11 de los aeropuertos más importantes del país, entre los que se encuentra el aeropuerto Logan. El aeropuerto Logan recibe fondos federales para proyectos de mejora aeroportuaria y, por lo tanto, está obligado por el gobierno federal a cumplir con los criterios de diseño de la RSA.[5]

La pista 9-27 del aeropuerto Logan tiene 7001 pies de largo y 150 pies de ancho. Las normas de diseño de la FAA exigen una RSA estándar de 1000 pies de largo a partir de cada extremo de la pista y 500 pies de ancho.[6] Tal como se observa en la **Figura ES-1**, el extremo de la pista 27 (extremo este de la pista 9-27) se encuentra en el extremo noreste del aeródromo, adyacente al puerto de Boston. Aunque la RSA en el extremo oeste de la pista 9-27 (extremo de la pista 9) cumple con el requisito de diseño de la FAA, la RSA en el extremo este (extremo de la pista 27) tiene solo 150 pies de largo y, por lo tanto, no cumple con el requisito de longitud de la RSA de 1000 pies para una RSA con las dimensiones exigidas (consulte la **Figura ES-2**).

Figura ES-2 Final de la pista 27 - Área de seguridad actual de la pista



3 Proyecto de ley del Congreso H.R. 3058: *Ley de asignación de fondos para transporte, hacienda, viviendas y desarrollo urbano, poder judicial, distrito de Columbia y organismos independientes, 2006.* Ley de derecho público 109-115, 30 de noviembre de 2005, 119 Ley 2401.

4 Ministerio de Transporte de los EE. UU., Administración federal de aviación, *Informe del programa de áreas de seguridad de las pistas de la FAA sobre las medidas adoptadas y necesarias para mejorarlas.* Número de informe: AV-2009-039, 3 de marzo de 2009. Disponible en: https://www.oig.dot.gov/sites/default/files/11WEB_FILE_RSA_Report_03-3-09_Issued.pdf.

5 Ministerio de Transporte de los EE. UU., Administración Federal de Aviación, circular de asesoramiento 150/5300-13B, *Diseño de aeropuertos*, 31 de marzo de 2022.

6 Ministerio de Transporte de los Estados Unidos, Administración Federal de Aviación, Procedimiento operativo estándar 8.00, Determinación del área de seguridad de la pista, Apéndice B: Formulario de determinación de la RSA, "Proyecto de mejoras de la RSA en el final de la pista 27, aeropuerto internacional Logan de Boston", firmado en enero de 2019.

ES.3 Alternativas analizadas

En 2017, la FAA ordenó a Massport que llevara a cabo un *estudio de mitigación de incursiones en la pista del aeropuerto Logan de Boston/estudio de alternativas de la zona de seguridad de la pista 9-27 (RSA)* para determinar las alternativas viables y razonables para que la RSA del final de la pista 27 cumpla con la normativa.[7] Se evaluaron seis alternativas de construcción y la alternativa de no construir en el análisis de alternativas de nivel 1, como se resume en la **Tabla ES-1**.

Tabla ES-1 Resultados del análisis de alternativas de nivel 1

	Criterios de evaluación alternativos						
	1 Distancias declaradas[1]	**2 Umbrales desplazados**	**3A RSA completa, Relleno**	**3B RSA completa, Cubierta**	**4A EMAS[2] en cubierta de 500’**	**4B EMAS[2] en cubierta de 306’**	**Sin construcción**
Brindar protección contra los aterrizajes demasiados largos o demasiado cortos de acuerdo con los criterios de diseño de la FAA	🟢	🔴	🟢	🟢	🟢	🟢	🔴
Preservar la utilidad y eficacia del aeródromo	🔴	🟢	🟢	🟢	🟢	🟢	🟢
Conservar la calle perimetral	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Evitar que se activen los requisitos de la orden sobre pistas de aterrizaje	🟢	🔴	🟢	🟢	🟢	🟢	🟢
Evitar los impactos en el canal de navegación	🟢	🟢	🔴	🔴	🔴	🟢	🟢
Evitar y minimizar los impactos ambientales	🟢	🟢	🔴	🔴	🔴	🟠	🟢

Código:

🟢 Verde indica que se cumple con el criterio o que no se prevé ningún efecto negativo; la alternativa es favorable en comparación con las demás.

🟠 Naranja indica que el criterio se cumple de forma parcial o que se prevé algún impacto negativo.

🔴 Rojo indica que no se cumple con el criterio o que se prevé un impacto negativo; la alternativa no es favorable en comparación con las demás.

1 Aunque la alternativa 1 de la RSA obtuvo una puntuación favorable en varios criterios de evaluación, afectaría de forma negativa a las operaciones del aeródromo y generaría restricciones en los despegues.

2 Un sistema mecanizado de detención de materiales (EMAS) es una plataforma de material que absorbe energía. En una emergencia, al avanzar sobre el EMAS, la aeronave se frena de forma tal que se minimizan los daños a la aeronave y las posibles lesiones a los pasajeros y miembros de la tripulación.

Sobre la base de los resultados del estudio, la FAA concluyó que la alternativa preferida era la 4B, que consiste en una RSA de aproximadamente 650 pies de largo con un sistema mecánico de detención de materiales (EMAS) sobre una cubierta de 306 pies de ancho. El EMAS es una plataforma de material que absorbe energía; en una emergencia, al avanzar sobre el EMAS, la aeronave se frena y así se minimizan los daños a la aeronave y posibles lesiones. El EMAS se utiliza a menudo cuando no es posible construir una RSA con las dimensiones exigidas debido a la falta de terrenos disponibles o para minimizar los impactos ambientales; el EMAS ofrece un nivel de seguridad aprobado por la FAA equivalente a una RSA construida con las dimensiones requeridas. También se incluyó una alternativa de no construir como parte del proceso de revisión ambiental, de conformidad con los requisitos de la MEPA.

7 Ministerio de Transporte de los Estados Unidos, Administración Federal de Aviación, procedimiento operativo estándar 8.00, *Determinación del área de seguridad de la pista*, Apéndice B: *Formulario de determinación de la RSA*, "Proyecto de mejoras de la RSA en el final de la pista 27, aeropuerto internacional Logan de Boston", firmado en enero de 2019.

Se realizó una evaluación de alternativas de segundo nivel para determinar la estructura adecuada para el soporte de la cubierta. Se analizaron dos tipos de estructuras de apoyo: pilotes y encofrados/pozos perforados. Los pilotes son elementos largos, circulares o cuadrados de hormigón prefabricado que se introducen en el suelo mediante vibración o impacto (hincado). Los encofrados, que son columnas circulares que suelen ser mucho más grandes que los pilotes, requieren la perforación de un agujero en el lecho de roca, donde se coloca acero estructural y se vierte hormigón para construir una columna.

Se identificaron y evaluaron cuatro alternativas como soporte de la cubierta de la RSA al final de la pista 27, tal como se resume en la **Tabla ES-2**.

Tabla ES-2 Resultados de la evaluación de nivel 2 de las alternativas de estructura de apoyo de la cubierta

Criterios de evaluación	Alternativas de estructura de apoyo de la cubierta			
	Alternativa 1: 416 pilotes	Alternativa 2: 326 pilotes	Alternativa 3: 160 encofrados	Alternativa 4: 128 encofrados
Impacto del área de recursos de los humedales costeros:				
Superficie total permanente de los pilotes/encofrados (total de pies cuadrados)	1,160	910	3,140	2,510
Socavación total permanente (total de yardas cúbicas)	380	340	1,060	1,120
Cierre de la pista de aterrizaje/ interrupción de las actividades del aeródromo: ¿Se puede finalizar la construcción en 120 días o menos?	No	Sí	No	No

El análisis determinó que la alternativa 2 de estructura de apoyo de la cubierta tendría el menor impacto en los recursos ambientales y podría construirse con el menor impacto operativo en el aeródromo. La alternativa 2 de estructura de apoyo de la cubierta se presentó como el proyecto propuesto para un análisis más exhaustivo, junto con la alternativa de no construir.

ES.4 Resumen de las mejoras propuestas

Como se observa en la **Figura ES-3**, el proyecto construiría un RSA de 600 pies de longitud con un EMAS instalado en una cubierta apoyada en pilotes (aproximadamente 450 pies de largo por 306 pies de ancho). El proyecto tendría los siguientes componentes:

- Ampliar la RSA existente del fin de la pista 27 para instalar un muro de tablestacas de acero en el límite interior de la cubierta para evitar el asentamiento y la erosión de las zonas altas.
- Instalar una losa de transición que abarque desde el terreno hasta la estructura apoyada en pilotes.
- Instalar una estructura de cubierta de aproximadamente 450 pies de largo y 306 pies de ancho (un área de unos 137.700 pies cuadrados [3,2 hectáreas]), sostenida por 326 pilotes de hormigón de veinte pulgadas cuadradas.
- Instalar un EMAS de aproximadamente 500 pies de largo por 170 pies de ancho ubicado dentro de la cubierta de la RSA.
- Rectificar y realinear la carretera perimetral del aeropuerto, de 20 pies de ancho, para mejorar la línea de visión vehicular y la concientización de la situación.
- Instalar dos rampas de acceso de emergencia, una a cada lado de la cubierta propuesta.
- Colocar salvavidas en los laterales y en el extremo de la cubierta para mejorar el acceso de entrada y salida del agua en caso de emergencia.

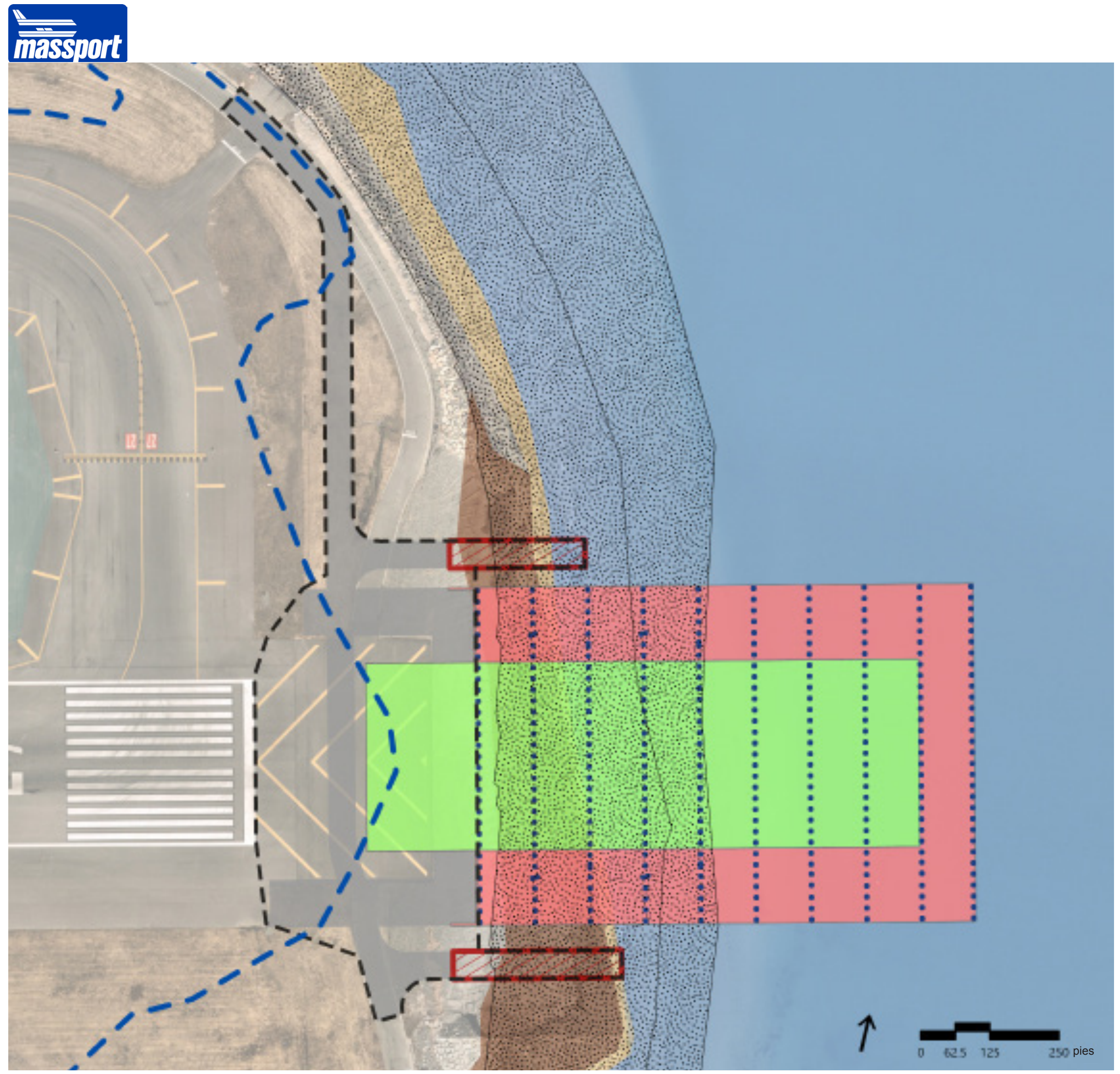
ES.5 Impactos ambientales

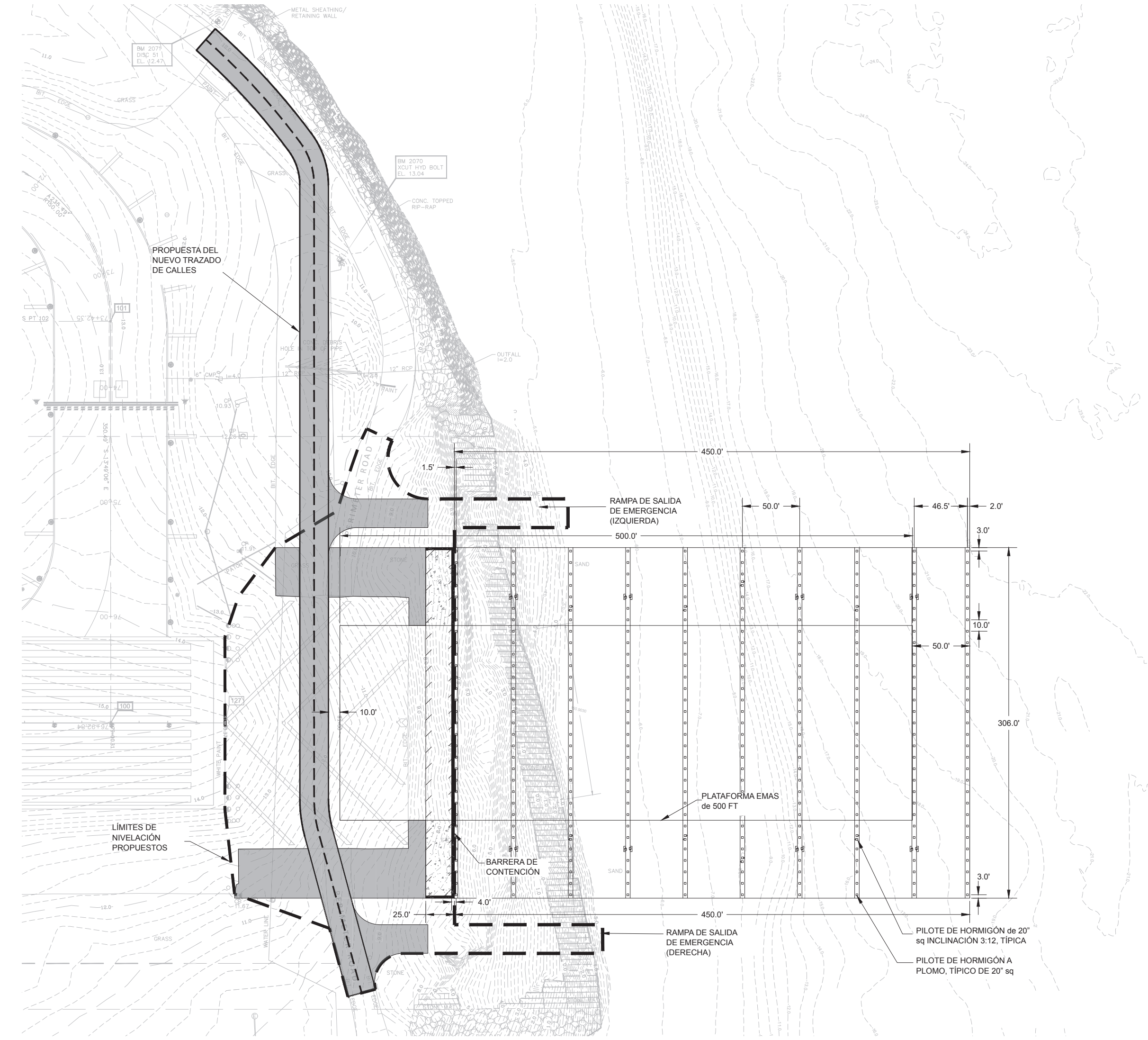
El proyecto tendría un impacto mínimo, pero directo sobre los recursos costeros, el hábitat y las plantas (consulte la **tabla ES-3**). Los recursos costeros en la superficie de construcción del proyecto se pueden ver en la **Figura ES-4**. La construcción generaría un aumento temporario y menor del ruido, de las emisiones de contaminantes del aire, de impactos en la calidad del agua (turbidez) y de tránsito en la superficie. Como se indicó anteriormente, **el proyecto no ampliaría la pista ni tendría efecto alguno en las operaciones habituales de la pista, la capacidad o los tipos de aeronaves que podrían transitar.** La única alternativa que evitaría los impactos en los recursos ambientales es la de no construir. Sin embargo, esta alternativa no es viable ya que no cumple con los requisitos de la FAA respecto de la RSA.

Tabla ES-3 Resumen de los posibles impactos

Categoría	Efecto adverso (sí/no)
Recursos costeros	**Sí.** Los pilotes de la cubierta de la RSA modificarían unos 880 pies cuadrados de terrenos sometidos a la acción de las mareas y de terrenos sumergidos en el océano, incluidos los márgenes costeros, playas costeras/planicies de mareas y terrenos donde habitan crustáceos. Se modificarían otros 9460 pies cuadrados de recursos costeros previamente alterados para construir las dos rampas de acceso de emergencia. No se prevén cambios en la dirección, velocidad, erosión o transporte de sedimentos de las olas. Se prevén impactos leves de socavación cerca de cada pilote.
Calidad del aire	**No.** No se produciría ningún cambio en las operaciones de las aeronaves, en el tipo de aeronaves o en el lugar donde operan.
Humedales/ beneficios públicos y navegación	**No.** El proyecto se encuentra dentro de la zona de seguridad del aeropuerto Logan regulada por la legislación y no limitaría la navegación de los buques más allá de la cubierta o entre la cubierta y el canal de navegación. La cubierta de la RSA no sería más elevada que la línea de costa actual y no se prevén diferencias significativas en la vista.
Recursos de peces de aleta	**No.** Algunos hábitats de peces de aleta serían desplazados por los pilotes. Sin embargo, los pilotes ofrecerían un nuevo sustrato rígido para los animales y algas marinas incrustantes, lo que ofrecería un hábitat de alimentación adicional para los peces.
Especies enumeradas a nivel estatal	**Posible.** Una parte del proyecto se encuentra en un hábitat prioritario de tierras altas para dos especies de aves de pradera: el correlimos batitú de tierras altas (*Bartramia longicauda*) [en peligro de extinción en el estado] y la alondra oriental (*Sturnella magna*) [de especial interés para el estado]. El NHESP está revisando el proyecto para determinar si se prevé algún impacto potencial adverso para estas especies.
Especies enumeradas a nivel federal	**Poco probable.** No se prevén impactos adversos para las especies enumeradas a nivel federal bajo la jurisdicción del Servicio de Pesca y Vida Silvestre de los Estados Unidos (USFWS) (especies terrestres). La consulta con la Dirección de Pesca de la NOAA está en curso (especies marinas).
Desagües pluviales y calidad del agua	**No.** No hay nuevas canalizaciones de aguas pluviales ni vertidos de aguas pluviales sin tratar. No se prevé que el proyecto genere una mayor carga contaminante o un aumento del total de sólidos en suspensión.
Recursos históricos y arqueológicos	**No.** No se han identificado recursos históricos o arqueológicos (incluidos los marinos) en el área de impacto potencial.
Materiales y residuos sólidos peligrosos	**No.** Ninguna zona del área de estudio figura en la lista de prioridades nacionales de la USEPA ni en la base de datos en línea del MassDEP.

Categoría	Efecto adverso (sí/no)
Cambio climático	**No.** El emplazamiento del proyecto se encuentra en una zona de alto riesgo en cuanto a la subida del nivel del mar/tormentas, precipitaciones intensas y calor extremo. La cubierta de la RSA estaría diseñada para resistir las tormentas costeras y la subida del nivel del mar previstas. No se prevé que el proyecto aumente el riesgo climático para otras edificaciones en las proximidades del emplazamiento. Salvo de forma temporal durante las obras de construcción, el proyecto no aumentaría las emisiones de gases de efecto invernadero.
Justicia ambiental (JA)	**No.** Existen tres grupos de bloques censales en el radio de una milla del emplazamiento del proyecto. Cada uno de ellos incluye poblaciones minoritarias de JA; estas comunidades de JA en la localidad de Winthrop no se verían afectadas de forma desmesurada por el proyecto. No existen criterios sanitarios vulnerables para la comunidad de Winthrop.
Construcción	**Sí.** Las obras de construcción provocarían un aumento, a corto plazo, del ruido, las emisiones atmosféricas, la turbidez y el tránsito en la superficie. Ruido: Se prevé que el ruido de la obra de construcción dure 120 días (durante dos períodos separados de 60 días). De ser posible, Massport empleará medidas de amortiguación del ruido durante el hincado de pilotes para minimizar el impacto acústico. Calidad del aire: Las emisiones de contaminantes atmosféricos durante la construcción estarían por debajo de los niveles mínimos. Calidad del agua: Durante la instalación de los pilotes puede generarse turbidez y podría afectar temporalmente a la calidad del agua en una zona específica. Se implementaría una barrera de turbidez para contener los sedimentos suspendidos nuevamente durante el hincado de pilotes. Transporte terrestre: La mayor parte de los materiales, equipos y personal serían transportados por barco y no tendrían mayor incidencia en el tránsito en la superficie. Se prohibiría el tránsito de maquinaría de construcción en las carreteras locales.





Pilotes cuadrados de hormigón de 20 pulgadas y 326 pies

La configuración de pilotes incluye:

- Un total de 326 pilotes (294 pilotes verticales y 32 pilotes inclinados)
- Pilotes de hormigón cuadrados de 20 pulgadas hincados en la roca en 10 estructuras de soporte [1] de 31 pilotes cada una
- Estructuras de soporte ubicadas a 50 pies de distancia y pilotes en cada estructura de soporte ubicados a 11 pies de distancia

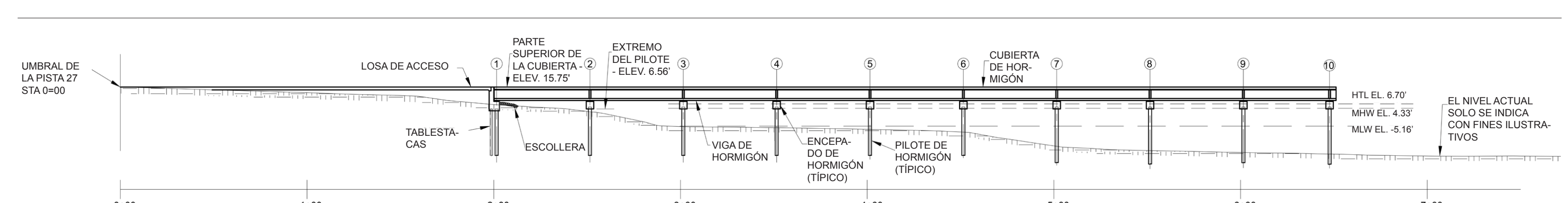
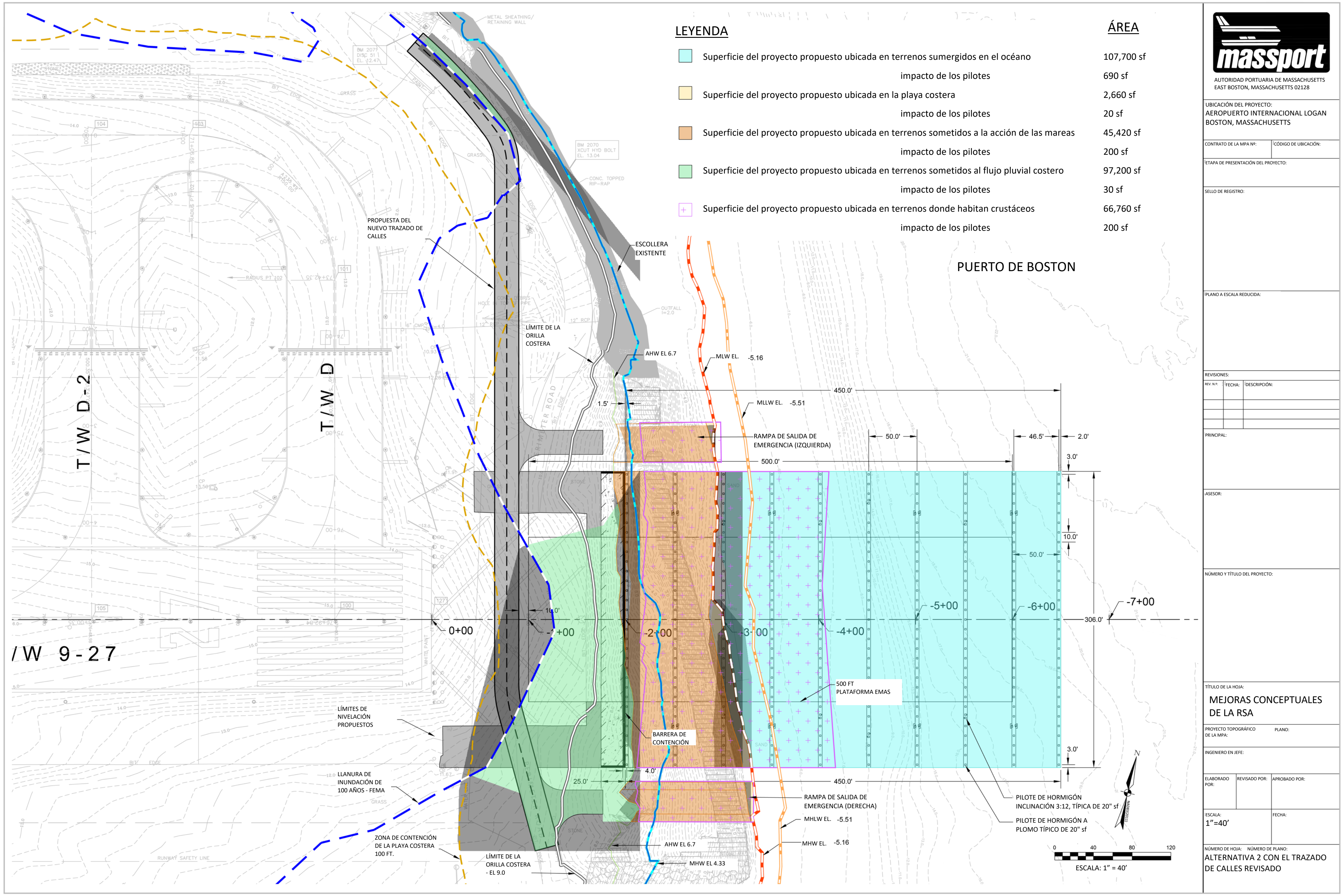


FIGURA ES-3: Alternativa 2 para el soporte de la cubierta de la RSA **Proyecto de mejoras en el área de seguridad al final de la pista 27**

- Límites de nivelación propuestos
- Cubierta apoyada en pilotes
- Plataforma propuesta con sistema mecanizado de detención de materiales (EMAS)
- Pavimento propuesto
- Pilotes propuestos
- Encofrados propuestos
- Losa de acceso propuesta
- Rampa de emergencia propuesta
- Playa costera
- Terrenos sumergidos en el océano
- Terrenos sometidos a la acción de las mareas
- Nivel de inundación de 100 años según la Agencia Federal de Gestión de Emergencias (FEMA)
- Terrenos donde habitan crustáceos

1 Una estructura de soporte es un grupo de pilotes en hilera unidos en la parte superior por un encepado.

Figura ES-4 Recursos costeros en el emplazamiento del proyecto



ES.6 Medidas de mitigación

Se identificaron medidas para mitigar los posibles impactos asociados al proyecto. Las medidas de mitigación de la construcción se incorporarían a los documentos y especificaciones contractuales que rigen las actividades de construcción. Las actividades de construcción cumplirían con la Circular Consultiva 150/5370-10H de la FAA, *Especificaciones estándar para la construcción de aeropuertos.*[8] Los ingenieros e inspectores que residan en el lugar supervisarían las actividades de construcción para garantizar que se apliquen las medidas de mitigación. La **tabla ES-4** resume las medidas de mitigación propuestas.

Tabla ES-4 Medidas de mitigación y compromisos propuestos

Categorías ambientales	Medida de mitigación	Cronograma de implementación
Terrenos donde habitan crustáceos	Establecer una tasa de mitigación para la recuperación fuera del emplazamiento.	Antes de la construcción
Hábitat	De ser posible, reemplazar el área de hierbas perdido en las tierras altas.	Durante las obras de construcción
	Aplicar la restricción de la época del año del lenguado de invierno para las actividades de construcción en el agua, que se extiende del 1 de febrero al 30 de junio.	Durante las obras de construcción
Humedales costeros	Establecer una tarifa de sustitución (Cuerpo de Ingenieros del Ejército de EE. UU. [USACE]) para los impactos en la llanura de marea	Tras la autorización
Calidad del agua	Desarrollar e implementar un plan integral de control de la erosión y los sedimentos del suelo de acuerdo con las normas del NPDES y del MassDEP.	Durante las obras de construcción
	Aplicar agua al suelo seco para evitar el polvo fugitivo.	Durante las obras de construcción
	Estabilizar los suelos que sean sumamente erosivos con mantas para el control de la erosión y otros métodos de estabilización, según sea necesario.	Durante las obras de construcción
	Utilizar métodos de control de sedimentos (como vallas de sedimentos y fardos de heno) para evitar que los sedimentos ingresen al sistema de aguas pluviales y a las vías navegables.	Durante las obras de construcción
	Realizar el mantenimiento de los equipos para evitar fugas de aceite y combustible.	Durante las obras de construcción
	Barreras de retención de sedimento alrededor de la instalación de pilotes y vallas de sedimento.	Durante las obras de construcción
Ruido	Instalar silenciadores en los equipos de construcción de acuerdo con las normas de la Administración de Seguridad y Salud Ocupacional (OSHA).	Durante las obras de construcción
	Minimizar el ralentí del motor de acuerdo con las reglamentaciones de Massachusetts contra el ralentí.	Durante las obras de construcción
	Equipar los equipos neumáticos con silenciadores neumáticos de escape.	Durante las obras de construcción
	Minimizar las obras de construcción durante la noche.	Durante las obras de construcción

8 U.S. Ministerio de Transporte de los EE. UU., Administración Federal de Aviación, Circular de asesoramiento 150/5370-10H, *Especificaciones estándar* para la construcción de aeropuertos, diciembre 2018.

Categorías ambientales	Medida de mitigación	Cronograma de implementación
	En la medida de lo posible, minimizar el ruido durante las actividades de hincado de pilotes.	Durante las obras de construcción
Transporte	Limitar el transporte de la maquinaria de construcción a las carreteras federales o estatales o a las del aeropuerto Logan. Se prohíbe usar carreteras de East Boston para el transporte de la maquinaria de construcción.	Durante las obras de construcción
	Aplicar técnicas de gestión para los desplazamientos de los trabajadores de la construcción.	Durante las obras de construcción
Calidad del agua y emisiones de gases de efecto invernadero	Minimizar el ralentí del camión de acuerdo con las reglamentaciones de Massachusetts contra el ralentí.	Durante las obras de construcción
	Acondicionar los equipos de construcción diésel adecuados con catalizadores de oxidación diésel o filtros de partículas.	Durante las obras de construcción
	Aplicar técnicas de gestión para los desplazamientos de los trabajadores de la construcción.	Durante las obras de construcción
Materiales y residuos sólidos peligrosos	Clasificar previamente los materiales antes de eliminarlos (si lo hubiese) para establecer las medidas correspondientes para su eliminación.	Durante las obras de construcción

ES.7 Permisos y aprobaciones

El proyecto propuesto requeriría varios permisos ambientales locales, estatales y federales antes de la construcción. Durante el proceso de concesión de permisos, se llevaría a cabo una revisión completa del proyecto por parte de los organismos reguladores y de recursos, y también por parte del público. La línea de costa dentro de la superficie del proyecto está formada por terrenos sometidos a la acción de las mareas y terrenos sumergidos en el océano, y está sujeta a reglamentaciones de acuerdo con los programas estatales reglamentarios. El puerto de Boston está ubicado en aguas navegables de los Estados Unidos, y la colocación de una estructura o un relleno en el puerto de Boston está sujeta a la reglamentación federales en virtud del artículo 10 de la Ley de Ríos y Puertos y del artículo 404 de la Ley de Aguas Limpias. La **tabla ES-5** resume las aprobaciones y los permisos previstos.

Tabla ES-5 Permisos y aprobaciones previstos

Organismo/Departamento	Permiso/Autorización/Acción
Federal	
Administración Federal de Aviación (FAA)	■ Ley de Política Medioambiental Nacional (NEPA)
Cuerpo de Ingenieros del Ejército de los Estados Unidos (USACE)	■ Artículo 10 de la Ley de Ríos y Puertos ■ Sección 404 de la Ley de Aguas Limpias
Dirección de Pesca de la Administración Nacional Oceánica y Atmosférica (NOAA)	■ Consulta de la sección 7 sobre especies en peligro de extinción
Guardia Costera de Estados Unidos (USCG)	■ Coordinación de la navegación
Agencia de Protección Ambiental de EE. UU. (USEPA)	■ Sistema Nacional de Eliminación de Descarga Contaminantes (NPDES) Permiso General de Construcción (CGP)

Organismo/Departamento	Permiso/Autorización/Acción
Mancomunidad de Massachusetts	
Oficina Ejecutiva de Energía y Asuntos Ambientales (EEA)	■ Revisor de la MEPA ■ Determinación del beneficio público
Oficina de Gestión de la Zona Costera de Massachusetts (CZM)	■ Declaración de congruencia con el plan de gestión de la zona costera de Massachusetts
Departamento de Protección Ambiental de Massachusetts (MassDEP)	■ Certificación individual de la calidad del agua según la sección 401 ■ Capítulo 91 Modificación de la licencia del programa de vías navegables
Programa de Patrimonio Natural y Especies en Peligro de Massachusetts (NHESP)	■ Permiso de conservación y gestión (si fuese necesario)
Ciudad de Boston	
Comisión de Conservación de Boston (BCC)	■ Orden de condiciones de la Ley de Protección de los Humedales (WPA) de Massachusetts

Nota: Esta es una lista preliminar de los permisos y autorizaciones locales, estatales y federales que pueden solicitarse para el Proyecto. Esta lista se basa en la información actual sobre el proyecto y está sujeta a modificaciones a medida que avance el diseño del proyecto.

ES.8 Requisitos del certificado del ENF

En el informe preliminar de impacto ambiental (DEIR), se debe incluir la información específica requerida por el certificado del ENF emitido por el secretario. La **tabla ES-6** enumera los requisitos generales del certificado y en qué parte del DEIR se puede encontrar esa información.

Tabla ES-6 Requisitos del certificado del formulario de notificación ambiental

Requisito	Sección del DEIR
Describir las condiciones existentes y previstas, los impactos del proyecto, las medidas de prevención, minimización y mitigación	Capítulo 4, Capítulo 5 y Capítulo 7
Cumplir con la sección 11.07 de las reglamentaciones de la MEPA y acreditar las medidas de prevención, minimización y mitigación a fin de reducir los daños al medioambiente	Totalidad del documento y Capítulo 7
Indicar cambios desde la presentación del ENF	Sección 1.1.1
Describir los requisitos federales, estatales y locales para obtener permisos y revisiones	Sección 1.4
Presentar planos detallados del emplazamiento sobre las condiciones existentes y posteriores a la construcción	Capítulo 3, Capítulo 4, Figura 2-1, Figura 3-5, Figura 3-10, Figura 4-2 y Figura 4-3
Analizar la medida cautelar que impide la alternativa 2	Sección 3.2.2.2
Describir el análisis de la alternativa a fin de seleccionar la alternativa preferida de estructura de apoyo de la cubierta	Sección 3.3
Cuantificar el impacto ambiental de cada alternativa de estructura de apoyo de la cubierta	Sección 3.3.1
Describir los criterios utilizados y rechazados en el análisis de las alternativas	Sección 3.2.1 y Sección 3.3.2
Describir la suficiencia estructural de las alternativas de estructuras de apoyo de la cubierta	Sección 3.3.1
Diseñar estructuras de soporte resilientes frente a tormentas costeras muy intensas y el aumento del nivel del mar	Sección 3.3.1
Analizar los impactos del período de construcción en los recursos ambientales, además de los cierres de las pistas, las interrupciones en el aeródromo, los barrios circundantes y el canal de navegación.	Sección 3.3.2

Requisito	Sección del DEIR
Describir el plan de divulgación de la justicia medioambiental	Sección 6.7
Evaluar y analizar las vulnerabilidades que deben enfrentar las poblaciones de justicia ambiental	Sección 6.4
Analizar todo impacto desproporcionado en las poblaciones circundantes de justicia ambiental	Sección 5.10 y Sección 6.4
Describir las medidas para mitigar las aguas pluviales	Sección 7.2.1
Analizar los estándares de rendimiento para las zonas de recursos de los humedales	Sección 5.2.1
Analizar los resultados de la modelización hidrológica	Sección 5.2.2
Analizar el plan de mitigación de crustáceos y coordinarlo con la DMF	Sección 7.2.1
Analizar las alternativas consideradas y rechazadas y las medidas de mitigación propuestas para proteger los intereses públicos en las vías navegables	Sección 3.2, Sección 3.3, y Capítulo 7
Indique la ubicación y la superficie de los humedales afectados	Sección 5.3.1, Sección 7.3.1.2, y Figura 4-2
Analizar la compatibilidad del proyecto con los beneficios públicos y el cumplimiento de las normas para un proyecto de uso no dependiente del agua	Sección 5.3 y Sección 7.3.1.2
Analizar los impactos sobre las especies enumeradas a nivel estatal	Sección 5.4 y Sección 5.5
Analizar los posibles impactos del cambio climático	Sección 5.9
Indicar el plazo estimado de construcción	Sección 3.4.4.2
Presentar el plan preliminar de gestión de la construcción y de las prácticas recomendadas de gestión	Anexo H
Analizar el plan de prevención de contaminación de aguas pluviales.	Capítulo 7.3.1.3
Analizar las medidas de tratamiento de las aguas pluviales que se implementará durante la construcción	Capítulo 7.3.1.3 y Anexo H
Hablar sobre las medidas de mitigación propuestas	Capítulo 7
Responder a los comentarios del ENF	Anexo A
Suministrar la lista de circulación	Anexo B

1

Project Description and Permitting

1.1 Introduction

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 or the Proposed Project) includes measures that are part of a continuing safety program and are required to enhance the RSA, to the extent feasible, 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 is a required FAA safety project that will not extend the runway or 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 prepared and submitted an Environmental Notification Form (ENF) on August 31, 2021, which described the proposed Runway 27 End RSA improvements, alternatives considered, potential environmental impacts, and preliminary construction mitigation strategies. The Secretary of the Executive Office of Energy and Environmental Affairs (EEA) issued the ENF Certificate on October 8, 2021, highlighting future study requirements for the Project. The Project has been further assessed in this Draft Environmental Impact Report (DEIR) which is required as a result of the work that will take place in Boston Harbor and the associated wetland impacts. The Project will require approvals under the Massachusetts Wetlands Protection Act (WPA), 401 Water Quality Certification, Massachusetts Endangered Species Act, and a modification of the existing Chapter 91 license. The Project will also be subject to review by the FAA under the National Environmental Policy Act (NEPA).

1 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022.

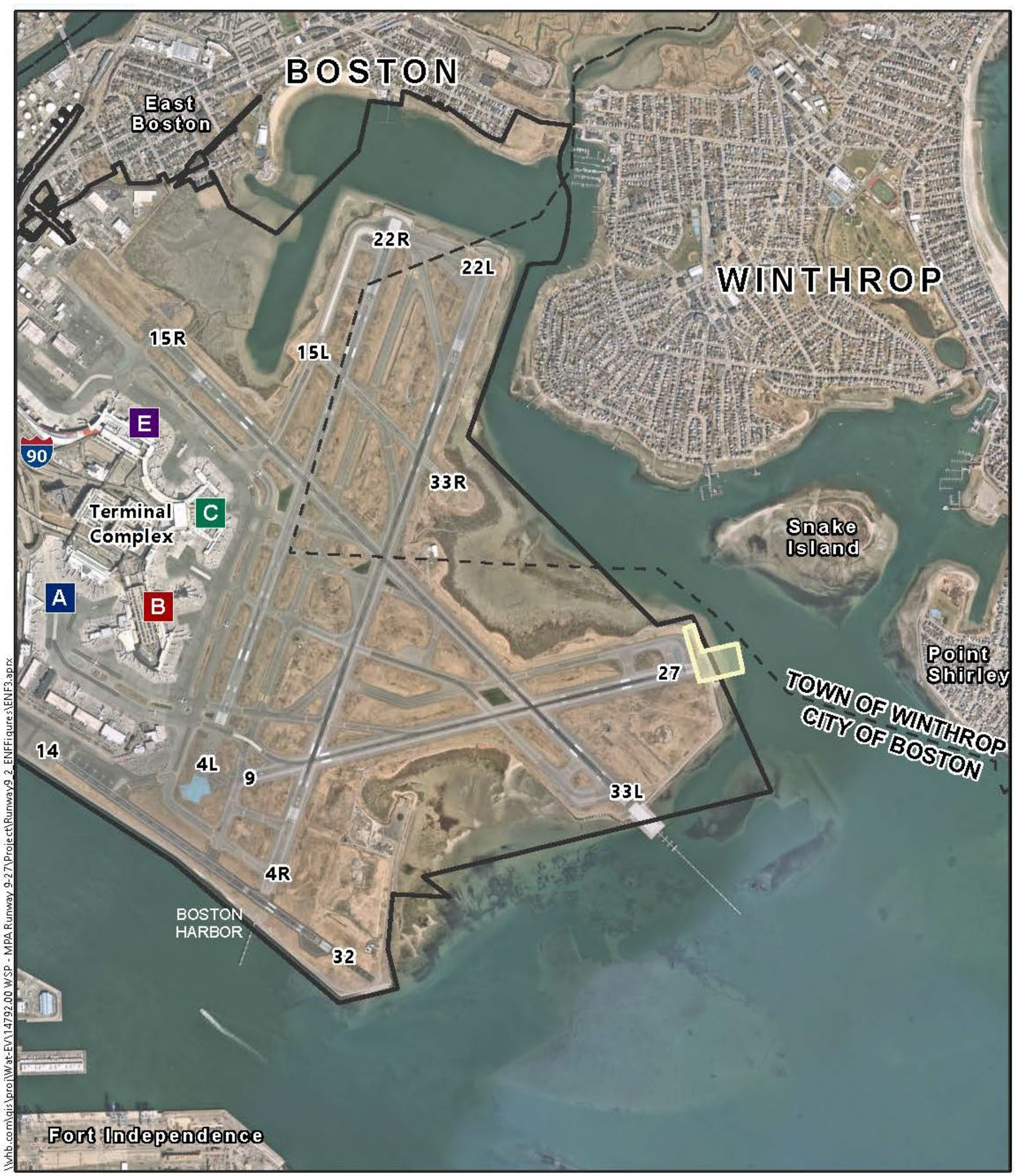


FIGURE 1-1: Logan Airport Aerial — **Runway 27 End RSA Improvements Project**

Sources: VHB 2021, ESRI, Nearmap Imagery March 2022

To minimize environmental impacts to Boston Harbor while enhancing safety, in 2019, the FAA determined 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 with an Engineered Materials Arresting System (EMAS) installed on the deck. An EMAS is a safety measure constructed of collapsible concrete blocks with predictable deceleration forces. When, under an emergency situation, an aircraft rolls into an EMAS, 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, it is expected that the 306-foot-wide deck would extend approximately 450 feet over Boston Harbor. This option, which would not lengthen existing Runway 9-27, is the subject of the environmental review for this Project. Since the Project, once completed, will not change how Logan Airport operates, this DEIR focuses on measures to avoid and minimize construction impacts and associated mitigation.

Figure 1-2 Aircraft Gear in Engineered Materials Arresting System (EMAS) (Photo Credit: SKYbrary, 2020)

1.1.1 Summary of Project Changes Since the ENF

There have been no substantive changes to the Project since the ENF filing. Alternatives for the foundation structures to support the RSA were evaluated to progress the conceptual design, and are described in Chapter 3, *Alternatives Considered.* Additionally, a detailed assessment of existing conditions and environmental impacts associated with the Project was conducted, as described in Chapter 4, *Existing Environment,* and Chapter 5, *Impact Assessment,* respectively.

1.1.2 MEPA Review Status

Massport filed an ENF with the MEPA Office on August 31, 2021. The Secretary of the EEA issued an ENF Certificate on October 8, 2021, which concluded that the Project requires a DEIR. This DEIR was prepared in accordance with the scope outlined in the ENF Certificate. Since the ENF filing, MEPA amended its regulations under 301 CMR 11.00 which were released on December 24, 2021. Additionally, MEPA released the *MEPA Interim Protocol on Climate Change Adaptation and Resiliency,* effective for all new filings as of October 1, 2021, and the *MEPA Public Involvement Protocol for Environmental Justice Populations* and *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations,* effective for all new filings as of January 1, 2022. Although the ENF for this Project was filed before these updates, Massport continues to coordinate with the MEPA Office on assessing impacts to environmental justice (EJ) populations in accordance with these updates and the DEIR scope outlined in the ENF Certificate. Details on the Project's public outreach plan and outreach conducted to date, including to EJ populations in the vicinity of the Project Site, are summarized in Chapter 6, *Environmental Justice and Public Outreach.*

1.2 Airport Safety

Airport safety and security are the highest priorities for the FAA and Massport. A critical, ongoing national initiative by the FAA is to improve RSAs when and where practicable. RSAs are among the most critical safety features on an airfield.[2] 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. 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.

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.[3] As the FAA's design criteria have evolved, Massport has continued to improve its RSAs as part of an ongoing program of airfield safety enhancements at Logan Airport. Section 1.3.3 of this chapter describes the efforts that Massport has taken to date to improve the RSAs at the ends of its runways.

1.3 Background

This section provides a description of the FAA's RSA requirements, an EMAS overview, and previous RSA improvements completed at Logan Airport.

1.3.1 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 increase protection of passengers in the event of an unintentional "excursion" from the runway. As stated earlier, 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 FAA Advisory Circular (AC) 150/5300-13B, *Airport Design*.

2 U.S. Department of Transportation, Federal Aviation Administration, Order 5100.38D, *Airport Improvement Program Handbook*, Change 1, February 26, 2019.
3 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022.

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 if an EMAS is installed at the runway end to provide an equivalent level of safety.

1.3.2 Engineered Materials Arresting System (EMAS) Overview

An EMAS is often installed when a full dimension RSA is not possible due to lack of available land or to minimize environmental impacts, and it provides a level of safety equivalent to a full dimension RSA. The amount of material and length of the EMAS is designed to stop the design aircraft traveling at a speed of up to 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 and surrounds the landing gear, stopping the aircraft. The runway's aircraft fleet mix determines the length of the EMAS. The 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 following 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.

1.3.3 Runway Safety Area Improvements at Logan Airport

Over the years, Massport has implemented several RSA 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 consist of 500-foot by 400-foot inclined crushed stone ramps that extend beyond the runway threshold to the Mean Low Water (MLW) line. The ISAs provide a graded transitional surface 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 also 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 at Runway 33L, and an ISA at the end of Runway 22R. At Runway 22R, there is also an EMAS which was first built in 2005 and replaced in 2014.

1.4 Regulatory Context

The EEA oversees the state environmental review of the Project. MEPA review is required when:

- 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
- One or more thresholds, as defined in 301 CMR 11.03, are met or exceeded.

This Project requires permits from state agencies and exceeds MEPA thresholds 301 CMR 11.03(3)(b)1.f and 301 CMR 11.03(3)(a)5, which requires an ENF and mandatory EIR.

The Proposed Project would construct a structure within federal, state, and local jurisdictional areas. 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. Boston Harbor is a Navigable Water of the U.S. and placement of a structure or filling within Boston Harbor is subject to federal regulation pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. The anticipated approvals that are required are outlined in the sections below and summarized in **Table 1-1**.

Table 1-1 Anticipated Project Permits and Approvals

Agency/Department	Permit/Approval/Action	Status
Federal		
Federal Aviation Administration (FAA)	National Environmental Policy Act (NEPA)	NEPA documentation forthcoming.
U.S. Army Corps of Engineers (USACE)	Section 10 of the Rivers and Harbors Act/ Section 404 of the Clean Water Act	To be obtained prior to construction.
National Oceanic and Atmospheric Administration (NOAA) Fisheries Service	Section 7 Endangered Species Consultation	To be completed prior to construction.
U.S. Environmental Protection Agency (USEPA)	National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP)	The Study Area may exceed 1 acre and require registration with the USEPA. If needed, a Notice of Intent (NOI) for registration with the NPDES CGP will be filed by the contractor. The associated Stormwater Pollution Prevention Plan will be developed by the contractor.
U.S. Coast Guard (USCG)	Navigation Coordination	Ongoing
Commonwealth of Massachusetts		
Executive Office of Energy and Environmental Affairs (EEA)	Massachusetts Environmental Policy Act (MEPA) Review Public Benefit Determination	DEIR submitted herein. To be issued by MEPA after the EIR review process.
Massachusetts Office of Coastal Zone Management Program (CZM)	Consistency Statement with Massachusetts Coastal Zone Management Plan	To be obtained prior to construction.

Agency/Department	Permit/Approval/Action	Status
Massachusetts Department of Environmental Protection (MassDEP)	Individual Section 401 Water Quality Certification for filling and for dredging Chapter 91 Waterways Program License Modification	To be obtained prior to construction. To be obtained prior to construction.
Massachusetts Natural Heritage and Endangered Species Program (NHESP)	Conservation and Management Permit (if required)	If required, prior to construction.
City of Boston		
Boston Conservation Commission (BCC)	Massachusetts Wetlands Protection Act (WPA) Order of Conditions	To be obtained prior to construction.

*This is a preliminary list of local, state and federal permits and approvals that may be sought for the Project. This list is based on current information about the Project and is subject to change as the design of the Project evolves.

1.4.1 Federal Permits and Approvals

The Proposed Project must receive approval pursuant to several federal environmental regulations. Agency correspondence is documented in Appendix C, *Agency Correspondence*.

1.4.1.1 National Environmental Policy Act (NEPA)

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

1.4.1.2 Section 10/Section 404

The proposed safety improvements require fill materials and/or structures to be placed below the extreme high-water line and the footprint of the Project exceeds 1 acre; therefore, the Project requires an Individual Section 10/ Section 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 Mean High Water (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 the Massachusetts Department of Environmental Protection (MassDEP) and a Coastal Zone Consistency Statement from the Massachusetts Office of Coastal Zone Management Program (CZM). Massport will continue regular coordination with these agencies throughout the regulatory review and permitting process.

1.4.1.3 NOAA Fisheries Service Section 7 Consultation

The National Oceanic and Atmospheric Administration (NOAA) Fisheries Service is responsible for several protected marine species, including sea turtles, marine mammals, and some anadromous fish species. Massport will continue to coordinate with the NOAA Fisheries Service through its formal Section 7 Consultation process to assess potential impacts to protected marine species.

1.4.1.4 U.S. Coast Guard Coordination

Construction activities within navigable waters that do not involve a bridge do not require a Section 9 permit[4] from the U.S. Coast Guard, but do require coordination to ensure construction activities are conducted safely and consider navigability issues. In addition to earlier coordination, Massport briefed the U.S. Coast Guard on May 9, 2022 in advance of filing the DEIR and will continue coordination to include any specific construction and notification procedures, and navigational lighting on construction equipment in the Project specifications.

1.4.1.5 USEPA NPDES Construction General Permit

The proposed RSA improvements require completion and submittal of a Notice of Intent (NOI) to the Environmental Protection Agency (USEPA) for coverage under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) for stormwater discharge from construction activities. As part of the NOI, a Stormwater Pollution Prevention Plan (SWPPP) will be prepared by the contractor to document stormwater management during the construction period. The NOI submitted for the NPDES CGP will contain information about the contents and stipulations of the SWPPP.

1.4.2 State Permits and Approvals

In addition to MEPA review, several environmental regulatory programs administered by state agencies will be required for this Project.

1.4.2.1 Public Benefit Determination

The Project Site is within tidelands subject to the provisions of *An Act Relative to Licensing Requirements for Certain Tidelands (*Chapter 168 of the Acts of 2007) and the Public Benefit Determination regulations (301 CMR 13.00). The Secretary of the EEA will conduct a Public Benefit Review as part of the MEPA review process. This DEIR demonstrates the Project's consistency with the Public Benefit Determination criteria and describes how the Project will meet the standards for a non-water-dependent use project (301 CMR 13.04) which can be found in Section 5.3 of Chapter 5, *Impact Assessment*. The Public Benefit Determination will be issued within 30 days of a Certificate on the FEIR.

1.4.2.2 Coastal Zone Management Consistency

As discussed above, the USACE authorization requires a CZM Consistency Statement demonstrating the proposed RSA improvements are consistent with the approved Massachusetts Coastal Zone Management Plan. The CZM's ENF comment letter, dated September 27, 2021, stated the DEIR should evaluate and document the analysis of impacts to resource areas, resulting changes in water flow that may result in scour, and shaded areas. Massport will continue to consult MassDEP, Massachusetts Division of Marine Fisheries (DMF), NOAA Fisheries, and the U.S. Coast Guard on potential Project impacts to ensure consistency with the Coastal Zone Management Plan. Similar to the previous work at Runway 33L, Massport believes that the Runway 27 RSA improvements can be designed and constructed to be consistent with all the CZM Program Policies as set forth in 301 CMR 21.00. The impacts on the resource categories listed by the CZM, as well as a consistency statement,

4 Rivers and Harbors Appropriation Act of 1899, Section 9 of 33 U.S.C. 401, "Construction of bridges, causeways, dams or dikes generally; exemptions."

can be found in Section 5.2 of Chapter 5, *Impact Assessment,* and Appendix D.1, *Coastal Zone Management Consistency Statement*.

1.4.2.3 Water Quality Certification

A 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 can be issued once 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 in-water construction activities. 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.

Additionally, MassDEP-Northeast Regional Office (MassDEP-NERO) states the DEIR should discuss how the Project will meet the Massachusetts Stormwater Standards. Section 5.6 of Chapter 5, *Impact Assessment,* provides a drainage analysis and a detailed description of the proposed stormwater management measures for the Runway 27 End and demonstrates how the Project meets MassDEP's Stormwater Management Policy and applicable standards. This DEIR identifies the size and location of any required stormwater system features and demonstrates how the proposed RSA improvements are consistent with Logan Airport's stormwater management practices and the requirements of the current NPDES Permit issued for Logan Airport.

1.4.2.4 Chapter 91 Waterways Program

The proposed Runway 27 End RSA Improvements Project would involve a modification of the existing non-water dependent use within flowed tidelands and would require Chapter 91 authorization. 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 improvements seaward of MHW would require a Chapter 91 license. The MassDEP Waterways Regulation Program (MassDEP-WRP) issued a comment letter on September 28, 2021, as part of the ENF filing, stating the alternative analysis should document why there are no reasonable conditions or alternatives aside from the preferred option that will achieve the desired outcome. This DEIR also discusses mitigation and efforts to minimize interferences with public interest in waterways, as requested in the ENF comment letter. The outcome of the alternatives analysis can be found in Chapter 3, *Alternatives Considered*. Additionally, MassDEP-WRP requested the DEIR clarify the location and area of flowed tidelands to be affected, as well as ensure all engineering and construction standards (310 CMR 9.37 and M.G.L. c.91 Section 34) are met and any construction impacts on public access and navigation and mitigation are described. Discussion of construction impacts can be found in Section 5.3 of Chapter 5, *Impact Assessment*.

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. To facilitate operation of Logan Airport by Massport, ownership of Logan Airport and certain adjacent lands under water, were conveyed to Massport by the Enabling Act (Chapter 465 of the Acts of 1956, as amended). The Enabling Act also contained broad authorization by Massport to utilize adjacent underwater areas for airport purposes should that need arise in the future:

> *The commonwealth hereby consents to the use of all lands owned by it, including lands lying under water, which are deemed by the Authority to be necessary for the construction and operation of any project…*[5]

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)).

Consistent with the RSA project at the Logan Airport Runway 33L End, Massport believes these areas can be designed and constructed in compliance with the applicable regulatory standards and that the proposed Runway 27 End RSA improvements serve a public purpose by enhancing aviation safety. The area in which work is proposed is not fully accessible to the public because these areas are within the Logan Airport Security Zone, pursuant to M.G.L. c.90 Section 61, which restricts public access. This security zone extends 500 feet seaward of MHW. Access by licensed and badged shellfishers would continue as it does today for Runway 33L RSA.

1.4.2.5 Massachusetts Natural Heritage and Endangered Species Program

Portions of landside Project elements are within a designated polygon of Priority Habitat for upland sandpiper and eastern meadowlark. NHESP's ENF comment letter, dated September 28, 2021, noted it is unclear if the Project would result in impacts to grassland habitats and if a prohibited "take" of a state-listed species would occur. A "take" of a state-listed species may only be permitted if the performance standards for a Conservation and Management Permit are met. The analysis of threatened and endangered species can be found in Section 5.5 of Chapter 5, *Impact Assessment*. Massport's goal is to design the Project to avoid a "take" of state-listed species. Consultation with the NHESP will continue through the permitting process to determine if a Conservation and Management Permit is required for the Project. If required, an application for the Conservation and Management Permit will be prepared and submitted to NHESP for review and approval.

1.4.2.6 Massachusetts Board of Underwater Archaeological Resources

The Massachusetts Board of Underwater and Archaeological Resources (BUAR) issued a comment letter September 21, 2021, as a part of the ENF filing. Based on a preliminary review of the Study Area, the BUAR found no record of underwater archeological resources within the Study Area. Discovery of any resource during construction would require notification to the BUAR and Massachusetts Historical Commission (MHC) in accordance with the Board's Policy Guidance for the Discovery of Unanticipated Archaeological Resources.

5 Massachusetts Port Authority Enabling Act, Chapter 465 of the Acts of 1956, Section 4, Paragraph 6.

1.4.3 Municipal Permits and Approvals

Portions of the proposed Runway 27 RSA improvements will occur within wetland resource areas regulated by the WPA at 310 CMR 10.00 et seq. and administered by the Boston Conservation Commission.

1.4.3.1 Massachusetts Wetlands Protection Act – Order of Conditions

The Proposed Project would require work within the jurisdiction of the 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. Prior to construction, Massport will prepare and file a NOI with the Boston Conservation Commission to obtain an Order of Conditions to allow the Project to proceed.

MassDEP-NERO's ENF comment letter, dated September 28, 2021, stated the DEIR should discuss and address how the performance standards will be met, and if they cannot be met, a Variance under the Wetlands Protection Act will be required. The analysis of wetland resources can be found in Section 5.2 of Chapter 5, *Impact Assessment*. The Proposed Project will not require a Variance under the WPA.

1.4.4 Agency Coordination

Agency correspondence is included in DEIR Appendix C, *Agency Correspondence*. Massport will continue to coordinate with the FAA, MEPA, USEPA, U.S. Coast Guard, U.S. Fish and Wildlife Service (USFWS), NHESP, NOAA Fisheries Service, DMF, USACE, MassDEP, CZM, MHC, BUAR, the Boston Conservation Commission (BCC), and Winthrop Conservation Commission (WCC) throughout the MEPA and NEPA review and permitting processes.

This Page Intentionally Left Blank.

2

Project Purpose and Need

This chapter describes the purpose of and the need for the proposed improvements to the Runway Safety Area (RSA) at the end of Runway 27 at Logan Airport and describes the Federal Aviation Administration (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 current FAA requirements. **This Project is a required FAA safety project that will not extend the runway or have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway.**

2.2 Need for the Project

Logan Airport, certificated under 14 Code of Federal Regulations (CFR) Part 139, is a commercial service and general aviation airport that receives federal funding for airport improvement projects, and is therefore federally obligated by FAA Order 5200.8[1] to meet the RSA design criteria contained in FAA Advisory Circular (AC) 150/5300-13B, *Airport Design,* to the extent practicable.[2]

2.2.1 Background

On March 3, 2009, the U.S. Department of Transportation Office of Inspector General (DOT OIG) released a report entitled *Actions Taken and Needed to Improve FAA's Runway Safety Program*.[3] The report indicated that, while the FAA had made significant progress in improving RSAs as required by the 2005 Congressional mandate,[4] 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 11 airports the DOT OIG identified as requiring RSA improvements and stated the FAA and Massport should complete the full RSA

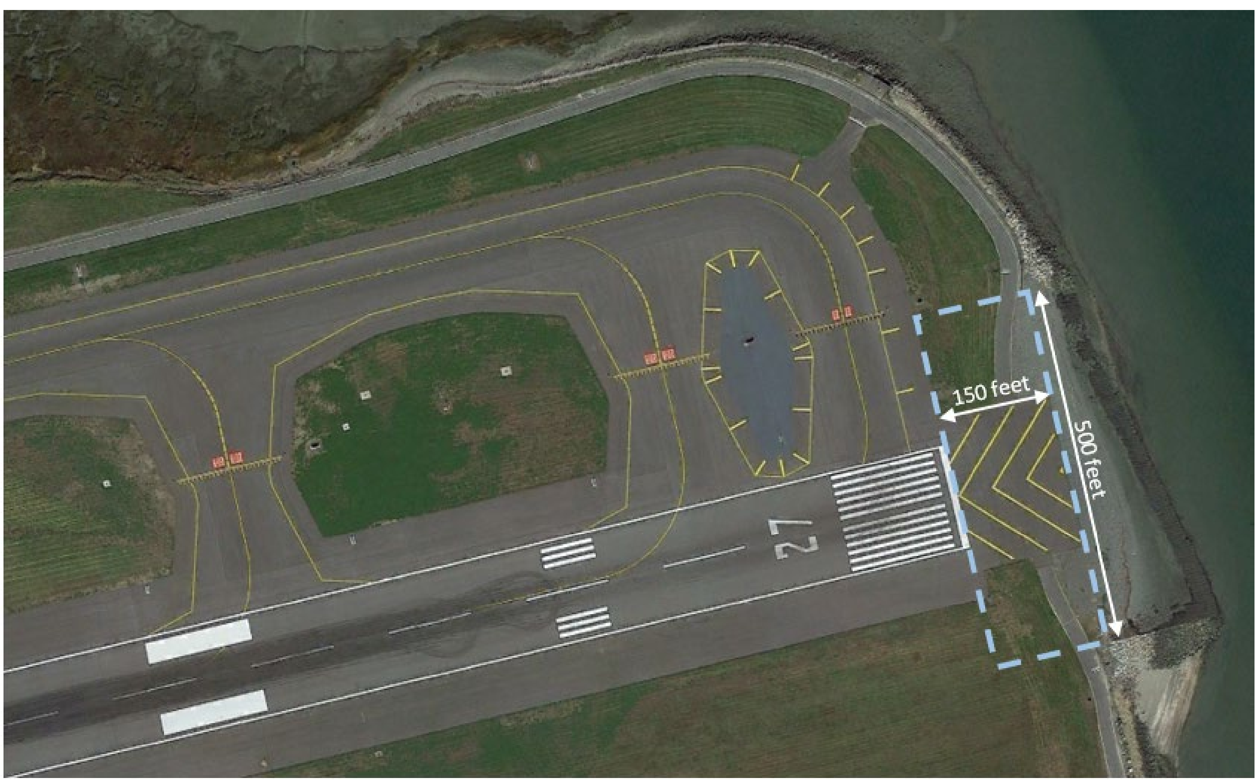
1 U.S. Department of Transportation, Federal Aviation Administration, Order 5200.8, *Runway Safety Area Program*, October 1, 1999.
2 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022.
3 U.S. Department of Transportation, Federal Aviation Administration. *Actions Taken and Needed to Improvement FAA's Runway Safety Area Program Report*, Report Number: AV-2009-039, March 3, 2009, https://www.oig.dot.gov/sites/default/files/11WEB_FILE_RSA_Report_03-3-09_Issued.pdf.
4 Congressional Bill H.R. 3058: *Transportation, Treasury, Housing and Urban Development, the Judiciary, the District of Columbia, and Independent Agencies Appropriations Act, 2006*; Public Law 109–115, November 30, 2005, 119 STAT. 2401.

improvements. Since that time, an FAA-compliant Engineered Materials Arresting System (EMAS) was installed on a pile-supported deck for Runway 33L, and for Runway 22R an Inclined Safety Area (ISA), a graded transition to mean low tide, was installed to improve the 190-foot-long EMAS. In accordance with the 2005 mandate by Congress, the improvement of the Runway 33L End RSA was completed before 2015. At Runway 22R, there is an EMAS, which was first built in 2005 and replaced in 2014.

2.2.2 Runway 27 RSA Needed Improvements

In 2017, the FAA notified Massport that Runway 27 did not meet current RSA standards. In response, Massport embarked on a Runway Incursion Mitigation (RIM) study and comprehensive airfield geometry analysis (see Appendix E.2, *RIM Study*). In 2019, Massport 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).[5] The RIM/Runway 9-27 RSA Alternatives Study identified options for improving Runway 9-27 RSAs, specifically the Runway 27 End closest to Boston Harbor (see **Figure 2-1**). The RIM/Runway 9-27 RSA Alternatives Study was attached to the FAA's Determination on the acceptable improvements for the Runway 27 RSA (see Appendix E.1, *FAA Determination*).

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



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

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 west end of the runway (the Runway 9 End), the current RSA meets the full dimension RSA standards. Improvements to the RSA at the Runway 27 End (east end of runway) were made in 1992 through construction of an ISA (EEA #5122). 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.

With the ISA in place, the Runway 27 End meets the RSA required dimensions for width (500 feet), but does not meet the current 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, airport employees, and damage to the environment by reducing the risk of an aircraft entering Boston Harbor.

2.3 FAA Design Criteria for Runway Safety Areas

The FAA requires, to the extent practicable, airports receiving federal funding for airport improvement projects provide standard RSAs that comply with the FAA's design criteria (standards).[6] 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 to aircraft and passengers in the event of an unintentional "excursion" from the runway in an emergency. 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*.[7] 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:[8]

- *Aircraft Approach Category (AAC):* A grouping of aircraft based on landing speed, expressed alphabetically (A through E, from slowest to fastest).

6 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022.
7 *Ibid.*
8 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022, p. 1-14.

- *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.[9] 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**.[10]

The RSAs are required to meet dimensional standards, and 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 accumulation;
3) Capable under dry conditions of supporting snow removal and aircraft rescue and firefighting (ARFF) equipment 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.[11]

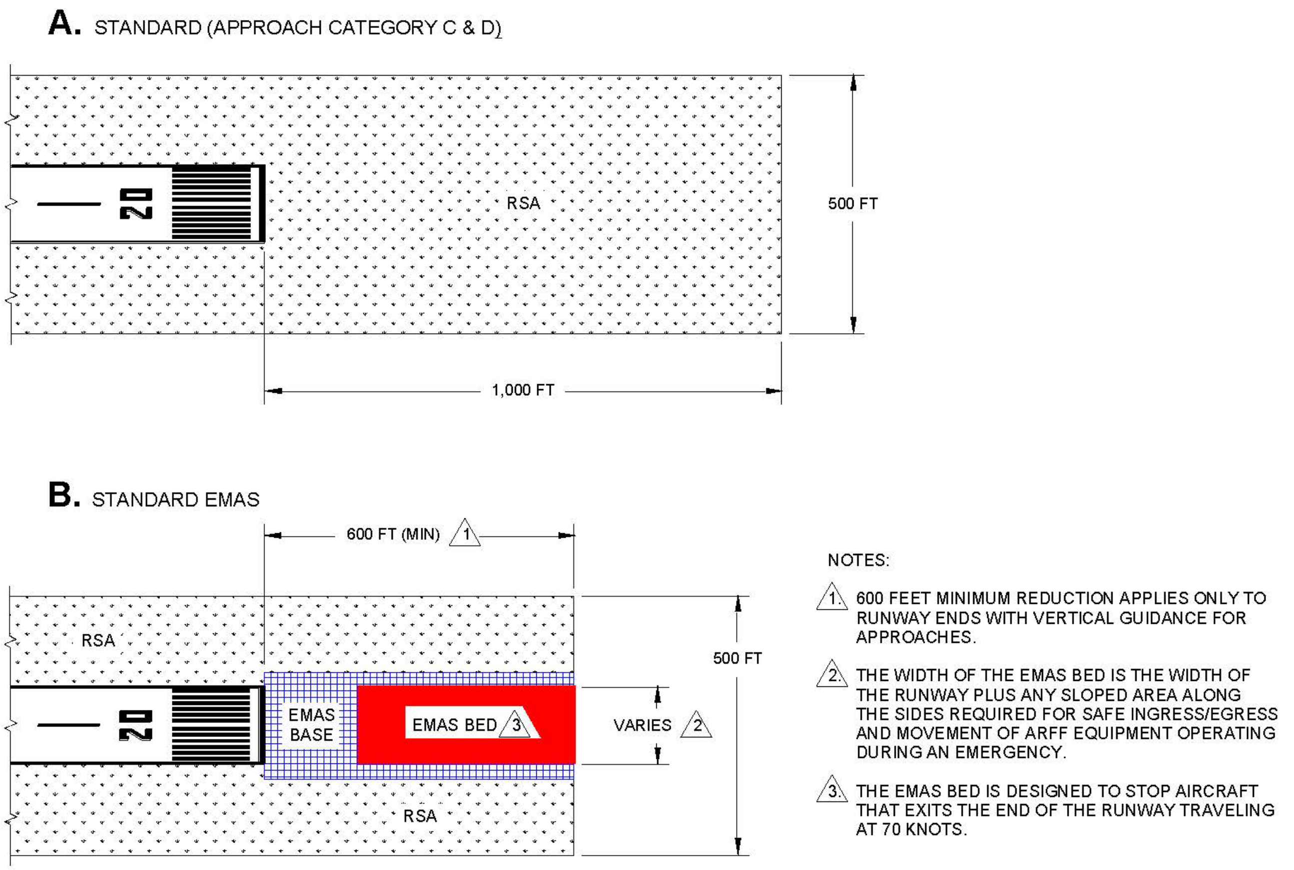
By comparing **Figure 2-1** showing the existing Runway 27 RSA dimensions, with a full dimension RSA as shown in **Figure 2-2A**, it is evident that the Runway 27 End RSA does not meet the FAA standards since the existing RSA at the Runway 27 End is only 150 feet long.

Terrain, natural obstacles, and local development can limit the availability of land and make a full dimension RSA not practicable; providing a full dimension RSA is challenging for runways that were constructed prior to the 1,000-foot-long RSA standard adopted approximately 20 years ago. To address these challenges, EMAS technology was invented to safely arrest overrunning aircraft and was approved by the FAA to be used in place of a full dimension RSA. An EMAS is a bed of energy-absorbing material with predictable deceleration forces.[12] In an emergency, when an aircraft rolls into an EMAS, the tires of the aircraft collapse the energy-absorbing material and the aircraft's speed is reduced. The EMAS length and depth is designed based on FAA requirements to stop the design aircraft entering the bed at a speed of up to 70 knots (approximately 80 miles per hour). The aircraft is then slowed down to a safe stop in a way that minimizes damage to the aircraft and injuries to passengers and crew members.[13] An 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.[14] **Figure 2-2B** shows the dimensions of a shortened RSA provided by an EMAS. The EMAS has demonstrated its

9 *Logan Airport Layout Plan*, February 2021.
10 Massport, Boston Logan Airport, *Runway Incursion Mitigation Study, Runway 9-27 Runway Safety Area (RSA) Alternatives Study*, January 8, 2019, p. 1-2.
11 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022, p.3-39 and 3-40.
12 U.S. Department of Transportation, Federal Aviation Administration, "Engineered Material Arresting System (EMAS)," updated January 5, 2022, https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=13754.
13 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 1550/5220-22B Appendix 1, September 27, 2012.
14 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022, p. 3-41.

effectiveness in arresting aircraft overruns; since 1999 there have been a total of 18 incidents at U.S. airports where EMAS has safely stopped overrunning aircraft.[15]

Figure 2-2 Comparison of Standard Runway Safety Area and Standard EMAS



Standard EMAS Installation Provides a Level Of Safety That is Equivalent to a Standard Runway Safety Area (RSA).

Note: Runway 9-27 belongs to Aircraft Approach Category (AAC) D. RSA and EMAS standards are the same for both category C and D.
Source: Adapted from Federal Aviation Administration, Advisory Circular 150/5220-22B, Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns, Change 1, September 27, 2012, Appendix 1.

15 U.S. Department of Transportation, Federal Aviation Administration, "Engineered Material Arresting System (EMAS)," updated January 5, 2022, https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=13754.

This Page Intentionally Left Blank.

3

Alternatives Considered

As described in Chapter 2, *Project Purpose and Need*, the Runway 27 End Runway Safety Area (RSA) does not meet current Federal Aviation Administration's (FAA) dimensional requirements for length. This chapter describes the existing Runway 27 End and its RSA, and the two-step process undertaken by the FAA and Massport to identify reasonable alternatives for enhancing the existing RSA. **This Project is a required FAA safety project that will not extend the runway or have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway.**

Prior to the preparation of this Draft Environmental Impact Report (DEIR), and as detailed in the Environmental Notification Form (ENF),[1] the FAA and Massport conducted an alternatives screening process to identify and evaluate alternatives to improve the RSA at the end of Runway 27. The alternatives evaluated in the first tier analysis (Tier 1 Alternatives Screening), documented in 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 Appendix E.2, *RIM Study*),[2] are summarized in Section 3.2 below. A description of Runway 9-27 (see Section 3.1) and the FAA's design criteria described in the RIM/Runway 9-27 RSA Alternatives Study (see Section 3.2) establish needs and guidelines used to identify the preferred alternative.

The RIM/Runway 9-27 RSA Alternatives Study examined six build alternatives and the No-Build Alternative and concluded that the only reasonable alternative for enhancing the RSA at the end of Runway 27, consistent with the FAA requirements, is an approximately 650-foot-long RSA with an Engineered Materials Arresting System (EMAS) on a 306-foot-wide deck extending into Boston Harbor. This alternative is named RSA Alternative 4B, which is described in Section 3.2, along with the other alternatives considered in the Tier 1 Alternatives Screening. The FAA stated that RSA Alternative 4B would provide the highest level of aircraft safety without reducing the operational capability of the runway, while also minimizing environmental impacts in Boston Harbor. The FAA's 2019 RSA Determination (see Appendix E.1, *FAA Determination*) directed Massport to construct an improved RSA with EMAS on a deck but did not specify the type of deck support structure to be constructed, nor did it specify the size of the EMAS.[3]

1 Massachusetts Port Authority. Runway 9-27 End RSA Improvements Project, Environmental Notification Form. August 2021. Available at: https://www.massport.com/media/4xdlv5rz/9-27-enf_compiled_final_083021.pdf.

2 U.S. Department of Transportation, Federal Aviation Administration, Standard Operating Procedure 8.00, *Runway Safety Area Determination*, Appendix B: *RSA Determination Form*, "Runway 27 End RSA Improvements Project, Boston Logan International Airport," signed January 2019.

3 The final length of the proposed RSA deck and support structure, and the size of the EMAS, will be determined during deck final design.

Since the publication of the ENF Certificate (October 8, 2021), as part of the second screening step, Massport considered four structural options for supporting the deck. DEIR Section 3.3 describes the development and screening of these deck support alternatives (Tier 2 Deck Support Alternatives Screening), including the screening criteria used to assess whether each deck support alternative should be carried forward for further analysis or eliminated from further consideration. The analysis found that one alternative, Deck Support Alternative 2, would have the least impact on environmental resources, compared to the other alternatives, and could be constructed with the least operational impacts to the airfield. Thus, Deck Support Alternative 2, described in detail in Section 3.4, is carried forward as the Proposed Project for further analysis in this DEIR.

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 located in the southwestern side of the airfield, and the Runway 27 End is on the eastern edge of the airfield, adjacent to Boston Harbor. Runway 9-27 intersects with Runways 4R-22L and 15R-33L. Runway 9-27 is one of Logan's busiest runways and uniquely utilized by the FAA as part of the all primary, 3-runway configurations at Logan. Runway 9 is predominantly used for departures, while Runway 27 is used for both arrivals and departures.

As described in 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 per FAA Advisory Circular (AC) 150/5300-13B, *Airport Design.*

The RSA for the Runway 9 End meets the FAA standard at 500 feet wide and 1,000 feet long beyond the runway end. The RSA at the Runway 27 End provides protection in the event that an aircraft arriving (or departing and needs to abort a 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, sloped transition to the tidal Mean Low Water (MLW) line (-5.16 feet North American Vertical Datum (NAVD)) to the east (**Figure 2-1**). While the ISA provides some additional degree of safety, as discussed in DEIR Section 2.2 of Chapter 2, *Project Purpose and Need*, the existing RSA for Runway 27 does not meet the current RSA length requirements of 1,000-foot overrun or 600-foot undershoot protection specified in FAA AC 150/5300-13B.[4]

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 with the improved RSA.

4 U.S Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022.

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**).[5] Runway use data for 2020 are not considered as representative of typical operating conditions for 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 the runway rehabilitation project, the Runway 27 End was raised approximately 10 inches to bring the runway into compliance with the 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: Massachusetts Port Authority, *Boston Logan International Airport 2018/2019 Environmental Data Report*, Table 6-5, p. 6-18, December 2020. https://www.massport.com/media/41rkxcxd/2018-19-edr_final-part-1.pdf.
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.

Runway 9-27 is designed to accommodate a wide range of aircraft from heavy wide-body commercial jets (B747, B777, B787, A330/340/350) to smaller regional 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 Massachusetts Port Authority, *Boston Logan International Airport 2018/2019 Environmental Data Report*, December 2020. Available at: https://www.massport.com/media/41rkxcxd/2018-19-edr_final-part-1.pdf.

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: Massachusetts Port Authority, *Boston Logan International Airport 2018/2019 Environmental Data Report*, Appendix H, Table H-5a, December 2020. https://www.massport.com/media/41rkxcxd/2018-19-edr_final-part-1.pdf.

1 Heavy Jets A (ADG V to ADG VI) = B747, A340, A380
2 Heavy Jets B (ADG IV to ADG V) = B767, B777, B787, A300, A310, A330, A350, MD-11
3 Light Jets A (ADG III) = B717, B737-800, MD-90
4 Light Jets B (ADG III to ADG IV) = B737, B757, A319, A320, A321, MD-80, E190
5 Regional Jet (ADG II to ADG III) = E135, E145, E170, E175, CRJ-200, CRJ-700, CRJ-900, J328 and Corporate Jets
6 Non-Jets (ADG I to ADG III) = Turboprops and Piston Aircraft

3.1.2 Critical Design Aircraft

A key factor for RSA projects that include EMAS is confirming the critical design aircraft (CDA). The CDA is a consideration when calculating the size of the EMAS and the EMAS block configuration per FAA AC 150/5220-22B, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*. Determination of CDA considers factors such as maximum takeoff weight, approach speed, and number of annual operations. To provide the appropriate EMAS, the CDA is defined as the aircraft (using the associated runway) that imposes the greatest demand upon the stopping capability of the EMAS. The CDA is usually, though not always, the heaviest/largest aircraft that regularly uses the runway. The EMAS performance is dependent not only on aircraft weight but also on landing gear configuration and tire pressure. In addition to the CDA, the current and future aircraft 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).[6,7,8]

6 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5000-17, *Critical Aircraft and Regular Use Determination*, Section 3.10, June 20, 2017.

7 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5220-22B, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*, September 27, 2012.

8 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 RSA. However, a 40-knot minimum exit speed must be used for the design of a non-standard EMAS. As per FAA AC 150/5220-22B, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*, pp. 4, September 27, 2012.

The FAA 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.[9] The CDA for the proposed EMAS will be confirmed as the EMAS design proceeds. When calculating the size of the EMAS, consideration will be given to the entire aircraft fleet expected to use Runway 9-27 in accordance with FAA AC 150/5220-22B.

3.2 Tier 1 Screening of Runway 27 End RSA Alternatives

3.2.1 Tier 1 Screening Evaluation Criteria

The FAA and Massport referred to the FAA design and other criteria identified 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's design criteria.** The chosen alternative must achieve the purpose and need for the Project: It must provide protection in the event of an aircraft overrun or undershoot. The level of protection provided must be consistent with the FAA's design criteria for a full dimension RSA of 1,000 feet long for an overrun and 600 feet long for an undershoot <u>or</u> provide the equivalent level of protection with an EMAS, as described in Section 2.2 of Chapter 2, *Project Purpose and Need*.
- **Preserve airfield utility and efficiency.** The alternative must maintain the utility and operational efficiency of the airfield. The efficiency of the airfield includes the ability of Runway 9-27 to accommodate RDC D-V aircraft. 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 to the airport. An example of an adverse operational impact would be an airport's inability to accommodate its current or planned aircraft fleet."[10] Keeping the utility/efficiency of the runway will also avoid shifting flights (and noise) to other runways.
- **Retain perimeter road.** The selected alternative must retain or realign 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, Massachusetts 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 court injunctions. The process to lift or make changes to the existing injunctions would require a lengthy court review process, compliance with federal and state environmental review procedures, filing an environmental impact statement, approval of the U.S. Secretary of Transportation, and potential litigation. The required safety improvements are an immediate airfield need and cannot be deferred pending resolution of an uncertain injunction reversal and any ensuing studies.

9 *Logan Airport Layout Plan*, February 2021.
10 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5220-22B, *Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns*, p. 1, September 27, 2012. 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."

- **Avoid major impacts to the maritime navigation channel.** The navigation channel east of Runway 27 is relatively 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. The U.S. Coast Guard is responsible for ports, waterways and coastal security; to maintain control of navigable waters and aids to navigation. Coordination with the U.S. Coast Guard is ongoing.
- **Avoid and minimize environmental impacts.** The alternatives should avoid and minimize environmental impacts where possible, for example, by selecting an alternative that meets the FAA design standards and avoids/minimizes potential environmental impacts.

3.2.2 Tier 1 – Runway Safety Area Alternatives

This section describes the RSA alternatives considered by the FAA and Massport for enhancing the Runway 27 End RSA in the 2019 RIM/Runway 27 RSA Alternatives Study and the results of applying the screening process and criteria described above in Section 3.2. Consistent with the requirements of FAA Order 5200.8,[11] the Runway 27 End RSA in the RIM/Runway 27 RSA Alternatives Study evaluated alternatives to bring the Runway 27 RSA into conformance with the applicable FAA AC 150/5300-13 design standards. These alternatives include the following six build alternatives as well as a No-Build Alternative (**Figures 3-1** through **3-7**):

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

The subsections below summarize the Tier 1 RSA alternatives that were described in the ENF and justification for elimination or progression to Tier 2. Additional details on the analysis of these alternatives are described in ENF Chapter 3, *Alternatives Considered*[12] and in Appendix E.2, *RIM Study*.

3.2.2.1 RSA Alternative 1 - Declared Distances

Declared distances represent the available runway lengths for takeoff and landing and can sometimes vary from the actual paved length of a runway. Declared distances are established primarily by changing the pavement markings on the runway. The RSA Alternative 1 would apply declared distances to the existing 7,001-foot Runway 9-27 to provide a full dimension RSA within the existing runway footprint (**Figure 3-1**) without having to initiate construction in Boston Harbor off the east end of the runway. The Runway 27 landing threshold

11 U.S. Department of Transportation, Federal Aviation Administration, Order 5200.8, *Runway Safety Area Program*, p. 1-2, October 1, 1999.
12 Massachusetts Port Authority, Runway 27 End Runway Safety Area Improvements Project Environmental Notification Form, August 2021, https://www.massport.com/media/4xdlv5rz/9-27-enf_compiled_final_083021.pdf.

would be moved by 450 feet to the west to accommodate a full dimension RSA. Use of declared distances would reduce the runway landing distance available (LDA) for arrival operations on both Runway 9 and Runway 27 to resolve the 850-foot RSA deficiency at the Runway 27 End. As described in Appendix E.2, *RIM Study*, the LDA for aircraft arriving on Runway 27 would be reduced by 450 feet and the LDA for aircraft arriving on Runway 9 would be reduced by 850 feet. Additionally, the Accelerate-Stop Distance Available (ASDA) for aircraft departing on Runway 9 would be reduced by 850 feet.

Many airlines calculate an aircraft's maximum operating takeoff weight based on the ASDA. The reduction of the Runway 9 ASDA due to the declared distances assumed in RSA Alternative 1 is anticipated to require certain ADG III, IV, and V aircraft to reduce their takeoff weight to comply with maximum operating takeoff weight requirements. Aircraft operators and airlines would need to reduce their takeoff weight 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 associated noise to other runways.

As described in the RIM/Runway 9-27 RSA Alternatives Study (Appendix E.2, *RIM Study*), shifting the Runway 27 threshold west by 450 feet in RSA Alternative 1 would reduce the available distance between the Runway 27 threshold and the exit to Taxiway E. Taxiway E is the most frequently used exit taxiway 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 associated Land and Hold Short Operations (LAHSO) line. The declared distances assumed in RSA Alternative 1 would reduce the distance between the Runway 27 threshold and Taxiway E from approximately 4,260 feet to 3,810 feet. Aircraft unable to slow down sufficiently to exit at Taxiway E would need to cross Runway 4R-22L to exit at Taxiway K or M, resulting in increased runway occupancy time, decreased arrival capacity on Runway 27, and potential operational impacts to Runway 22L departure capacity.

The RSA Alternative 1 was eliminated from further consideration. Although establishing declared distances could achieve a full dimension RSA at the Runway 27 End by reducing the available runway length, RSA Alternative 1 would adversely affect airfield operations. Reducing the ASDA for aircraft departing on Runway 9 would result in takeoff weight limitations on some ADG III, IV, and V aircraft departing Runway 9, which make up 80 percent of Runway 9 departures. The reduction and subsequent weight limitations would adversely affect airfield operating efficiency, and negatively impact the Airport's operating flows, particularly during warmer temperatures when aircraft may be subject to greater takeoff weight restrictions. Additionally, reducing the available distance between the Runway 27 threshold and the exit to Taxiway E would result in increased runway occupancy time, decreased arrival capacity on Runway 27, and potential operational impacts to Runway 22L departure capacity. See Section 1.3.1 in Appendix E.2, *RIM Study,* for more detailed information.

3.2.2.2 RSA Alternative 2 – Displaced Threshold Markings

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. The RSA Alternative 2 would shift the Runway 9 threshold to the west by 195 feet to maintain the full 7,001 feet of existing runway length for arrivals and departures on Runway 9-27 (**Figure 3-2**). The shift would be accomplished by restriping a segment of existing Taxiway M pavement immediately west of the existing Runway 9 end. As shown on **Figure 3-2**, RSA Alternative 2 would restripe this segment of Taxiway M as available pavement for Runway 9 departures via a displaced threshold and shift the declared distance for Runway 9 departures west by approximately 195 feet. RSA Alternative 2 would change the operational runway length in either direction. Shifting the takeoff run available (TORA), takeoff distance available (TODA), and ASDA further west would provide an additional 195 feet of length for RSA at the east end of the runway (Runway 27 End). Under this alternative, the Runway 27 End would still not meet the full dimension RSA length of 1,000 feet but would decrease the existing RSA length deficiency from 850 feet to 655 feet.

The RSA Alternative 2 was eliminated from further consideration because it only marginally increases the RSA length and would not result in the Runway 27 End meeting the FAA's design requirements for the full dimension RSA. The action to lift or modify the injunction would require a lengthy court review process, compliance with federal and state environmental review procedures, filing a full environmental impact statement, approval of the U.S. Secretary of Transportation, and potential litigation. The required safety improvements are an immediate airfield need and cannot be deferred pending resolution of an uncertain injunction reversal and any ensuing studies. Given the challenges presented by the injunction, the marginal increase in RSA length (less than FAA full-dimension requirements), and that the purpose and need of the Proposed Project could be achieved by other alternatives, RSA Alternative 2 was eliminated from further consideration. See Section 1.3.2 in Appendix E.2, *RIM Study*, for additional details.

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

The RSA Alternative 3A would extend the existing Runway 27 End RSA length from 150 feet to 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, full dimension RSA at the Runway 27 End for both overrun and undershoot. The RSA at the Runway 27 End would have a total area of approximately 500,000 square feet, of which approximately 425,000 square feet (nearly 10 acres) would be required in Boston Harbor. Accounting for an average harbor depth of 25 feet requiring fill, approximately 375,000 cubic yards of fill would be needed. The RSA extension would also extend into the existing navigation channel. This alternative would provide a full dimension RSA and would not reduce the existing runway operational length via displaced thresholds or declared distances (and resulting aircraft takeoff weight limitations), nor compromise existing airfield operational efficiency.

The RSA Alternative 3A would not require relocating the existing threshold, runway lights, or signs. It would not impact the taxiway configuration or the existing perimeter road. This alternative would maintain the full 7,001 feet of runway length.

However, RSA Alternative 3A was eliminated from further consideration because of the potential significant marine resource and harbor navigation impacts, and because as indicated below, the purpose and need of the Proposed Project could be achieved by other alternatives with substantially fewer 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 Appendix E.2, *RIM Study* for additional details).

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

The RSA Alternative 3B would extend the length of the existing Runway 27 End 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**). The extension into Boston Harbor would provide a fully compliant, full dimension RSA. While minimizing the fill associated with RSA Alternative 3A, the deck would create approximately 425,000 square feet (nearly 10 acres) of additional area for the RSA (the total area for the RSA at the Runway 27 End would be approximately 500,000 square feet). However, as with Alternative 3A, the deck for the improved RSA would extend into the existing navigation channel. The RSA Alternative 3B would maintain the full 7,001 feet of runway length. This alternative would not require the relocation of the existing runway threshold, runway lights, signs, or existing perimeter road.

The RSA Alternative 3B was eliminated from further consideration because of the potential significant marine resource and harbor navigation impacts and the fact that an equivalent level of safety could be achieved by another alternative with substantially reduced environmental impacts. Although RSA 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, as indicated below, other alternatives would have fewer impacts (see Section 1.3.3 in Appendix E.2, *RIM Study* for additional details).

3.2.2.5 RSA Alternative 4A – EMAS on 500-Foot-Wide Deck

The RSA Alternative 4A would extend the length of the existing RSA from 150 feet to a maximum total length 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 Appendix E.2, *RIM Study*). This alternative complies with the FAA's RSA requirements using an EMAS installation. As discussed in Section 1.3.4 of the RIM/Runway 9-27 RSA Alternatives Study (refer to Appendix E.2), the RSA Alternative 4A EMAS was assumed to be similar to the length and width of the adjacent Runway 33L End EMAS. The 600-foot EMAS is approximate and corresponds to the FAA's minimum RSA length requirements using an EMAS installation.

The deck and EMAS design and dimensions would be confirmed during design based on the aircraft fleet mix and runway use. The EMAS in RSA Alternative 4A would be partially supported on existing land and by an approximately 500-foot long by 500-foot-wide deck structure extending into Boston Harbor. The deck would start 150 feet east of the Runway 27 threshold and extend 500 feet into Boston Harbor, resulting in an RSA of approximately 325,000 square feet, of which 250,000 square feet (approximately 6 acres) would be over Boston Harbor. The deck would be supported by pilings or caissons. The perimeter road would be realigned so that it is between the Runway 27 threshold and the beginning of the EMAS.

However, RSA Alternative 4A was eliminated from further consideration because the 500-foot-wide deck would have greater navigation channel and environmental impacts compared to RSA Alternative 4B (see below). The RSA Alternative 4A complies with the FAA design requirements for a standard RSA using an 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, as indicated below, another alternative would have fewer impacts (see Section 1.3.4 in Appendix E.2, *RIM Study* for additional details).

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

The RSA 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 to meet the FAA's design requirements for a standard RSA using an EMAS installation. The RSA Alternative 4B would maintain the existing operational capability of the airfield while also minimizing environmental impacts (**Figure 3-6**). The final dimensions of and setback distance for the RSA would be determined/confirmed during the EMAS design as noted in RSA Alternative 4A.

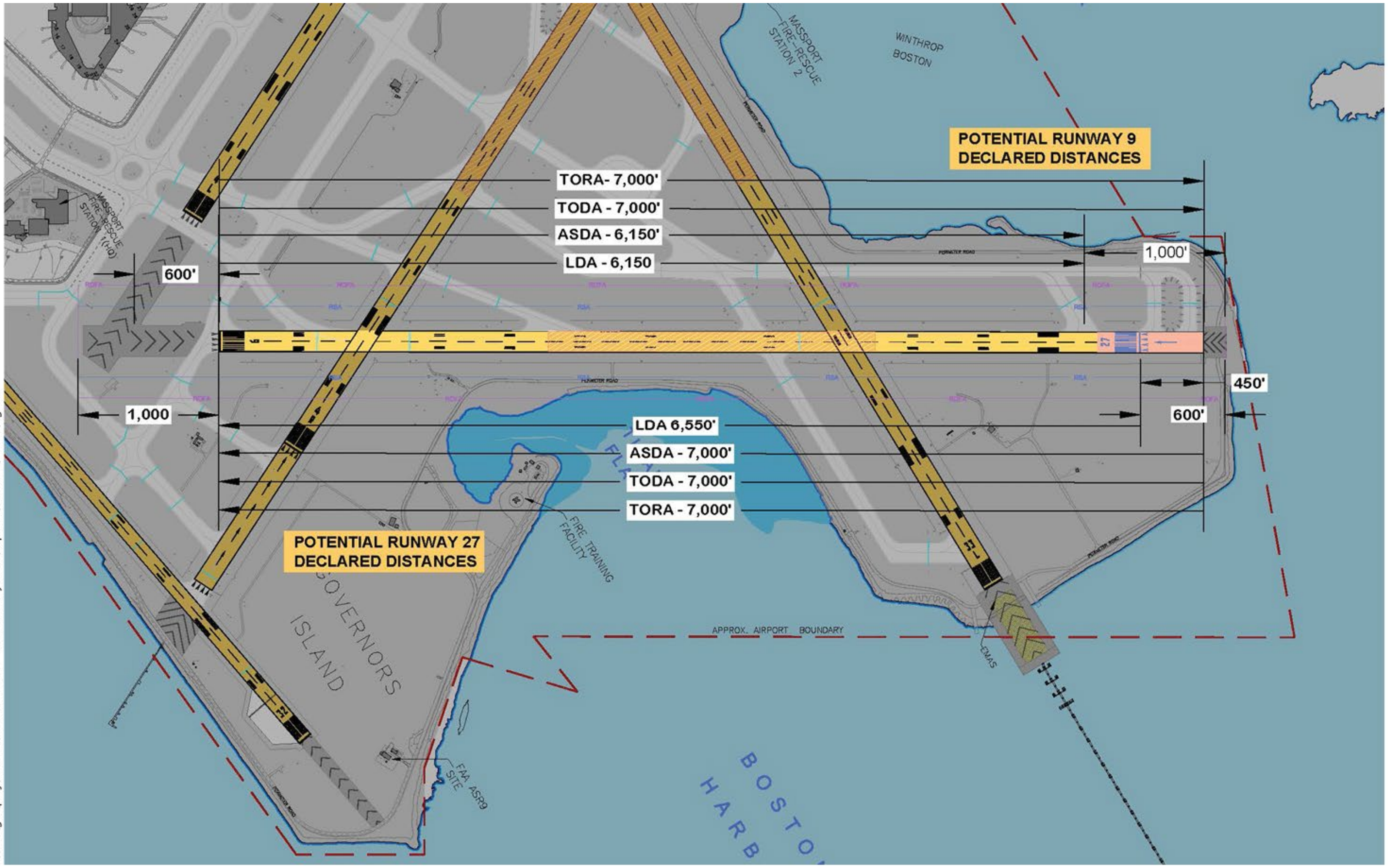
The RSA deck would be pavement on grade for approximately 150 feet, then extend approximately 450 feet on a deck into Boston Harbor. The resulting RSA would be approximately 198,900 square feet, of which approximately 153,000 square feet (approximately 3.5 acres) would be over Boston Harbor. Based on calculations for the completed Runway 33L End RSA improvements, 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 would be shifted to a location between the end of Runway 27 and the beginning of the EMAS as was done for the Runway 33L RSA. Additionally, the perimeter road would be straightened on the northside of the Runway 27 End to enhance vehicular sight lines and situational awareness crossing the runway end, while remaining clear of the EMAS.

The FAA and Massport selected RSA Alternative 4B (EMAS on 306-foot-wide deck) as the Preferred Alternative. This alternative was selected because it would provide full FAA-required overrun and undershoot protection, while maintaining the airfield utility and efficiency. 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 the screening criteria (see Section 1.3.4 in ENF Appendix E.2, *RIM Study* for additional details). Alternatives for the deck support structure are discussed in Section 3.3.

3.2.2.7 No-Build Alternative

Both the Massachusetts Environmental Policy Act (MEPA) and National Environmental Policy Act (NEPA) environmental review processes require the Preferred Alternative be compared to the No-Build Alternative (**Figure 3-7**). The No-Build Alternative assumes that no improvements to the RSA at the Runway 27 End would be made, and the existing RSA would remain 500 feet wide and 150 feet long. Thus, the RSA for the Runway 27 would not meet the FAA standard RSA length of 1,000 feet for a full dimension RSA nor the standard for an EMAS, and the existing 850-foot RSA deficiency at the Runway 27 End would remain unresolved. 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. Although the No-Build Alternative does not impact the environment, this alternative does not address the primary safety purpose and need of the Project. A No-Build Alternative is used as the baseline against which to evaluate the environmental impacts of the alternatives carried forward for analysis. In accordance with the requirements of MEPA, this alternative is retained for further analysis for comparative purposes only within the environmental review process.



\\vhb\gbl\proj\Wat-EV\14792.00 WSP - MPA Runway 9-27\Reports\DEIR-EA\Drafts\Figures

Figure 3-1: Alternative 1—Declared Distances

Runway 27 End RSA Improvements Project

Runway Pavement	Instrument Landing System (ILS) Holdbar
High Energy Runway Area	Holdbar
Taxiway/Apron Pavement	Potential Displaced Threshold
Building	Potential Pavement Painting
Water	Runway Safety Area (RSA)

	Runway Object Free Area (ROFA)
TORA	Takeoff Run Available
TODA	Takeoff Distance Available
ASDA	Accelerate-Stop Distance Available
LDA	Landing Distance Available

0 400 800 1600 Feet

Source: Massachusetts Port Authority, "Boston Logan Airport Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study," January 8, 2019.

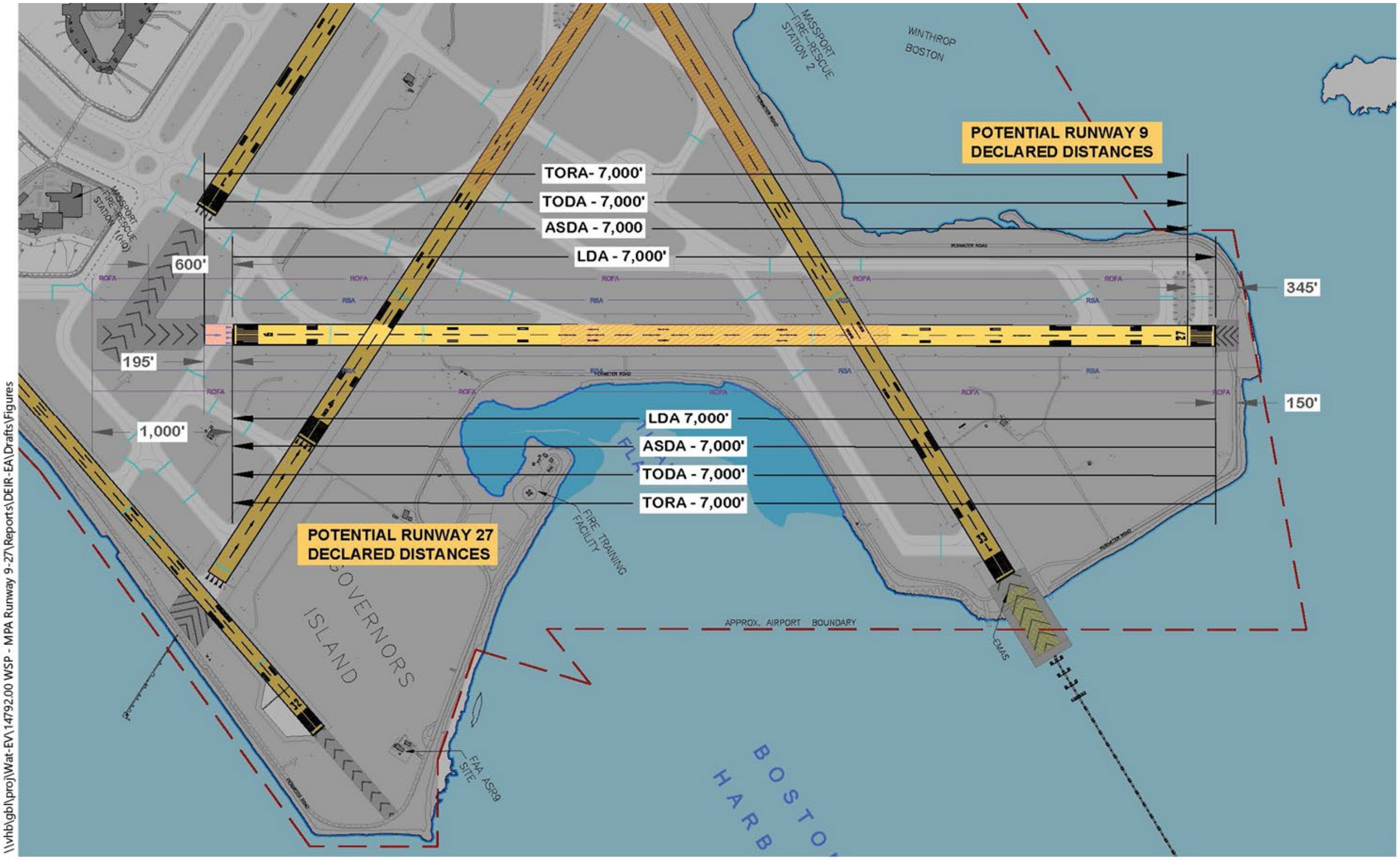


Figure 3-2: Alternative 2—Displaced Threshold Markings

Runway 27 End RSA Improvements Project

	Runway Pavement		Instrument Landing System (ILS) Holdbar		Runway Object Free Area (ROFA)
	High Energy Runway Area		Holdbar	TORA	Takeoff Run Available
	Taxiway/Apron Pavement		Potential Displaced Threshold	TODA	Takeoff Distance Available
	Building		Potential Pavement Painting	ASDA	Accelerate-Stop Distance Available
	Water		Runway Safety Area (RSA)	LDA	Landing Distance Available

0 400 800 1600 Feet

Source: Massachusetts Port Authority, "Boston Logan Airport Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study," January 8, 2019.

\\vhb\gbl\proj\Wat-EV\14792.00 WSP - MPA Runway 9-27\Reports\DEIR-EA\Drafts\Figures

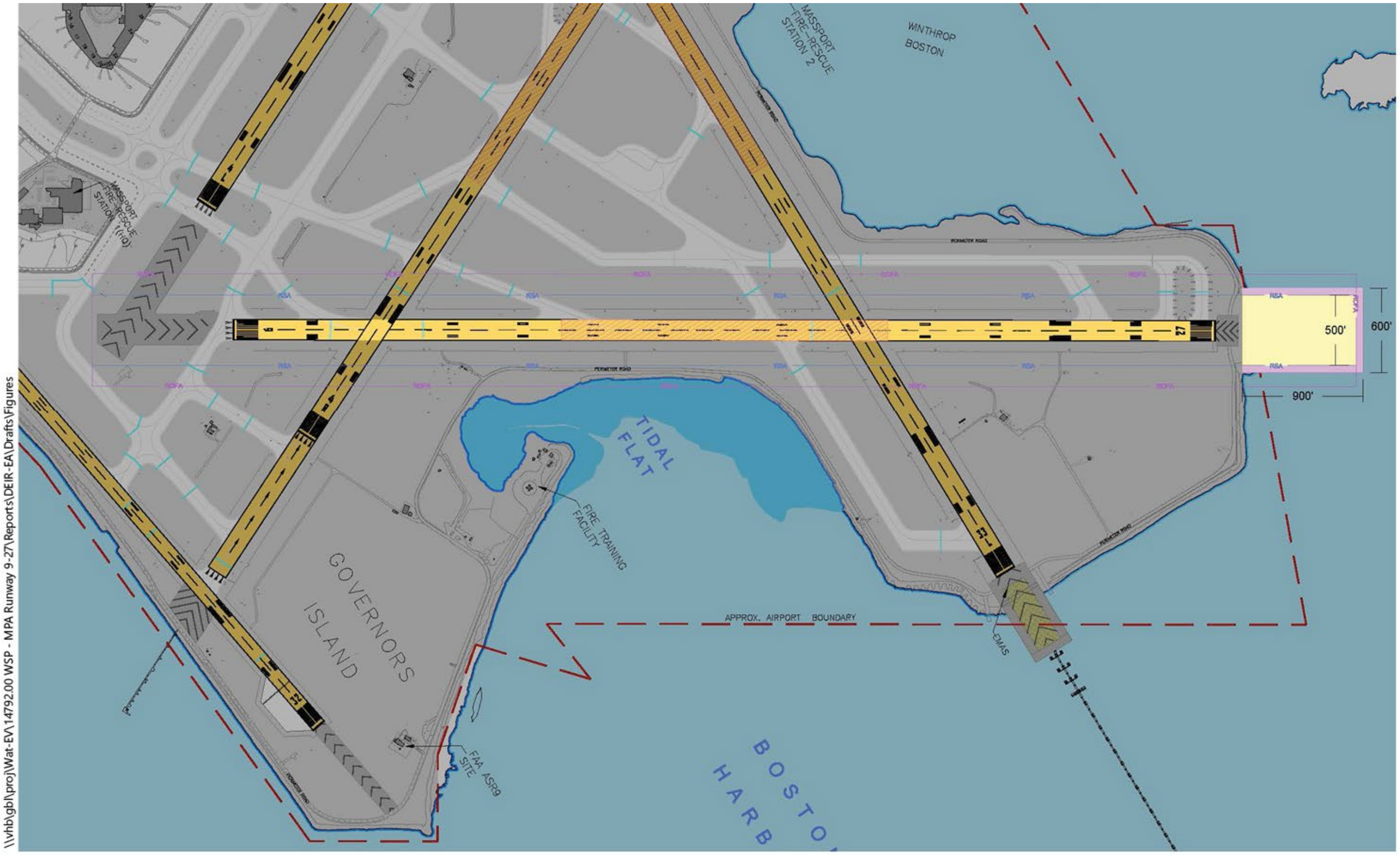


Figure 3-3: Alternative 3A—Full RSA in Boston Harbor, Fill Option

Runway 27 End RSA Improvements Project

Runway Pavement	Instrument Landing System (ILS) Holdbar	Runway Object Free Area (ROFA)
High Energy Runway Area	Holdbar	TORA Takeoff Run Available
Taxiway/Apron Pavement	Potential Displaced Threshold	TODA Takeoff Distance Available
Building	Potential Pavement Painting	ASDA Accelerate-Stop Distance Available
Water	Runway Safety Area (RSA)	LDA Landing Distance Available

0 400 800 1600 Feet

Source: Massachusetts Port Authority, "Boston Logan Airport Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study," January 8, 2019.

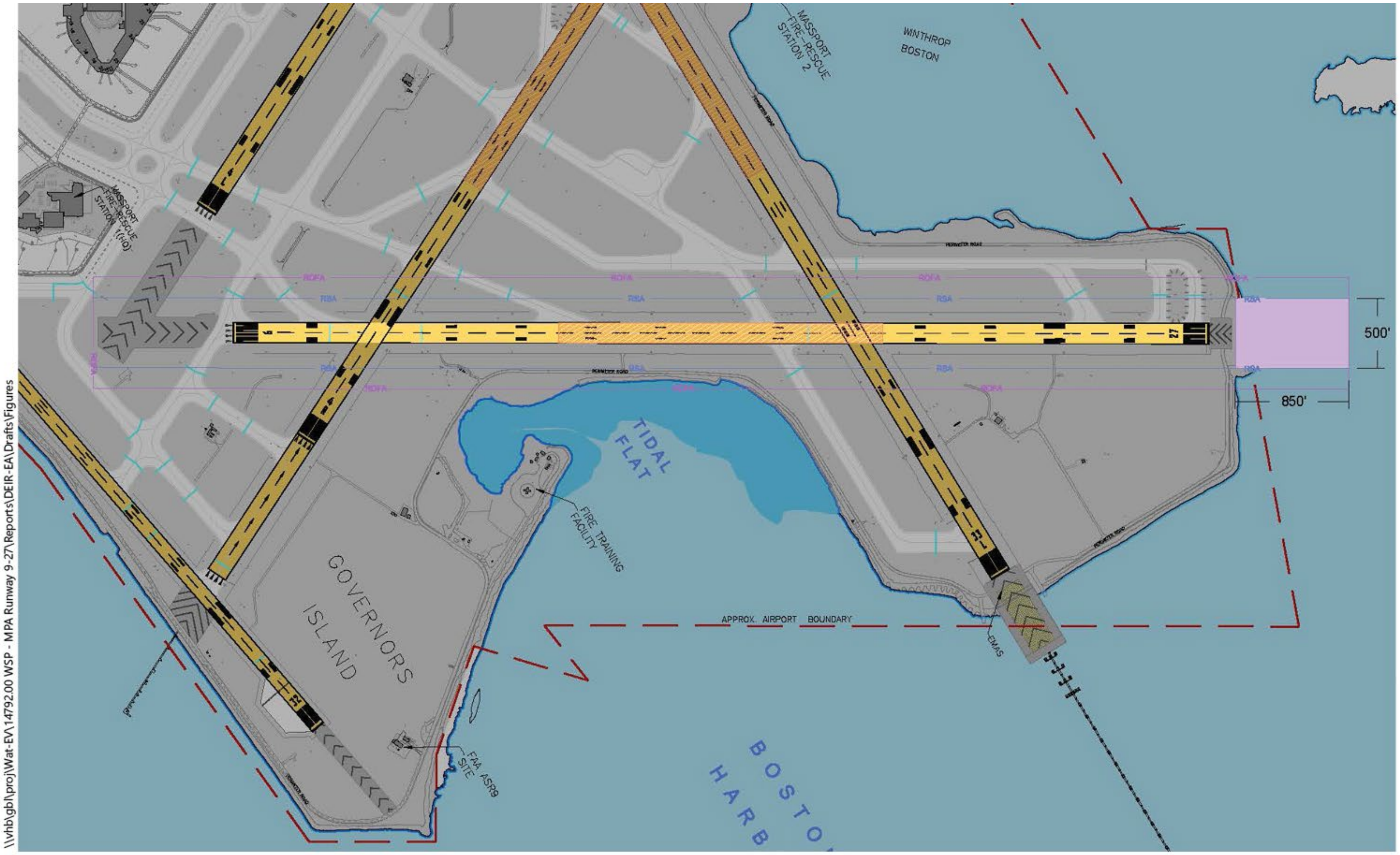


Figure 3-4: Alternative 3B—Full RSA in Boston Harbor, Deck Option

Runway 27 End RSA Improvements Project

Runway Pavement
High Energy Runway Area
Taxiway/Apron Pavement
Building
Water
Instrument Landing System (ILS) Holdbar
Holdbar
Potential Displaced Threshold
Potential Pavement Painting
Runway Safety Area (RSA)
Runway Object Free Area (ROFA)
TORA Takeoff Run Available
TODA Takeoff Distance Available
ASDA Accelerate-Stop Distance Available
LDA Landing Distance Available

0 400 800 1600 Feet

Source: Massachusetts Port Authority, "Boston Logan Airport Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study," January 8, 2019.

\\vhb\gbl\proj\Wat-EV\14792.00 WSP - MPA Runway 9-27\Reports\DEIR-EA\Drafts\Figures

\\vhb\gbl\proj\Wat-EV\14792.00 WSP - MPA Runway 9-27\Reports\DEIR-EA\Drafts\Figures

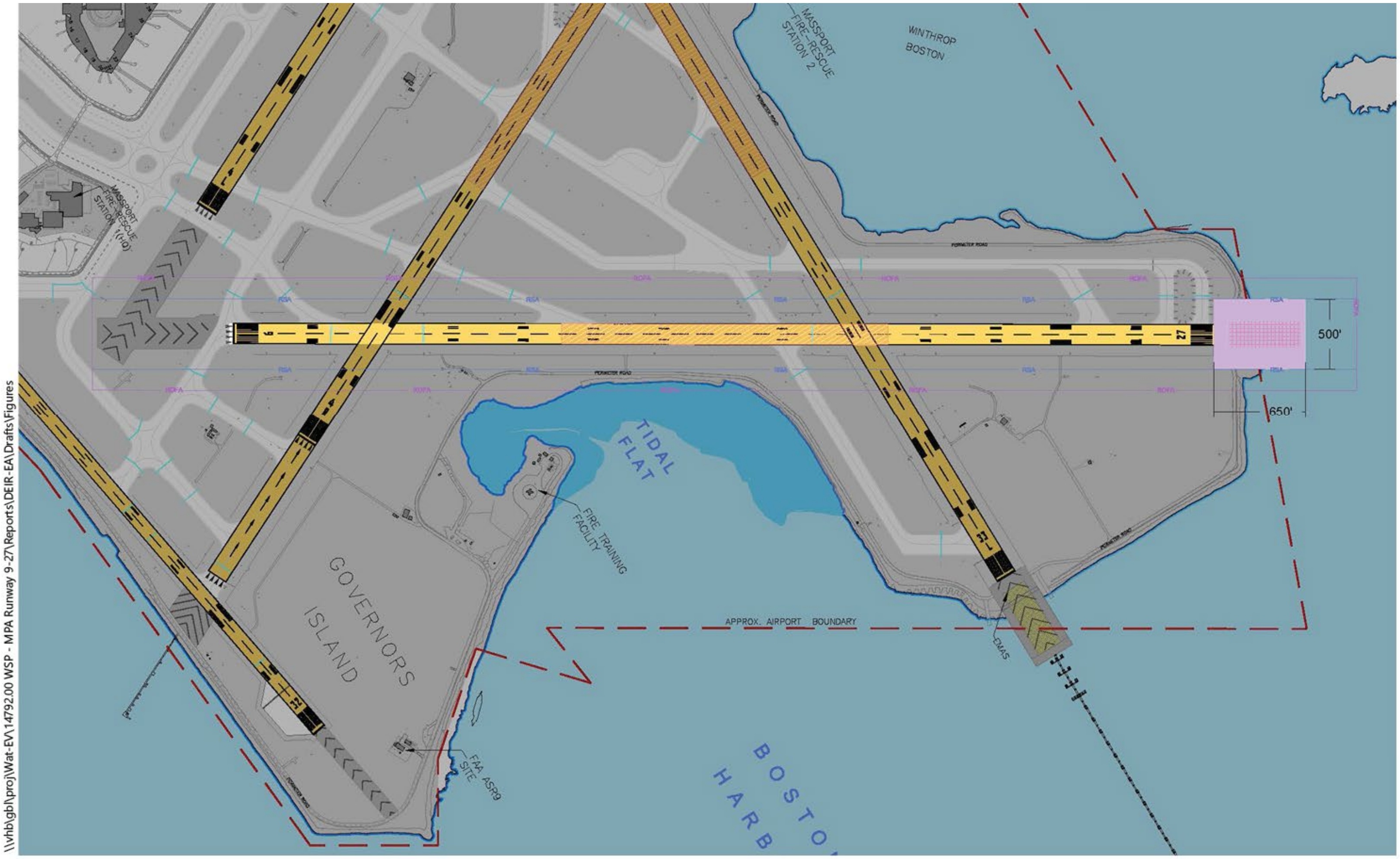


Figure 3-5: Alternative 4A—EMAS on 500-Foot-Wide Deck

Runway 27 End RSA Improvements Project

Runway Pavement	Instrument Landing System (ILS) Holdbar	Runway Object Free Area (ROFA)
High Energy Runway Area	Holdbar	TORA Takeoff Run Available
Taxiway/Apron Pavement	Potential Displaced Threshold	TODA Takeoff Distance Available
Building	Potential Pavement Painting	ASDA Accelerate-Stop Distance Available
Water	Runway Safety Area (RSA)	LDA Landing Distance Available

0 400 800 1600 Feet

Source: Massachusetts Port Authority, "Boston Logan Airport Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study," January 8, 2019.

\\vhb\gb\proj\Wat-EV\14792.00 WSP - MPA Runway 9-27\Reports\DEIR-EA\Drafts\Figures

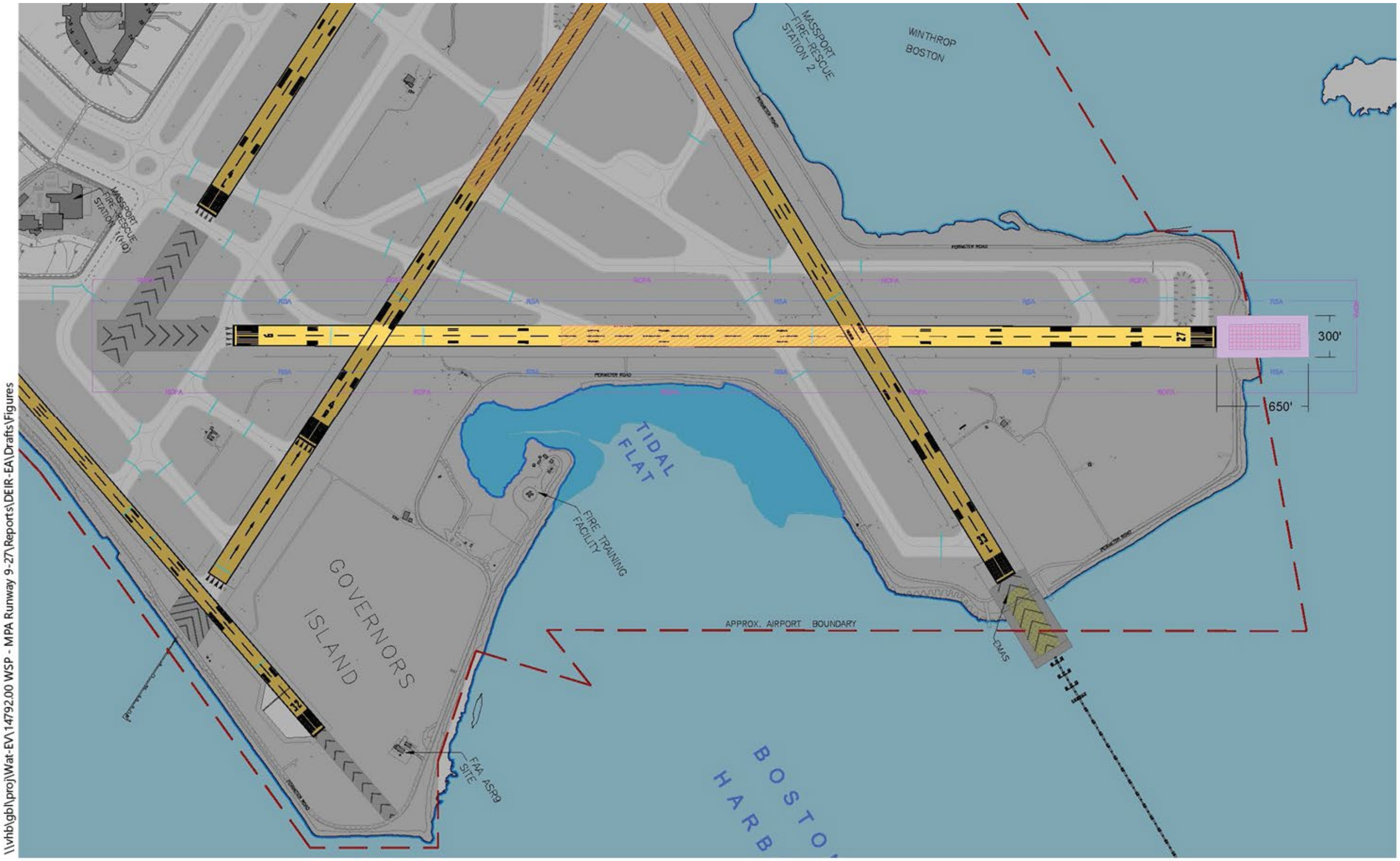
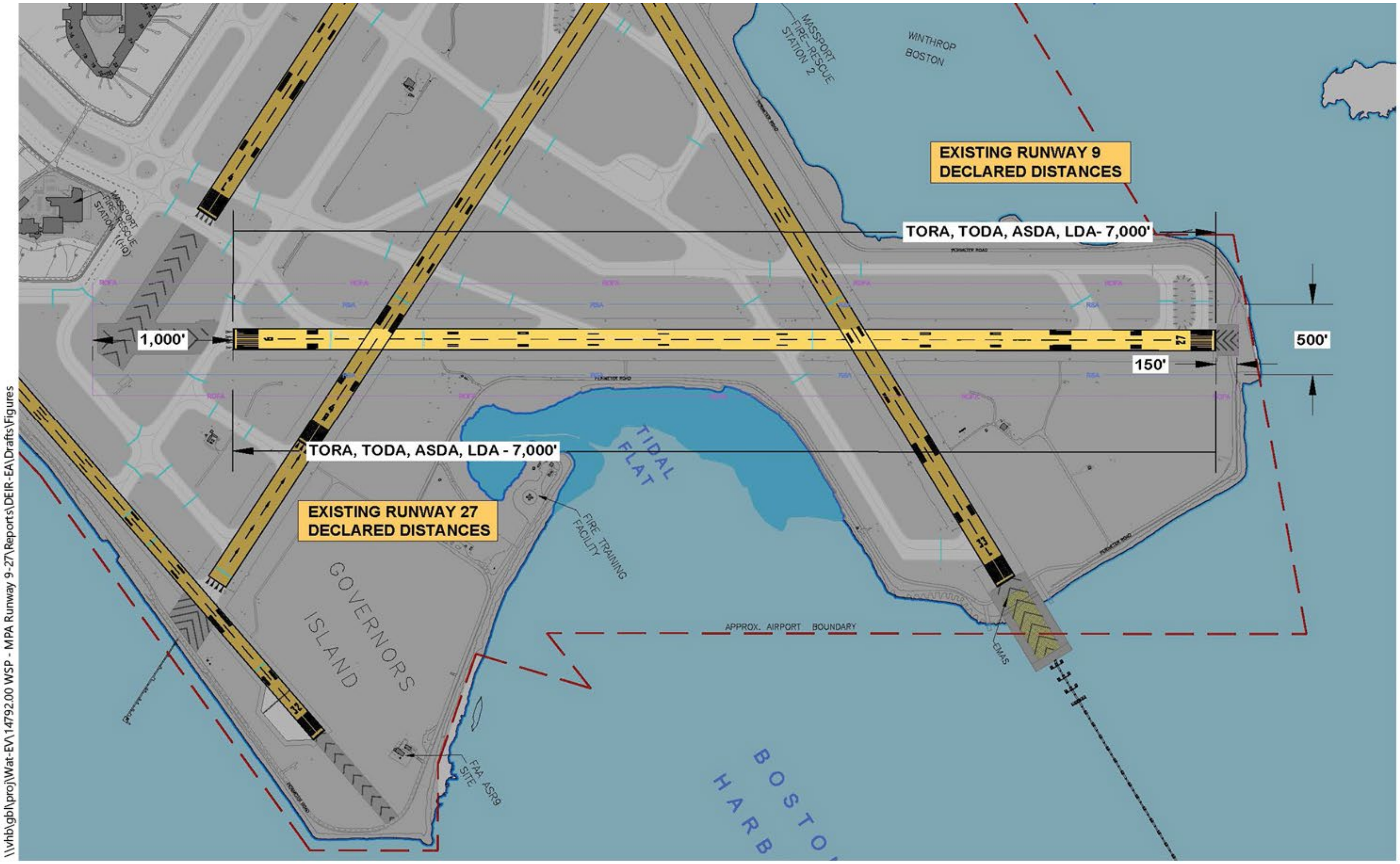


Figure 3-6: Alternative 4B—EMAS on 306-Foot-Wide Deck *(Preferred Alternative)* **Runway 27 End RSA Improvements Project**

- Runway Pavement
- High Energy Runway Area
- Taxiway/Apron Pavement
- Building
- Water
- Instrument Landing System (ILS) Holdbar
- Holdbar
- Potential Displaced Threshold
- Potential Pavement Painting
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- TORA Takeoff Run Available
- TODA Takeoff Distance Available
- ASDA Accelerate-Stop Distance Available
- LDA Landing Distance Available

0 400 800 1600 Feet

Source: Massachusetts Port Authority, "Boston Logan Airport Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study," January 8, 2019.



\\vhb\gbl\proj\Wat-EV\14792.00 WSP - MPA Runway 9-27\Reports\DEIR-EA\Drafts\Figures

Figure 3-7: No-Build Alternative (Existing Conditions)

Runway 27 End RSA Improvements Project

- Runway Pavement
- High Energy Runway Area
- Taxiway/Apron Pavement
- Building
- Water
- Instrument Landing System (ILS) Holdbar
- Holdbar
- Potential Displaced Threshold
- Potential Pavement Painting
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)

TORA	Takeoff Run Available
TODA	Takeoff Distance Available
ASDA	Accelerate-Stop Distance Available
LDA	Landing Distance Available

0 400 800 1600 Feet

Source: Massachusetts Port Authority, "Boston Logan Airport Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study," January 8, 2019.

3.2.3 Summary of Tier 1 RSA Alternatives Screening

In summary, five of the seven Runway 27 End RSA improvement alternatives were dismissed from further review as they either (1) do not meet the Project's purpose and need or (2) have greater impacts than the Preferred Alternative (RSA Alternative 4B: EMAS on 306-Foot-Wide Deck). These results are summarized in **Table 3-3.**

Table 3-3 Tier 1 Alternatives Screening Results

	Alternative						
Screening Criteria	1 Declared Distances[1]	2 Displaced Thresholds	3A Full RSA, Fill	3B Full RSA, Deck	4A EMAS on 500' Deck	4B EMAS on 306' Deck	No-Build
Provide overrun and undershoot protection for aircraft consistent with the FAA design criteria	🟢	🔴	🟢	🟢	🟢	🟢	🔴
Preserve airfield utility and efficiency	🔴	🟢	🟢	🟢	🟢	🟢	🟢
Retain perimeter road	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Avoid triggering runway injunction requirements	🟢	🔴	🟢	🟢	🟢	🟢	🟢
Avoid impacts to the navigation channel	🟢	🟢	🔴	🔴	🔴	🟢	🟢
Avoid and minimize environmental impacts	🟢	🟢	🔴	🔴	🔴	🟠	🟢

Key:
🟢 Green indicates that the criterion is met and/or that no negative effect is anticipated; the alternative is favorable in comparison to the other alternatives.
🟠 Orange indicates that the criterion is partially met and/or that there is some negative effect anticipated.
🔴 Red indicates that the criterion is not met and/or that a negative effect is anticipated; the alternative is not favorable in comparison to the other alternatives.
1 Although RSA Alternative 1 scored positively against several of the screening criteria, it would adversely affect airfield operations and pose significant takeoff limitations.

Accordingly, the following alternatives are eliminated from further consideration:

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

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, in January 2019, issued an RSA Determination Form ("2019 RSA Determination") for the Project in accordance with FAA Standard Operating Procedure 8.00, *Runway Safety Area Determination*. The 2019 RSA Determination stated that:

> "(*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.*" [13]

The Preferred Alternative, RSA Alternative 4B (EMAS on a 306-foot-wide deck), was advanced for further evaluation by the FAA and Massport. In accordance with the requirements of MEPA, the No-Build Alternative is carried forward for comparative purposes as part of the environmental review process. The RSA Alternative 4B was selected as the preferred alternative for the resolution of the RSA deficiencies on Runway 9-27 because it would provide overrun and undershoot protection consistent with the FAA's design criteria while maintaining 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 extend the RSA into Boston Harbor and still meets the Project purpose and need.

3.3 Tier 2 Screening - Deck Support Alternatives

The RSA Alternative 4B, the Preferred Alternative (EMAS on a 306-foot-wide deck), would extend the existing RSA from 150 feet up to a maximum of 650 feet. The length required for the deck depends upon the length of the EMAS, which would be determined later in the design by the EMAS manufacturer based on the anticipated aircraft fleet mix, runway use, and using proprietary EMAS design software. However, as noted in Section 3.2.2.6, it is expected that the EMAS and other requirements, including access for emergency vehicles all around the EMAS, would be accommodated on a deck with a maximum length of 450 feet. Therefore, the Tier 2 analysis assumes a 306-foot wide by 450-foot-long supported deck extending into Boston Harbor. The existing section of RSA would be combined with the deck to provide the full RSA extension.

Since the ENF was published, Massport has considered various options for supporting the deck (the deck "substructure"), as described in Section 3.3.1. Section 3.3.2 presents screening criteria for screening the deck support alternatives to assess whether they should be carried forward for further analysis or eliminated from further consideration. Section 3.3.3 presents the results of the screening and identifies one Preferred Deck Support Alternative to be carried forward for further analysis in Chapter 5, *Impacts Assessment,* of this DEIR.

3.3.1 Development of Deck Support Alternatives

The deck support alternatives must be structurally sufficient to support the deck and the EMAS, the CDA, and emergency vehicles. The substructure must have a 75-year design life and designed to be capable of withstanding anticipated coastal storm events. To the greatest extent possible while also meeting the FAA's

13 U.S. Department of Transportation, Federal Aviation Administration, Standard Operating Procedure 8.00, *Runway Safety Area Determination*, Appendix B: *RSA Determination Form*, "Runway 27 End RSA Improvements Project, Boston Logan International Airport," signed January 2019.

design criteria, the deck must be designed to withstand anticipated sea level rise.[14] All substructure or deck support alternatives were developed to meet these requirements.

The two potential types of support structures for the deck are piles and caissons/drilled shafts (referred to collectively as vertical elements). The RSA would start on land for approximately 200 feet and extend approximately 450 feet into Boston Harbor on either a pile- or caisson-supported deck.[15] The resulting RSA would be approximately 198,900 square feet, of which approximately 137,700 square feet (approximately 3.2 acres) would be on a deck over Boston Harbor.

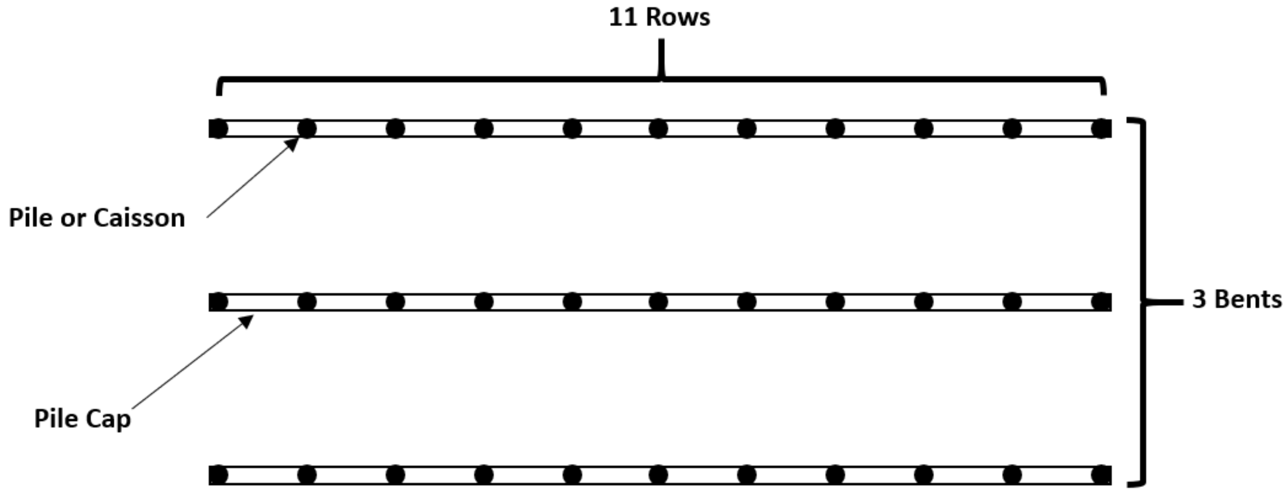
Piles are long, typically circular or square elements of between 12 to 36 inches in diameter or per side. They would be made from precast concrete, would be transported to the construction site, and would be driven into the ground using vibration or impact (pile driving). Caissons, which are circular columns typically much larger than piles (3 to 12 feet in diameter), would be constructed on the Project Site. A hole would be drilled into the bedrock into which structural steel would be placed and concrete would be pumped into the hole, creating a column.

The number and spacing of the piles or caissons is dependent on the structural load they must support and the size and strength of the individual elements. For example, the deck could be supported by many small diameter piles spaced close together or by fewer, larger diameter caissons spaced farther apart. Increasing the pile spacing generally requires increasing the size and weight of the superstructure, which is the horizontal structure on top of the piles or caissons on which the deck would be constructed. The number and spacing of the piles or caissons is also affected by the available strength of the subsurface soil formation. The piles or caissons would be arranged in a grid pattern, as shown in **Figure 3-8**. In one direction of the grid, the piles or caissons would be fastened together at the top by pile-caps and the connected rows are referred to as "bents." As shown in **Figure 3-8**, the spacing between the piles or caissons in the rows may be different than the spacing between the bents.

14 The FAA design criteria restrict the slope of and changes in the grade of runways and RSAs (U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022). Thus, the RSA must match the grade of existing Runway 9-27 and be relatively flat and free from bumps. During the 2020 rehabilitation of Runway 9-27, the Runway 27 End was raised approximately 10 inches to bring the runway into compliance with the FAA's design standards and to accommodate sea level rise.

15 While the RIM/Runway 9-27 RSA Alternatives Study summarized in Section 3.2 assumed the paved area at the end of the runway would end at the top of the existing riprap as it does now, to accommodate a transition slab from the pavement to the deck, a sheet pile cutoff wall is required, extending the existing pavement from 150 to 200 feet. The sheet pile would reduce the required deck length from a maximum of 500 feet identified in the RIM/Runway 9 27 RSA Alternatives Study to approximately 450 feet, to create a total length of 650 feet and reducing the total area of the deck from 3.5 acres to 3.2 acres.

Figure 3-8 Typical Pile/Caisson Configuration



Piling or caisson configurations were developed at the conceptual design level and in developing the deck support alternatives, consideration was given to constructability issues, such as minimizing airfield disruptions, and to environmental resources and construction impacts.

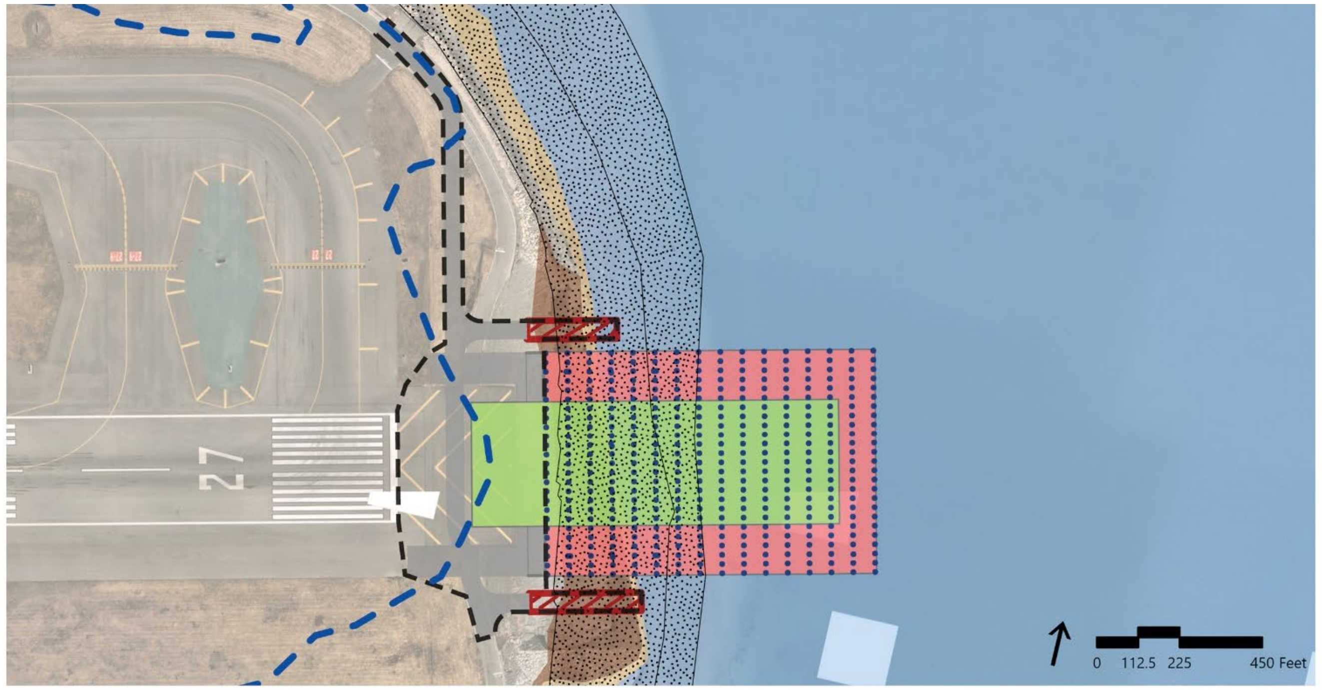
Four deck support alternatives were developed for the Runway 27 End RSA deck, as shown in **Table 3-4**, illustrated in **Figure 3-9,** and described below.

Table 3-4 Runway 27 End RSA Deck Support Alternatives

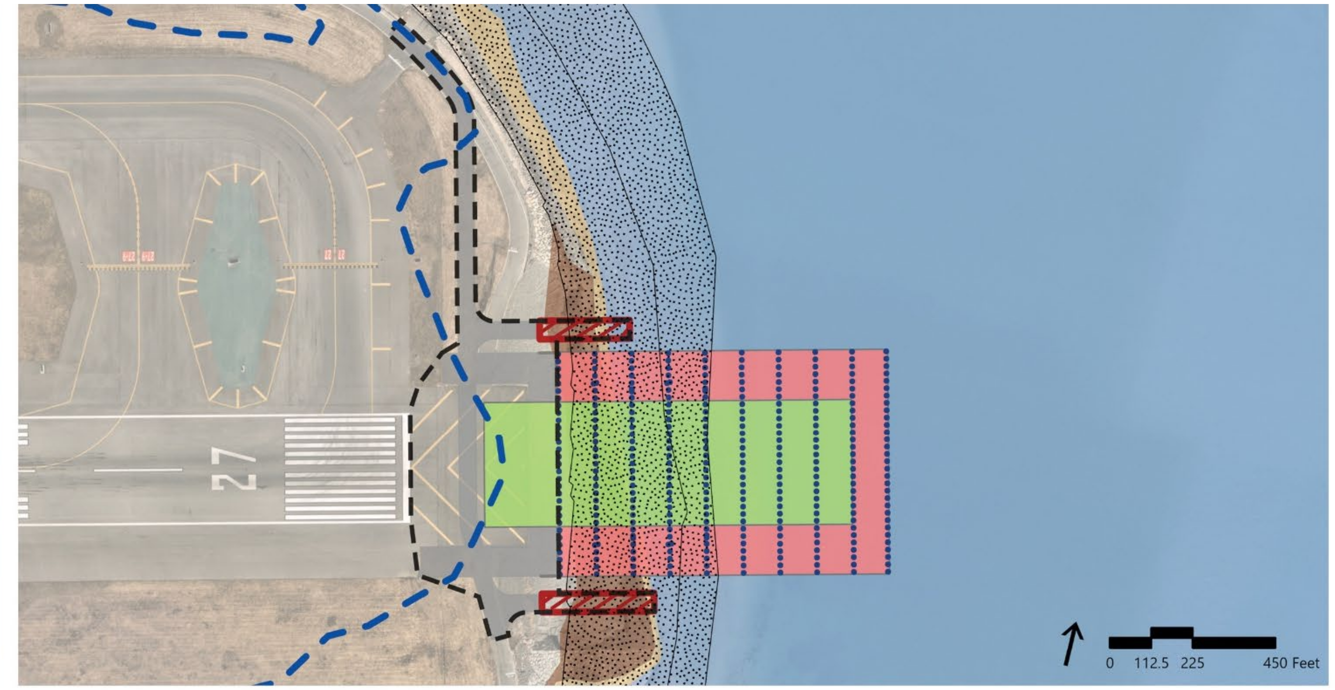
Deck Support Alternative	Deck Support Type	Pile Size (inches)	Number of Vertical Elements[1]	Number of Batter Piles[2]	Total Number of Piles	Number of Bents[3]	Approximate Bent Spacing (feet)
1	Concrete Pile	20” x 20”	384	32	416	25	12.6’
2	Concrete Pile	20” x 20”	294	32	326	10	50’
3	Caisson	60” diameter	160	0	160	10	50’
4	Caisson	60” diameter	128	0	128	8	65’

1 The vertical elements are the piles or caissons.
2 Batter piles are bracing piles driven at an angle to the vertical to provide resistance to horizontal forces.
3 A bent is an array of piles or drilled shafts in a row and fastened together at the top by a pile-cap or bracing.

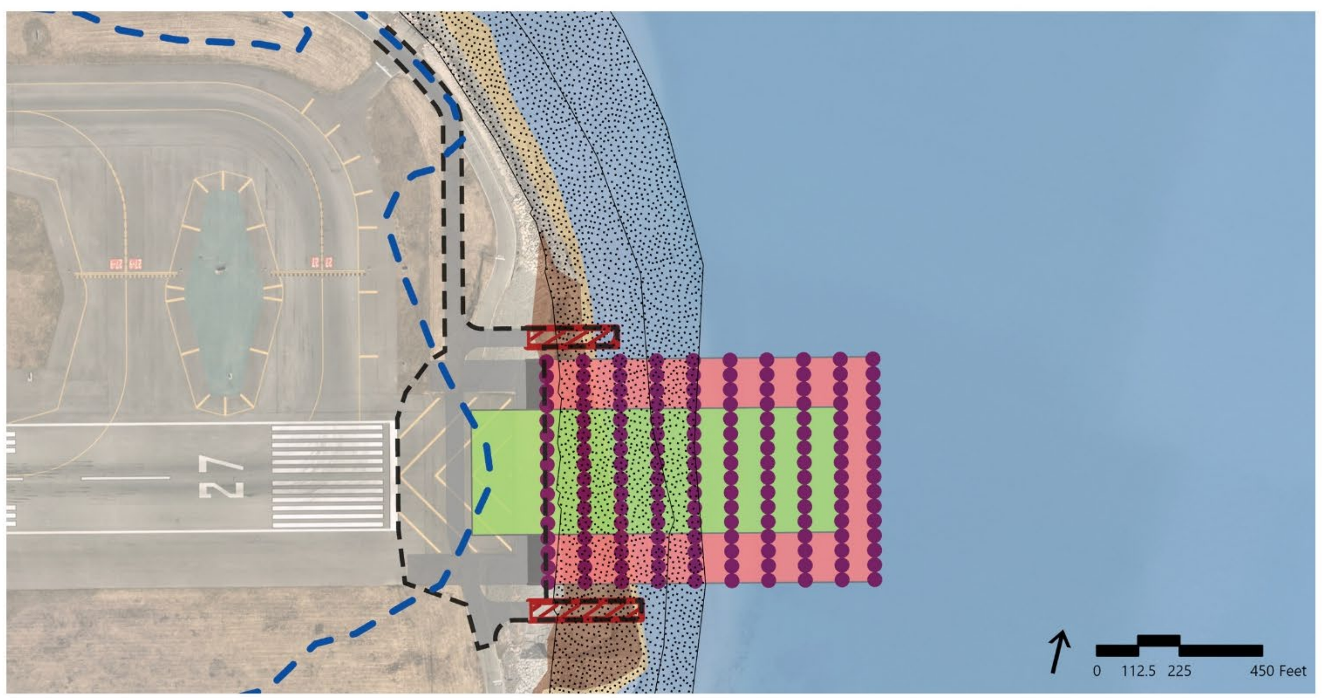
This Page Intentionally Left Blank.



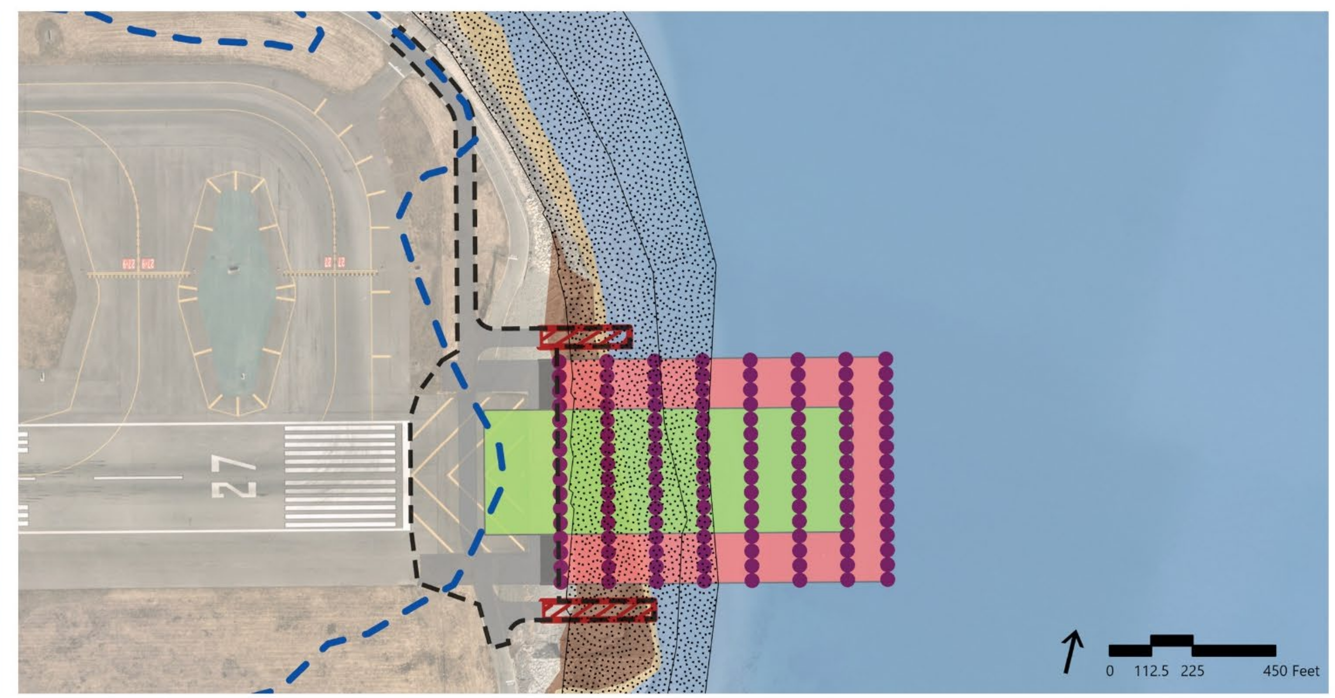
Alternative 1: 416 20-Inch Square Concrete Piles



Alternative 2: 326 20-Inch Square Concrete Piles



Alternative 3: 160 60-Inch Diameter Caissons



Alternative 4: 128 60-Inch Diameter Caissons

Figure 3-9: RSA Deck Support Alternatives (Tier 2 Screening) **Runway 27 End RSA Improvements Project**

- Proposed Grading Limits
- Pile-Supported Deck
- Proposed Engineered Materials Arresting System (EMAS) Bed
- Proposed Pavement
- Proposed Piles
- Proposed Caissons
- Proposed Approach Slab
- Proposed Emergency Ramp
- Coastal Beach
- Land Under Ocean
- Land Subject to Tidal Action
- Federal Emergency Management Agency (FEMA) 100-Year Flood Level
- Land Containing Shellfish

This Page Intentionally Left Blank.

Deck Support Alternative 1: 416 20-Inch Square Concrete Piles

The pile configuration of Deck Support Alternative 1 would include the following:

- Total of 416 piles (384 vertical piles and 32 batter piles[16]);
- 20-inch square concrete piles driven to rock in 25 bents[17] of 16 piles each; and
- Bents spaced 12.5 feet apart and piles within each bent spaced 29.7 feet apart.

Deck Support Alternative 2: 326 20-Inch Square Concrete Piles

The pile configuration of Deck Support Alternative 2 would include the following:

- Total of 326 piles (294 vertical piles and 32 batter piles);
- 20-inch square concrete piles driven to rock in 10 bents of 31 piles each; and
- Bents spaced 50 feet apart and piles within each bent spaced 11 feet apart.

Deck Support Alternative 3: 160 60-Inch Diameter Caissons

The caisson configuration of Deck Support Alternative 3 would include the following:

- Total of 160 vertical caissons/drilled shafts;
- 60-inch diameter drilled shaft foundation system in 10 bents of 16 caissons each; and
- Bents spaced 50 feet apart and caissons within each bent spaced 20 feet apart.

Deck Support Alternative 4: 128 60-Inch Diameter Caissons

The caisson configuration of Deck Support Alternative 4 would include the following:

- Total of 128 vertical caissons/drilled shafts;
- 60-inch diameter drilled shaft foundation system in 8 bents of 16 caissons each; and
- Bents spaced 65 feet apart and caissons within each bent spaced 20 feet apart.

3.3.2 Tier 2 Deck Support Alternatives Screening Criteria and Process

Massport established screening criteria to identify reasonable alternatives for supporting the deck at the end of Runway 27. The screening criteria address permanent environmental impacts and short-term impacts to operation of the airfield and are described below:

- **Permanent Wetland Resource Area Impacts**. For each deck support alternative, permanent impacts to wetland resource areas were calculated. These impacts include the total footprint on the seabed and intertidal area that would be directly impacted by the piles or caissons. In addition, the piles or caissons may permanently alter the water flow in the immediate area of the deck and potentially cause

16 Batter piles are bracing piles driven at an angle to the vertical to provide resistance to horizontal forces; sometimes, two batter piles replace a vertical pile.
17 A bent is an array of piles or caissons in a row and fastened together at the top by a pile-cap or bracing.

scour of the seabed or intertidal area; therefore, estimates of the potential volume of scour were calculated for each deck support alternative. It should be noted, however, that for all of the deck support alternatives, the model indicated no scour under typical conditions for the type of sediments present at the Proposed Project Site. Therefore, to conduct a comparative analysis of scour effects under worst case and very long-term conditions, including many major storms, current speed (or flow velocity) equivalent to 1.5 times the normal flow condition was applied to the flow model to yield a scour result for each alternative that is useful for comparative purposes, but that is overstated in terms of the effects of each alternative under typical conditions. Shading impacts for the section of the deck over water are not addressed in the screening because they would be the same for all alternatives. Rather, shading and navigation impacts are addressed in Chapter 5, *Impacts Assessment.*

- **Construction Impacts to Airfield Operations.** Runway 9-27 must be closed during construction of the RSA improvements because equipment and people cannot be in the RSA when the runway is in use. Closing Runway 9-27 would temporarily change airfield operations because, as shown in **Table 3-1**, Runway 9-27 is used for departures by 42 percent of jet aircraft (the sum of departures for the two runway ends) and for arrivals by 22 percent of jet aircraft (Runway 9 is not used for arrivals). To minimize those construction disruptions, Massport has determined that the maximum practical runway closure time is 60 consecutive days in each of two consecutive construction seasons, or a total of 120 days. Therefore, alternatives that would require more than 120 days of construction are not practical. Each alternative was evaluated to determine if it could be constructed in 120 days or less.

These criteria are applied to each of the deck support alternatives in the section below. The section below also discusses other considerations for each deck support alternative, including flexibility to demobilize and remobilize during construction in the water (if Runway 9-27 must be temporarily reopened during the closure periods due to an emergency requiring closure of other runway(s) or if severe weather, such as a hurricane, requires equipment to move to a protected location). A small portion of the estimated construction area would overlap with the navigation channel and the area of impact would be the same for all alternatives. The duration of impacts to the navigation channel that would occur from the moving of construction barges would vary for each alternative based off of the length of each alternative's construction schedule. The impacts to the navigation channel are addressed in Chapter 5, *Impacts Assessment.* Construction noise impacts to surrounding neighborhoods are also addressed. Because installing pilings or caissons would be the dominant source of noise experienced by the surrounding neighborhoods during construction, the approximate maximum sound level (L_{max}) that would be experienced at the closest residences (in Winthrop) as a result of installing pilings or caissons is reported. The closest residences are located approximately 2,400 feet from the outer edge of the deck. At 2,400 feet, the L_{max} from an impact or vibratory driver used to install piles would be approximately 68 dBA; the L_{max} from an auger drill used to drill the shafts for the caissons would be 50 dBA.[18]

To put these noise levels in context:

- Massport voluntarily follows the City of Boston Noise Control criteria which prohibit any individual piece of construction equipment from generating a noise level exceeding 86 dBA at a distance of 50 feet from the devise, except that impact devices, such as impact or vibratory drivers, are exempt.[19]

18 The closest residences are approximately 2,400 feet from the outer edge of the deck. The L_{max} 2,400 feet from an impact or vibratory driver used to install piles would be approximately 68 dBA and the L_{max} 2,400 feet from an auger drill used for the shafts for the caissons would be 50 dBA. (L_{max} derived from data in the Federal Highway Administration (FHWA) Roadway Construction Noise Model User's Guide, January 2006).

19 Regulations for the Control of Noise in the City of Boston, City of Boston, Air Pollution Control Commission.

- Noise from a vacuum cleaner at a distance of 10 feet is approximately 69 dBA and noise from a dishwasher in the next room is approximately 50 dBA.

Construction noise impacts are discussed in detail for the Preferred Alternative in Chapter 5, *Impacts Assessment.*

3.3.3 Deck Support Alternatives Screening

This section applies the screening criteria to the four deck support alternatives and identifies why each alternative was dismissed from further consideration or advanced for further analysis. It also addresses the flexibility of each alternative to demobilize and remobilize during construction in the water and construction noise impacts to surrounding neighborhoods. The deck support alternatives screening results are summarized in **Table 3-5.**

Table 3-5 Tier 2 Screening Results of Deck Support Alternatives

Screening Criteria	Deck Support Alternatives			
	Alternative 1: 416 Piles	Alternative 2: 326 Piles	Alternative 3: 160 Caissons	Alternative 4: 128 Caissons
Coastal Wetlands Resource Area Impact:				
Permanent total footprint of piles/caissons (total square feet)[1]	1,160	910	3,140	2,510
Permanent total scour (total cubic yards)[2,3]	380	340	1,060	1,120
Runway Closure/Airfield Disruption: Can construction be completed in 120 days or less?	No	Yes	No	No

1 Total number of piles or caissons multiplied by the area per pile or caisson (2.8 square feet per pile and 19.6 square feet per caisson).
2 Modeled using the Federal Highway Administration of the U.S. Department of Transportation Hydraulic Engineering Circular No. 18 (HEC-18) method under normal tide conditions for Boston Harbor.
3 No scour is anticipated under typical conditions and with the cohesive materials within the Proposed Project Site. To conduct a comparative analysis of scour effects, current speed (or flow velocity) equivalent to 1.5 times the normal flow condition was applied to the flow model to yield a scour result for each alternative that is useful for comparative purposes, but that is overstated in terms of the effects of each alternative under typical conditions.

3.3.3.1 Deck Support Alternative 1: 416 20-Inch Square Concrete Piles

Deck Support Alternative 1, with 416 piles, would have a total permanent footprint on wetland resource areas of approximately 1,160 square feet and a permanent scour volume of approximately 380 cubic yards.[20] Each pile would have a scour depth of approximately 0.5 yards and a scour width of approximately 1 yard. The wetlands footprint and scour volume would be the second smallest of the four alternatives. This deck support alternative is not practical because it would require closing Runway 9-27 for more than 120 days, even with multiple construction crews and a 7-day per week, 12-hour per day schedule. Construction of piles would offer more flexibility than caissons to demobilize and remobilize if Runway 9-27 must be temporarily opened during construction in the event of an emergency or severe weather affecting the other runways.

This alternative would have a maximum A-weighted sound level (L_{max}) of approximately 68 dBA at the closest residences and it could occur on up to 41 days, the duration of the pile driving.

20 For all Deck Support Alternatives, no scour is anticipated under typical tidal conditions and with the cohesive materials within the Proposed Project Site. To determine the potential scour impacts under extreme conditions, storms equivalent to 1.5 times the normal flow condition were applied to observe the steady-state scour for each alternative. The scour observed under this condition and reported here is the most excessive scour that can be expected for each alternative under a steady state scour analysis.

Deck Support Alternative 1 was dismissed because it would require closure of Runway 9-27 for more than 120 days, which is not practical. It would also have greater environmental impacts than Deck Support Alternative 2. It would have a larger permanent impact than Alternative 2 to wetland resource areas from both the footprint of the piles and scour. During construction, it could have noise impacts to the surrounding neighborhood for 41 days, which is a longer period than Deck Support Alternative 2.

3.3.3.2 Deck Support Alternative 2: 326 20-Inch Square Concrete Piles

Deck Support Alternative 2, with 326 piles, would have a total permanent footprint on wetlands resource areas of approximately 910 square feet and a permanent scour volume of approximately 340 cubic yards. Each pile would have a scour depth of approximately 0.5 yards and a scour width of approximately 1 yard. The wetland impact footprint and scour volume would be the smallest of the four deck support alternatives. This alternative has fewer piles than the other pile alternative because it has a thicker deck, allowing greater spacing of the piles. The thicker deck sits above the Mean High Water (MHW) line, but initially the other pile alternative was examined because it was not clear this alternative would sit above MHW. Deck Support Alternative 2 is practical because the construction could be completed in a total of 120 days during two 60-day closure periods. As noted for Deck Support Alternative 1, construction of piles would offer more flexibility than caissons to demobilize and remobilize, should it be necessary to temporarily open Runway 9-27 during construction in the event of an emergency or weather affecting the other runways.

Deck Support Alternative 2 would have a L_{max} of approximately 68 dBA at the closest residences and it could occur on up to 27 days, the duration of the pile driving.

Deck Support Alternative 2 was advanced for further analysis because it could be constructed in 120 days and is practical, and because it would have the smallest impact to wetland resource areas. It would also have the shortest period of construction noise impacts to the surrounding neighborhoods. Although pile driving is somewhat louder than drilling for caissons, the duration of the pile driving for Alternative 2 is 27 days versus 168 days for the shorter of the two caisson alternatives, Alternative 4.

3.3.3.3 Deck Support Alternative 3: 160 60-Inch Diameter Caissons

Deck Support Alternative 3, with 160 caissons, would have a total permanent footprint on wetlands resource areas of 3,140 square feet, the largest impact of the four deck support alternatives. This alternative would have a permanent scour volume of 1,060 cubic yards, the second largest of the four deck support alternatives. Each caisson would have a scour depth of approximately 0.9 yards and a scour width of approximately 1.7 yards. Deck Support Alternative 3 would require closing Runway 9-27 for more than 120 days, which is not practical. In addition, construction of caissons offers less flexibility than piles to demobilize and remobilize the construction equipment if Runway 9-27 would have to be temporarily opened in the event of an emergency or severe weather affecting the other runways.

Deck Support Alternative 3 would have a L_{max} of approximately 50 dBA at the closest residences. The L_{max} is lower than the maximum sound level from pile driving, but the drilling would occur for 216 days versus 27 days for Alternative 2 and 41 days for RSA Alternative 1.

Deck Support Alternative 3 was dismissed because it would require closure of Runway 9-27 for more than 120 days and would therefore, not be practical. In addition, it would have the greatest permanent wetlands footprint and the second greatest scour impact of all the alternatives. The duration of the construction noise impacts to surrounding neighborhoods would be the longest of all the alternatives.

3.3.3.4 Deck Support Alternative 4: 128 60-Inch Diameter Caissons

Deck Support Alternative 4, with 128 caissons, would have a total permanent footprint on wetlands resource areas of 2,510 square feet, the second largest impact of the four deck support alternatives. This alternative would have a permanent scour volume of 1,120 cubic yards, the largest of the four deck support alternatives. Each caisson would have a scour depth of approximately 1 yard and a scour width of approximately 1.9 yards. Deck Support Alternative 4 would require closing Runway 9-27 for more than 120 days, which is not practical. In addition, construction of caissons offers less flexibility to airfield operations compared to piles should it be necessary to temporarily open Runway 9-27 during the closure periods.

Deck Support Alternative 4 would have a L_{max} of approximately 50 dBA at the closest residences. The L_{max} is lower than the maximum sound level from pile driving, but the drilling would occur for 168 days, which is over 120 days more than for Deck Support Alternatives 1 and 2.

Deck Support Alternative 4 was dismissed because it would require closure of Runway 9-27 for more than 120 days and would therefore not be practical. In addition, it would have greater permanent impacts to wetland resource areas than Alternatives 1 and 2 and the duration of the construction impacts to surrounding neighborhoods is greater than for Alternatives 1 and 2.

3.3.4 Summary of Tier 2 Deck Support Alternatives Screening Results

Deck Support Alternative 2 was advanced for further evaluation because it would be practical (it can be constructed in 120 total days and no more than 60 days of runway closure is required in each of two construction seasons) and it would have the smallest area of permanent impact to wetland resource areas of the four deck support alternatives. The other deck support alternatives are not practical because they cannot be constructed in 120 days or less (refer to **Table 3-5**) and they also have greater environmental impacts. For these reasons, Deck Support Alternative 2 is the Proposed Project.

In addition, because Deck Support Alternative 2 would use piles rather than caissons, it provides flexibility to demobilize and remobilize should it be necessary to temporarily open Runway 9-27 in the event of an emergency or extreme weather affecting the other runways. Deck Support Alternative 2 would also have the shortest duration of construction noise impacts to surrounding communities compared to the other three deck support alternatives.

3.4 DEIR Deck Support Alternatives

This section describes the two alternatives that were advanced for a more detailed evaluation of impacts in Chapter 5, *Impacts Assessment*: the No-Build Alternative (described in Section 3.2.2.7) and the Preferred Alternative - EMAS on a 306-foot-wide deck supported by 326 piles (described in Sections 3.2.2.6 and Section 3.3.3.2).

3.4.1 No-Build Alternative

The No-Build Alternative, shown in **Figure 3-7**, assumes that no improvements would be made to the RSA at the Runway 27 End. The existing RSA would remain 500 feet wide and 150 feet long, which does not meet the FAA standard for RSAs for a full dimension RSA end. The No-Build Alternative would result in no changes to existing airfield operations or the perimeter road; it would avoid permanent environmental impacts and construction impacts to surrounding neighborhoods and the navigation channel. Although the No-Build Alternative does not impact the environment, this alternative does not address the primary safety purpose and need of the Project.

3.4.2 Preferred Alternative: EMAS on 306-Foot-Wide Pile-Supported Deck

The Secretary's Certificate on the DEIR requires that the Preferred Alternative and its construction activities, scheduling and sequencing be described in the DEIR. Chapter 5, *Impacts Assessment*, and Appendix H, *Draft Construction Management Plan*, describe the Preferred Alternative's proposed improvements and proposed construction activities, including construction techniques and activities, construction sequencing and phasing, and construction costs. The information presented is based on conceptual construction plans and it represents the best estimate of construction activities and costs that can be made at this time. When the proposed Runway 27 End RSA Improvements Project is in the final design and construction phase, Massport would prepare detailed phasing and construction sequence procedures to provide for continual safe operation of the runways and protection for environmental resources. Whether conventional or design/build construction strategies are implemented is not anticipated to impact the overall schedule, proposed construction techniques, or environmental impacts. The environmental impacts associated with construction of the proposed Runway 27 End RSA Improvements Project are addressed in Chapter 5, *Impacts Assessment.*

The Preferred Alternative is Alternative 4B, an improved RSA with EMAS constructed partially on a 306-foot-wide deck with Deck Support Alternative 2 (supported by 326 vertical and batter piles). The Preferred Alternative would have the smallest impacts to wetland resources and the shortest construction period, which would minimize the duration of construction noise and operational impacts. The final dimensions of and setback distance for the RSA and the dimensions of the EMAS would be determined/confirmed during the final design of the EMAS and deck. The impact analyses presented in Chapter 5, *Impacts Assessment*, assume the longest deck length.

3.4.3 Description of Proposed Improvements

As shown in **Figure 3-10**, the Preferred Alternative would consist of the following improvements:

- Extension of the 500-foot-wide, paved, existing Runway 27 End RSA from 150 feet to 200 feet to accommodate a steel sheet pile wall;
- A deck structure approximately 450 feet long and 306 feet wide, with an area of approximately 137,700 square feet (3.2 acres), most of which is elevated above the harbor surface and will host the EMAS;
- A steel sheet pile wall within the current ISA footprint which would be approximately 350 feet long at the inshore limit of the deck to prevent settlement and erosion of the upland areas;
- A transition slab (25 feet wide) spanning from the land to the pile-supported structure;

- A supporting structure for the deck comprised of 326 twenty-inch square concrete piles driven to rock (294 vertical piles and 32 batter piles) in a 10 bent arrangement spaced 50 feet apart with cast-in-place (CIP) pile-caps, precast girders, and CIP 15-inch deck slab;
- An EMAS approximately 500-feet long by 170-feet wide located within the RSA;
- Relocation of the existing 20-foot-wide airport perimeter road to a location between the Runway 27 threshold and the EMAS;
- Straightening of the perimeter road on the north side of the runway to enhance vehicular sight lines and situational awareness crossing the runway end while remaining clear of the EMAS;
- Two 25-foot-wide emergency access ramps, each located on either side of the proposed deck; and
- Life rings on the sides and end of the deck to further enhance access in and out of the water in the event of an aircraft emergency.

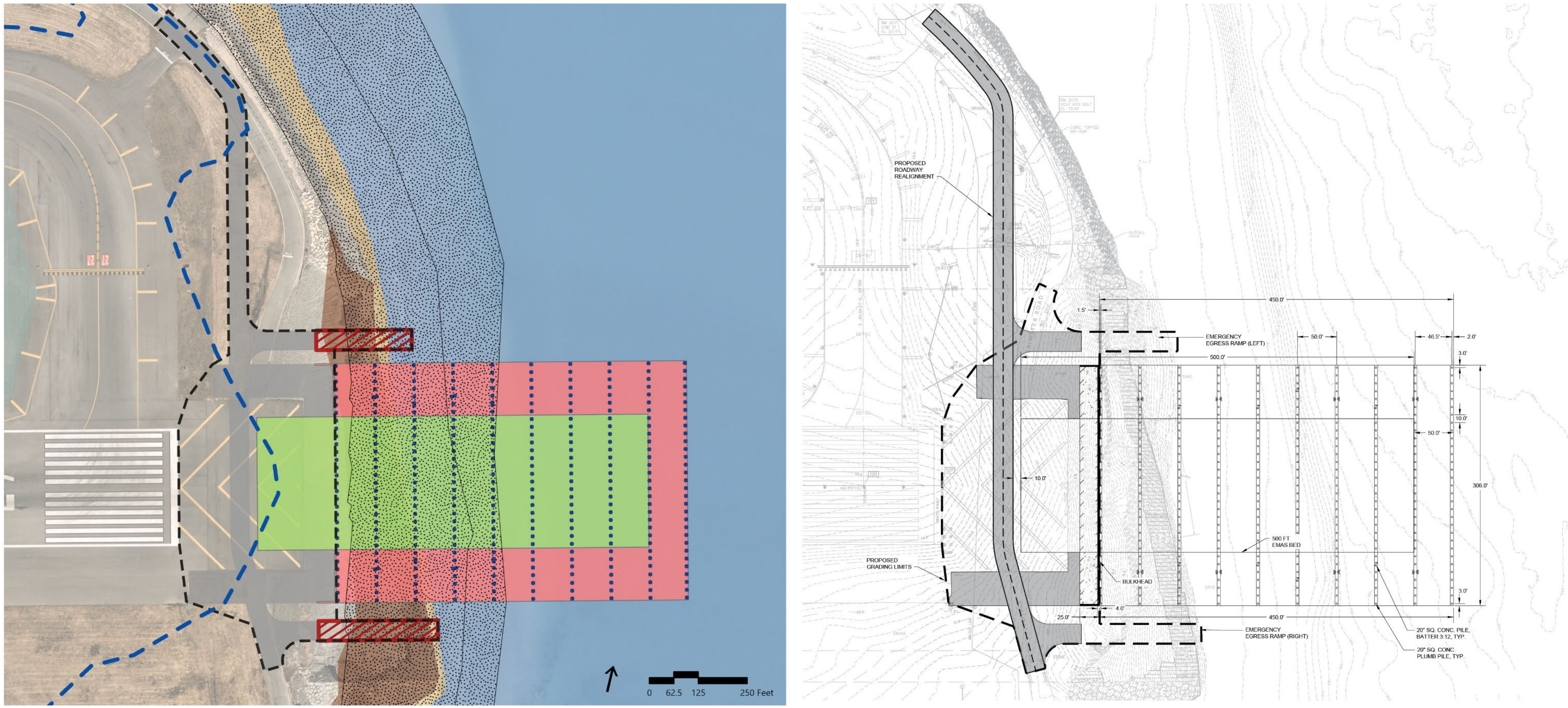
3.5 Conclusion

This chapter of the DEIR documents the process undertaken by the FAA and Massport to identify reasonable alternatives for improving the Runway 27 End RSA to meet current FAA design standards for length. The DEIR Section 3.2 documents the Tier 1 Alternatives Screening conducted prior to the ENF, in which the FAA and Massport examined six build alternatives and concluded that the only reasonable alternative for enhancing the Runway 27 End RSA, consistent with the FAA requirements, is an approximately 650-foot-long RSA with an EMAS constructed on a 306-foot-wide deck extending up to 450 feet into Boston Harbor (RSA Alternative 4B). The FAA concluded RSA Alternative 4B would provide the highest level of aircraft safety without reducing the operational capability of the runway, while also avoiding and minimizing environmental impacts in Boston Harbor. While the FAA directed Massport to construct an improved RSA with EMAS on a deck, the FAA did not specify the type of deck support structure to be constructed.

As documented in DEIR Section 3.3, Massport considered four alternatives for supporting a 306-wide by 450-foot-long deck in the Tier 2 Deck Support Alternatives Screening. The analysis determined that Deck Support Alternative 2, comprised of 326 20-inch square concrete piles, is the recommended alternative for further analysis.

Deck Support Alternative 2 would have the least impact on environmental resources, has the shortest in-water construction duration and the shortest duration construction noise impacts on the surrounding neighborhoods. Furthermore, it is the only practical construction alternative with regard to minimizing impacts to airfield operations. For these reasons, Deck Support Alternative 2 is carried forward for further analysis in DEIR Chapter 5, *Impacts Assessment,* and as required by the MEPA and NEPA processes, the No-Build Alternative will also be carried forward for further analysis in Chapter 5.

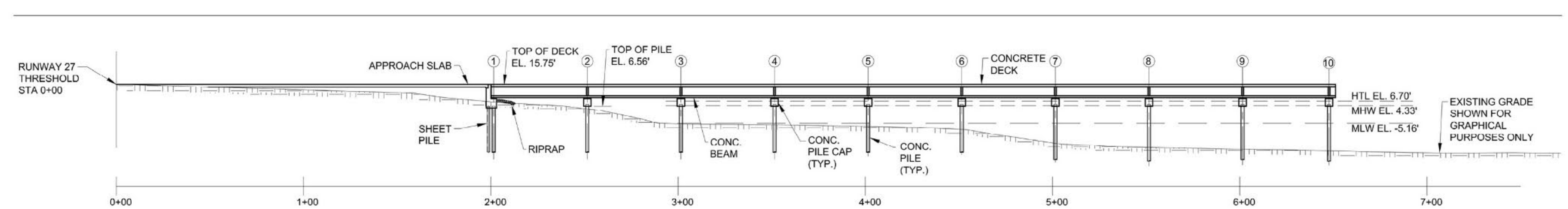
This Page Intentionally Left Blank.



326 20-Inch Square Concrete Piles

The pile configuration includes:

- 326 total piles (294 vertical piles and 32 batter piles)
- 20-inch square concrete piles driven to rock in 10 bents[1] of 31 piles each
- Bents spaced 50 feet apart and piles within each bent spaced 11 feet apart



\\vhb\gbl\proj\Wat-EV\14792.00 WSP - MPA Runway 9-27\Reports\DEIR-EA\Drafts\Figures

FIGURE 3-10: RSA Deck Support Alternative 2 **Runway 27 End RSA Improvements Project**

Proposed Grading Limits
Pile-Supported Deck
Proposed Engineered Materials Arresting System (EMAS) Bed
Proposed Pavement
Proposed Piles
Proposed Caissons
Proposed Approach Slab
Proposed Emergency Ramp
Coastal Beach
Land Under Ocean
Land Subject to Tidal Action
Federal Emergency Management Agency (FEMA) 100-Year Flood Level
Land Containing Shellfish

1 A bent is an array of piles in a row and fastened together at the top by a pile cap.

This Page Intentionally Left Blank.

4

Existing Environment

4.1 Introduction

The Existing Environment, also referred to as the existing conditions, for the proposed Runway 27 End Runway Safety Area (RSA) Improvements Project (the Project or the Proposed Project) is documented for each applicable environmental resource category specified in 301 Code of Massachusetts Regulations (CMR) 11.07(g). The purpose of the Existing Environment analysis is to provide a baseline of the existing environmental resources present where the Project would occur. These baseline conditions are then used to compare to the Build Condition and assess potential impacts associated with this safety project.

Figure 4-1 shows the Study Area used for a majority of the Existing Environment analyses, which encompasses the approximate area that may be temporarily used during construction, including staging. The Study Area is located at the eastern end of Runway 9-27 and includes adjacent environmental resources potentially affected by the Project. The Project Site, as shown in **Figure 4-1**, is the approximate boundary within which the permanent improvements would exist (i.e., the permanent RSA deck, emergency egress ramps, realigned perimeter road, and the limits of grading). A larger Study Area was considered for some resources (as noted within the narrative). Runway 9-27 is oriented east-west and extends the farthest east of any runway at Boston Logan International Airport (Logan Airport or the Airport). This chapter summarizes the existing conditions for:

- Coastal Resources (Section 4.3) and Coastal Processes (Section 4.4)
- Tidelands/Public Benefits and Navigation (Section 4.5)
- Finfish Resources (Section 4.6)
- Rare and Endangered Species (Section 4.7)
- Stormwater and Water Quality (Section 4.8)
- Ground Transportation (Section 4.9)
- Cultural/Historical Resources (Section 4.10)
- Hazardous Materials/Materials Handling/Recycling (Section 4.11)
- Air Quality and Greenhouse Gas (GHG) (Section 4.12)
- Noise (Section 4.13)
- Climate Change, Adaption and Resiliency, and Sustainability (Section 4.14)

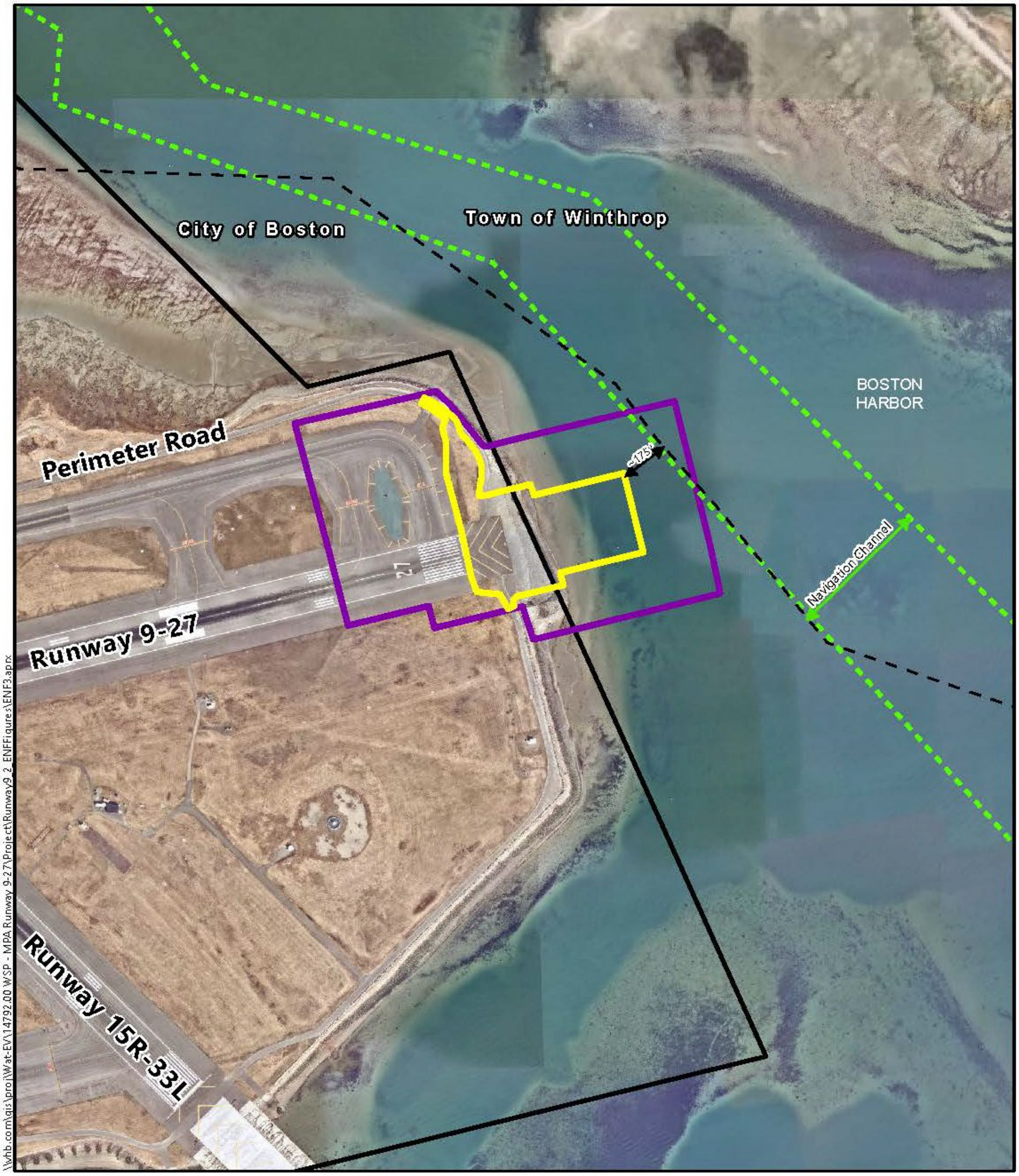


FIGURE 4-1: Project Study Area **Runway 27 End RSA Improvements Project**

Study Area
Proposed Project Site
Logan Airport Property Line
Political Jurisdictions
Designated Navigation Channel

0 250 500 1000 Feet

Sources: Nearmap Imagery, March 2022; Commonwealth of Massachusetts, Topographical Survey Commission, Atlas of the Boundaries of the Town of Winthrop, Suffolk County, 1898.

4.2 Resource Categories Not Considered

Certain resource categories were not evaluated either due to their absence within the Study Area, or because the proposed safety improvements would not change aircraft operations. Resource categories not present or affected include:

- **Pollutant Loading:** Once constructed, the proposed RSA would also have no effect on harbor pollutant loading. Pollutant loading from existing impervious surfaces would be dependent on the aircraft and automobiles/trucks using the runway, RSA and associated perimeter road, 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 would not result in any new uses in these areas.
- **Traffic:** The Proposed Project would not increase existing air operations, nor automobile or truck activity, and would not increase the risk of spills or other contamination. Traffic was evaluated as a temporary construction impact as there will be an increase in traffic during construction.
- **Public Access:** With the exception of badged access by shellfishers licensed by the Massachusetts Division of Marine Fisheries (DMF), no public access is permitted within the Study Area due to Logan Airport's legislated security zone.
- **Light Emissions**: The Proposed Project does not create or alter any existing light sources and is therefore not analyzed.

4.3 Coastal Resources

Coastal resources in the vicinity of the Proposed Project include the shoreline, intertidal, and subtidal areas. Work in the Study Area consists of construction activities within Boston Harbor, which have the potential to affect coastal and water resources such as changes in water circulation, sedimentation, and erosion. This section examines existing coastal resources and marine habitats within the Study Area.

4.3.1 Regulatory Framework

Coastal resource areas subject to federal, state, and local jurisdiction are present within Logan Airport's boundary and within the Study Area. The regulatory requirements for work within coastal resources include the Massachusetts Wetlands Protection Act (WPA),[1] Section 10 of the Rivers and Harbor Act (Section 10),[2] Section 404 of the Clean Water Act (Section 404),[3] and are discussed in the following sections.

1 Massachusetts General Law (MGL) Chapter 131 Section 40 – 310 CMR 10.00.
2 33 USC 403 – Section 10 of Rivers and Harbors Act of 1899.
3 Public Law 92-500 Section 404.

4.3.1.1 Massachusetts Wetlands Protection Act (310 CMR 10.00)

The Proposed Project is regulated by the provisions of the WPA[4] and with specific resource areas and associated performance standards. Project review under the WPA is delegated to the local conservation commission, in this case, the Boston Conservation Commission. Any appeals of a local decision would be reviewed by the Massachusetts Department of Environmental Protection (MassDEP). A Notice of Intent (NOI) will be prepared and submitted to the Boston Conservation Commission for review, and at the same time a copy will be submitted to MassDEP.

Identification of the regulated resources was based on-site inspection and resource delineation and categorized according to the definitions of the different resource areas described below. The Project Site is located within the City of Boston (refer to **Figure 4-1**). Massport will, however, continue to coordinate with the Town of Winthrop, including the Winthrop Conservation Commission.

State and local resource areas regulated in the WPA are generally determined by the physical shoreline configuration, tidal elevation, vegetation, or floodplain elevation. State and local regulated resources at the Project Site include the following:

- Land Under the Ocean
- Coastal Beaches
- Coastal Banks
- Salt Marsh
- Land Containing Shellfish
- Land Subject to Tidal Action
- Land Subject to Coastal Storm Flowage (100-year coastal floodplain)

The functions and values provided by the coastal resource areas present at the Airport include flood control, storm damage prevention, fish and shellfish habitat, production export, sediment/shoreline stabilization, and wildlife habitat. These coastal resources are illustrated in **Figure 4-2**.

In addition to the wetland resource areas regulated by the WPA as listed above, the state regulations include a 100-foot buffer zone landward from the upper limit of Coastal Bank, Coastal Beach, or coastal wetland.

4 Wetlands Protection Act regulations. MGL Chapter 131 Section 40 – 310 CMR 10.00.

4.3.1.2 Federally Regulated Resources

Boston Harbor is classified as a federal Navigable Water of the U.S. and work activities such as the construction of the proposed RSA deck are regulated by the U.S. Army Corps of Engineers (USACE) pursuant to Section 10 and Section 404. Section 10 regulates any structures, floats, piles, dredging and filling within jurisdiction, and Section 404 regulates the discharge of dredged or fill material below the Mean High Water (MHW) line. Section 404 jurisdiction also includes Special Aquatic Site (SAS) that includes Vegetated Wetlands like salt marsh, Submerged Aquatic Vegetation (SAV) such as eelgrass beds and Mud Flats.

The jurisdiction of Section 10 and Section 404 includes up to the Annual High Tide (AHT) line (Section 404) and to the limit of any vegetated wetland beyond the AHT line, and to the MHW line (Section 10). Pursuant to Section 10 and Section 404, the upper limits of coastal federal jurisdiction are based on tidal ranges of the MHW line for Section 10 and AHT line for Section 404 which are Elevation 4.33 feet (NAVD 1988)[5] and Elevation 6.5 feet (NAVD)(Year 2022),[6] respectively. The boundaries of federal jurisdiction are based on the tidal elevations from the National Oceanic and Atmospheric Administration (NOAA) tidal predictions, Boston Station datums, and the onsite topography. Excavating (dredging), backfilling, and driving piles below the MHW line are subject to Section 10 jurisdiction as is the proposed deck structure. Filling or backfilling for the emergency access ramps or deck supporting infrastructure that is below the AHT line are subject to Section 404 regulations.

Within the above jurisdictional areas, SASs are identified pursuant to the 404(b)(1) Guidelines[7] which have specific review considerations for potential dredging or filling projects. In the vicinity of the Study Area, the SASs present include Vegetated Wetlands (salt marsh) and Mud Flats. No work below the MHW line is planned in proximity to the adjacent salt marsh areas. An underwater survey for eelgrass was conducted, but no SAS was identified in the vicinity of the Project Site. There are no Vegetated Wetlands above the AHT line within the Study Area. Mud Flat extends seaward below the Mean Low Water (MLW) line (Elevation -5.16 feet NAVD)[8] and is exposed during extremely low tide events.

Within the proposed footprint of the RSA improvements and the emergency ramps on either side of the RSA, the federally regulated resource areas below the AHT line or MHW line are characterized as a constructed 4-inch to 6-inch crushed rock shoreline, sand/mud flat in the intertidal zone, or sand/mud subtidal seabed (refer to **Figure 4-2** for the location of the MHW, AHT, and MLW lines in relation to the Proposed Project Site).

4.3.2 Coastal Resources Existing Conditions

Both federal and state coastal resource areas are present at the Project Site. Federally regulated resources below the AHT line and the MHW line include Mud Flats, which are broad flat areas exposed during extremely low water and inundated during high tides. Salt marsh, identified in the vicinity of the Project Site, is not within the footprint of the anticipated construction area and any work adjacent to salt marsh will be landward of the Coastal Bank where a section of the existing perimeter road will be shifted away from the harbor. Mud Flats at the Project Site are regulated pursuant to the WPA as Land Under the Ocean resource area that is exposed below the MLW line during lower tidal events.

5 NOAA, *Tide Predictions; 2022 Boston, MA. Highest Predicted Tidal Level, Datum NAVD*, https://tidesandcurrents.noaa.gov/tide_predictions.html.
6 NOAA, *Tide Predictions; Datum for 8443970, Boston, MA.*, https://tidesandcurrents.noaa.gov/datums.html?id=8443970.
7 40 CFR Part 230 – Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material.
8 NOAA, *Tide Predictions; Datum for 8443970, Boston, MA.*, https://tidesandcurrents.noaa.gov/datums.html?id=8443970.

FIGURE 4-2: Environmental Resource Areas **Runway 27 End RSA Improvements Project**

- Proposed Project Site
- Proposed Emergency Egress Ramps
- Proposed Realigned Airport Perimeter Road
- Special Flood Hazard Area (100-Year Flood)
- Mean High Water Line
- Mean Low Water
- Mean Lower Low Water Line
- Annual High Tide Line
- Coastal Bank Line
- 100-ft Coastal Beach Buffer
- Land Subject to Tidal Action
- Coastal Beach
- Land Subject to Coastal Storm Flowage
- Land Under the Ocean
- Land Containing Shellfish
- Existing Airport Security Buoy (To Be Relocated)
- Logan Airport 250-Foot Inner Security Zone
- Legislated Logan Airport 500-Foot Security Zone

0 100 200 400 Feet

Sources: WSP, VHB, NOAA 2021, FIRM Panel Number 25025C0101J, Effective Date 3/16/2016, Nearmap Imagery March 2022 Massachusetts Bureau of Geographic Information, MassGIS Data: Shellfish Suitability Areas, May 2011.

4.3.2.1 Land Under the Ocean (310 CMR 10.25)

The nearshore areas of Land Under the Ocean extend from MLW seaward to the boundary of a municipality's jurisdiction and usually are covered by tidal waters. Land Under the Ocean is important for the protection of marine fisheries and shellfish. The nearshore areas are also likely to be significant to storm damage prevention, flood control, and protection of wildlife habitat.

At the Project Site, Land Under the Ocean extends from the MLW line, which is approximately at or slightly beyond the toe of the shoreline stabilization, through the portion of the Project Site that is offshore. Based on conditions during an extreme low water, Land Under the Ocean consists of a "soft bottom" with a flat nearly level silty sand surface. There is approximately 107,700 square feet of Land Under the Ocean within the Project Site as illustrated in **Figure 4-3**.

The land drops from MLW (Elevation -5.16 feet) to Elevation -8 feet in approximately 120 feet. Beyond Elevation -8 feet, the land rapidly descends (within approximately 70 feet) 7 feet to Elevation -15 feet and continues to Elevation -22 feet at the end of the proposed RSA improvements. Between MLW and Elevation - 8 feet, the land supports numerous polychaetes, snails (*Littorina littorea*), bivalves (*Mya arenaria, Spisula solidissima* and *Ensis directus*), crustaceans (hermit [*Pagurus*], and green [*Carcinus*] crabs) and when flooded, shrimp and fish.

The seabed was observed by video survey conducted as part of an eelgrass survey. Based on the video survey, beyond Elevation -8 feet, small clusters of European oysters (*Ostrea edulis*) populate the bottom that support solitary tunicates or sea squirts (*Styela* sp. or *Mogula* sp.) and macro algae (kelp). Between the clusters of oysters, spider (*Libinia*) and rock (*Cancer*) crabs, and fish were common as well as swimming Mysids, a small shrimplike species. From the results of the benthic survey, a variety of polychaetes and amphipods are present in the sediment or on the seabed surface. Other noted features from the side scan sonar survey are occasional tires, lobster pots, and large timbers present on the seabed in the Project Site. No hard bottom (bedrock or boulders/cobbles) substrate was noted in the Study Area.

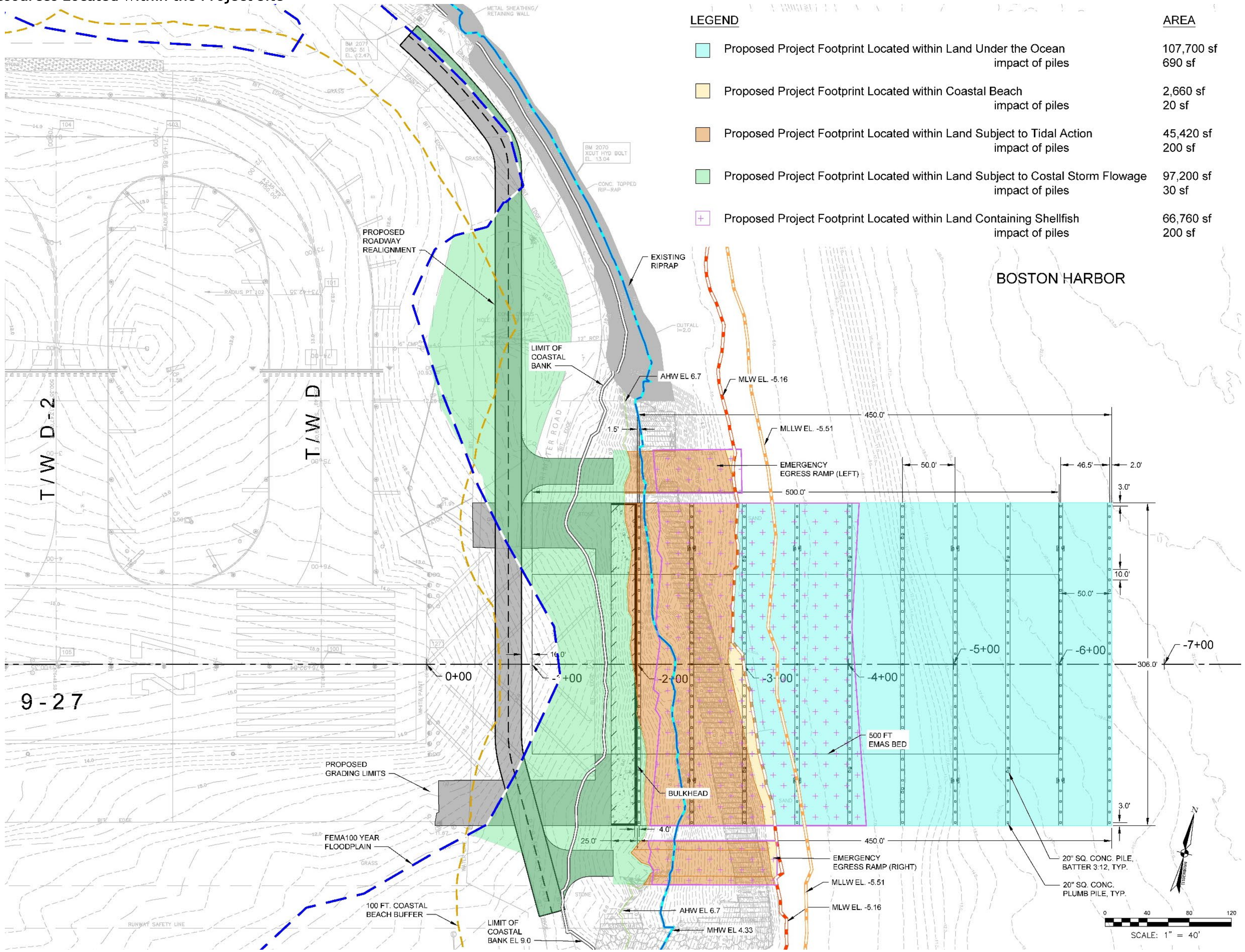
Eelgrass

The Project Site subtidal areas were investigated on June 10, 2021 to document the presence or absence of subtidal eelgrass and benthic communities. The entire subtidal Study Area was scanned with a Humminbird™ side scan sonar, and through a video survey of the seabed, to determine if any eelgrass could be identified on the seabed as well as macro marine, benthic organisms, and algae. The locations of the video tracks for the eelgrass survey are provided in **Figure 4-4**. The MassDEP Seagrass GIS data layer was also viewed and did not indicate any known areas of eelgrass (*Zostera marina*) in the vicinity of the Project Site.

A GIS review and video transects conducted in June 2021 determined there is no eelgrass within or immediately adjacent to the Proposed Project footprint (refer to the Eelgrass Survey Report in the Environmental Notification Form [ENF] Attachment F). The nearest mapped eelgrass beds are off the end of Runway 33L, approximately 900 feet south of the Project Site. Several photos were taken as screen shots from the video or by the GoPro™ camera that appeared to be blades of eelgrass (refer to the Eelgrass Survey Report in the ENF Attachment F, Plates: Video Track 8, Photos C and D; Video Track 9 Photo D; Video Track 10 Photo F; Video Track 11 Photos C and D; and Video Track 12 Photo D). However, all were determined to be dead leaves lying on the seabed and were not rooted.

Eelgrass beds are highly regulated both by state and federal regulations. Identified collectively as SAV, it provides critical feeding, rearing, cover, and escape habitat for juvenile fish and other marine resources. Eelgrass is a sea grass (not an algae) and requires sunlight for growth and can be a good indicator of water quality. Eelgrass typically is not found below 12 to 15 feet deep due to lack of light penetration. Poor water quality or low light transmittance through the water column can also reduce the presence of eelgrass beds.

Figure 4-3 Coastal Resources Located within the Project Site



This Page Intentionally Left Blank.

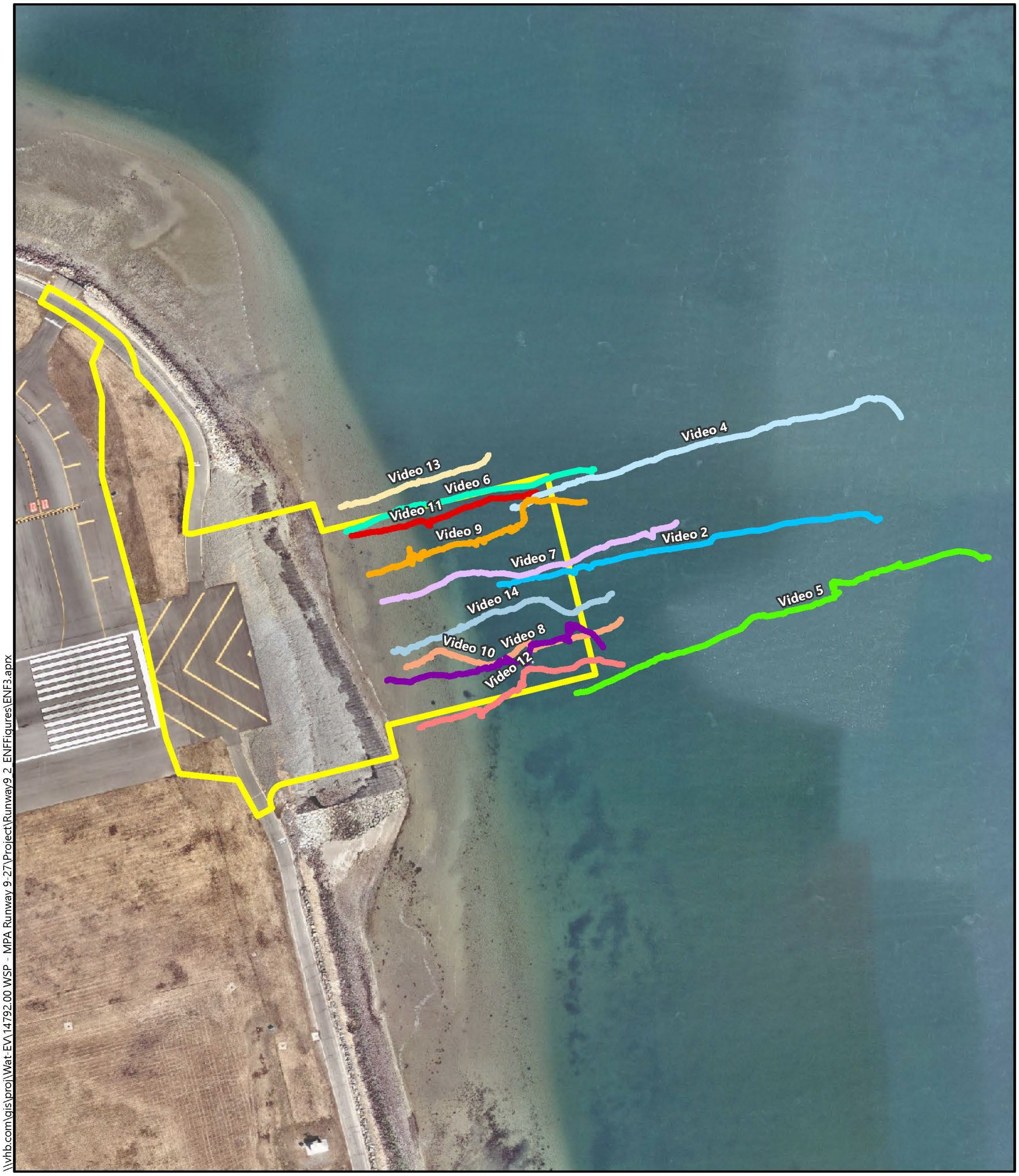
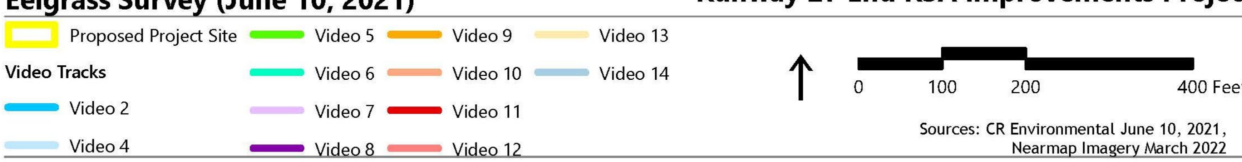


FIGURE 4-4: Video Tracks for Eelgrass Survey (June 10, 2021)

Runway 27 End RSA Improvements Project



Sources: CR Environmental June 10, 2021, Nearmap Imagery March 2022

Benthic Environment

As part of the review of the seabed and Land Under the Ocean, a benthic survey was conducted to help characterize and understand the potential impacts to the seabed. Benthic communities can indicate the relative health of the area with a diverse species community indicating a healthy environment free of pollution. Low species diversity or dominance by some species known to be tolerant can indicate a stressed or polluted environment. Benthic species are generally low on the food chain, providing food for fish and higher-level invertebrates.

In addition to the video survey, the benthic environment was surveyed by taking bottom sediment grab samples on June 10, 2021. The survey consisted of taking four samples (B27-1, B27-2. B27-3, and B27-4) from a research vessel within the footprint of the Proposed Project (refer to **Figure 4-5**). The sediment samples were collected with a Ted Young modified VanVeen grab operated from a small research vessel. 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 Site. Station B27-4 was located slightly inshore of the other samples in an area that is exposed during extreme low water events.

The collected sediment samples were sieved on the boat with pumped seawater and a 0.5-millimeter stainless steel 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 and plant debris. The pre-sorted animals were then identified to the family level, if possible, and counted. The collected animals were stored in 70 percent ethyl alcohol.

The results of the identification of the benthic samples are provided in **Table 4-1** (for more detail see Appendix D.2, *Benthic Survey Results*). The numbers of identified species ranged from 11 to 17 and the numbers of individuals ranged from 97 to 578. The species collected represented a range of polychaetes, crustaceans, and mollusks, typical of a marine or estuarine habitat. The dominant polychaetes were several species of family Spionidae, and the dominant crustaceans were amphipods. The diversity of benthic species and density of individuals indicates a healthy environment.

Table 4-1 Benthic Sampling Results

	Station B27-1	Station B27-2	Station B27-3	Station B27-4
No. of Species Identified[1]	11	17	13	16
No. of Individuals	97	432	435	578

Source: VHB, March 2022
1 Identification generally to Family

FIGURE 4-5: Benthic and Shellfish Sample Locations

Runway 27 End RSA Improvements Project

Proposed Project Site
Benthic Samples
Blue Mussel Samples
Shellfish Survey Location

0 125 250 500 Feet

Sources: VHB 2021, ESRI, Nearmap Imagery March 2022

Based on visual observation of the sediment collected in the benthic grab, the seabed sediment at the deeper benthic sampling stations (B27-1, -2, and -3) consists of sandy silt/clay sediment, while the sediment at shallower station (B27-4) consisted of silty sand. Sediment at all stations had a thin (centimeter) oxidized surface layer of light gray or brown sediment and black reduced mud below. When sieved, nearly all the mineral material (sand and mud) passed through the sieve and the remaining collected material was mostly decomposed plant material (algae or saltmarsh grasses), shell fragments, polychaete tubes, and other invertebrates.

4.3.2.2 Coastal Beaches (310 CMR 10.29)

According to the WPA regulations, Coastal Beaches, which are defined to include tidal flats, are significant to storm damage prevention, flood control, and the protection of wildlife habitat. Tidal flats are the nearly level portion of the Coastal Beach.

The Coastal Beach is very narrow at the Project Site, between the stabilized Coastal Bank and the MLW line. Coastal Beach is only about 10 to 13 feet wide consisting of nearly level sand and fine-grained sediments between Elevation -5.0 and -5.16 feet along the southern half of the proposed RSA improvements. The characteristics of Coastal Beach at the Project Site are the same as the near shore Land Under the Ocean, supporting soft bottom benthic habitat. The narrow Coastal Beach area is low in the tidal range and only exposed for a short time during low tides. There is approximately 2,165 square feet of Coastal Beach within the Project Site as illustrated in **Figure 4-3**.

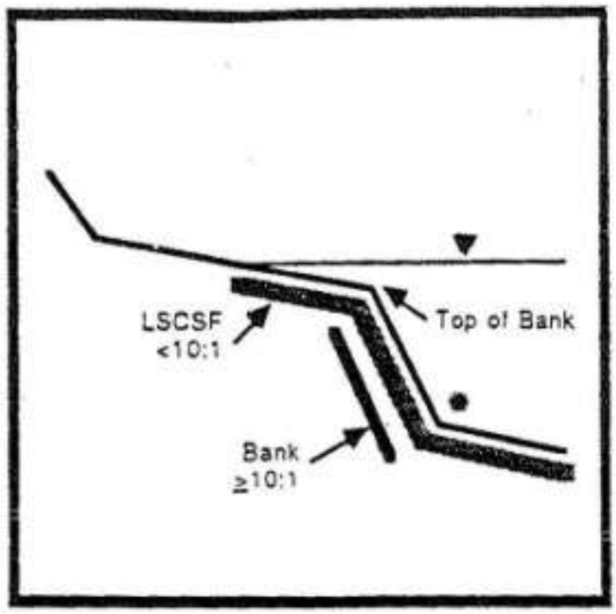
4.3.2.3 Coastal Banks (310 CMR 10.30)

Coastal Banks are the seaward face of an elevated landform, landward of Coastal Beach, Land Subject to Tidal Action, or other wetland resource area. The Coastal Bank is landward of the MLW line or the upper limit of Land Under the Ocean. Coastal Bank is presumed to be important for storm damage prevention and flood control.

The Coastal Bank at the Project Site is an entirely man-made feature of 4-inch to 6-inch crushed rock to stabilize the seaward shoreline slope off the end of Runway 27. Based on the MassDEP Policy 92-1 (**Figure 4-6**), Coastal Bank at the Project Site extends landward from MLW to the point where the slope of the land becomes flatter than 10:1. The point roughly corresponds to Elevation 9.0 feet. The distance between the top of Coastal Bank at Elevation 9.0 feet and MLW at -5.16 feet is 88 feet and an average slope of 8:1. Above Elevation 9.0, the average slope of the land is 12.5:1 to the edge of the existing paved RSA. The Coastal Bank consists of the 4-inch to 6-inch crushed rock shoreline stabilization and does not support any vegetation.

Work in Coastal Bank will consist of reconstruction of the existing paved RSA, repaving the new RSA and installing the new emergency access ramps. Approximately 420 linear feet of Coastal Bank will be altered by the Project.

Figure 4-6 Top of Coastal Bank per MassDEP Wetlands Program Policy 92-1



As shown in the above figure, and as defined in Wetlands Program Policy 92-1, "A "top of coastal bank" will fall below the 100-year flood elevation and is the point where the slope ceases to be greater than or equal to 10:1."

Source: Massachusetts Department of Environmental Protection, Wetlands Program Policy 92-1: *Definition and Delineation Criteria for Coastal Bank*, Figure 4, Issued March 3, 1992.
Note: LSCSF = Land Subject to Coastal Storm Flowage

4.3.2.4 Salt Marsh (310 CMR 10.32)

An area of salt marsh was identified to the north of the Project Site, approximately 740 feet from the proposed Runway 27 End RSA improvements. The salt marsh appears to be low marsh dominated by saltmarsh cord grass (*Spartina alterniflora*). Although near the Project Site, no salt marsh is within the anticipated Project Site.

4.3.2.5 Land Containing Shellfish (310 CMR 10.34)

Land Containing Shellfish is found within other coastal wetlands resources subject to the jurisdiction of the WPA and it is a significant interest identified in the WPA. Specifically, Land Containing Shellfish is located within part the Coastal Beach and Land Under the Ocean for this Project. The shellfish species that are characteristic of Land Containing Shellfish include bay scallop (*Argopecten irradians*), blue mussel (*Mytilus edulis*), ocean quahog (*Arctica islandica*), oyster (*Crassostrea virginica*), quahog (*Mercenaria mercenaria*), razor clam (*Ensis directus*), sea clam (*Spisula solidissima*), sea scallop (*Placopecten magellanicus*), and soft shell clam (*Mya arenaria*). The area of Land Containing Shellfish based on the MassGIS data layer for Shellfish Suitability Areas is illustrated on **Figure 4-7**. Additionally, the Runway 27 End is within the DMF Conditionally Restricted shellfish[9] growing areas GBH5.2 and GBH5.3 and Restricted growing area GBH5.0 (**Figure 4-7**).

9 Conditionally Restricted: Contains a limited degree of contamination at all times. Subject to intermittent pollution events and may close due poor water quality from rainfall events or season. When open, only commercial harvesting of soft shell clams for depuration is allowed.
Source: Massachusetts Division of Marine Fisheries website. https://www.mass.gov/service-details/shellfish-classification-areas.

Coordination was conducted with the DMF to identify shellfish species that may be found in the vicinity of the Study Area. On April 23, 2021, Massport and DMF discussed 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*). The DMF representatives noted the survey would likely find a few razor clams but may not find live specimens of soft shell clams since the clam population throughout Boston Harbor has suffered over the past decade due to disease. The 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 region-wide disease. The DMF representatives suggested collecting a sample where paired clam shells (dead) are observed as clams tend to settle where they spawn in clusters. The DMF also suggested selectively collecting the upper centimeter of sediment to collect small seed clams.

An intertidal shellfish survey was conducted on April 29, 2021 during an extremely low tide event (-7.3 feet) that exposed a broad sand flat (±100 feet) below MLW which is normally submerged. The shellfish sampling was primarily intended to evaluate the Project Site for the presence of a soft shell clam (*Mya arenaria*) population, an important commercial species. The 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 square meter polyvinyl chloride (PVC) pipe quadrat (50 centimeters on a side). The first 2 to 3 centimeters of the quadrat was collected separately and sieved through fine screening to collect any small seed clams that may be present. The next 6 to 8 inches within the quadrat was collected for larger or adult specimens. The lower collected sediment was sieved through 0.25-inch mesh to separate any shellfish or other animals. Four shellfish sites were sampled (one on each side of the Project Site and two within the Project Site (**Figure 4-5**). 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 and could be present within the armored shoreline.

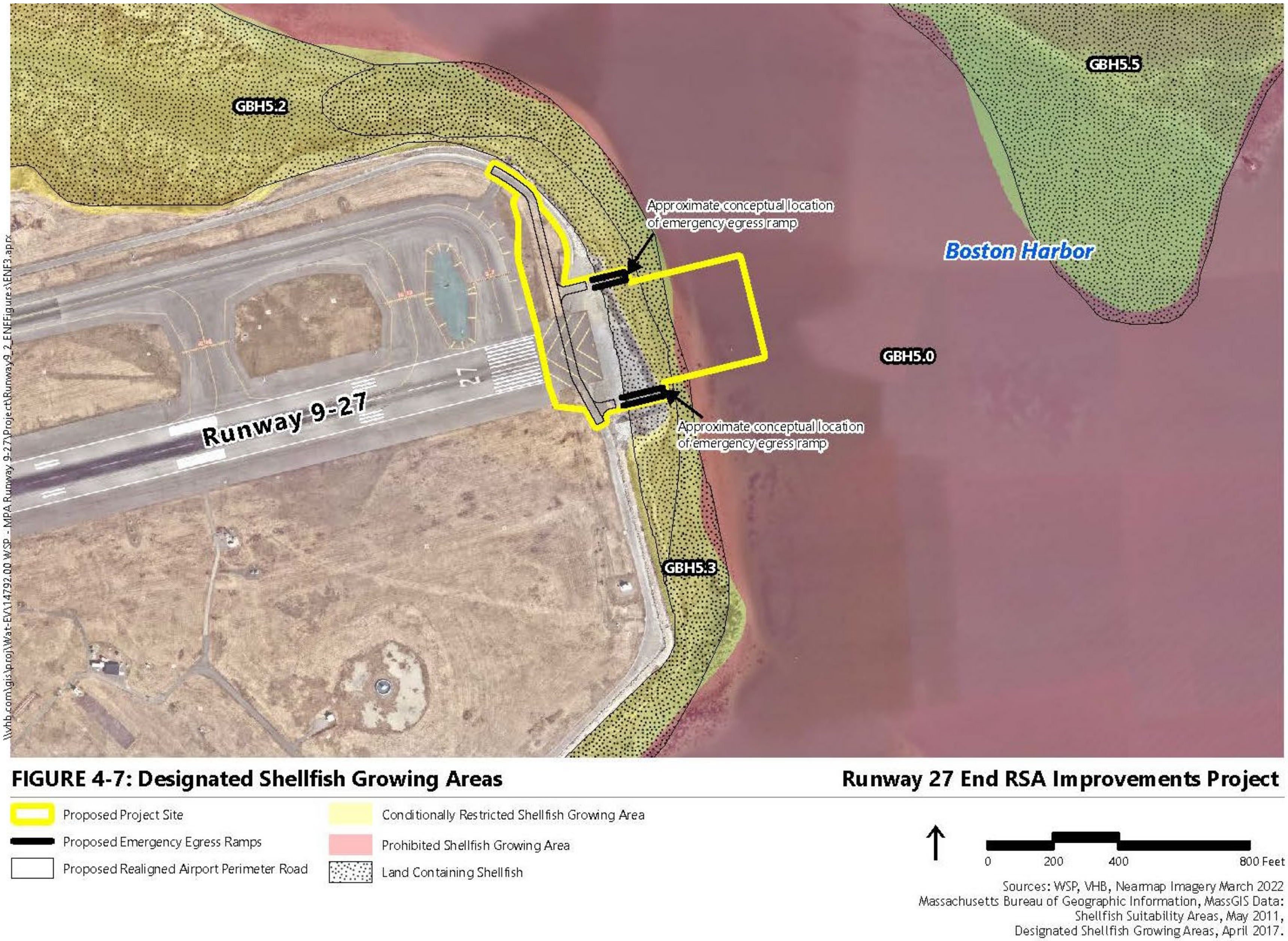


FIGURE 4-7: Designated Shellfish Growing Areas **Runway 27 End RSA Improvements Project**

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 (dead) was observed and Station S 27-2 was located in the midst of these shells but only one small soft shell clam was collected.

The results of 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 4-2**). Dead adult soft shell clams were observed in several areas (**Figure 4-8**) including in the vicinity of Station S27-2. Blue mussels (*Mytilus edulis*) are also present attached to the armoring rock along the shoreline north of the proposed RSA improvements in a band between low tide and high tide (**Figure 4-8**). The full observations and results of the shellfish field study can be found in Appendix D.3, *Bivalve Field Survey Notes at Runway 27 End*.

Table 4-2 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 centimeter)	8	2 (5 and 2 centimeter)	8	1 surf clam (Spisula solidissima) (.5 centimeter) 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 centimeter)	4	0	0	Polychaete worms
S27-4	1 (0.5 centimeter)	4	0	0	Polychaete worms

Source: VHB, April 2021

4.3.2.6 Land Subject to Tidal Action (310 CMR 10.02(1)(c))

Land Subject to Tidal Action is land that experiences the periodic rise and fall of a coastal water body, including spring tides according to WPA regulations. Land Subject to Tidal Action is measured from between the Annual High Water line (AHW) to the MLW line and includes Coastal Beach and Coastal Bank. Land Subject to Tidal Action can consist of unconsolidated sediment, riprap, or in some cases be vegetated. The Land Subject to Tidal Action was determined as the area of the Project Site between the AHT line (Elev. 6.7 feet) and MLW line (Elev. -5.16 feet).

The Land Subject to Tidal Action is significant to the Airport as it provides storm damage prevention and flood control. This land includes the Coastal Beaches. Within the Project Site, the Land Subject to Tidal Action consists primarily of a constructed rocky shoreline and encompasses approximately 35,955 square feet as shown in **Figure 4-3**.

Dead Adult Soft Shell Clam *(Mya arenaria)* **Observations on the Tidal Flat Surface at Station B-27-2**

Blue Mussels *(Mytilus edulis)* **Observations Along the Shoreline Protection North of the Proposed Project Site**

Figure 4-8: Photograph Observations: Soft Shell Clam and Blue Mussels

Runway 27 End RSA Improvements Project

4.3.2.7 Land Subject to Coastal Storm Flowage (310 CMR 10.02(1)(d))

Land Subject to Coastal Storm Flowage includes Coastal Bank, Coastal Beach, and extends to the landward extent of the 100-year floodplain. Floodplains are defined in the federal Executive Order (EO) 11988, Floodplain Management,[10] as "the lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands. Floodplains include, at a minimum, those areas with at least a one percent or greater chance of flooding in any given year" (i.e., area inundated by a 100-year flood).[11] The 1 percent annual chance (100-year frequency) flood has been adopted by the Federal Emergency Management Agency (FEMA) as the base flood for floodplain management purposes.

Land Subject to Coastal Storm Flowage, as described by the WPA, is defined as "land subject to any inundation caused by coastal storms up to and including that caused by the 100-year storm, surge of record or storm of record, whichever is greater." Land Subject to Coastal Storm Flowage was identified within the Study Area using the Flood Insurance Rate Map (FIRM) issued by FEMA using the mapped 100-year floodplain boundary (refer to **Figure 4-2** and the associated green shading). The Study Area is included on FEMA FIRM Panel 25025C0101J, revised March 16, 2016. As illustrated on the FEMA FIRM and as depicted in **Figure 4-9**, the Study Area is within four flood zones:

- Zone VE (Elevation 14) is offshore between Logan Airport and Winthrop. The VE zones represent a velocity hazard area with wave action above the Base Flood Elevation (BFE) noted in parentheses in feet. Zone VE encounters the outer edge of the proposed RSA deck.
- Zone VE (Elevation 13) follows the inshore area of shoreline of Logan Airport.
- Zone AE (Elevation 12) is onshore and extends from the shoreline a short distance onto the upland of the Airport.
- Zone VE (Elevation 15) includes a small portion of the Project Site consisting of the perimeter road north of the proposed RSA deck.

The boundaries of these zones represent the 100-year floodplain. The 100-year floodplain is also the boundary of the Land Subject to Coastal Storm Flowage as it extends on to the Airport as illustrated in **Figures 4-2** and **4-3**. All elevations are based on the datum of NAVD. Approximately 97,200 square feet of Land Subject to Coastal Storm Flowage would be altered by the Proposed Project (**Figure 4-3**). The alterations would include reconstructing the paved RSA, reconfiguring the airport perimeter roadway from the north and the upper portions of the two emergency egress access ramps.

10 42 Federal Register 26951, Executive Order No. 11988, *Floodplain Management*, May 24, 1977.
11 *Ibid.*

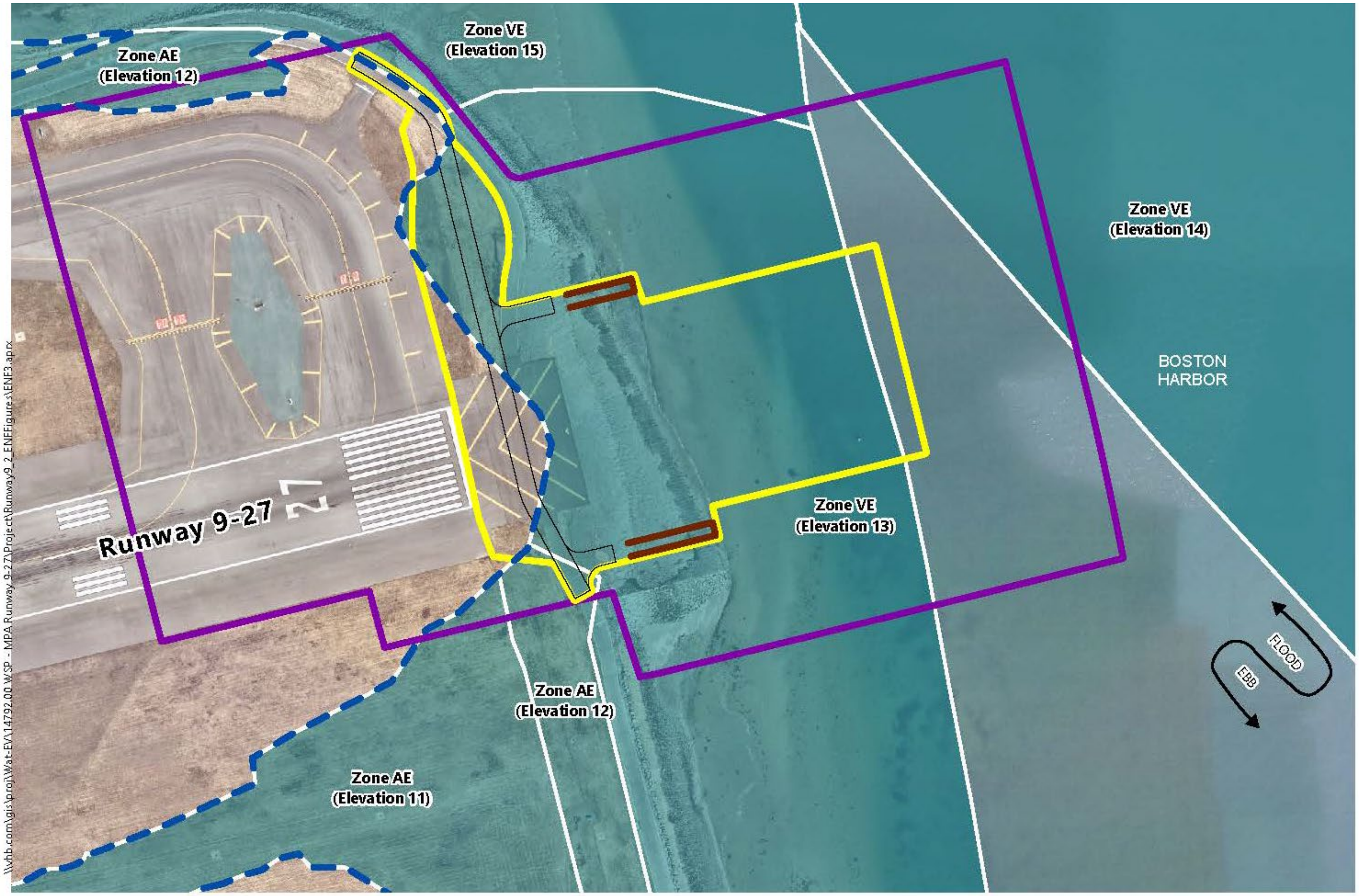


FIGURE 4-9: FEMA Flood Hazard Areas

Runway 27 End RSA Improvements Project

Proposed Project Site
Study Area
Proposed Emergency Egress Ramps
Proposed Realigned Airport Perimeter Road

Federal Emergency Management Agency (FEMA) Special Flood Hazard Area (SFHA) Subject to Inundation by the 1% Annual Chance Flood (100-Year Flood)

Zone AE: Base Flood Elevations Determined
Zone VE: Coastal Flood Zone with Velocity Hazard (Wave Action); Base Flood Elevations Determined

0 100 200 400 Feet

Sources: WSP, VHB, NOAA 2021, FIRM Panel Number 25025C0101J, Effective Date 3/16/2016, Nearmap Imagery March 2022 Massachusetts Bureau of Geographic Information

4.3.2.8 Federal Resource Areas

Federal resource areas extend seaward from AHW or MHW depending on jurisdiction. Between AHW and MLW the Project Site is a crushed rock covered Inclined Safety Area (ISA). The lower toe of the ISA includes a stone filled geogrid mattress to add stability to the shoreline and contain the stone within the ISA. Below MLW to MLLW (Mean Lower Low Water) and beyond the seabed is a gently sloping silty sand substrate that continues seaward. The federal resource areas are the same as Land Subject to Tidal Action, and Land Under the Ocean as described above for the state regulated resource areas.

4.4 Coastal Processes

Coastal processes describe the series of actions (currents, waves, sediment erosion and deposition, and marine resources) that move sediment, shape coastal landforms, and determine the geologic evolution of coastlines, including coastal wetlands. A field study was conducted November 2021 to January 2022 to characterize the oceanography of the marine waters in the vicinity of the Proposed Project. Marine sediments were characterized from a borings program conducted in July 2020. Conclusions from this study are described below and in Appendix D.4, *Coastal Analysis*.

4.4.1 Regulatory Framework

There are no federal state or local laws or regulations that regulate coastal processes.

4.4.2 Coastal Processes Existing Conditions

This section describes coastal processes present at the Project Site, including currents, waves, and sediment and erosion deposition.

4.4.2.1 Currents

Currents were measured by an Acoustic Doppler Current Profiler (ADCP) device that is placed on the seafloor, which can measure the vertical structure of horizontal current speed and direction, tidal elevation and wave height, direction, and period for extended periods of time. An ADCP was deployed from November 2021 to January 2022 in a mean water depth of 4.5 meter (14.8 feet) just to the northeast of Runway 27 End. Currents in the area are primarily driven by semi-diurnal tides and show little variance through the depth of the water column. Currents of up to 0.22 m/s in northern direction (V-velocity) and 0.33 m/s in eastern direction (U-velocity) were recorded during the ADCP deployment.

4.4.2.2 Waves

Waves are created as wind blows over the ocean surface, so there is a close correlation between wind and waves. The amount of energy transferred to the water by the wind depends upon wind speed, the length of time the wind blows (duration), and the distance over which the wind blows over the water (fetch). Energy is stored in waves until it is released when the wave reaches the coastline or other obstruction. Waves are generated inside the Harbor by wind blowing over the water surface but they can also come from the ocean outside the Harbor under certain circumstances. The Study Area is subject to both local wind-generated waves and ocean waves entering from the east. The maximum wave height recorded during the ADCP deployment in November 2021 to January 2022 was

1.27 meters, and the average wave height was 0.25 meters. Appendix D.4, *Coastal Analysis,* shows the calibration of the model with the water depths and velocities; that includes the effect of the tides generated due to the locally generated wind and waves entering from the east during the sampling period.

4.4.2.3 Sediment Data

The U.S. Geological Survey (USGS), Massachusetts Office of Coastal Zone Management (CZM), and NOAA collaborated on a study to characterize the seafloor of Boston Harbor. Much of the seabed in outer Boston Harbor has been altered by human activities including dredging, dredge material disposal, wrecks of small boats and barges, and piles of debris.[12] Bottom sediments are generally sand, silt, and clay with small fractions of gravel in places. The majority of the seabed in outer Boston Harbor, particularly adjacent to the Logan Airport property, is classified as either low-relief mud or as altered by anthropogenic modification. Low-relief mud is defined as slopes of less than 1 degree with fine-grained muddy sediment.

Sediment data and a general characterization of the seabed around Logan Airport from the USGS study support what was found in the data collected off the Runway 27 End for the Proposed Project: bottom sediments are generally sand, silt, and clay, with small fractions of gravel in all but one sample. The grain size analysis from the samples shows sediment that ranges from 0 to 12 percent gravel, 0 to 87 percent sand, and 3 to 66 percent silt plus clay. Mean values are 1 percent gravel, 12 percent sand, and 31 percent silt plus clay.[13,14] **Figure 4-10** shows the location of the soil boring locations.

4.4.2.4 Sediment Erosion and Deposition

Erosion and deposition in the near shore areas of Logan Airport are the result of sediment transport induced by waves and currents. Sediment transport occurs as a result of velocity, water depth, and wave energy, which is characterized by stress, termed bed shear stress, applied to the seabed by current and wave energy. The bed shear stress is the horizontal pressure applied on the seabed surface, due to the relative movement of the water on the seabed. Bed shear stress occurring at the seafloor for the entire outer Harbor area, from spring and neap tidal cycles during their respective high, mean, and low tide condition due to tidal currents and waves, was predicted using a hydrodynamic model. Sediments will start to move on the seabed if the shear stress exceeds a critical value, called critical shear, and it will potentially continue moving, creating a process called bed sediment transport. During bed sediment transport process, bed sediments are picked up from the water column, eroding the area from which the sediments are picked up. These sediments are deposited in areas where sediment transport capacity is higher. Bed transport and suspended sediment transport will together create erosion and deposition in different areas on the sea floor. The calibrated hydrodynamic model was used to predict the bottom shear expected to occur at the seafloor for the entire outer Boston Harbor area for high, low, and medium tides from spring and neap tidal currents and waves. The model was used to predict the areas vulnerable to erosion and deposition from the Proposed Project. Appendix D.4, *Coastal Analysis* shows a graphical representation of bottom stresses from waves and currents during high, low, and mean tides for spring and neap cycles during the period of ADCP data collection.

12 Ackerman, S.D., Butman, B., Barnhardt, W.A., Danforth, W.W. and Crocker, J.M., 2006, *High-resolution Geologic Mapping of the Inner Continental Shelf; Boston Harbor and Approaches,* Massachusetts: U.S. Geological Survey Open-File Report 2006-1008, DVD-ROM. Also available online at http://pubs.usgs.gov/of/2006/1008/.

13 One of two samples from Boring B-9, the closest boring to the shoreline, included 12 percent gravel at a depth of 10 to 12 feet.

14 GEI Consultants, Inc., *Geotechnical Data Report, Logan RW 9-27 Safety Area Improvement Project,* August 2020.

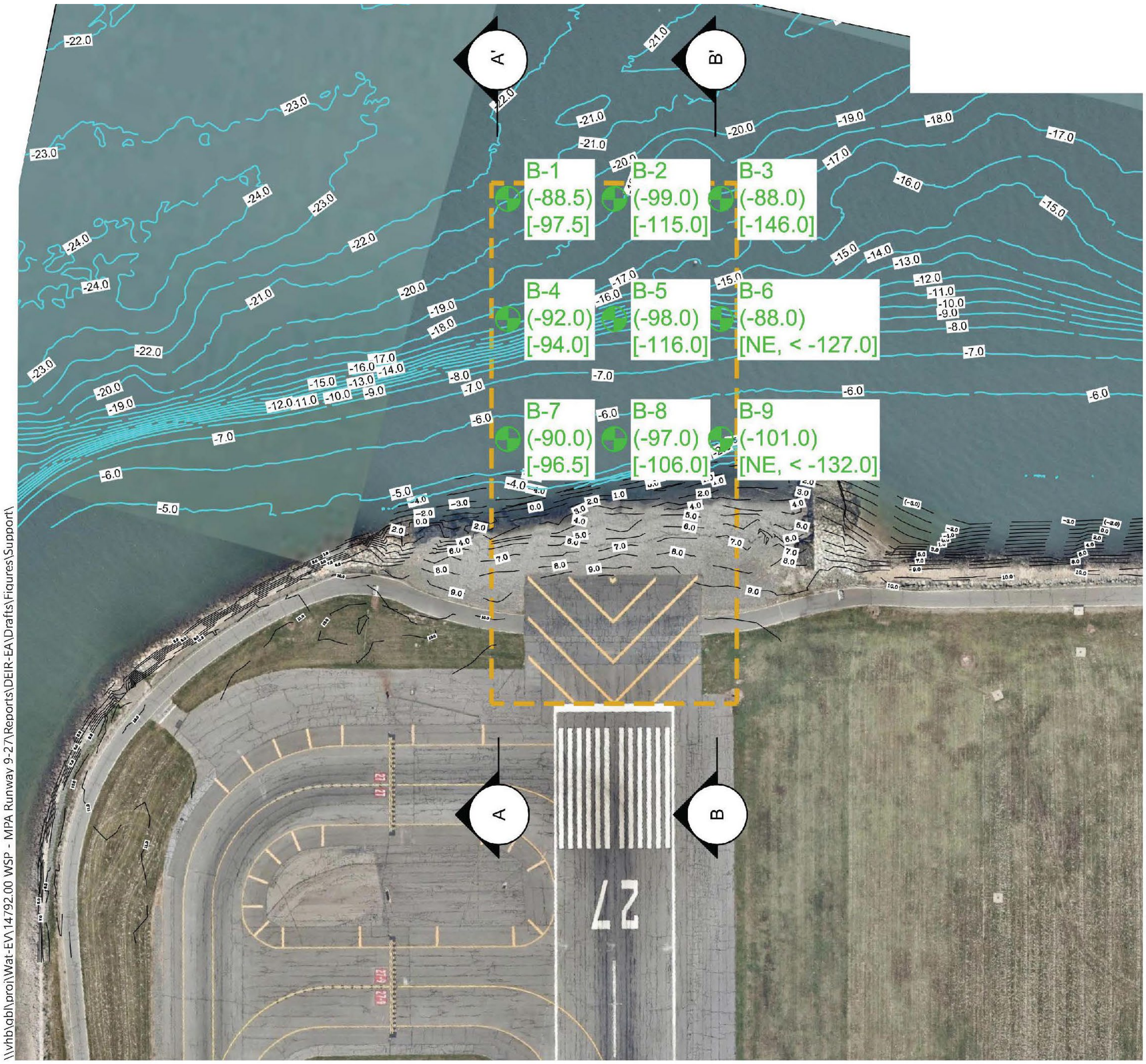


Figure 4-10: Soil Boring Locations

Runway 27 End RSA Improvements Project

Boring by GEI, 2020

(-88.5) Values in Parentheses Indicate Elevation of Top of Glacial Till

[-94.9] Values in Parentheses Indicate Elevation of Top of Bedrock

NE, < -127.0 Not Encountered. Top of Rock is Below the Bottom of Boring Elevation Indicated

Footprint of Proposed Runway Safety Area Deck

0 200 400 Feet

Notes:

1. Elevations are References to the North American Datum of 1988 (NAVD88)
2. Aerial Photo Provided By Nearmap
3. Bathymetry Data Provided By WSP on 06/17/2021

4.5 Tidelands/Public Benefits and Navigation

Logan Airport is surrounded on three sides by Boston Harbor. Massachusetts General Law (MGL) Chapter 91 protects the public's interest in tidelands and waterways of the Commonwealth. Authorization is not required in previously filled tidelands within the geographical boundary of Logan Airport (310 CMR 9.03(3)(b)); only flowed tidelands located below the high tide line would be subject to Chapter 91 jurisdiction at the Airport. The proposed RSA deck will extend beyond the existing limit of filled tidelands and will be subject to Chapter 91 jurisdiction.

4.5.1 Regulatory Framework

As noted in the Massachusetts Environmental Policy Act (MEPA) Certificate, 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 improvements 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 improvements serve a proper public purpose by enhancing aviation safety. Similar to Runway 33L RSA improvements, MassDEP has indicated that the proposed Runway 27 End RSA improvements appear to be a non-water dependent use 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 Chapter 91 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. Only licensed and badged shellfishers have access to the area. These areas are within the Logan Airport Security Zone, pursuant to MGL Chapter 90, Section 61, which restricts public access. The security zone extends 500 feet seaward of MHW. Access by licensed and badged shellfishers would not be affected by the Project.

4.5.1.1 Massport's Unique Rights and Responsibilities with Respect to Boston Harbor

Under Massport's Enabling Act, Chapter 465 of the Acts of 1956, as amended (Enabling Act), Massport was established as a public instrumentality to own, operate, and maintain Logan Airport for the benefit of the citizens of the Commonwealth. The exercise by Massport of the powers conferred by the Enabling Act "shall be deemed and held to be the performance of an essential governmental function."[15]

15 Massachusetts Port Authority Enabling Act, Chapter 465 of the Acts of 1956, Section 2, Paragraph 1 (as amended).

To facilitate operation of Logan Airport by Massport, fee ownership of Logan Airport, and certain adjacent lands under water, was conveyed to Massport by the Enabling Act. Importantly, the Enabling Act also contains a broad authorization by the Massachusetts General Court (MGC) for Massport to use additional adjacent underwater areas for airport purposes should that need arise in the future:

> "The commonwealth hereby consents to the use of all lands owned by it, ***including lands lying under water,*** which are deemed by the Authority to be necessary for the construction and operation of any project; provided, however, that any such use shall require the prior approval of the governor and council, except as otherwise specifically provided in this act."[16]

4.5.1.2 The Logan Airport Security Zone

In addition to the legislative authorization for Massport's use of adjacent submerged lands of the Commonwealth for airport purposes, the legislature has also recognized the paramount importance of maintaining safety and security along Logan Airport's waterside perimeter, as indicated in MGL Chapter 90, Section 61. By virtue of MGL Chapter 90, Section 61, the public rights that typically exist in flowed and submerged tidelands have been either completely extinguished or greatly curtailed within the Logan Airport Security Zone.

The Logan Airport Security Zone extends 500 feet seaward of and parallel to the MHW mark at Logan Airport.[17] With extremely limited exceptions described below, any access to the security zone is subject to Massport's oversight and permission. Public access is not permitted within the inner 250 feet of the Logan Airport Security Zone; however, Massport permits public boating navigation access within the outer 250-foot security zone as defined by the white and orange buoys around the airport shoreline. The Project would be located entirely within the 500-foot Logan Airport Security Zone but would extend seaward of the inner 250-foot zone (refer to **Figure 4-2**). Vessels operating in the outer 250 feet of the security zone will be restricted from operating under or near the RSA deck and will need to divert around the RSA deck when navigating in the area.

Limited shellfishing authorized by the DMF is permissible within the Logan Airport Security Zone. Massport authorizes and regulates shellfishing activity within the Logan Airport Security Zone. Any persons so authorized are required by MGL Chapter 90, Section 61 to register in advance with Massport and to undergo a security assessment which includes a federally mandated criminal records history check and a U.S. Transportation Security Administration Security Threat Assessment.

Approximately five commercial shellfishers are currently registered with Massport and cleared the requisite security check. Those individuals may engage in shellfishing activity within the Logan Airport Security Zone as authorized by the DMF regulations, provided that Massport receives prior notice of the number of individuals, the time of the activity, and "all other information as the [Massachusetts Port] Authority may reasonably require."[18]

16 Massachusetts Port Authority Enabling Act, Chapter 465 of the Acts of 1956, Section 4, Paragraph 6 (as amended).
17 Massachusetts General Law, Chapter 90, Section 61(a).
18 Massachusetts General Law, Chapter 90, Section 61(b).

Accordingly, pursuant to MGL Chapter 90, Section 61, the public rights in tidelands that might typically exist are, under state law, inapplicable within the Logan Airport Security Zone. Moreover, the limited boating and Massport-managed shellfishing activities that may take place within the Logan Airport Security Zone do not conflict with the use of the Project for its intended purposes.

4.5.1.3 Regulation of Massport Activities Under the Waterways Regulations

The role that Massport plays within the Port of Boston under its Enabling Act has resulted in the unique treatment of Massport's projects under the Waterways Regulations. Massport projects on the filled portion of Logan Airport are exempt from tidelands licensing [310 CMR 9.03(3)] and certain other activities undertaken by Massport are also exempt [310 CMR 9.05(3)(d)]. These regulatory provisions of the Waterways Regulations were adopted in light of Section 2 of the Enabling Act, which provides that Massport "shall not be subject to the supervision or regulation of the Department of Public Works (DEP's predecessor in interest with respect to tidelands licensing) or any department, commission, board, bureau or agency of the commonwealth except to the extent and in the manner provided in the [Enabling Act]," and the last paragraph of Section 6 of the Enabling Act, which provides that:

> "Upon transfer of the port properties, all the rights, powers and duties pertaining to the Port of Boston Commission in respect to lands, rights in lands, flats, shores, waters and right belonging to the commonwealth in tidewaters and in lands under water, within the Port of Boston, and any other rights and powers vested by the laws of the commonwealth in the port of Boston Commission in respect to the Port of Boston not heretofore in this act expressly vested in or imposed upon the Authority are hereby transferred to and hereafter shall be vested in and exercised by the Authority; provided, however, the department of public works [now DEP] acting through the division of waterways, may, in accordance with such plans as it may adopt, not in conflict with the purposes, powers, and plans for the development of the port of Boston or the Authority…issue licenses and permits for filling, dredging, building of structures or excavating within the port of Boston…**provided no such licenses or permits shall be required to be obtained by the Authority**."

That said, Massport has secured Ch. 91 licenses at Logan Airport for structures seaward of MHW. The existing ISA was licensed in 1993, License No. 3467. Massport expects to amend that License to accommodate the portions of the new RSA deck seaward of MHW.

4.5.2 Navigation Existing Conditions

The previous section laid out Logan Airport and Massport's unique role and jurisdiction within Boston Harbor. The following section discusses the Project Site's location in relation to nearby navigation channels.

The eastern threshold of the Runway 9-27 End is within approximately 150 feet of MHW.[19] Based on marine navigation charts,[20] the Project Site is adjacent to a marked navigation channel leading to the Winthrop Basin and the entrance to Belle Isle Inlet (**Figure 4-1**). 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 Site. The legislated Airport Security Zone extends 500 feet seaward of MHW and includes the entire footprint of the proposed RSA deck. A 250-foot inner Security Zone (**Figure 4-2**) is marked by

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

a series of white buoys surrounding the waterside perimeter of Logan Airport, including the area adjacent to the Runway 27 End RSA.

4.6 Finfish Resources

Boston Harbor is habitat for a variety of marine finfish species of both commercial and recreational value. Existing fish species and habitat were identified based on the NOAA Fisheries Service (NOAA Fisheries) Essential Fish Habitat (EFH) Mapper database.

4.6.1 Regulatory Framework

In conformance with the 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act,[21] the NOAA Fisheries has designated EFH within marine, estuarine and freshwaters of the U.S., including Boston Harbor. Designated EFH is defined as "those waters and substrate[22] necessary to fish for spawning, breeding, feeding, or growth to maturity." The NOAA EFH Mapper database was consulted to identify the EFH within Boston Harbor.

NOAA Fisheries 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[23] consultation during the National Environmental Policy Act (NEPA) review and will continue coordination with NOAA Fisheries regarding potential Project impacts.

4.6.2 Finfish Resources Existing Conditions

Based on the NOAA Fisheries EFH Mapper program,[24] within Boston Harbor, EFH has been designated for one or more life stages of 27 species. **Table 4-3** lists the 24 finfish, 2 cephalopods, and 1 shellfish species with supporting habitat for one or more life stages in Boston Harbor.

The Project Site 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 and from 0 to 20 meters from MLW. It 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 Study Area does not support a rocky substrate but is habitat to benthic invertebrates that could provide feeding opportunity for several bottom dwelling EFH species. In addition, the presence of clusters of European oysters observed on the video survey of the seabed within the Project Site provide habitat diversity, cover, and feeding opportunity from the attached algae and encrusting organisms.

21 *Magnuson-Stevens Fishery Conservation and Management Act*, Public Law 94-265, as amended through October 11, 1996. http://www.nmfs.noaa.gov/sfa/magact/.
22 *Ibid.*
23 Endangered Species Act of 1973, Sections 7(a)-(d) of 16 U.S.C. 1536(a)-(d)]
24 Essential Fish Habitat Mapper, February 16, 2017. https://www.habitat.noaa.gov/apps/efhmapper/efhreport/.

Table 4-3 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
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
Scup	*Stenotomus chrysops*	Juvenile, Adult
black sea bass	*Centropristis striata*	Adult
Northern shortfin squid	*Illex illecebrosus*	Adult
Longfin inshore squid	*Loligo pealei*	Juvenile, Adult
Atlantic surfclam	*Spisula solidissima*	Juvenile, Adult

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

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 DMF trawl surveys were suspended after the 2021 survey during the COVID-19 pandemic but were conducted again beginning in May 2022. The survey results from 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 off Nahant and Hull. 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, as a nursery and for feeding. The sandy/muddy substrate habitat at the Study Area and the associated benthic invertebrates could support suitable habitat for these finfish species. All but three of the EFH fish species listed in **Table 4-3** 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. Additionally, the subtidal area within the Study Area was mapped as essential habitat for spawning and early development winter flounder. As noted below, the video survey of the seabed in June 2021 confirmed the presence of winter flounder in the Study Area.

A field study of the Project Site was conducted on June 10, 2021. Video survey for eel grass beds, as discussed in Section 4.3, were also used to demonstrate the presence of species (including fish) within the Study Area. While video survey was not intended for this purpose, it provides additional background on local species and 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. Fish trawls or traps were not used to collect data on fish populations or use of the Study Area. The analysis is based on inferred benefit to fish species based on the presence or absence of suitable habitat obtained by the other field surveys.

Massport coordinated with the U.S. Fish and Wildlife Service (USFWS), NOAA Fisheries, 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 USFWS response was included in Attachment C of the ENF.

4.7 Rare and Endangered Species

This section discusses rare and endangered species within the Study Area. This section reviews the results of field studies done to determine initial conditions as well as agency coordination to determine effected species and habitat.

4.7.1 Regulatory Framework

The responsibility for protected species is managed by the Massachusetts Natural Heritage and Endangered Species Program (NHESP). Federally listed threatened and endangered species are either under the jurisdiction of the USFWS or NOAA Fisheries. Generally, USFWS manages upland, bird and freshwater species, while NOAA Fisheries manages marine and anadromous species.

4.7.2 Rare and Endangered Species Existing Conditions

The 2021 Massachusetts Natural Heritage Atlas was used to determine if any estimated or priority habitats are located within the Study Area. Coordination with the USFWS and NOAA Fisheries was also conducted to determine if federally listed threatened and endangered species are present within the Study Area.

The USFWS indicated that there are no federally listed threatened or endangered species under their jurisdiction within the Project Site. According to NOAA Fisheries, suitable forage and habitat exists in Boston Harbor for three species of federally-threatened or endangered sea turtles and five species of whales: loggerhead turtle (*Caretta caretta*), Kemp's Ridley turtle (*Lepidochelys kempi*), leatherback sea turtle (*Dermochelys coriacea*), the federally-endangered North Atlantic right whale (*Eubalaena glacialis*), the federally endangered humpback whale (*Megaptera novaeangliae*), the fin whale (*Balaenoptera physalus*), the sei whale (*Balaenoptera borealis*), and the sperm whale (*Physter macrocephalus*). NOAA Fisheries deemed it "likely" that sea turtles are occasionally present in Boston Harbor and therefore, may occasionally be present in the Study Area. Furthermore, NOAA Fisheries data documents loggerheads and Kemp's Ridley turtles in waters as cold as 11°C/51.8 °F. It also concluded that although the whale species are not considered residents of the Boston Harbor area, transients occasionally enter the area as they complete seasonal migrations in nearby Massachusetts Bay.

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.

Review of the 2021 Massachusetts Natural Heritage Atlas indicates there is Priority Habitat (PH 1322) in the Study Area (**Figure 4-11**). In its letter dated April 23, 2021, NHESP reported the Study 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.

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. 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.

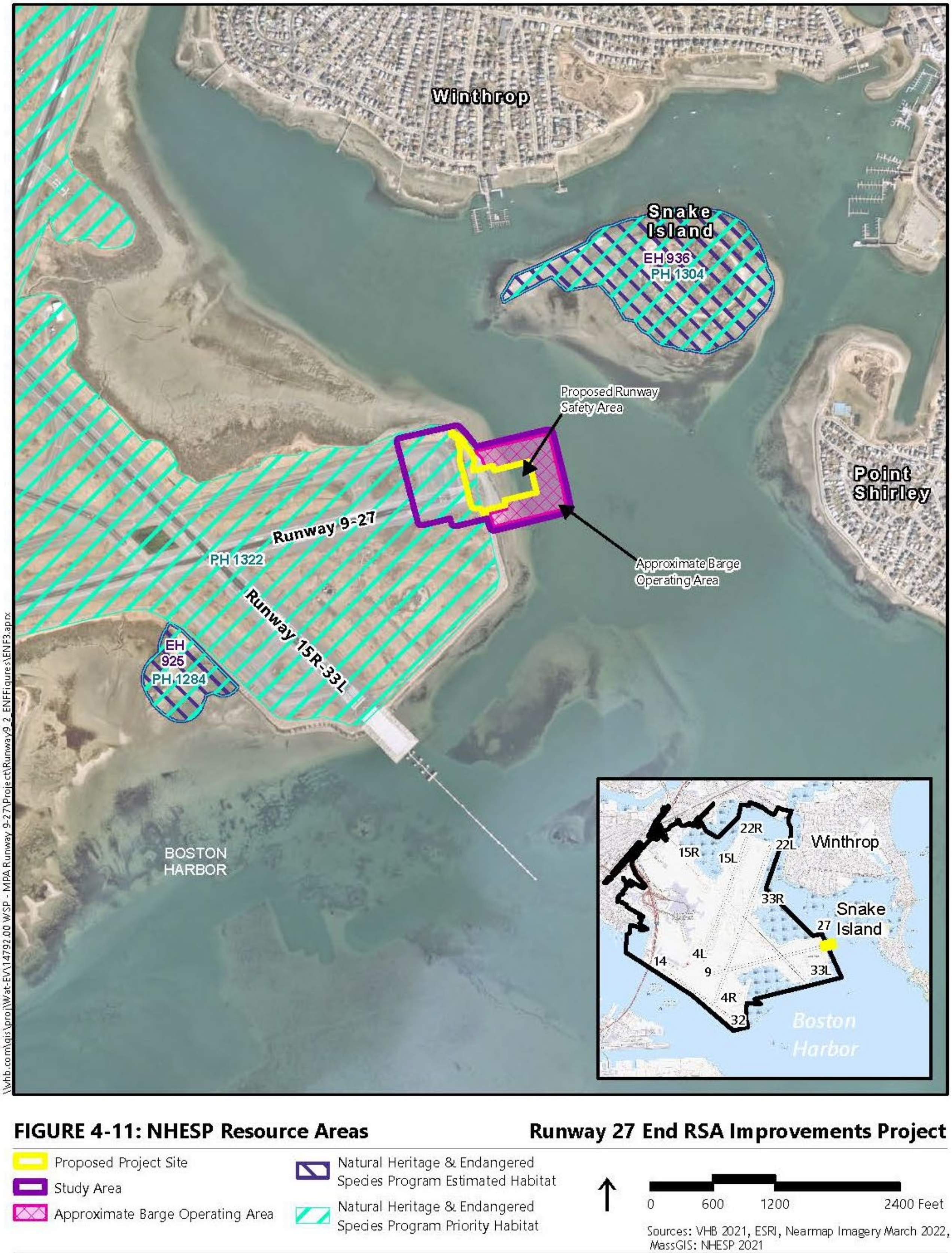


FIGURE 4-11: NHESP Resource Areas **Runway 27 End RSA Improvements Project**

Study of the vegetation around the Study Area is important for recognizing habitats of potential birds that may be impacted by the Project. On April 29, 2021, the proposed limits of work and surrounding areas were documented to assess habitat conditions. Additionally, visual, and auditory observations of bird species were documented for both upland areas and adjacent coastal features.

The upland areas within the Project Site consist primarily of pavement (runway, taxiway or perimeter road) or maintained grass area. The vegetated upland areas are maintained by Massport in accordance with the Federal Aviation Administration (FAA) wildlife hazard guidance. 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 Site is surrounded by coastal features associated with Boston Harbor including rocky shorelines, exposed tidal flats, and off to the northern side of the Project Site, 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 Study Area construction laydown areas, though none were observed during the site investigation. **Table 4-4** lists the avian species seen or heard during the April 29, 2021, site inspection.

Table 4-4 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

The presence of state-listed species on the adjacent Snake Island in Winthrop was not discussed in the ENF for this Project. However, the potential for temporary construction-related impacts to these species was raised in comments on the ENF, including the possibility of disturbing bird species using Snake Island for nesting, rearing young, and resting. Snake Island is an uninhabited island approximately 2,200 feet northeast of the Project Site in Winthrop. Over 90 species of birds have been inventoried on Snake Island.[25] Estimated habitat (EH 936) and priority habitat (PH 1304) polygons are present on the entire area of Snake Island. Massport contacted the NHESP regarding the species of interest on Snake Island and were notified that least tern (*Sternula antillarum*) and common tern (*Sterna hirundo*), both species of special concern are present on Snake Island.

A visit to Snake Island was conducted in May 2022 to evaluate the habitat and presence of bird species. During the site visit to Snake Island, visual and auditory surveys were conducted around the perimeter of the Island. Both common tern and least tern were observed on the Island and in surrounding waters. Based on the existing

25 BHI--Snake Island, Suffolk County, MA, U.S. - eBird Hotspot

habitat conditions observed on the Island and presence of individual birds, favorable habitat conditions appear to exist for both common terns and least terns on Snake Island. The island also appears to serve as nesting habitat for American oystercatchers as several pairs were noted during the site visit. The habitat evaluation and observations from the Snake Island visit are found in Appendix D.5 *Snake Island Habitat Evaluation*.

4.8 Stormwater and Water Quality

This section reports on federal and state surface and stormwater regulations, existing water quality conditions in Boston Harbor and stormwater handling at Logan Airport.

4.8.1 Regulatory Framework

Water quality and stormwater discharges at Logan International Airport are regulated by the National Pollutant Discharge Elimination System (NPDES,) and the Massachusetts Stormwater Policy and Stormwater Management Standards. The NPDES permit program, created by the Clean Water Act 33 U.S.C. Section 1251 et seq, addresses water pollution by regulating point sources that discharge pollutants in stormwater to Waters of the U.S. The NPDES Permit for Logan Airport is an individual permit, tailored to the activities that occur at the Airport, the nature of the stormwater discharge, and the quality of the receiving waters in Boston Harbor and its tributaries.

The MassDEP issued regulations under the WPA that establishes Massachusetts Stormwater Management Standards to encourage treatment and recharge of runoff and prevent stormwater discharges from causing or contributing to pollution of the surface waters and ground waters of the Commonwealth. MassDEP applies the Stormwater Management Standards pursuant to its authority under the Wetlands Protection Act (MGL, Ch. 131, Section 40) and the Massachusetts Clean Waters Act (MGL, Ch. 21, Sections 26-53). The revised Stormwater Management Standards have been incorporated in the Wetlands Protection Act Regulations, 310 CMR 10.00 and the Water Quality Certification Regulations, 314 CMR 9.00. The 10 standards of the Massachusetts Stormwater Management Standards address water quality (pollutants) and water quantity (flooding, low base flow and recharge) by establishing standards that require the implementation of a wide variety of stormwater management strategies. These strategies include environmentally sensitive site design and low impact development techniques to minimize impervious surface and land disturbance, source control and pollution prevention, structural best management practices construction period erosion and sedimentation control, and the long-term operation and maintenance of stormwater management systems.

The Existing NPDES permit for Logan Airport's stormwater outfalls (NPDES Permit MA0000787) was issued in July 2007 and permit coverage has been administratively continued since that time. The permit controls effluent limitations and includes monitoring requirements for discharges from specified stormwater outfalls. On April 12, 2021, the U.S. Environmental Protection Agency (USEPA) issued a new draft NPDES permit to Massport for stormwater discharges from the Airport. It is expected that the NPDES permit will be in place and apply to the Proposed Project once finalized. The draft NPDES permit proposes to limit the amount of pollutants entering Boston Harbor, Boston Inner Harbor, and Winthrop Bay. The draft permit has several provisions to enhance protection of the environment and public health, in line with current Clean Water Act permits issued within Massachusetts. MassDEP is expected to issue a similar permit to Massport for Logan Airport under the State's Clean Waters Act.

4.8.2 Stormwater and Water Quality Existing Conditions

4.8.2.1 Boston Harbor Water Quality

The Massachusetts Surface Water Quality Standards segments and classifies the surface waters of the Commonwealth. The Project Site is in Boston Harbor and is classified as SB Shellfishing. The Belle Isle Inlet, north of the Project Site within Rumney Marsh, is designated as SA Shellfishing, ORW (outstanding resource water).[26] A classification of SB indicates Coastal and Marine Waters designated as a habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation. Class SA indicates Coastal and Marine Waters designated as an excellent habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation. The Shellfishing designation denotes more stringent regulation in accordance with the rules and regulations of the DMF. ORWs are waters recognized for their outstanding socio-economic, recreational, ecological and/or aesthetic values.

Massachusetts reports on water quality to the USEPA in accordance with Section 303(d) of the Clean Water Act. For reporting purposes, Boston Harbor is divided into several segments based on contributing drainage areas and water body characteristics. The Project Site is in the Winthrop Bay Segment MA70-10. The Winthrop Bay Segment begins at the tidal flats at Coleridge Street in East Boston and ends at an imaginary line drawn from the northeast of Runway 33L and extending eastward to Point Shirley in Winthrop. Just south of the Project Site, the Boston Harbor Segment begins at the southern boundary of the Winthrop Bay Segment and extends eastward into Massachusetts Bay, southward to Point Allerton in Hull, and westward across the mouths of Quincy and Dorchester Bays. The 2018-2020 Clean Water Act 303(d) list of impaired waters lists each of these segments as a Category 5 water requiring a Total Maximum Daily Load (TMDL) for contaminants in fish and/or shellfish, enterococcus, fecal coliform, and Polychlorinated Biphenyls (PCBs) in fish tissue.

4.8.2.2 Logan Airport Stormwater

The NPDES permit regulates stormwater discharges from all Logan Airport outfalls including the North, West, Northwest, Porter Street, and Maverick Street Outfalls, and airfield outfalls. The Proposed Project would be located in the Airfield Outfall Drainage Area. The stormwater management system at Logan Airport consists of both a closed and open conveyance system. The Airfield Outfall Drainage Area consists of a closed conveyance system that includes catch basins and pipes to convey stormwater from runways, taxiways, and the perimeter roadway (approximately 910 acres) to Airfield Outfalls A-1 through A-44 discharging into Boston Harbor (see **Figure 4-12**). The open stormwater system uses the airfield's grass swales and open channels to infiltrate stormwater from runway surfaces.

The industrial activities conducted at the airport include, but are not limited to, aircraft and runway deicing, aircraft and vehicle fueling, aircraft and vehicle maintenance, lavatory waste handling, runway rubber removal. Massport and its Co-Permittees are subject to an extensive Stormwater Pollution Prevention Plan (SWPPP) which contains Best Management Practices (BMPs) that are designed to address all activities at the airport and minimize the discharge of pollutants from such activities. The SWPPP is updated every year. The Logan Airport SWPPP addresses stormwater pollutants, including deicing and anti-icing chemicals, bacteria, fuel and oil, and other sources of stormwater pollutants. BMPs specific to aviation activities are included in the SWPPP. In

26 314 CMR 4.06, Massachusetts Surface Water Quality Standards, current through April 15, 2022.

accordance with the other requirements of the NPDES permit, Massport conducts training for personnel responsible for implementing activities identified in the SWPPP.

Massport is required to conduct a comprehensive outfall monitoring program for the entire Airport. As part of these requirements, 15 percent of the 44 airfield outfalls (seven outfalls) are sampled during wet weather events on a quarterly basis, as well as two wet weather events during deicing season. Samples are tested quarterly for pH, oil and grease, total suspended solids (TSS), and benzene, and deicing event samples are tested for ethylene glycol, propylene glycol, five-day biochemical oxygen demand, chemical oxygen demand, total ammonia nitrogen, nonylphenol, and tolyltriazole. The draft NPDES permit contains new effluent limitations and monitoring requirements, as well as requirements to reduce the overall discharge level of glycols from deicing operations and meet new bacteria limits as a result of the State Water Quality Standards and Boston Harbor Pathogen TMDL.

FIGURE 4-12: Stormwater Outfalls and Associated Drainage Areas

Runway 27 End RSA Improvements Project

Sources: WSP, Nearmap Imagery March 2022

4.9 Ground Transportation

The following section discusses the existing roadways within the Study Area and on Logan Airport.

4.9.1 Regulatory Framework

Existing roadways are discussed per 310 CMR 11.07(6)(v).

4.9.2 Ground Transportation Existing Conditions

Logan Airport is proximate to downtown Boston and is accessible by two public transit lines: the Massachusetts Bay Transportation Authority's (MBTA's) Blue and Silver lines and a well-connected regional and interstate roadway system. Major gateways serving as Airport access points include Route 1A, the Martin Coughlin Bypass Road, the Ted Williams Tunnel (Interstate 90), the Sumner/Callahan Tunnels, Frankfort Street/Neptune Road, and Maverick Street (gated to limit traffic to East Boston residents only). On-Airport, non-terminal related traffic primarily circulates along Service Road (SR-2), Transportation Way, and Harborside Drive. As described in Massport's construction management specifications, construction vehicles are restricted from using local roads.

4.10 Cultural/Historical Resources

The following section discusses the presence of cultural and historical resources within the Study Area.

4.10.1 Regulatory Framework

The identification of historic properties and the potential effects of the Project on these resources is determined through the FAA's and Massport's consultation with the Massachusetts Historical Commission (MHC), the Massachusetts Board of Underwater Archaeological Resources (BUAR), Tribes, and other identified consulting parties.

Section 106 of the National Historic Preservation Act (36 Code of Federal Regulations [CFR] 800)

Section 106 of the National Historic Preservation Act of 1966 (36 Code of Federal Regulations [CFR] 800) requires federal agencies to take into account the effects their actions may have on historic properties. Any project that requires federal funding, licenses, or permits must be reviewed by the MHC in its role as the State Historic Preservation Office (SHPO) in compliance with Section 106. The FAA and Massport will continue to coordinate with the BUAR, Tribes, and other consulting parties as appropriate.

MGL Chapter 9, Sections 26-27c, as amended by Chapter 254 of the Acts of 1988, (950 CMR 71)

The MHC has review authority over projects requiring state funding, licenses, permits, or approvals, in order to evaluate potential direct or indirect impacts to properties listed in the State Register of Historic Places, in compliance with MEPA and the State Register Review requirements (MGL Chapter 9, Sections 27-27c, as amended by Chapter 254 of the Acts of 1988). Similar to Section 106, the consultation process identifies potential adverse effects to historic properties, and evaluates ways to avoid, minimize, or mitigate these adverse effects. When a project is considered to be both a federal and a state undertaking, Section 106 and State Register Review generally occur concurrently in a single review process.

MGL Chapter 6, Sections 179-180 and Chapter 91, Section 63

While the State Archaeologist and other professional archaeologists are among the MHC staff, the BUAR serves a different but related role in protecting the Commonwealth's underwater archaeological heritage. The BUAR's jurisdiction extends across all inland and coastal waters/submerged lands of the Commonwealth. Along the coast, BUAR jurisdiction extends from MHW out offshore to the state-federal waters boundary.

Under MGL Chapter 6, Sections 179-180, and Chapter 91, section 63, the BUAR has statutory jurisdiction within state waters and is the sole trustee of the Commonwealth's underwater heritage, charged with the responsibility of encouraging the discovery and reporting, as well as the preservation and protection, of underwater archaeological resources.

Under MGL Chapter 6, Section 180, title to underwater archaeological resources located within the inland and coastal waters of the Commonwealth is declared to be in the Commonwealth, which retains regulatory authority over their use.

Under MGC Chapter 91, Section 63, no person, organization or corporation may "remove, displace, damage, or destroy" any underwater archaeological resources located within the Commonwealth's submerged lands except through consultation with the BUAR and in conformity with the permits it issues.

4.10.2 Cultural/Historical Resources Existing Conditions

Logan Airport has been inventoried; no individually listed resources or eligible resources have been identified in or near the Study Area.

The potential for occurrences of submerged archaeological resources were determined by contacting the BUAR. In a letter dated September 21, 2021, BUAR stated that through a preliminary review of files and secondary literature sources, no record of any underwater archaeological resources was found.

4.11 Hazardous Materials/Materials Handling/Recycling

Although there have been reported spills and releases at Logan Airport, these have been addressed through the Massachusetts Contingency Plan (MCP) (310 CMR 40) process, and no releases have occurred within the vicinity of the Study Area. Tracking of MCP activity is reported annually by Massport and can be found in the *Logan Airport 2018/2019 Environmental Data Report (EDR)*(Executive Office of Energy and Environmental Affairs [EEA] #3247).

4.11.1 Regulatory Framework

Several state and federal regulatory programs govern the requirements for site remediation, transport of regulated hazardous materials[27], and potential spills during construction. In the Commonwealth of Massachusetts, the management of hazardous materials and petroleum products when released into the environment is generally governed by the MCP.

27 Hazardous material means material, including, but not limited to, any material in whatever form which, because of its quantity, concentration, chemical, corrosive, flammable, reactive, toxic, infectious or radioactive characteristics, either separately or in combination with any substance or substances, constitutes a present or potential threat to human health, safety, welfare, or to the environment, when improperly stored, treated, transported, disposed of, used, or otherwise managed.

4.11.2 Hazardous Materials Existing Conditions

The regulatory status of a disposal site and relevant MCP reporting documentation is publicly available to review via the MassDEP Waste Site and Reportable Release/Spills Lookup website. Based on a search of the USEPA online database, there are no National Priority List (NPL) sites on Logan Airport. MassDEP documented releases have been documented within the greater Logan Airport; however, none of these documented releases are located within 500 feet of the Study Area.

4.12 Air Quality and Greenhouse Gases

The following sections discuss the regulatory framework and existing noise conditions within the Study Area.

4.12.1 Regulatory Framework

Massachusetts state law, the federal Clean Air Act (CAA), and the National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) govern air quality in Massachusetts. The NAAQS and the Massachusetts State Implementation Plan (SIP) promulgated pursuant to, and in compliance with the CAA and the 1990 amendments to the CAA, regulate air quality issues in the Study Area. The CAA requires the USEPA to set NAAQS for six common air pollutants known as criteria air pollutants. These pollutants are regulated by the USEPA to protect public health, the environment, and the quality of life from the detrimental effects of air pollution. These NAAQS are set for the following six pollutants: carbon monoxide (CO); lead (Pb); nitrogen dioxide (NO_2); ozone (O_3); sulfur oxides (SO_x); and particulate pollution (including particulate matter smaller than or equal to 10 microns in diameter (PM_{10}) and particulate matter smaller than or equal to 2.5 microns in diameter ($PM_{2.5}$)).

In accordance with the CAA, and based on air quality monitoring, all areas within Massachusetts are designated with respect to the NAAQS as either in attainment, nonattainment, maintenance, or unclassifiable. An area with air quality better than the NAAQS is designated as attainment; an area with air quality worse than the NAAQS is designated as nonattainment; and an area that is in transition from nonattainment to attainment is designated as attainment/maintenance. An area may also be designated as unclassifiable when there is a temporary lack of data to form a basis for determining attainment status. Nonattainment areas are further classified as extreme, severe, serious, moderate, or marginal by the degree of non-compliance with the NAAQS. The Boston area is presently designated as attainment/maintenance for CO, indicating that it is in transition back to attainment for CO. The Boston metropolitan area is otherwise designated as attainment for all other criteria pollutants.

4.12.2 Air Quality Existing Conditions

The most recent emission inventory for Logan Airport was completed for calendar year 2019. The inventory included Volatile Organic Compounds (VOCs), CO, NO_x, $PM_{2.5}$, and PM_{10}. Emissions of ozone were not included because it is a secondary pollutant formed by emissions of NO_x and VOCs, which serve as a surrogate for ozone formation. There were no exceedances for any criteria pollutants at Logan Airport in 2019.[28]

28 Massachusetts Port Authority. Logan Airport 2018/2019 Environmental Data Report, Appendix I, Air Quality. EEA #3247, December 2020. https://www.massport.com/media/41rkxcxd/2018-19-edr_final-part-1.pdf.

4.12.2.1 Greenhouse Gas Emissions

Many factors can affect global climate change, including changes in atmospheric composition due to GHG emissions. GHG emissions contribute to climate change and have a negative impact on human health. In the mid-2000s, Massport began calculating its operational GHG emissions and has continued to do so in alignment with evolving regulatory requirements for GHG disclosure and management, including the Commonwealth's Global Warming Solutions Act of 2008. Total emissions for Logan Airport in 2019 (inclusive of Scopes 1, 2, and 3 emissions) were estimated to be 808,125 metric tons of carbon dioxide equivalents (CO_2e), which represents approximately one percent of statewide totals. While this safety project will not change emissions at Logan Airport, the MEPA GHG Protocol requires discussion of project-related emissions.

4.13 Noise

The following sections discuss the regulatory framework and existing noise conditions within the Study Area.

4.13.1 Regulatory Framework/Methodology

The FAA Order 1050.1F serves as the agency's policy and procedures for compliance with NEPA implementing regulations and federal requirements with regard to noise. For actions that include sources of noise other than aircraft in flight, such as surface transportation improvements or construction, FAA Order 1050.1F states that the noise analysis should be conducted using accepted methodologies from the appropriate modal administration, including the Federal Highway Administration (FHWA) for construction noise. Massport also uses City of Boston guidelines applicable to the control of construction noise.

The City of Boston has established regulations for evaluating sound levels associated with construction activities. The Air Pollution Control Commission of the City of Boston, acting under the authority granted in MGL Chapter 40, Section 21, and by the City of Boston Code, Ordinances, Title 7, Section 50, has adopted regulations for the Control of Noise in the City of Boston. Regulation 3: "Restrictions on Noise Emitted from Construction Sites" establishes maximum allowable sound levels based upon the land use impacted by the construction of a Proposed Project. The noise criteria provided in the regulations were used to evaluate whether or not the Project would generate sound levels that result in adverse impacts.

The City of Boston noise control regulation considers construction sound levels to be an impact if operation of construction devices exceeds the L_{10} sound levels[29] shown in **Table 4-5**, If the existing background L_{10} sound level already exceeds the limits referenced in **Table 4-5**, the L_{10} sound level during construction must not exceed the background L_{10} sound level by 5 dBA or greater. Unless exempt, such as impact devices, no individual piece of construction equipment can generate a noise level exceeding 86 dBA at a distance of 50 feet from the device.

29 L_{10} is the A-weighted sound level which is exceeded 10 percent of the time during a specified period. During a 10-minute period, the L_{10} would be the sound level which was exceeded by other sound levels for 1 minute.

Table 4-5 City of Boston Construction Noise Limits

Land Use	L_{10} Sound Level	L_{max} Sound Level
Residential or Institutional	75	86
Business or Recreational	80	--
Industrial	85	--

Source: Regulations for the Control of Noise in the City of Boston, City of Boston, Air Pollution Control Commission

4.13.2 Noise Existing Conditions

The noise environment at Logan Airport is dominated by aircraft noise as has most recently been documented in the *Logan Airport 2018/2019 EDR* Appendix H, Noise Abatement.[30] In the EDR, aircraft noise is evaluated using the FAA's Aviation Environmental Design Tool (AEDT) version 3c model that was released for general use on June 19, 2020, as the primary analytical tool to assess the noise environment at Logan Airport. The AEDT model requires detailed operational data as inputs for its noise calculations, including numbers of operations per day by aircraft type and by time of day, aircraft weight and flight performance profile, which runway for each arrival and for each departure, and flight track geometry for each track. The results of these analyses are included in the *Logan Airport 2018/2019 EDR* Appendix H, Noise Abatement.

The 2019 Day-Night Average Sound Level (DNL) contours were prepared in the EDR using the FAA's AEDT for DNL values of 60, 65, 70, and 75 dB. The DNL is a measure of the cumulative noise exposure over a 24-hour day, the FAA-defined metric for evaluating noise and land use compatibility.

The 2019 DNL reflects the most recent year of full operations. There are 8,768 people residing within the 2019 DNL 65 dB contour which is approximately half the number of people within the 2000 DNL 65 dB contour (17,745 people). All of the residential areas within the 2019 DNL 65 dB contour have previously participated in the Massport Residential Sound Insulation Program. The 2019 DNL 65 dB and 70 dB contours extend over Point Shirley in Winthrop primarily due to aircraft arrivals to Runway 27 and departures from Runway 9.

Massport has two noise monitors located in Point Shirley located east of Runway 9-27. Noise Monitor 4 is the closest to the runway end and historically reports an aircraft DNL greater than 70 dB and Noise Monitor 5 is located further away and not under the runway extended centerline and historically reports an aircraft DNL less than 65 dB. The proposed RSA improvements will not change how Logan Airport operates and therefore, no changes to the Airport noise profile would occur with this project.

4.14 Climate Change, Adaptation and Resiliency, and Sustainability

The following section discusses the regulatory framework and existing conditions of the Study Area related to the Project's potential for contribution to climate change and its response to future climate hazards. Projected climate changes are anticipated to result in changes in precipitation, sea level rise, rising temperatures, and extreme weather, and in most cases will increase the severity, duration, or frequency of these hazards.

30 Massachusetts Port Authority. Logan Airport 2018/2019 Environmental Data Report, Appendix H, Noise Abatement. EEA #3247, December 2020. https://www.massport.com/media/41rkxcxd/2018-19-edr_final-part-1.pdf.

4.14.1 Regulatory Framework

Governor Baker's EO 569: *Establishing an Integrated Climate Change Strategy for the Commonwealth* (EO 569) was issued on September 16, 2016. The EO 569 recognizes the serious threat presented by climate change and directs Executive Branch agencies to develop and implement an integrated strategy that leverages state resources to combat climate change and prepare for its impacts. The EO 569 seeks to ensure that Massachusetts will meet GHG emissions reduction limits established under the Global Warming Solution Act (GWSA) of 2008 and will work to prepare state government and cities and towns for the impacts of climate change. On April 22, 2021, Governor Baker issued EO 594 *Leading by Example: Decarbonizing and Minimizing Environmental Impacts of State Government*. The EO 594 updated the Commonwealth's GHG reduction goal in support of achieving net zero GHG emissions by 2050. The EO 594 is applicable to all Executive Branch agencies. The urgent need to address climate change was also recognized with the recent passage into law of Chapter 8 of the Acts of 2021 - *An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy*.

The State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) was issued on September 17, 2018 in fulfillment of Governor Baker's EO 569 on climate change. The SHMCAP integrates climate change impacts and adaptation strategies with hazard mitigation planning and includes specific actions for each Executive Branch agency. The SHMCAP led to the creation of the inter-agency Resilient MA Action Team (RMAT), which is tasked with monitoring and tracking the SHMCAP implementation process, making recommendations to and supporting agencies on plan updates, and facilitating coordination across State government and with stakeholders.

Additionally, the MEPA statute (MGL Chapter 30, Section 61) directs all state agencies to consider reasonably foreseeable climate change impacts, including additional GHG emissions, and effects, such as predicted sea level rise, when issuing permits, licenses and other administrative approvals and decisions. This Project is subject to the MEPA GHG Policy because it exceeds thresholds for a mandatory Environmental Impact Report (EIR).

As of October 1, 2021, the *MEPA Interim Protocol on Climate Change Adaptation and Resiliency* (Interim Protocol) requires all new projects filing with the MEPA Office to print the output report generated from the RMAT Climate Resilience Design Standards Tool and submit it as an attachment. The Interim Protocol also added a new section entitled, "Climate Change Adaptation and Resiliency Section" to the ENF to solicit information regarding adaptation strategies the Project will employ to address climate risks. The RMAT Tool output was included in ENF Attachment E and updated in this Draft EIR (DEIR) Appendix F, *RMAT Output Report*.

For adaptation and resiliency specific to this Project, the ENF Certificate requested that the DEIR include a comprehensive discussion of the potential effects of climate change on the Project Site and describe features incorporated into the Project design that will increase the resiliency of the site to these changes. It was also requested that the DEIR explain whether the proposed deck support is being elevated to account for climate conditions (within the constraints of FAA regulations), and, if so, the DEIR is to identify the projected climate conditions and assumptions, such as temperature, sea level rise and precipitation rates, that will be used in design. Finally, the Certificate requested that the DEIR discuss how the stormwater system will be sized to address future climate conditions, including during the construction period.

4.14.2 Climate Considerations Existing Conditions

The section below discusses the existing conditions for adaptation and resiliency.

4.14.2.1 Adaptation and Resiliency

As described in the ENF, facilities in the Boston area and along the Massachusetts coastline 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. The Massachusetts Coastal Flood Risk Model is used to assess potential flooding vulnerabilities for Massport projects along the coastline. In 2020, Massport performed a safety rehabilitation of Runway 9-27 to enhance the surface of the runway. As part of that effort, and with the knowledge that some type of improvement to the Runway 27 End RSA would be upcoming, the runway threshold was raised 10 inches from its existing elevation. The 10-inch 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 maximum extent practicable in relation to the remainder of the airfield. The 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.

5

Impact Assessment

5.1 Introduction

The impact assessment of the proposed Runway 27 End Runway Safety Area (RSA) Improvements Project (the Project or the Proposed Project) is documented for each applicable environmental resource category, as required by the Secretary of Energy and Environmental Affairs' (EEA) Certificate on the Environmental Notification Form (ENF)(Appendix A, *Response to ENF Comments*). In accordance with the Massachusetts Environmental Policy Act[1] (MEPA) regulations for the preparation of a Draft Environmental Impact Report (DEIR), the Build Alternative (the Proposed Project) is compared to the No-Build Alternative for environmental impact categories to determine the effect (beneficial or adverse) of the Proposed Project. Direct, indirect, and construction impacts are included in the discussion of each impact category.

Mitigation measures and/or other commitments required for resource impacts are identified in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*. Regulatory compliance of the Proposed Project is discussed in Chapter 1, *Project Description and Permitting*.

An impact assessment for the following resources is discussed below:

- Coastal Resources (Section 5.2)
- Tidelands/Public Benefits and Navigation (Section 5.3)
- Finfish Resources (Section 5.4)
- Threatened and Endangered Species (Section 5.5)
- Stormwater and Water Quality (Section 5.6)
- Cultural/Historical Resources (Section 5.7)
- Hazardous Materials/Materials Handling/Recycling (Section 5.8)
- Climate Change, Adaptation and Resilience, and Sustainability (Section 5.9)

1 301 Code of Massachusetts Regulations (CMR) 11.00: MEPA Regulations, Section 11.07: Environmental Impact Report (EIR) Preparation and Filing.

- Other Construction Impacts (Section 5.10)
  - Surface Transportation (Section 5.10.1)
  - Noise (Section 5.10.2)
  - Air Quality and Greenhouse Gas (GHG) Emissions (Section 5.10.3)

5.1.1 Summary of Key Findings

The proposed safety improvements at the Runway 27 End benefit from Massport's planning, design, and construction experience from the adjacent pile-supported RSA deck at the Logan Airport Runway 33L End. That successful project provided guidance to both the Federal Aviation Administration (FAA) and Massport on how to improve safety while minimizing environmental impacts. Key to that process was the FAA's early acceptance of a pile-supported deck concept with an Engineered Material Arresting System (EMAS) to achieve equivalent safety standards with the smallest environmental footprint.

The following sections summarize key findings with respect to environmental impacts for the Proposed Project, including:

- Coastal Resources
  - The Proposed Project was designed to avoid and minimize adverse impacts to the maximum extent practicable, but unavoidable permanent impacts to coastal wetlands remain. The proposed pile-supported deck (approximately 450-feet long by 306-feet wide) has an overall footprint of approximately 3.2 acres. The wetland area is subject to federal jurisdiction as Waters of the U.S., as well as state-regulated resource areas Coastal Bank, Coastal Beach/Tidal Flats, Land Containing Shellfish, and Land Under the Ocean. The direct alteration of these resources would be restricted to the actual footprint of the pilings and would be approximately 880 square feet of Land Subject to Tidal Action (LSTA) and Land Under the Ocean, and includes Coastal Bank, Coastal Beach/Tidal Flats, and Land Containing Shellfish. An additional 97,200 square feet of coastal resources would be altered by the emergency egress ramps. Most of this area has been previously altered.
  - The Proposed Project would not cause any change in wave direction or velocity nor result in increased erosion or deposition in the marine environment. Minor scour effects in the immediate vicinity of the piles are anticipated.
  - A turbidity curtain would be deployed around the active construction work area to contain sediment resuspended during construction pile-driving activities.
  - Massport will adhere to the TOY restriction for in-water, silt producing work extending from February 15 through June 30 for the protection of winter flounder.
- Tidelands/Public Benefits and Navigation
  - The Proposed Project would alter the shoreline due to the installation of a pile-supported deck structure. Portions of that shoreline have been previously altered. At the distance from which the shoreline is viewed by the closest residential neighborhood, the RSA would be no higher than the existing shoreline and the view would not be substantially different than the existing view.

- The safety improvements would be constructed within the Logan Airport Security Zone and would be approximately 175 feet from the edge of the navigation channel at its nearest point. The proposed RSA deck would not limit vessel navigation outside the deck or between the deck and the navigation channel.

- Finfish Resources
  - Some fish habitat would be displaced by the pilings. However, the pilings would offer new hard substrate for encrusting marine animals and algae.
  - Massport will adhere to the TOY restriction for in-water, silt producing work extending from February 15 through June 30 for the protection of winter flounder.

- Rare and Endangered Species
  - A portion of the Project is within an estimated and priority habitat polygon for two grassland bird species: upland sandpiper (*Bartramia longicauda*) and Eastern meadowlark (*Sturnella magna*). These state-listed protected species are identified as endangered and species of special concern, respectively. Approximately 18,000 square feet of mowed grass would be impacted by relocating the perimeter road. The Project will be reviewed by the Natural Heritage and Endangered Species Program (NHESP) to determine if there would be an adverse impact to these listed species. If NHESP determines the Project will cause an adverse effect, appropriate mitigation measures would be developed and provided.
  - The Proposed Project is not likely to adversely affect any federally threatened or endangered species. The Project would not adversely impact federally-listed threatened or endangered species under the U.S. Fish and Wildlife Service (USFWS) jurisdiction (terrestrial species). Consultation with the National Oceanic and Atmospheric Administration (NOAA) Fisheries Service (NOAA Fisheries) is ongoing (marine species).

- Stormwater and Water Quality
  - The Project would have no adverse effect on water quality. The Project does not include any new stormwater conveyances, or new discharges of untreated stormwater. Activities on RSAs do not result in a higher pollutant load than existing conditions and are not anticipated to increase total suspended solids (TSS) in the waters adjacent to the Runway 27 End.
  - During construction, turbidity may be created during installation of piles and could temporarily affect water quality in a localized area adjacent to the Proposed Project. A turbidity curtain would be deployed around the construction work area to contain sediment resuspended during the pile-driving activities.

- Cultural/Historical Resources
  - The Project would have no anticipated construction period or permanent impacts to historic resources or temporary construction impacts, as there are no identified above ground or archaeological resources in the Area of Potential Effect (APE).

- Hazardous Materials/Materials Handling/Recycling
  - No sites within the Study Area are listed on the U.S. Environmental Protection Agency's (USEPA) National Priorities List (NPL) or in the Massachusetts Department of Environmental Protection (MassDEP) online databases. There would be no adverse impacts in the category of hazardous materials, solid waste, and pollution prevention because of the Project.
- Climate Change, Adaption and Resiliency, and Sustainability
  - According to the Project's output report (generated using the Resilient Massachusetts Climate Resilience Design Standards Tool (RMAT), see Appendix F, *RMAT Output Report*), the Project Site would have a high initial risk to climate hazards due to its exposure to sea level rise/storm surges, extreme precipitation due to urban flooding, and extreme heat. The deck substructure would be designed to withstand anticipated coastal storms and sea level rise. The Project would not increase climate risk to other properties in the vicinity.
  - The Proposed Project would not change Airport operations or surface transportation patterns, and therefore, would not result in a permanent change in greenhouse gas (GHG) emissions.
- Transportation
  - Most construction materials, equipment, and personnel would be transported by marine vessel and thus would not contribute to surface traffic in the vicinity of Logan Airport. Trucks carrying construction materials, equipment, and personnel would have a minimal, temporary impact on ground transportation in the vicinity of Logan Airport. Construction vehicles would be prohibited from local roads.
- Noise
  - Construction noise is anticipated to occur for 120 days total that would take place during two separate 60-day construction periods. While construction noise levels are not anticipated to exceed City of Boston construction noise limit criteria, Massport will consider construction measures (such as noise dampening mats employed during pile-driving activities) to further minimize noise impacts where possible.
- Air Quality and GHG Emissions
  - Emissions of air pollutants during construction would meet the *de minimis* standards for General Conformity with the National Ambient Air Quality Standards (NAAQS).

5.1.2 Methodology

The following sections assess the potential impacts of each resource category (as identified in Section 5.1) for the Proposed Project.

5.1.2.1 Direct Impacts

Direct impacts are caused by the Proposed Project and occur at the same place and at the same time. Direct impacts were determined per resource category based on the footprint of the area altered.

5.1.2.2 Indirect Impacts

Indirect impacts are caused by the Proposed Project and occur later in time or in another location but are still reasonably foreseeable. Indirect impacts could occur elsewhere in Boston Harbor, in the nearby neighborhoods, or at Logan Airport because of the Proposed Project.

5.1.2.3 Temporary Construction-Related Impacts

Temporary, construction-related impacts occur on a short-term basis and depend on construction methods, duration, materials, and equipment.

5.2 Coastal Resources

Coastal resources are present within the limits of disturbance of the Proposed Project as described in Chapter 4, *Existing Environment*. This section describes the impacts of the following resources for the No-Build Alternative and Build Alternative. The following sections discuss and address how the Massachusetts Wetlands Protection Act (WPA) performance standards, for each wetland resource area affected by the proposed deck, would be met.

- Land Under the Ocean
- Coastal Beach
- Coastal Bank
- Salt Marsh
- Land Containing Shellfish
- Land Subject to Tidal Action
- Land Subject to Coastal Storm Flowage (100-year coastal floodplain)
- Federally Regulated Resources

Mitigation measures for impacts on coastal resources are discussed in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings.*

5.2.1 Direct Impacts

The proposed pile-supported deck would result in the alteration or loss of coastal wetland resources (**Table 5-1**). A discussion regarding potential impacts from the No-Build Alternative and Build Alternative is included below. Coastal wetland resources were identified and delineated as described in Section 4.3 of Chapter 4, *Existing Environment*. The wetland delineation mapping was overlaid with the footprint of the proposed Runway 27 construction options to identify and quantify the potential direct impacts to coastal wetlands.

Table 5-1 Runway 27 End RSA Direct Impacts to Coastal Wetland Resources – Proposed Project

Wetland Resource Area	Jurisdiction	Impacts			
		RSA Deck (shading)	Piles (Number/Area[1])	Emergency Access Ramps	Total[2]
Land Under the Ocean	Local and State	107,700 sf	246 / 690 sf	0	107,700 sf
Coastal Beach	Local and State	2,170 sf	6 / 20 sf	490 sf	2,660 sf
Coastal Banks	Local and State	310 lf	N/A	80 lf	390 lf
Salt Marsh	Local and State	0	0	0	0
Land Containing Shellfish	Local and State	58,130 sf	124 / 350 sf	8,630 sf	66,760 sf
Land Subject to Tidal Action	Local and State	35,960 sf	70 / 200 sf	9,460 sf	45,420[3]
Land Subject to Coastal Storm Flowage	Local and State	92,000 sf	10 / 30 sf	5,200 sf	97,200 sf
Land Below Annual High Tide	Federal	143,660 sf	316 / 880 sf	9,460 sf	153,120 sf
Mud Flat (Special Aquatic Site)	Federal	37,210 sf	100 / 280 sf	490 sf	37,700 sf

All square footages are approximate values as they have been rounded to the nearest value of ten (most values were rounded up).
1 Each 20-inch square pile is 2.78 square feet (sf). Direct impact of all 326 piles is 906 square feet.
2 Area of impact under the RSA Deck or area of upland. Area of piles or approach slab not included, since included in the overall deck area.
3 Includes 1,230 square feet for RSA Deck approach slab.
lf = linear feet
sf = square feet
N/A = Not Applicable

5.2.1.1 No-Build Alternative

No impacts to coastal wetlands resources would occur under the No-Build Alternative. There would be no change to existing wetland functions and values from the No-Build Alternative nor would there be any public safety improvement.

5.2.1.2 Build Alternative

The following sections describe wetland impacts resulting from the Proposed Project (**Figure 4-3** and **Table 5-1**). Direct impacts would result from reconstructing the existing RSA, realigning the perimeter road, installing an approach slab, installing approximately 325, 20-inch square concrete piles to support the deck, and constructing two emergency egress ramps. Direct impacts would also result from sediment deposition occurring during construction. The temporary impacts resulting from installing piles to support the deck and from sediment deposition are discussed, by WPA resource area, in the sections below.

Land Under the Ocean (Subtidal) – 310 Code of Massachusetts Regulations (CMR) 10.25

The Proposed Project would result in the loss of approximately 690 square feet of Land Under the Ocean from the 246 pilings installed in the resource area to support the RSA deck. The installation represents a loss of less than one percent of the 107,700 square feet of natural substrate under the deck.

The Proposed Project could have a minor effect on the interests of the WPA to Land Under the Ocean. Land Under the Ocean would continue to mitigate storm damage and provide flood control. The arrangement of piles supporting the RSA deck could improve storm damage protection by dispersing wave energy coming ashore at the Project Site. The benefit of flood control would not be impacted as floodwaters would pass under the RSA deck. Despite the loss of a small area of available Land Under the Ocean, the Project Site would continue to function as marine fisheries and wildlife habitat. The arrangement of piles is not anticipated to adversely affect the surrounding water column and the piles would provide a new solid surface area for attachment for encrusting organisms and algae. The new habitat would also provide "reef" habitat with additional feeding opportunity and escape cover for fish and wildlife. Post construction studies of the RSA deck constructed at the Runway 33L End confirmed mussels, barnacles, and tunicates attaching to the deck piles.

The presence of submerged aquatic vegetation (SAV) or eelgrass, and the benthic habitat are key features of Land Under the Ocean. The potential impacts to these resources from the Project were assessed because of their importance of Land Under the Ocean.

Eelgrass

Based on detailed field surveys conducted for this project, no SAV or eelgrass (*Zostra marina*) beds were identified in the vicinity of the Study Area; therefore, no SAV or eelgrass beds would be directly impacted by the Proposed Project.

Benthic Environment

The RSA deck would overshadow approximately 107,700 square feet (2.47 acres) of the seabed with a direct impact of 690 square feet of lost surface area in the resource area from the piles needed to support the RSA deck. The loss of 690 square feet of benthic habitat would be minor given the extent of available habitat in the vicinity of the Study Area. The seabed within the Study Area is soft bottom habitat of flat, silty sand or sandy silt, and supports a healthy marine animal community that lives on or within the seabed. Although shadowed, the benthic environment would continue to function as before since the habitat would remain unchanged and would remain subject to the ebb and flood of the tides. Most benthic invertebrates are either filter feeders or bottom feeders and their food sources would continue to be provided by the tidal waters. The arrangement of piles would not reduce the movement of tidal waters and would not lead to a stagnated water condition that could degrade the habitat.

Although not specifically intended as mitigation, the loss of 690 square feet of soft bottom habitat would be replaced out-of-kind by the new solid surface habitat of the piles. In time, encrusting organisms, collectively known as "fouling communities" would attach to the piles to provide new feeding opportunities for fish and other invertebrates. Assuming an average pile length of 11 feet above the seabed and exposed within the water column, each with a surface area of 73 square feet, approximately 18,000 square feet of new hard bottom habitat would be created by the Project. While the new hard bottom habitat creation would not fully offset the loss of 690 square feet of soft bottom clam habitat, it would create opportunity for a fouling community. The species associated with a hard bottom habitat would be different than the soft bottom species but would provide additional species diversity and density to the subtidal plant and animal community. The loss of soft bottom soft shell clam habitat is anticipated to be mitigated during Project permitting in consultation with the Division of Marine Fisheries (DMF) and U.S. Army Corps of Engineers (USACE) as discussed in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*.

The following section describes how the Proposed Project would meet each of the required WPA performance standards.

Performance Standards – 310 CMR 10.25
When Land Under the Ocean or nearshore areas of Land Under the Ocean are found to be significant to the protection of marine fisheries, protection of wildlife habitat, storm damage prevention or flood control, 310 Code of Massachusetts Regulations (CMR) 10.25(3) through (7) the following shall apply:

(3) *Improvement dredging for navigational purposes affecting land under the ocean shall be designed and carried out using the best available measures so as to minimize adverse effects on such interests caused by changes in…*

The Project does not include any dredging of Boston Harbor for either improvement or maintenance of a navigational channel. A small amount of dredging would be required to install the toe of the two emergency egress ramps to securely anchor the seaward ends below the existing mud line. Approximately 340 cubic yards of material would be removed and disposed of upland and replaced with riprap, bedding stone, and concrete ramp pavers set to match the existing shoreline grades.

(4) *Maintenance dredging for navigational purposes affecting land under the ocean shall be designed and carried out using the best available measures so as to minimize adverse effects on such interests caused by changes in marine productivity which will result from the suspension or transport of pollutants, increases in turbidity, the smothering of bottom organisms, the accumulation of pollutants by organisms, or the destruction of marine fisheries habitat or wildlife habitat.*

The Project does not include any dredging of Boston Harbor for navigational purposes. During construction, minor increases of turbidity may occur during the pile driving for the RSA deck or construction of the two emergency egress ramps. Measures would be taken to contain and minimize turbidity and prevent impacts to nearby intertidal and subtidal habitats.

(5) *Projects not included in 310 CMR 10.25(3) or (4) which affect nearshore areas of land under the ocean shall not cause adverse effects by altering the bottom topography so as to increase storm damage or erosion of coastal beaches, coastal banks, coastal dunes, or salt marshes.*

A scour analysis was conducted to evaluate the potential impact of the pile-supported deck on tidal currents, and seabed erosion or accretion. The analysis can be found in Appendix D.4, *Coastal Analysis*. The analysis determined the Proposed Project would have no change to seabed scour or shoreline erosion beyond that already experienced at the Project Site under existing conditions.

(6) *Projects not included in 310 CMR 10.25(3) which affect land under the ocean shall if water-dependent be designed and constructed, using best available measures, so as to minimize adverse effects, and if non-water-dependent, have no adverse effects, on marine fisheries habitat or wildlife habitat caused by:*

(a) *alterations in water circulation;*

As determined by the scour analysis, there would be no changes to water circulation in the vicinity of the proposed RSA deck.

(b) *destruction of eelgrass (Zostera marina) or widgeon grass (Rupia maritina) beds;*

No eelgrass or widgeon grass is present in the vicinity of the Project Site.

(c) *alterations in the distribution of sediment grain size;*

As determined by the scour analysis, no changes to sediment grain size or distribution would be anticipated in the vicinity of the proposed RSA deck.

(d) *changes in water quality, including, but not limited to, other than natural fluctuations in the level of dissolved oxygen, temperature or turbidity, or the addition of pollutants; or*

Water would freely circulate under the RSA deck and would not be restricted by the support piles so there would be no changes to the water quality, chemistry, temperature, or turbidity once constructed. The RSA deck would not be used by any vehicles, nor for any activities, nor store materials that would discharge or release contaminants or pollutants to Boston Harbor.

(e) *alterations of shallow submerged lands with high densities of polychaetes, mollusks or macrophytic algae.*

Alterations of the seabed would be limited to the installation of concrete piles to support the RSA deck. Existing benthic organisms (polychaetes, mollusks, and crustaceans) would continue to use the seabed under the RSA deck. The seabed is a soft bottom of silty sands and is not suitable for attached macrophytic algae. However, algae are attached to clusters of European oysters present at the Project Site. These oyster clusters are not attached to the seabed but could move with tidal currents and storm surge. In the shadow of the RSA deck, photosynthetic plants, such as phytoplankton and algae, would not be exposed to sunlight and not grow as with current conditions. Some light would penetrate around the edges of the deck, but well under the deck would not receive sunlight.

(7) *Notwithstanding the provisions of 310 CMR 10.25(3) through (6), no project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.*

The Project Site includes a polygon of priority habitat for two upland grassland bird species. There may be some loss of grassland habitat from the Project. The NHESP will review the Project and determine if there would be an adverse impact. Massport's goal would be to offset any loss of protected grassland habitat elsewhere on the airfield.

Coastal Beaches – 310 CMR 10.27

Coastal Beaches is defined in the WPA as unconsolidated sediment subject to wave, tidal, and coastal storm action and extend from the Mean Low Water (MLW) line landward to the seaward edge of existing human-made structures. As noted in Chapter 4, *Existing Environment,* Coastal Beach at the Project Site is a narrow sandy strip (10- to 13-feet wide) between MLW and the toe of the existing crushed rock slope protection. Above the Coastal Beach is the crushed rock stabilized shoreline serving as an inclined safety area for Runway 27. The stabilized shoreline is regulated by the Coastal Bank as discussed below. The No-Build Alternative would leave the Coastal Beach unaltered. The Proposed Project would include installing six concrete piles to support the RSA deck within the area of Coastal Beach, impacting approximately 20 square feet. An additional 490 square feet of Coastal Beach would be impacted by the two emergency access ramps. Overall, there is 2,170 square feet of Coastal Beach between the area under the RSA deck and the two emergency access ramps. Approximately 510 square feet of Coastal Beach would be directly impacted by the RSA deck piles and the two emergency access ramps.

The Proposed Project would not affect the interests of the WPA to Coastal Beach. The Coastal Beach resource area at the Project Site is not extensive and provides little benefit for storm damage prevention, flood control, or protection of wildlife habitat. The Proposed Project would leave most of the Coastal Beach unaltered. The support piles placed within the Coastal Beach would help to dissipate wave energy contributing to storm damage prevention. The existing Coastal Beach offers little benefit for flood control since flood waters over top the available beach area by approximately 18 feet. Wildlife habitat for shore birds is provided by the Coastal Beach as feeding habitat only during low water. The Beach area is flooded every tidal cycle and is submerged more than exposed. Construction of the RSA deck and the two emergency access ramps would reduce available feeding habitat, however ample other shoreline habitat is available in the vicinity of the Study Area.

Performance Standards – 310 CMR 10.27

When a Coastal Beach is determined to be significant to storm damage prevention, flood control or protection of wildlife habitat, 310 CMR 10.27(3) through (7) the following shall apply:

(3) *Any project on a coastal beach, except any project permitted under 310 CMR 10.30(3)(a), shall not have an adverse effect by increasing erosion, decreasing the volume, or changing the form of any such coastal beach or an adjacent or downdrift coastal beach.*

The Proposed Project would not significantly alter the Coastal Beach form that would increase or decrease erosion or alter the downdrift of sediment. The impacts analysis shows there would be no change to existing coastal processes.

(4) *Any groin, jetty, solid pier, or other such solid fill structure which will interfere with littoral drift, in addition to complying with 310 CMR 10.27(3), shall be constructed as follows:*

The Proposed Project does not include construction of a solid fill structure. Analysis of the proposed RSA deck has shown it would not alter the existing littoral drift characteristics at the Project Site.

(f) *It shall be the minimum length and height demonstrated to be necessary to maintain beach form and volume. In evaluating necessity, coastal engineering, physical oceanographic and/or coastal geologic information shall be considered.*
(g) *Immediately after construction any groin shall be filled to entrapment capacity in height and length with sediment of grain size compatible with that of the adjacent beach.*
(h) *Jetties trapping littoral drift material shall contain a sand by-pass system to transfer sediments to the downdrift side of the inlet or shall be periodically redredged to provide beach nourishment to ensure that downdrift or adjacent beaches are not starved of sediments.*

(5) *Notwithstanding 310 CMR 10.27(3), beach nourishment with clean sediment of a grain size compatible with that on the existing beach may be permitted.*

The Proposed Project does not involve beach nourishment.

(6) *In addition to complying with the requirements of 310 CMR 10.27(3) and (4), a project on a tidal flat shall if water-dependent be designed and constructed, using best available measures, so as to minimize adverse effects,*

and if non-water-dependent, have no adverse effects, on marine fisheries and wildlife habitat caused by:
- *(a) alterations in water circulation;*
- *(b) alterations in the distribution of sediment grain size; and*
- *(c) changes in water quality, including, but not limited to, other than natural fluctuations in the levels of dissolved oxygen, temperature or turbidity, or the addition of pollutants.*

The tidal flat (also Coastal Beach) at the Project Site consists of a narrow strip of silty sand about 10 to 13 feet wide between a crushed rock stabilized shoreline and MLW. Although the Project is designed to keep aircraft and its passengers out of the harbor during an emergency, the Proposed Project is presumed non-water dependent since it is associated with safe airport operations. The proposed RSA deck will be designed to minimize impacts to the marine environment. The proposed RSA deck would be elevated above Boston Harbor and supported on widely spaced piles. The Proposed Project has been analyzed and will not alter water circulation, sediment distribution, or erosion or accretion. Since tidal waters would be able to freely circulate beneath the deck, water quality would not be altered and no long-term adverse effects to fish, clam, and other wildlife habitat would be anticipated other than the direct impact from the pile installation.

(7) Notwithstanding the provisions of 310 CMR 10.27(3) through (6), no project may be permitted which will have any adverse effect on specified habitat sites or rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.

The Proposed Project would be within a mapped polygon of state-listed species on the airport property. The Project will be reviewed by the NHESP for potential impacts to the listed species. If NHESP determines the Project will cause an adverse effect, appropriate mitigation measures would be developed and provided. Massport's goal would be to offset any loss of protected grassland habitat elsewhere on the airfield.

Coastal Banks – 310 CMR 10.30

The Proposed Project would result in the unavoidable alteration of approximately 310 linear feet of the fabricated Coastal Bank to install the steel sheet piling and fill structure supporting the approach slab and landward end of the RSA deck. An additional 80 linear feet of the crushed rock slope would be altered for the two emergency access ramps. The alteration would convert the existing riprap bank to a low steel sheet pile wall and concrete paver emergency access ramps. The Proposed Project would not affect the functions or the interests of the Coastal Bank including storm damage prevention and flood control. The new steel sheet pile wall beneath the proposed RSA deck would protect the deck abutment and would maintain the stability of the Coastal Bank beneath the deck.

Performance Standards – 310 CMR 10.30

When a coastal bank is determined to be significant to storm damage prevention or flood control because it supplies sediment to coastal beaches, coastal dunes or barrier beaches, 310 CMR 10.30(3) through (5) shall apply:

(3) No new bulkhead, revetment, seawall, groin or other coastal engineering structure shall be permitted on such a coastal bank except that such a coastal engineering structure shall be permitted when required to prevent storm damage to buildings constructed prior to the effective date of 310 CMR 10.21 through 10.37 or constructed pursuant to a Notice of Intent filed prior to the effective date of 310 CMR 10.21 through 10.37 (August 10, 1978),

including reconstructions of such buildings subsequent to the effective date of 310 CMR 10.21 through 10.37, provided that the following requirements are met:

(a) a coastal engineering structure or a modification thereto shall be designed and constructed so as to minimize, using best available measures, adverse effects on adjacent or nearby coastal beaches due to changes in wave action;

(b) the applicant demonstrates that no method of protecting the building other than the proposed coastal engineering structure is feasible and;

(c) protective planting designed to reduce erosion may be permitted.

The Proposed Project does not include construction of a revetment, groin, seawall, or other solid fill structure to protect a pre-existing building.

(4) *Any project on a coastal bank or within 100 feet landward of the top of a coastal bank, other than a structure permitted by 310 CMR 10.30(3), shall not have an adverse effect due to wave action on the movement of sediment from the coastal bank to coastal beaches or land subject to tidal action.*

Work is proposed within 100 feet of the top of the Coastal Bank. The upland portion of the reconstructed RSA would extend to Elevation 6 and continue east into Boston Harbor as a pile-supported deck. The top of Coastal Bank is Elevation 9 feet based on the slope of the ground, so a portion of the Coastal Bank would be altered. The Coastal Bank and LSTA is a crushed rock stabilized surface that does not provide a source of sediment to other nearby coastal resources. The Coastal Beach would be beneath the pile-supported deck and would not be substantially altered and the movement of sediment would not be restricted.

(d) The Order of Conditions and the Certificate of Compliance for any new building within 100 feet landward of the top of a coastal bank permitted by the issuing authority under M.G.L. c. 131, § 40 shall contain the specific condition: 310 CMR 10.30(3), promulgated under M.G.L. c. 131, § 40, requires that no coastal engineering structure, such as a bulkhead, revetment, or seawall shall be permitted on an eroding bank at any time in the future to protect the project allowed by this Order of Conditions.

The existing Coastal Bank is a crushed rock stabilized shoreline and is not eroding.

(5) *When a coastal bank is determined to be significant to storm damage prevention or flood control because it is a vertical buffer to storm waters, the following shall apply:*

The existing Coastal Bank is a sloped shoreline and not a vertical surface providing a buffer to storms; therefore, the remainder of this standard does not apply.

Salt Marsh – 310 CMR 10.32

While identified along the shoreline northwest of the Project Site, no impacts to salt marsh would be anticipated during construction or project implementation.

Land Containing Shellfish (Intertidal and Subtidal) – 310 CMR 10.34

Land Containing Shellfish includes/overlays Land Under the Ocean, tidal flats, rocky intertidal shores, and salt marshes that also contain shellfish. Based on the MassGIS data layer for suitable shellfish growing areas, regular coordination with the DMF and field investigations conducted as part of this Project, Land Containing Shellfish is present within the intertidal and subtidal areas of the Project Site. Survey of the intertidal zone determined the Study Area supports commercially important species such as soft-shell clams, razor clams, surf clams, and blue mussels (see Appendix D.2, *Runway 27 Benthic Survey Results*). A small clam species with no commercial value, Northern dwarf tellin (*Tellina agilis),* was also collected within the Study Area during the benthic survey. All clam species were found in low quantities with few adult specimens collected, in part due to shellfish disease. The Proposed Project would result in the alteration of Land Containing Shellfish from installing pilings to constructing the RSA deck. Approximately 124 piles would be installed within the resource area, directly impacting 350 square feet. The RSA deck would also overshadow approximately 58,130 square feet of the intertidal and subtidal zone identified as Land Containing Shellfish. The overshadowing would not impact shellfish species since clams are filter feeders and would be able to continue feeding with the deck in place.

The proposed emergency egress ramps would also directly impact Land Containing Shellfish. Approximately 8,630 square feet of Land Containing Shellfish would be directly impacted by installation of concrete pavers and riprap to create the ramps. Most of the egress ramps will impact the existing crushed rock shoreline that was placed for the Inclined Safety Area (ISA), a small portion of which is supporting blue mussels (approximately 400 square feet). In addition, about 400 square feet of the impact area is beyond the existing ISA is within soft shell clam habitat at the toes of the proposed egress ramps. The hard surface of the ramps and adjacent riprap, in time, would provide new blue mussel habitat. The toes of the ramps would extend into the soft bottom habitat of the coastal beach and are anticipated to impact about 400 square feet of soft shell clam habitat.

A scour analysis was conducted to determine if the presence of piles would alter patterns of tidal currents and/or would cause either erosion or accretion of the sediments. The results of the sediment transport and scour analysis (Section 5.2.2.1) determined there would be no change to erosion or accretion in the vicinity of the Project from the proposed RSA deck and support piles. Therefore, secondary impacts to shellfish habitat from shifting sediments caused by the Project would not be anticipated.

The Proposed Project would directly affect the interests of the WPA to Land Containing Shellfish by the loss of 350 square feet of potential shellfish habitat from the proposed piles. Although the area currently supports extremely low shellfish densities, the habitat would still be available and in time, the Land Containing Shellfish could return to its former productivity following construction. Mitigation for the lost shellfish habitat (if required) will be developed in consultation with the DMF. Since the numbers of shellfish within the Study Area are so low, mitigation is likely to consist of funding DMF shellfish habitat restoration.

Performance Standards – 310 CMR 10.34

When a resource area including land under the ocean, tidal flats, rocky intertidal shores, salt marshes, or land under salt ponds is determined to be significant to the protection of land containing shellfish and therefore to the protection of marine fisheries, 310 CMR 10.34(4) thorough (8) shall apply:

(4) *Except as provided in 310 CMR 10.34(5), any project on land containing shellfish shall not adversely affect such land or marine fisheries by a change in the productivity of such land caused by:*
  (a) *alterations of water circulation;*
  (b) *alterations in relief elevation;*
  (c) *the compacting of sediment by vehicular traffic;*
  (d) *alterations in the distribution of sediment grain size;*
  (e) *alterations in natural drainage from adjacent land; or*
  (f) *changes in water quality, including, but not limited to, other than natural fluctuations in the levels of salinity, dissolved oxygen, nutrients, temperature or turbidity, or the addition of pollutants.*

The Project Site is partially within Land Containing Shellfish and has been known to be a potentially productive soft-shell clam flat. The proposed RSA deck would extend over Coastal Beach and Land Under the Ocean and would be designed to minimize impacts to the marine environment. The proposed RSA deck would be elevated above Boston Harbor and supported on widely spaced piles. Concrete support piles would be installed by equipment operating either from upland areas or floating barges. The work would not alter the surface of the Coastal Beach or Land Under the Ocean either by construction activities or vehicle traffic. The Proposed Project would not alter water circulation, sediment distribution, or erosion or accretion. Since tidal waters would freely circulate beneath the deck, water quality would not be altered and no adverse effects to fish and wildlife habitat would be anticipated.

(5) *Notwithstanding the provisions of 310 CMR 10.34(4), projects which temporarily have an adverse effect on shellfish productivity but which do not permanently destroy the habitat may be permitted if the land containing shellfish can and will be returned substantially to its former productivity in less than one year from the commencement of work, unless an extension of the Order of Conditions is granted, in which case such restoration shall be completed within one year of such extension.*

A survey was conducted to assess the condition of the shellfish population at the Project Site. The results of the survey determined only a few small soft-shell clams were present and no mature adult individuals were found (see Appendix D.3, *Bivalve Field Survey Notes at Runway 27 End*). According to the DMF, the Project Site has been a productive clam flat in the past, but disease has significantly impacted shellfish stocks throughout Boston Harbor, including the Project Site. Of about 58,130 square feet of Land Containing Shellfish, the proposed pile driving would impact approximately 350 square feet of the available habitat. The emergency egress ramps will impact an additional 8,630 square feet of Land Containing Shellfish, which is mostly the crushed rock ISA and does not provide suitable shellfish habitat. Based on the extremely low density of soft-shell clams present and the small area impacted by the deck piles, the impact to Land Containing Shellfish would not be significant.

(a) *In the case of land containing shellfish defined as significant in 310 CMR 10.34(3)(b) (i.e., those areas identified on the basis of maps and designations of the Shellfish Constable), except in Areas of Critical Environmental Concern, the issuing authority may, after consultation with the Shellfish Constable, permit the shellfish to be moved from such area under the guidelines of, and to a suitable location approved by, the Division of Marine Fisheries, in order to permit a proposed project on such land. Any such project shall not be commenced until after the moving and replanting of the shellfish have been commenced.*

Despite the current low densities of clams within the project footprint, Massport has already initiated discussions regarding potential mitigation measures for the loss of habitat with the DMF. Consistent with similar projects at Logan Airport, mitigation may consist of funding DMF shellfish habitat restoration within Boston Harbor.

(b) *Notwithstanding 310 CMR 10.34(4) through (6), projects approved by the Division of Marine Fisheries that are specifically intended to increase the productivity of land containing shellfish may be permitted. Aquaculture projects approved by the appropriate local and state authority may also be permitted.*

This Project is not intended to enhance shellfish stocks or include aquiculture.

(c) *Notwithstanding the provisions of 310 CMR 10.34(4) through (7), no project may be permitted which* *will have any adverse effect on specified habitat of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.*

The Proposed Project is within a mapped polygon of state-listed species on the Airport property. The Project will be reviewed by the NHESP for any potential impacts to the listed species. If NHESP determines the Proposed Project would cause an adverse effect, appropriate mitigation measures will be developed and provided. Massport's goal would be to offset any loss of protected grassland habitat elsewhere on the airfield.

Land Subject to Tidal Action – 310 CMR 10.02(1)(c)

Work in LSTA extends from MLW (Elevation -5.16 feet) to Annual High Tide (AHT)(Elevation 6.7 feet) line. Vertically, approximately 12 feet makes up the intertidal zone at the Project Site. The majority of the LSTA is the existing ISA and is covered by 4- to 6-inch crushed rock that stabilizes the shoreline and creates the ISA. Only a small area of coastal beach (310 square feet) is not covered with the crushed rock. LSTA overlays, in part or in total, other resource areas including Coastal Beach, Coastal Bank and Land Containing Shellfish.

Direct impacts to LSTA would include installation of an approach slab, a short steel sheet pile wall, installing concrete piles and the RSA deck. Direct impact from shading, the piles and approach slab would be approximately 35,960 square feet, which includes 200 square feet of impact for the 70 piles. An additional 9,460 square feet would be altered to create the two emergency egress ramps.

As noted above, the LSTA is characterized as crushed rock that was placed for a previous safety project. No vegetation is present within the resource area and only a small amount of filamentous brown algae was found attached on the lower portion of the intertidal zone near the MLW line. Blue mussels are present in the lower intertidal zone attached to the plastic geogrid mats. The stability provided by the geogrid would allow mussels to attach and maintain a presence. The direct impact to the LSTA would be a loss of area from the piles, concrete approach slab, and emergency egress ramps. Although the impacted area is subject to the ebb and flood of the tides, the lack of vegetation and crushed rock substrate does not provide much value for habitat, primary production, or fish feeding opportunity. The lower end of the emergency egress ramps would extend slightly to the MLW that provides habitat for shellfish. Approximately 485 square feet of Coastal Beach would be altered and converted to a hard bottom by the egress ramps.

There are no performance standards for LSTA in the WPA regulations since it is an overlay of other resource areas.

Land Subject to Coastal Storm Flowage – 310 CMR 10.02(1)(d)

The 100-year floodplain, as determined by the Federal Emergency Management Agency (FEMA), constitutes Land Subject to Coastal Storm Flowage (LSCSF). The floodplain base flood elevation is Elevation 13 and 12 feet at the Project Site and extends into the upland of the existing paved RSA, the perimeter roadway, and a portion of the Taxiway D. The LSCSF is characterized as paved and mowed grass areas. The LSCSF is a coastal floodplain, the result of a rise in the coastal flood waters or wave action above the base flood elevation.

Work within LSCSF would consist of several activities to reconstruct the RSA, match the new RSA deck, and improve access around the Airport. The existing RSA would be raised to Elevation 15.75 feet to match the Runway 27 elevation. A concrete approach slab and low steel sheet pile wall would be installed to match the RSA deck and new abutment. The perimeter road north of the RSA would be realigned to straighten the road as it approaches the runway to improve driver visibility and safety. The perimeter road would then be repaved and restriped within the Project limits. A new stone surface would be placed between the relocated perimeter road and the existing roadway. The ground area between Taxiway D and the realigned perimeter road would be raised, leveled, and stabilized with grass. The emergency egress ramps would be extended to connect to the perimeter road on either side of the RSA, impacting 5,200 square feet. Work for the RSA and perimeter road would alter an additional 92,000 square feet of LSCSF and would raise the RSA above the existing floodplain level. Ten piles impacting approximately 30 square feet would also be within the LSCSF.

All of the Project Site within LSCSF is upland mowed grasses or paved. Some mowed grass areas that would be altered may provide habitat for upland sandpiper or Eastern meadowlark, state-listed species as endangered or species of special concern, respectively. Approximately 32,000 square feet of existing mowed grass would be altered and paved or covered in crushed stone by the Proposed Project. A discussion of impacts to wildlife and state-listed species is provided below.

There are no performance standards for LSCSF in the WPA regulations.

Buffer Zone – 310 CMR 10.02(2)(b)

There is a state-regulated buffer zone extending 100-feet landward from the top of Coastal Bank. Work proposed within the buffer zone includes reconstructing, repaving, and restriping the existing RSA, realigning, and repaving the perimeter road, placing stone between the existing perimeter road and the realigned perimeter road, and regrading and reseeding the ground between the realigned perimeter road and Taxiway D.

Federally Regulated Resource Areas

Boston Harbor is a tidal water and is classified as a Navigable Waters of the U.S. and work within Boston Harbor is regulated by the USACE under Section 10 and Section 404. The Proposed Project would include placing structures, the pile-supported RSA deck within Boston Harbor, placing fill for the emergency egress ramps, and dredging to install the lower ends of the ramps. All work (structures, fill, dredging) below Mean High Water (MHW) (Elevation 4.33 feet) is subject to Section 10 and any filling below AHT[2] (Elevation 6.7 feet) is subject to Section 404. The combined area of the Project subject to Federal jurisdiction is 153,120 square feet. Within the combined area, 143,660 square feet would be the footprint of the RSA deck, 880 square feet of impact from 316 piles, and 9,460 square feet of fill for the emergency egress ramps. Much of the impact area consists of crushed rock shoreline that does not offer much habitat value. The largest impact area is from the RSA deck over tidal waters that would be approximately 143,660 square feet.

Below the crushed rock covered shoreline is a narrow strip of sandy beach just above MLW and a broad flat that is exposed during minus low tides. The exposed broad flat creates a mud flat which is a Section 404 Special Aquatic Site. Work is proposed with the mud flat associated with pile driving and the RSA deck. Work in mud flat would impact 37,700 square feet consisting of 37,210 square feet of the RSA deck, 280 square feet for the 100 piles, and 490 square feet for the seaward end of the emergency egress ramps. Total direct impacts to mud flat would be 770 square feet, or about 2 percent of the mud flat within the Project Site.

2 The highest annual tide of the calendar year.

Functions and values of coastal wetlands at the Runway 27 End, regulated under Section 404 of the Clean Water Act (CWA) would be similarly affected by the Proposed Project. The following is a description of how applicable functions and values of coastal wetlands under federal jurisdiction would be affected.

- **Fish and Shellfish Habitat**: Fish and shellfish habitat would still be available after construction of the Proposed Project. Installing pilings would result in some loss of natural substrate. The pilings would provide additional hard surface habitat for sessile benthic organisms, increasing habitat diversity.
- **Production Export**: Primary production would be slightly affected by the Proposed Project. Currently, the area provides an opportunity for plants and phytoplankton to photosynthesize producing organic material that can serve as a food source for animals and can be exported elsewhere by tidal waters. The proposed RSA deck will shade a portion of Boston Harbor reducing some opportunity for primary production. However, currents and tidal action will constantly move seawater out from under the deck allowing phytoplankton and drifting seaweed to relocate back into the sun and to continue to flourish.
- **Sediment/Shoreline Stabilization**: The Proposed Project would provide similar stability to the existing shoreline. Changes to the shoreline are not anticipated. Approximately 40 feet of the geogrid shoreline protection will be removed from either side of the proposed RSA deck to allow construction of the emergency egress ramps. The existing plastic geogrid along the lower intertidal zone previously placed to withstand wave action and erosion of the shoreline is being evaluated to be removed and replaced with other shoreline stabilization measures.
- **Wildlife Habitat:** Wildlife habitat at the Runway 27 End would be altered as a small area of Coastal Beach that provide feeding and loafing habitat for a variety of shorebirds would be lost due to pilings. The Project would not be a barrier to wildlife for movement along the shoreline.

5.2.2 Indirect Impacts

Indirect impacts are defined as being caused by a proposed action and occur later in time or in another location, but are still reasonably foreseeable. Indirect impacts could occur elsewhere in Boston Harbor, in the nearby neighborhoods, or at Logan Airport as a result of the proposed action.

The Proposed Project would not cause the loss of other functions and values outside the Project Site, as discussed below:

- The Proposed Project would not affect the ability of any resource areas outside of the RSA Project Site to recharge or discharge groundwater. This interest is not applicable to coastal resources.
- The Proposed Project would not affect flood flow functions or the ability to reduce flood damage of wetlands outside of the RSA deck, as it would not affect the stability of the Coastal Bank.
- The Proposed Project does not represent a barrier to movement and would not reduce any habitat functions or values outside of the RSA deck. The RSA would not decrease the ability of other wetland resources to provide wildlife, shellfish, or fish habitat.
- The Proposed Project would not reduce the ability of resources outside of the Project Site to remove, retain, or transform nutrients. The RSA would not change runoff patterns.

- The shoreline stabilization function of wetlands outside of the Proposed Project would not be affected. The Proposed Project would maintain the stability of the adjacent shoreline.

5.2.2.1 Sediment Transport and Scour

Because the Project Site is close to sensitive coastal resource areas and an active navigation channel, a study of the potential sediment transport and scour impacts due to the construction of the proposed pile-supported RSA deck was conducted. The modeling analysis focused on the local seabed and nearby shorelines of Snake Island, and the Cottage Park and Winthrop Yacht Clubs. The study used available seabed mapping and two months of site-specific tidal and current modeling.

As velocity (of the water) and bed shear stress (pressure exerted along the seabed surface) are core attributes to the processes of sediment transport and scour (i.e., increased bed sheer stress and velocity indicate increased sediment transport capacity and scour conditions), a model was developed to evaluate these two parameters under existing conditions as compared to proposed conditions.

Based on the coastal modeling results, there are no appreciable changes to the movement of sediments at the Project Site, Snake Island, or the Cottage Park or Winthrop Yacht Clubs. The Proposed Project would result in a small increase in the velocity of the water but the values are well below the critical velocity and bed shear stress values required to result in movement of the seabed material. The maximum velocities in the vicinity of the Project Site are 0.116 meters per second (or 0.226 knots) for the existing condition compared to 0.212 meters per second (or 0.412 knots) for the proposed condition. These values are well below the critical velocity value of 0.69 meters per second (or 1.34 knots). Similarly, the model predicted minor increases in bed shear stresses. The maximum shear stresses in the vicinity of the Proposed Project are 0.025 Pascals (0.0005 pounds per square foot) for the existing condition and would be 0.199 Pascals (0.0004 pounds per square foot) for the proposed condition. Based on the properties of the seabed material, the critical shear stress required to move the existing seabed material would be 2.24 to 2.33 Pascals (0.047-0.049 pounds per square foot), which is an order-of-magnitude higher than the predicted increase in bed shear stress under the proposed condition. A detailed description of the coastal modeling process is provided in Appendix D.4, *Coastal Analysis*.

5.2.3 Temporary Construction Impacts

Construction of the RSA deck is anticipated to generate suspended sediment during construction because of driving piles and installation of emergency access ramps as discussed on Section 5.6.3 and in Appendix D.4, *Coastal Analysis*. Barge anchorage would occur using a low impact anchor such as temporary driven pile anchors. The anchor piles would be removed at the completion of construction. Use of spuds[3] to anchor the barges at the construction site could temporarily generate sediment and could temporarily impact benthic organisms. While measures would be taken to minimize the amount of sediment generated, it is likely that construction could result in the release of some sediment into the water column. Turbidity curtains would be deployed around the work area and the equipment to contain turbidity generated from construction activities.

3 Spuds are through-deck pilings or steel shafts temporarily driven into the sediment at the bottom of the water to provide stability for the barge when moored. A spud barge is commonly used for marine construction operations.

5.2.4 Findings

As documented in this section, the Proposed Project would not affect water supplies, alter hydrology, affect the ability of the coastal wetlands to protect the public health, safety, or welfare, and would not adversely affect the maintenance of natural systems. The RSA would not adversely affect the coastal floodplain or affect floodplain values.

The Proposed Project can comply with the performance standards for regulated resource areas and be approved without the need for a Variance under the WPA. Mitigation measures will be developed for the Project with consultation with the appropriate state or federal agencies during the permitting phase. No aspect of the Project appears to conflict with local, state or federal regulatory requirements and can be constructed with minimal impact to the environment or surrounding communities.

5.3 Tidelands/Public Benefits and Navigation

The proposed safety improvements were analyzed to determine potential impacts to coastal waterways and tidelands, in accordance with the Massachusetts Waterways Regulations (310 CMR 9.00). The RSA Project would require the construction of a pile-supported deck partially seaward of the MHW line on Commonwealth tidelands, which are protected under Chapter 91 and the Massachusetts Coastal Zone Management (CZM) Program. The Project will be built partially within the limits of the previously authorized ISA (MassDEP License No. 3467). Massport will seek an amendment for the RSA deck and emergency egress ramps. The analysis of adverse impacts focuses on how a project is consistent or not consistent with a state's regulatory standards and coastal zone management program.

The Secretary's Certificate on the ENF required the following information be included in the DEIR related to these coastal resources:

- Clarify location and quantity of flowed tidelands affected by the Project;
- Demonstrate the Project meets the engineering and construction standards enumerated at 310 CMR 9.37, including whether there are any Harbor Lines established pursuant to Massachusetts General Law (MGL) Chapter 91 Section 34; and
- Describe any construction impacts on lawful public access and navigation.

5.3.1 Direct Impacts

Direct impacts are the result of constructing a pile-supported structure within the waterways and tidelands subject to Chapter 91 jurisdiction, and include the loss of the resource.

5.3.1.1 No-Build Alternative

No impacts associated with the No-Build Alternative are anticipated, as there would be no changes in the existing conditions other than ongoing natural processes.

5.3.1.2 Build Alternative

The Proposed Project would affect waterways and tidelands as described below. The impact to Chapter 91 resources would be the area of the deck, deck pile supports, and emergency egress ramps seaward of the MHW line. There would also be a small sliver of the deck landward of the MHW line. These impacts are summarized in **Table 5-2** below. The Study Area is not fully accessible to the public as it is within Logan Airport's 500-foot Security Zone as established by MGL Chapter 90, Section 61 and described in Section 4.5 of Chapter 4, *Existing Environment*.

As documented in Section 4.5 of Chapter 4, *Existing Environment*, the only interests currently provided by the proposed RSA Project Site are limited shellfishing, living marine resources, and water quality. The Proposed Project would reduce shellfishing as a result of the deck pilings. The proposed RSA deck would not affect the ability of the onshore areas to protect water quality, as further discussed in Section 5.6.

The proposed RSA would extend beyond the shoreline adjacent to the existing navigation channel. 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 navigation.

Table 5-2 Runway 27 End RSA Direct Chapter 91 Impacts (Support Design Alternative 2)

Project Element	Impacts
RSA Deck	144,890 square feet
Piles[1]	880 square feet
Emergency Access Ramps	9,460 square feet
Total	154,350 square feet

1 Each 20-inch square pile is approximately 2.78 square feet.

As confirmed by previous runway safety projects at Logan Airport, an RSA is a required public safety measure associated with an existing runway at Logan Airport. As such, it is an "Infrastructure Facility" as that term is defined by 310 CMR 9.02:

> Infrastructure Facility means a facility which produces, delivers, or otherwise provides electric, gas, water, sewage, *transportation*, or telecommunication services to the public. [emphasis added]

Consequently, the standards for "Conservation of Capacity for Water-Dependent Use" (310 CMR 9.51), "Utilization of Shoreline for Water-Dependent Purposes" (310 CMR 9.52), and "Activation of Commonwealth Tidelands for Public Use" (310 CMR 9.53) are not applicable. Instead, pursuant to 310 CMR 9.55, a proposal for an "Infrastructure Facility" shall include "mitigation and/or compensation measures as deemed appropriate by the [DEP] to ensure that all feasible measures are taken to avoid or minimize detriments to the water related interests of the public."

The Waterway Regulations list six potential water-related interests of the public that should be evaluated in connection with the permitting of an "Infrastructure Facility":[4]

- The protection of maritime commerce, industry, recreation, and associated public access;
- The protection, restoration, and improvement of living marine resources;
- The attainment of water quality goals;
- The reduction of flood and erosion-related hazards on lands subject to the 100-year storm event or to sea level rise, especially those in damage-prone or natural buffer areas;
- The protection and improvement of public views and visual quality in the natural and built environment of the shoreline; and
- The preservation of historic sites and districts, archaeological sites, and other cultural resources near waterways.

The Proposed RSA would incorporate appropriate measures to protect water quality and to avoid and minimize impacts to marine resources (salt marsh, eelgrass, and shellfish beds). Given the nature of the statutory Logan Airport Security Zone, the other water-related interests of the public are not applicable to this location.

When dealing with Infrastructure Facilities, MassDEP would typically require implementation of reasonable measures to provide open spaces for active or passive recreation at or near the water's edge only if and as "appropriate" under the specific circumstances. MassDEP's Waterways Regulations expressly recognize that any such measures "need to avoid undue interference with the infrastructure facilities in question, and to protect public health, safety, or the environment."[5]

Moreover, in light of the express legislative authorization for Massport to own, operate, and maintain Logan Airport in conformity with public safety standards, the express authorizations of the Enabling Act for Massport to use adjacent submerged lands if necessary for operation of the airport, and the statutory designation of the affected area as the Logan Airport Security Zone pursuant to MGL Chapter 90, Section 61, the RSA Project may appropriately be treated as a "Project With Special Legislative Authorization" under 310 CMR 9.31(4). In such cases, no variance is required; instead, MassDEP may prescribe such alterations and conditions as it deems necessary to ensure the Project conforms with:[6]

- Any requirements contained in the legislative authorization; and
- The standards of 310 CMR 9.31 through 9.60, to the extent consistent with the legislative authorization.

The proposed RSA deck and emergency egress ramps will be constructed within an area previously altered for an inclined safety area that was authorized by Waterways License (No. 3467) issued to Massport. The RSA deck will be different than previously authorized and Massport will seek an amendment of the existing License to allow the RSA deck and emergency egress ramps.

4 Waterways Regulations. 310 CMR 9.55(1).
5 Waterways Regulations, 310 CMR 9.55(2).
6 Waterways Regulations, 310 CMR 9.31(4).

Engineering and Construction Standards

The Proposed Project would meet all required engineering and construction standards. All fill and structures would be structurally sound, as certified by a Registered Professional Engineer, and would comply with applicable state requirements for construction in floodplains in accordance with the State Building Code (780 CMR 744.00). The proposed structure would not pose an unreasonable threat to navigation, public health or safety, or adjacent buildings or structures, if damaged or destroyed in a storm.

The planned safety improvements would extend to within approximately 175 feet of the boundary of the navigation channel and would not restrict the ability to dredge the adjacent navigation channel.

The Proposed Project is located within a coastal high hazard area as defined in 310 CMR 9.02, as the area is mapped by FEMA as Zone VE: High Risk Coastal Area. However, the Project would not include any new or expanded buildings.

Although harbor lines were established in Boston Harbor in Chapter 170 of the Acts of 1880, to Massport's knowledge no harbor lines have been established in the area since then. In addition, based on historic aerials, this area of Logan Airport was filled sometime between 1938 and 1955; any harbor lines that may have existed would no longer be in effect since the area has since been filled.

Variance Standards

New fill and structures for non-water dependent use are prohibited seaward of the MHW mark (310 CMR 9.32(1)(a)). While, as noted above, there are exceptions to the prohibition, MassDEP may decide that the exceptions should not be applied to the Proposed Project. Without application of the available exceptions, MassDEP would conclude that the Proposed Project would not meet the basic requirements set forth in 310 CMR 9.31(1) because it includes pile-supported structures located below the high-water mark for non-water dependent uses that extend beyond the footprint of the existing, previously authorized pile-supported structures (310 CMR 9.32(1)(a)). To that extent, the Proposed Project could not proceed without a Variance from the Chapter 91 performance standards for non-water dependent uses.

In many respects, the variance standards under MassDEP's Waterway Regulations, 310 CMR 9.00 et seq., parallel the variance requirements under MassDEP's WPA Regulations, 310 CMR 10.00 et seq. Under 310 CMR 9.21, a variance may be granted if the Commissioner finds that:

- There are no reasonable conditions or alternatives that would allow the project to proceed in compliance with 310 CMR 9.00;
- The project includes mitigation measures to minimize interference with the public interests in waterways and the project incorporates measures designed to compensate the public for any remaining detriment to such interests; and
- The variance is necessary to accommodate an overriding municipal, regional, state, or federal interest.

A variance may be granted to accommodate an overriding public interest. Reasonable conditions and alternatives must be explored to achieve compliance with the regulations if feasible. Mitigation measures would be included to advance the statutory interests and compensate for detrimental environmental impacts.

No Reasonable Conditions or Alternatives

"There are no reasonable conditions or alternatives that would allow the project to proceed in compliance with 310 CMR 9.00."

An extensive alternatives analysis was undertaken for the Proposed Project, as described in Chapter 3, *Alternatives Considered*. The analysis found that there would be no reasonable alternatives that would allow the existing RSA to be improved to meet FAA standards and the same time comply with the Waterways Regulations, as the site limitations necessitate construction in tidelands below MHW. As demonstrated in Chapter 2, *Project Purpose and Need*, the Proposed Project is necessary to accommodate an overriding public/safety interest. During the subsequent design phases of the Proposed Project, additional design modifications would be investigated to ensure that waterways impacts have been minimized to the extent practicable.

Mitigation Measures

"The project includes mitigation measures to minimize interference with the public interests in waterways and that the project incorporates measures designed to compensate the public for any remaining detriment to such interests."

- *Shellfishing Mitigation*. As described above, there is only limited shellfishing allowed within the Security Zone; no changes are proposed. The proposed deck support piles would slightly reduce the available shellfish habitat based on the footprint of the piles. Mitigation for the loss of shellfish habitat and shellfishing opportunity will be developed in coordination with the DMF during the permitting process.
- *Water Quality Mitigation*. Water quality goals would be attained using stormwater best management practices (BMPs). Specifically, mitigation would include improving current stormwater management conditions, to the extent practicable, to meet the Stormwater Management Redevelopment Standard, as discussed in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings.*
- *Storm Damage Prevention*. The Proposed Project would not affect the functions or significant interests of the Coastal Bank including storm damage prevention and flood control. The Coastal Bank at Runway 27 would largely be left intact and unaltered other than the addition of the concrete deck piles. The Coastal Bank will be able to continue providing storm damage prevention and flood control as currently configured. The existing shoreline is stabilized with crushed rock and does not supply sediment to adjacent coastal beaches, coastal dunes, or barrier beaches. The RSA Project is designed to continue to protect Logan Airport from flood damage and erosion; therefore, no additional mitigation measures are proposed.
- *Protection of Archeological Resources*. There are no known historic sites and districts, archaeological sites, or other significant cultural resources located within the RSA Study Area. Massport would continue to coordinate with the FAA, the Massachusetts Historical Commission, Tribal Historic Preservation Officer(s), and the Board of Underwater Archaeological Resources (BUAR). The BUAR provided a response letter dated September 21, 2021, stating the Project is "unlikely to adversely impact submerged cultural resources."[7] The letter specifies that if any previously unrecorded archaeological resources are encountered during construction, Massport would be expected to follow the protocol outlines in BUAR's *Policy Guidance for the Discovery of Unanticipated Archaeological Resources* (October 2019).

7 Comment Letter on the ENF received from the Massachusetts Board of Underwater Archaeological Resources, dated September 21, 2021.

Overriding Public Interest

"The variance is necessary to accommodate an overriding municipal, regional, state or federal interest; or to avoid such restriction on the use of private property as to constitute an unconstitutional taking without compensation; or to avoid substantial hardship for the continuation of any use or structure existing as of October 4, 1990, and for which no substantial change in use or substantial structural alteration has occurred since that date."

The purpose of the Project is to protect the lives and safety of aircraft passengers in emergency situations by enhancing the RSA at the end of Runway 27 consistent with the FAA's guidelines and Massport's responsibilities as Airport operator. As stated in FAA Order 5100-38B, "The highest aviation priority of the U.S. is the safe and secure operation of the airport and airway system." The FAA supports this policy by giving the highest priority to projects that improve the safety and security of our national airport system. The FAA's National Priority Rating system gives the highest priority to constructing, extending, or improving RSAs.

Chapter 2, *Project Purpose and Need*, documents how the Proposed Project would meet this standard, based on FAA policy and requirements and MassDEP's prior Variance Decision on the Runway 33L Safety Area Improvement which clearly recognized the overriding public interest served by these safety projects.

5.3.2 Indirect Impacts

Indirect impacts were assessed based on the footprint of the pile-supported structure on Chapter 91 tidelands, in the context of the public uses adjacent to Logan Airport. No indirect impacts to waterways or tidelands, or public uses, are anticipated. The proposed pile-supported deck would not affect the public's right on tidelands elsewhere in Boston Harbor because the Proposed Project does not require closing tidelands elsewhere in Boston Harbor.

5.3.3 Temporary Construction Impacts

As noted in the Certificate on the ENF, MGL Chapter 90, Section 61, creates a security zone around Logan Airport that extends 500 feet seaward of the MHW line. Within the security zone, no unauthorized access is permitted. The legislation allows for limited shellfishing as authorized by DMF in coordination with Massport, though no other boats may enter within 250 feet seaward of the MHW line.

Construction-related impacts to tidelands and waterways would be limited to temporary occupancy of a portion of the tidelands around the proposed deck by construction barges. As described in Chapter 3, *Alternatives Considered*, a significant amount of construction materials and equipment would be transported to the work area by barge, and barges containing large construction equipment (cranes, pile drivers, etc.) would be moored within the construction area.

5.3.4 Massachusetts Public Benefits Determination

The Public Benefits Determination Regulations (301 CMR 13.00) establishes a procedure for the Secretary of EEA to ensure that public benefits are protected and/or provided by non-water dependent projects within tidelands, pursuant to the authority granted under MGL Chapter 91, Section 18B. The regulations provide that the public benefit determination will not in any way impair MassDEP's exercise of its powers under Chapter 91 and that MassDEP will incorporate the public benefit determination into the official record of the Chapter 91 decision.

The Secretary required that a mandatory public benefit review be conducted for the Proposed Project following procedures within 301 CMR 13.03. Specifically, the Certificate required that the DEIR include detailed information describing the nature of the tidelands affected by the non-water dependent project and document compliance with the requirements for public benefits. The RSA would result in a positive Public Benefits Determination, as described in the following sections.

Purpose and Effect of the Project

The purpose of the Proposed Project is to increase safety for aircraft and their passengers in emergency situations by enhancing the RSA at the end of Runway 27 consistent with the FAA's orders and regulations (see Chapter 2, *Project Purpose and Need*). Logan Airport is a commercial service airport that receives federal funding for airport improvement projects and is required by the FAA to meet FAA-mandated RSA design criteria.

Impact on Abutters and the Surrounding Community

There would be no changes to Airport operations once construction of the RSA deck at the Runway 27 End is completed. Massport will minimize noise and air emissions from surface traffic during construction by having much of the construction materials and workers access the Project site by water on barges and boats. Trucks used to transport concrete and the EMAS materials would access the site by Route lA, Interstate 90, and the main Airport roadways only. Trucks would be prohibited from using local streets unless they are seeking construction-related access to or from local businesses. There would be no permanent change to air quality or noise at the Airport because the RSA would not change the numbers or types of aircraft operations. Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, describes mitigation commitments for temporary construction impacts.

Improvement to the Property

The Proposed Project includes important safety improvements at Logan Airport. The existing Runway 27 RSA does not meet current FAA design criteria for overrun and undershoot protection for the runway's design aircraft. The Project would include construction of a 650-foot-long RSA with EMAS on a 306-foot-wide pile-supported deck. The Proposed Project would maintain the existing runway utility and capacity and would provide protection and functionality equivalent to an RSA that fully meets the design criteria.

Benefits to the Public Trust Rights in Tidelands

Considering the Massachusetts Port Authority Enabling Act, preservation of public safety and security at Logan Airport has been legislatively determined to be an appropriate use of the public trust held in the affected tidelands. Other potential public interests in tidelands that might otherwise be affected by the proposed safety project are limited due to existing Airport security restrictions. Under state law, no public access is allowed within the Logan Airport Security Zone within which the entire Project Site. Limited shellfish harvesting by licensed shellfish diggers is allowed within the Security Zone with prior notice from DMF. Recently, because of the low density of harvestable shellfish, only limited shellfishing has been conducted in the area adjacent to Runway 27.

Although the proposed safety improvements would impact waterways and tidelands, there would be no significant impacts to the public's existing interests in these tideland areas. Due to legislated access restrictions, the only interests relevant to the proposed RSA Project Site are shellfishing, living marine resources, and water quality. Limited shellfishing would continue to be permitted in accordance with the provisions of the Security Zone Statute in those areas that have historically supported that activity. The Project would be designed to protect, restore, and improve living marine resources, as described in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*. Water quality goals would continue to be attained.

Community Activities on the Site

Due to aviation operations and long-standing state and federal security restrictions, no public/community activities can take place within 250 feet of the MHW line around the waterside perimeter of Logan Airport. The boundary of the inner security area is marked with a series of white and orange buoys. A portion of the RSA deck would extend beyond the inner 250-foot security area and into a portion of the outer 250-foot security area. The RSA deck would restrict transient boating within the footprint of the deck. Boats operating in the outer 250-foot security zone would need to divert around the RSA deck. Boats are not permitted to anchor within the 500-foot security zone and the RSA deck would not change the restriction on boating activities.

Environmental Protection and Preservation

The Proposed Project aims to avoid and minimize impacts to wetland resources, as described in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*. Mitigation measures for impacts to wetland resources are likely to consist of contributing to ongoing shellfish restoration programs.

Public Health and Safety, and General Welfare

The RSA improvements would address an overriding public interest in aviation safety. Safety improvements to the RSAs reduce the potential for injury to passengers, aircraft crew, and airport employees. RSAs reduce the risk of damage to aircraft and injury to persons inside the aircraft should the aircraft overrun, undershoot, or veer off the runway. RSAs also provide additional safety in comparison to existing conditions during less-than-ideal weather conditions, should an aircraft land in the harbor.

5.3.5 Findings

As documented in this section, the proposed Runway 27 RSA improvements would increase restrictions for public boating around Logan Airport and would affect the public's interests in tidelands. Existing restrictions for access to the shoreline around Logan Airport would not change. Waterways and Tidelands are a state-regulated resource with no comparable federal regulated resource.

5.4 Finfish Resources

The following sections include a discussion of the environmental consequences of the proposed Runway 27 RSA improvements and the No-Build Alternative on finfish.

5.4.1 Direct Impacts

Section 4.6 of Chapter 4, *Existing Environment*, describes the existing finfish found in the vicinity of the proposed Runway 27 End RSA Improvements. Constructing the pile-supported deck would result in minor loss of habitat to fish as discussed below.

The addition of piles supporting the deck may provide new habitat forming new "reef habitat" and the solid surface of the piles would also provide new solid surface for attachment of fouling communities and algae. Survey of the concrete piles of the RSA constructed at the end of Runway 33L documented barnacles, mussels and tunicates colonizing the surface of the piles. Evaluation of impacts to fisheries and fishery habitat is based on the NOAA Fisheries Essential Fish Habitat (EFH) Mapper database.

5.4.1.1 No-Build Alternative

There would be no impact to finfish for the No-Build Alternative. There would be no change to the physical environment at Runway 27 End.

5.4.1.2 Build Alternative

The construction of the pile-supported deck requires installing piles, which would result in a minor amount of habitat loss for fish and benthic organisms (shellfish, crabs, and other invertebrates) as well as plants.

A small amount of habitat that could be used by fish species, including the 27 species for which Boston Harbor provides EFH, would be altered by the proposed pilings and shaded by the deck. The DMF has recommended a time-of-year (TOY) restriction for in-water, silt producing work extending from February 15 through June 30 for the protection of winter flounder (*Pseudopleuronectes americanus*), one of the fish species for which Boston Harbor provides EFH. Winter flounder uses the nearshore areas in the vicinity of the proposed deck for spawning, larval settlement, and juvenile development.[8] The proposed structure would not be anticipated to have permanent adverse effects on fish habitat at the Runway 27 End, and there would be no anticipated permanent effects on EFH.

5.4.2 Indirect Impacts

Indirect impacts are the potential effects of the structure on the movement of fish population effects due to changes in food sources, and other potential changes that would affect fish populations in the vicinity of Logan Airport. Some fish species are herbivores, eating attached or floating algae. Shading the seabed by the RSA deck would reduce or eliminate sunlight and would impact the ability for attached algae and phytoplankton to photosynthesize under the proposed deck. Drifting algae and single cell algae in the water column would be carried by tidal currents under the RSA deck and would still be available as food for fish species. Sessile and fouling organisms and the associated invertebrate community will also be able to thrive on solid surfaces (piles)

8 Comment Letter on the ENF received from the Massachusetts Division of Marine Fisheries, dated September 28, 2021.

under the deck and would provide continue to provide feeding opportunities for fish species. The Proposed Project is not anticipated to affect fish populations in Boston Harbor.

5.4.3 Temporary Construction Impacts

There could be temporary impacts to fish, benthic invertebrates, and plants because of construction activities. As discussed in Section 5.6.3, construction may generate suspended sediment which would, after a brief time in the water column, settle on the bottom. The sediment could clog the gills of fish and benthic invertebrates, affecting their respiratory function. These impacts would be short-term and are not anticipated to result in any long-term disruption of growth or population dynamics. No in-water construction would occur between February 15 and June 30, the most sensitive period for juvenile winter flounder and other important fish species protected under the Magnuson Stevens-Act.[9] During construction, a turbidity curtain would be deployed around the work area to contain turbidity.

Construction equipment (barges, cranes, pile-driving, etc.) would result in activity and noise in the vicinity of Runway 27. The resulting activity and noise could cause fish to avoid the work area. Construction, particularly pile-driving, can generate high noise levels underwater that could potentially harm fish species in proximity. The sounds from pile driving result from the impact of the solid surface of the hammer with that of the pile. They are repeated, usually at intervals greater than one second, for some minutes and/or hours.

However, construction operations could temporarily scare fish away from the construction area.

Fish species can be injured or killed by the impact sounds generated by high-intensity sources such as pile driving.[10] Their hearing may also be affected, or their behavior altered. The specific effects of pile driving on fish depend on a wide range of factors including the type of pile (e.g., steel or concrete), type of hammer (e.g., vibratory or impact), fish species, fish size, environmental setting, and many other factors, including whether fish are induced to leave the area due to construction activity in the water. The fish species affected depend on the location of the operation, and the habitat types. Sound levels often are expressed in decibels (dB) which is commonly used to describe the magnitude of a sound pressure. NOAA Fisheries and the USFWS note that high sound pressure levels can cause temporary behavioral changes (startle and stress) that could decrease a fish's ability to avoid predators.[11] According to research by the California, Oregon, and Washington Departments of Transportation regarding analysis of fish noise exposure criteria from pile-driving activities, which is based on a 2008 report that included key technical and policy staff, and national experts on sound propagation activities that affect fish and wildlife species of concern, fish are likely to be driven away by construction activity and noise.[12]

9 Magnuson-Stevens Fishery Conservation and Management Act, Public Law 94-265, as amended through January 12, 2007, https://media.fisheries.noaa.gov/dam-migration/msa-amended-2007.pdf.

10 A. N. Popper, and Hastings M. C. 2009. The effects of human-generated sound on fish (Review paper). Integrative Zoology 2009; 4: 43-52.

11 Technical Guidance for Assessment and Mitigation of the Hydroacoustic Effects of Pile Driving on Fish, February 2009. Prepared for California Department of Transportation by ICF Jones & Stokes & Illingworth and Rodkin, Inc., http://www.dot.ca.gov/hq/env/bio/files/Guidance_Manual_2_09.pdf.

12 Fisheries Hydroacoustic Working Group. Memorandum on the Agreement in Principle for Interim Criteria for Injury to Fish from Pile Driving Activities, June 12, 2008. The agreement meeting included staff from the Federal Highway Administration, NOAA Fisheries, U.S. Fish and Wildlife Service, the Departments of Transportation from California, Oregon, and Washington; and national experts on sound propagation activities that affect fish and wildlife species of concern, https://semspub.epa.gov/work/01/550571.pdf.

5.4.4 Findings

Mitigation measures will be used to minimize the effects of noise generated during construction. While construction is ongoing, the noise generated is likely to disperse fish away from the Project site and reduce the opportunity for injury.

5.5 Threatened and Endangered Species

The following section describes environmental consequences of the Proposed Project on state-listed and federally-listed threatened or endangered species that may occur in the vicinity of the Proposed Project.

The NHESP has established estimated and priority habitat polygons at the Runway 27 Project Site and on nearby Snake Island. The polygons at the Project Site are for upland sandpiper (*Bartramia longicauda*) and Eastern meadowlark *(Sturnella magna*), listed as endangered and special concern, respectively, and on Snake Island for least tern (*Sternula antillarum*) and common tern (*Sterna hirundo*), both species of special concern.

Comments received on the ENF questioned potential impacts to bird species using nearby Snake Island. The Project Site and Snake Island have been surveyed for the presence of state and federal-listed species. Although individuals of the species of interest were not observed at the Runway 27 RSA site, open grassland habitat is present that could support upland sandpiper or meadowlark. Snake Island in Winthrop was also surveyed in mid-May 2022, and least tern and common tern were both observed on the island, as well as suitable nesting habitat conditions for terns, however, no active nests were observed (see Appendix D.5, *Snake Island Habitat Evaluation*). It is important to note that despite air operations ongoing on Runway 27, the numerous birds observed on Snake Island did not show any reaction to the over flights.

The USFWS indicated there are no federally-listed threatened or endangered species under their jurisdiction within the Study Area.[13] The FAA has made a preliminary determination that the proposed pile-supported deck is not likely to adversely affect any threatened or endangered species listed under the jurisdiction of NOAA Fisheries.[14,15] A discussion with NOAA Fisheries was held on June 23, 2022 to present the Project and receive preliminary comments from NOAA on the potential issues associated with protected species of interest. NOAA Fisheries indicated species of interest in Boston Harbor include shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon (*A. oxyrinchus oxyrinchus)*, several species of sea turtles, and whales. Massport will continue to coordinate with the USFWS and NOAA Fisheries as the Project design progresses.

5.5.1 Direct Impacts

Massport will continue Massachusetts Endangered Species Act coordination with the NHESP to determine if the proposed work, including construction phase activities, could permanently alter NHESP Priority Habitat of a protected species, evaluate the effects on the local population, and determine if a Conservation and Management Permit would be required for the proposed work. Approximately 18,000 square feet of grassland habitat would be lost at the Project Site. Replacement of lost habitat could be provided by converting pavement to grassland elsewhere on the Airport property. While the proposed safety improvements would not change

13 Letter from USFWS to Massport, April 1, 2021.
14 Letter to National Marine Fisheries Service from Massport, March 29, 2021.
15 Vanasse Hangen Brustlin, Inc., Assessment of Sea Turtles and Whale Presence within the Boston Harbor Technical Memorandum, dated February 12, 2010.

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 Study Area and at nearby Snake Island during construction. Given the lack of any reaction to aircraft overflying the island during the May 2022 field survey, it would appear construction of the RSA deck would not have an adverse effect on the birds residing on Snake Island.

Literature on habitat requirements and stranding observations was reviewed to determine whether there could be any impacts to federally listed threatened or endangered species, specifically for protected fish species, whales and sea turtles. Direct effects would include the loss of critical habitat or incidental mortality of individuals. The federal Endangered Species Act (ESA) requires the federal government to designate “critical habitat” for any species it lists under the ESA. “Critical habitat” is defined as: (1) specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation.

No permanent adverse impacts to federally listed species is anticipated resulting from the construction of the pile-supported deck, as discussed below. As documented in Chapter 4, *Existing Environment*, there is no designated critical habitat within Boston Harbor.

5.5.1.1 No-Build Alternative

There would be no impacts to threatened or endangered species because of the No-Build Alternative. There would be no change to the environment at the Runway 27 End.

5.5.1.2 Build Alternative

Although protected species are potentially present in Boston Harbor, the pile-supported deck could impact openwater habitat potentially of use to fish, sea turtles and whales. Fish species and turtles could easily avoid the piles so the presence of the piles should not result in an adverse effect that would jeopardize the continued existence of these species or adversely change their habitat in Boston Harbor. No direct impact to listed species is anticipated. The proposed Runway 27 RSA improvements would not likely affect federally listed whale species, including North Atlantic right, humpback, fin, sei, and sperm whales, as the proposed RSA would be constructed in an area that is generally too shallow to be used by whales. NOAA Fisheries indicated general concurrence that the presence of the RSA deck would not adversely impact protected species or their habitat at a June 23, 2022 meeting. However, NOAA will want a Biological Assessment as part of a formal Section 7 Consultation that provides a detailed discussion of the construction impacts and comparison of the impact area and the remaining unaltered habitat within Boston Harbor.

5.5.2 Indirect Impacts

Indirect effects to protected marine species, if present, could include effects on population persistence or stability due to changes of food sources, and could potentially include health effects due to water quality (turbidity) and underwater construction noise.

5.5.3 Temporary Construction Impacts

Construction could result in temporary impacts to protected species habitat because of several activities. As discussed in Section 5.6.3, construction would be anticipated to generate some suspended sediment which would settle after a brief time in the water column. These impacts would be short-term and are not anticipated to result in any long-term disruption of growth or population dynamics of transient protected species. During construction, turbidity curtains would be deployed to contain turbidity and reduce the extent of impact, including preventing protected fish and sea turtles from entering the active construction area.

Construction equipment (barges, cranes, increased boat traffic, pile-driving, etc.) would result in activity and noise in the vicinity of the Runway 27 End. Activity and noise could cause protected species to avoid the work area and therefore avoid impacts of sedimentation and noise. Construction, particularly pile-driving, can generate high noise levels underwater that could potentially harm protected species. However, these noise levels would decrease to levels unlikely to cause harm within 20 meters (66 feet) of the work area. Because of the activity and noise of construction, protected species (if present in Boston Harbor) would be expected to avoid the area during active in-water construction. In-water construction is anticipated to occur for 60 days between July and September 2025.

5.5.4 Findings

As documented in this section, NOAA Fisheries provided a preliminary concurrence at the meeting on June 23, 2022, that the proposed Runway 27 End RSA Improvements Project would not an adverse effect on protected fish species, sea turtles, or marine mammals or their habitats. These safety improvements are not anticipated to have a significant effect on threatened or endangered species managed by NOAA.

5.6 Stormwater and Water Quality

The Secretary's Certificate required that the DEIR evaluate impacts to water quality and drainage resulting from the Proposed Project. Specifically, the Certificate requires the DEIR to discuss how the stormwater system will be sized to address future climate conditions, including during the construction period.

A discussion of the proposed Runway 27 RSA improvement's regulatory compliance with water quality regulations, including the Massachusetts Stormwater Management regulations, and the applicable Stormwater Standards is provided below. Mitigation measures to protect water quality during construction and post construction are presented in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*.

5.6.1 Direct Impacts

Direct impacts to water quality generally result from the Project changes to hydrology and any new pollutant loading that could occur. Potential impacts to water quality are intricately linked to changes in the composition, volume, and rate of stormwater runoff for projects that do not involve new water withdrawals or point-source discharges. Evaluation of water quality impacts considers increases in stormwater runoff, decreases in infiltration, and changes in the concentrations of constituents contained within the runoff.

Existing airfield impervious surfaces such as the runway, perimeter roadway, and existing 150-foot RSA were evaluated to determine the hydraulic and hydrologic characteristics under existing conditions. Because all runoff from the Airport discharges to tidal waterbodies, peak rate control is not a water quality concern if stormwater outfalls are designed to manage discharges without causing erosion. Changes to groundwater infiltration and recharge would not be significant water quality concerns because subsurface conditions at the Airport are not conducive to infiltration and groundwater levels are tidally influenced. Potential impacts were evaluated by comparing the existing stormwater management system and its impacts on water quality with the stormwater management features of the proposed Runway 27 RSA improvements.

The Proposed Project would occur in developed portions of the airfield near the end of Runway 27 and undeveloped intertidal and subtidal areas within Boston Harbor. Because Airport operations would not change due to the Proposed Project, direct impacts to water quality would be potentially associated only with stormwater management practices on the RSA deck and changes to currents and sediment transport within near-shore waters adjacent to the deck.

5.6.1.1 No-Build Alternative

Under the No-Build Alternative, no changes would be made to the existing RSA and the perimeter road would remain in its current configuration. Existing drainage areas would not be altered, and no new stormwater management features would be constructed.

5.6.1.2 Build Alternative

The Proposed Project would have a negligible impact on water quality based on negligible pollutant loading occurring on the RSA deck.

Proposed Drainage System

The Airport's existing drainage areas and associated stormwater outfalls would not be affected by the construction of the proposed Runway 27 RSA improvements (see **Table 5-3**).

Table 5-3 Proposed Runway 27 RSA Stormwater Management

Element	Existing Cover Type	New Impervious Area	Stormwater Management
RSA Deck	Open Water	3.3 acres	Drain to Boston Harbor through scuppers distributed along edges of deck
RSA Approach Slab and Perimeter Road	Pavement (perimeter road), grass infield, concrete, and riprap slope	0.5 acres	Drain to Boston Harbor via overland flow or existing catch basins to outfalls

The proposed realigned perimeter roadway is in an upland portion of the Airport. The existing closed drainage system in the area consists of a series of catch basins and pipes with limited drainage areas which discharge to separate outfalls. Outfalls A-25, A-26, and A-27 discharge stormwater flows from portions of the end of Runway 27 to the west-southwest, northwest, and east of the Runway 27 End. All outfalls will continue to be regulated under the Airport's existing National Pollutant Discharge Elimination System (NPDES) permit, as described in Section 4.8 of Chapter 4, *Existing Environment*. Stormwater sampling of the airfield outfalls is an ongoing requirement of the NPDES permit and would continue following the construction of the RSA. Stone riprap at these outfalls prevents erosion and sedimentation as the result of stormwater discharges.

Runoff from portions of the existing perimeter roadway and portions of the existing Runway 27 End RSA do not enter the closed drainage system and sheet flow across the riprap slope into Boston Harbor. Some paving in the upland portion of the Runway 27 End RSA and realignment of the perimeter road would result in changes to stormwater runoff by adding impervious areas in currently grassed uplands. The proposed Runway 27 End RSA Improvements Project would be designed so that these stormwater changes would not impact wetland resources.

The shoreline in this location is protected from erosion with poured cement and stone riprap. Rain that would fall on the surface of the deck-based portion of the RSA would not be detained and would be discharged at several locations to prevent erosive forces associated with concentrated flow from disturbing sediment and affecting the receiving water. Stormwater runoff from the deck would be discharged via scuppers located beneath the deck. Runoff from portions of the deck located within the intertidal zone (landward of MLW) would be collected in a separate piped drainage system and discharged at a location seaward of MLW. Runoff from portions of the deck located seaward of MLW would be discharged through scuppers distributed along each side of the deck. Stormwater runoff from the deck will not erode sediments adjacent to the deck because discharge would be distributed and would only occur at locations that are inundated throughout the tidal cycle.

Pollutant Loading

The RSA and perimeter road generate negligible amounts of contaminants or suspended solids, because these areas are not typically sanded and convey limited vehicular traffic which consists only of safety and maintenance equipment. Due to its composition, the existing and proposed EMAS would not be accessed by vehicles other than during an emergency or for routine maintenance. Runways, taxiways, and aprons are not sources of pollutants. There is a negligible contribution of nutrients to the receiving waters because no fertilizers are used on airfield grassed areas. Frequent sweeping of the paved portions of the site further reduces the quantity of sediments that are available for transport by stormwater runoff.

Rates of atmospheric deposition of pollutants would not be altered by the construction of the proposed Runway 27 RSA improvements. Most of the increase in pavement would occur as the result of the construction of the deck. Under existing conditions, the area is open water and currently receives direct deposition of air-borne pollutants. Following construction of the deck, the same quantity of air-borne pollutants would be deposited and potentially captured by the deck. These pollutants would be washed off the deck into Boston Harbor by rain events, rather than falling directly into Boston Harbor as it does under existing conditions.

Management of snow and ice within the airfield is a critical component of Airport operations. Logan Airport is prohibited from disposing of snow into Boston Harbor except under limited emergency situations. Snow is removed from runways and perimeter roads onto the grassed infield areas as soon as possible after it has fallen. De-icing is performed with potassium acetate (runways and taxiways), sodium acetate (RSAs and roadways), and airport grade sand. Because sodium acetate dissolves completely once applied, this practice generates negligible quantities of sediment and reduces the volume of waste material that must be managed by the stormwater treatment and collection system. Because heavy equipment is prohibited from accessing the EMAS, snow removal from the existing EMASs at the Airport, if needed, mainly due to icing concerns, is performed with a specialized snow blower with low ground pressure. The heavy equipment would also be used to remove snow from the proposed EMAS as needed. However, Massport staff indicate that, because of winds, it is rarely necessary to use snow removal equipment at the perimeter of the airfield. Snow management operations would result in negligible impacts to water quality and would be performed in accordance with the Airport

Stormwater Pollution Prevention Plan (SWPPP) and the NPDES discharge permit. Snow is not disposed of in Boston Harbor.

The volume and rate of stormwater runoff from the airfield is the same as that from other equivalent cover types. However, stormwater runoff from the airfield contains substantially fewer contaminants than runoff from comparable areas of public roadways handling large volumes of vehicular traffic and treated with standard winter maintenance practices. As described above, sodium acetate is used rather than salt or sand for winter de-icing, and vehicular traffic on the paved perimeter roads is limited to use by safety and maintenance equipment. The perimeter road is swept frequently (at least weekly) thereby further reducing the quantity of pollutants that are available for wash off by stormwater flows. The Proposed Project would continue to follow these practices.

Massachusetts Stormwater Regulations

As shown above, water quality monitoring data demonstrate that runoff from the airfield does not contain significant quantities of contaminants under existing conditions. Because the existing stormwater management practices (limited use of chemicals and existence of catch basins) can achieve acceptable water quality, it would not be warranted to install advanced stormwater management measures for the proposed Runway 27 RSA improvements. In addition, stormwater management basins would not be appropriate for the airfield since standing water would attract wildlife, particularly waterfowl, and could pose a hazard to aircraft operations The compliance to the Stormwater Management Standards are discussed below:

Standard 1: No New Untreated Discharges or Erosion to Wetlands

The Proposed Project would be designed to comply with Standard 1. No new stormwater outfalls are proposed for the Proposed Project. Existing outfalls would be maintained, and if needed, appropriate erosion and scour protection would be added to the outfalls.

Standard 2: Peak Rate Attenuation

The Proposed Project would seek to waive compliance to this Standard as it is LSCSF as defined in 310 CMR 10.04 and is not required to have peak rate attenuation or mitigation.

Standard 3: Stormwater Recharge

The Proposed Project would seek to waive compliance with Standard 3. The new impervious area due to the proposed deck would be located above tidal open water. The proposed scupper system would allow the deck to discharge directly to the open water.

Standard 4: Water Quality

The Proposed Project would seek to waive compliance Standard 4. As described above, the runoff from the RSA deck would not be accessed by vehicles unless during an emergency. Fertilizers would not be used on the grassed areas in the airfields. De-icing and snow management efforts would not result in pollutants being applied to the decking. Therefore, the deck would be in the same category as a roof. Per Massachusetts Stormwater Handbook, roof runoff may discharge directly to groundwater in a non-critical area and would not be required to be treated for the water quality volume.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

The existing Airport is considered a Land Use with Higher Potential Pollutant Loads (LUHPPLs) as there is an existing NPDES Permit monitoring the outfalls for the Airport. The outfalls would continue to be regulated during construction and operation of the proposed RSA Improvement Project.

Standard 6: Critical Areas

The Proposed Project would be seeking to waive compliance for Standard 6. Adjacent to the Project Site are shellfish growing areas that periodically harvested. The shellfish growing areas are critical areas that would receive runoff from the Project Site. As noted above, the runoff quality would be high quality and treatment, infiltration, peak attenuation, and recharge would not be suitable for the Airport.

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the Maximum Extent Practicable

The Proposed Project is not considered redevelopment and would be required to comply with the 10 Stormwater Management Standards. However, due to site constraints and subject to coastal storm flowage, the Project would comply to the maximum extent practicable as described under each standard.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Controls

The Proposed Project would potentially disturb up to approximately 6 acres of land including the onshore staging area and would therefore be required to obtain coverage under the USEPA NPDES Construction General Permit. As required under the NPDES Construction General Permit, a SWPPP would be developed and submitted before land disturbance begins. Recommended construction period pollution prevention and erosion and sedimentation controls would be finalized in the SWPPP and enacted on-site during the work.

Standard 9: Operation and Maintenance Plan

In compliance with Standard 9, a Post Construction Stormwater Operation and Maintenance (O&M) Plan would be developed for the Project. The Project would also adhere to the Operation and Maintenance requirements listed in the existing NPDES Permit issued for Logan Airport.

Standard 10: Prohibition of Illicit Discharges

The Project Site does not have any known illicit connections. Any illicit connections to sanitary sewer or storm drainage structures found in the project limit of work would be removed or incorporated into the Project. There are no habitable structures or sanitary sewer lines in the vicinity of the Project Site.

5.6.2 Indirect Impacts

The RSA would be constructed on a pile-supported deck that would not generate pollutants that could be released into Boston Harbor, nor would it receive substantial vehicle traffic or other sources of potential pollutants. Limited amounts of erosion would occur because of scour at the bottom of the pilings and currents in the vicinity of the deck would not be significantly altered. The analysis of sediment transport and scour has demonstrated the erosive forces will not be changed in the vicinity of the Proposed Project. The proposed Runway 27 RSA improvements would result in negligible impacts to turbidity and pollutant loading in Boston Harbor because it would not increase pollutant loading in the waters off the runway end. The proposed Runway 27 RSA would not change the number of aircraft or ground vehicle operations, and accordingly would not result in a change in generation of local pollutants or the discharge of pollutants from atmospheric deposition resulting from the proposed improvements.

5.6.3 Temporary Construction Impacts

Potential impacts associated with the construction of the proposed Runway 27 End RSA improvements Project could include increased sediment within the water column during installation or removal of sub-surface features, erosion of sediments from disturbed soils within the airfield, and the accidental release of construction materials or construction by-products. Spill prevention measures would be deployed to prevent pollution from construction equipment or material. Protective measures, such as silt curtains, silt fencing and erosion controls would be deployed throughout the construction phase to prevent sediment from affecting water quality at the construction site. Construction of the Proposed Project would use BMPs to prevent erosion of sediment that could temporarily affect water quality during the construction period.

Most of the proposed Runway 27 End RSA Improvements Project would be constructed from barges and other water-based craft. The use of this equipment would limit the amount of disturbance to the areas immediately affected by the insertion of driven piles. The spuds that barges deploy while operating would periodically release benthic sediments in the water column and increase turbidity in the vicinity of operations. No spuds would be deployed in the Town of Winthrop. Installation and subsequent removal of the temporary piles used to hold templates for pile-driving operations similarly release sediments. The analysis determined that sediment resulting from construction activities would result in negligible deposition on the surrounding areas.

The suspended sediment concentrations resulting from extracting the temporary piles holding the pile-driving templates in place and from deploying the spud barges were not modeled because the volume of sediment released during a single pile extraction or barge deployment is less than 1 cubic foot and would not result in significant sediment concentrations. Driving pilings would also result in negligible sediment discharges.

5.6.4 Findings

As documented in this section, the proposed Runway 27 End RSA Improvements Project would be designed to meet relevant state water quality standards to the maximum extent practicable and would not have a significant impact on water quality.

5.7 Cultural/Historical Resources

As described in Chapter 4, *Existing Environment*, no historic resources were identified within the APE. Therefore, no direct or indirect impacts (physical and non-physical) are anticipated under the No-Build Alternative or the Build Alternative.

The Massachusetts Historical Commission (MHC) and the Massachusetts BUAR received a copy of the ENF for the Project to review and solicit input regarding the presence of historic resources and the potential effects of the Project on such resources. The MHC did not provide a response letter, indicating its opinion there is no potential to affect historic resources. The BUAR provided a response letter dated September 21, 2021, stating the Project is "unlikely to adversely impact submerged cultural resources."[16] The letter specifies that if any

16 Comment Letter on the ENF received from the Massachusetts Board of Underwater Archaeological Resources, dated September 21, 2021.

previously unrecorded archaeological resources are encountered during construction, the Proponent is expected to follow the protocol outlines in BUAR's *Policy Guidance for the Discovery of Unanticipated Archaeological Resources* (October 2019).

5.7.1 Direct Impacts

Direct effects occur when an effect comes from the time and place of the Project with no intervening cause. These effects are usually physical in nature; however, direct effects can include visual, auditory, or other impacts resulting directly from the Project in some circumstances.

5.7.1.1 No-Build Alternative

As discussed in Section 4.10 of Chapter 4, *Existing Environment*, no historic resources were identified in the APE. Therefore, there would be no direct effects anticipated under the No-Build Alternative.

5.7.1.2 Build Alternative

As discussed in Section 4.10 of Chapter 4, *Existing Environment*, no historic resources were identified in the APE. Therefore, there would be no direct effects anticipated under the Build Alternative.

5.7.2 Indirect Impacts

Indirect effects to historic resources are those caused by the undertaking that are later in time or farther removed in distance but are still reasonably foreseeable. These are usually non-physical effects such as visual or auditory impacts.

5.7.2.1 No-Build Alternative

As discussed in Section 4.10 of Chapter 4, *Existing Environment*, no historic resources were identified in the APE. Therefore, there would be no indirect effects anticipated under the No-Build Alternative.

5.7.2.2 Build Alternative

As discussed in Section 4.10 of Chapter 4, *Existing Environment*, no historic resources were identified in the APE. Therefore, there would be no indirect effects anticipated under the Build Alternative.

5.7.3 Temporary Construction Impacts

No temporary, construction period impacts to historic resources would be anticipated. Per the BUAR's instructions, if an archaeological feature is encountered during in-water construction, Massport will follow the protocol in the *Policy Guidance for the Discovery of Unanticipated Underwater Archaeological Resources* (October 2019).

5.7.4 Findings

There would be no anticipated temporary construction or permanent impacts as there are no identified above-ground or archaeological resources in the APE.

5.8 Hazardous Materials/Materials Handling/Recycling

The following section describes the potential solid and hazardous waste impacts of the Build Alternative and the No-Build Alternative. The Secretary's Certificate on the ENF did not require specific information on solid and hazardous waste for the proposed Runway 27 RSA improvements; however, hazardous materials were evaluated to understand any potential resources that could impact the Study Area.

5.8.1 Direct Impacts

The environmental consequences of the Proposed Project on solid and hazardous waste were determined by reviewing the USEPA NPL for sites on Logan Airport and the MassDEP Waste Site and Reportable Releases database as well as review of other materials provided by Massport to determine if there is any potential for discovering solid or hazardous waste during construction. Direct impacts could include the potential for the Proposed Project to result in the accidental discharges of fuel or hydraulic fluid.

5.8.1.1 No-Build Alternative

There would be no change to the Runway 27 End that could cause a release of hazardous materials and no solid waste would be generated.

5.8.1.2 Build Alternative

There would be no operational changes to the use of Runway 27 that would result in an impact relative to hazardous materials and solid waste. Any impacts associated with the management of hazardous materials or solid wastes would be mitigated during construction as further discussed in Section 5.8.3.

5.8.2 Indirect Impacts

Indirect impacts could include the effects of releasing contaminated sediments in the water column or transporting hazardous materials off-site. Indirect impacts of the Proposed Project on solid and hazardous waste potentially include whether the off-site disposal of excavated or dredged material would affect landfills or have any adverse effects outside of the Study Area. It is not expected that off-site disposal of dredged or excavated materials is required.

5.8.3 Temporary Construction Impacts

A small quantity of sediment is anticipated to be generated during dredging associated with construction activities. Sediments can often contain naturally occurring metals and therefore sediments will be properly handled and managed during construction. Spill control and containment BMPs would be used during construction to mitigate potential spills or accidental discharges of fuel, hydraulic fluid, and other construction materials. Therefore, any impacts relative to hazardous materials or solid waste during construction will be mitigated.

5.8.4 Findings

As documented in Section 4.11 of Chapter 4, *Existing Environment*, there are no sites in the Study Area that are listed on the USEPA's NPL or in the MassDEP online databases. Therefore, there are no significant impacts in the category of hazardous materials associated with the proposed Runway 27 End RSA Improvements Project.

5.9 Climate Change, Adaption and Resiliency, and Sustainability

Massport's facilities, including Logan Airport and other maritime facilities in the City of Boston, are increasingly susceptible to flooding hazards caused by extreme storms and rising sea levels because of climate change. The Secretary's Certificate required that the DEIR evaluate impacts to water quality and drainage resulting from the Proposed Project. Specifically, the Certificate requires the DEIR to:

- Include a comprehensive discussion of the potential effects of climate change on the Project Site and describe features incorporated into the Project design that will increase the resiliency of the site to these changes;
- Explain whether the proposed deck support is being elevated to account for climate conditions (within the constraints of FAA regulations), and, if so, identify the projected climate conditions and assumptions, such as temperature, sea level rise and precipitation rates, that will be used in design; and
- Discuss how the stormwater system will be sized to address future climate conditions, including during the construction period.

The following section includes a discussion of the potential effects of climate change on the Project Site and describes features incorporated into the Project design that would increase the resiliency of the site to these changes. The section also describes the temporary construction impacts of the Project related to climate change and sustainability and identifies ways that Massport would incorporate measures to avoid and minimize these impacts.

As Project design and analyses advance, Massport would incorporate consideration of climate change adaptation and resiliency where possible within the FAA's design guidelines for these safety improvements. The Project would follow Massport's floodproofing design guidelines to the greatest extent possible and would utilize the most current climate modeling and flood projection data for the Commonwealth.

The Project will be designed to:

- Withstand existing and expected future storm intensity including coastal storm surge and sea level rise
- Withstand inundation by saltwater
- Accommodate an increase in heavy precipitation events
- Use materials that will not degrade in high heat

5.9.1 Direct Impacts

5.9.1.1 No-Build Alternative

No new impacts to climate would occur under the No-Build Alternative. The No-Build Alternative would not be any more susceptible to climate hazards than existing conditions.

5.9.1.2 Build Alternative

Adaptation and Resiliency

The ENF included the output report for the Project generated from the RMAT Climate Resilience Design Standards Tool. Based on the output report, the Project is identified as having a high initial risk rating due to exposure to sea level rise/storm surge, extreme precipitation due to urban flooding, and extreme heat. The flood risk of the Study Area is discussed further in Section 4.3.2.7 of Chapter 4, *Existing Environment*. The RSA deck will have a 75-year design life. As indicated in the ENF and throughout this DEIR, the proposed RSA is required by the FAA and would be constructed partially on land and partially on a deck over Boston Harbor. As discussed in Section 4.14.2.1 of Chapter 4, *Existing Environment*, Massport raised the runway threshold 10 inches during a 2020 safety rehabilitation of Runway 9-27 to account for sea level rise. Massport's *Floodproofing Design Guide* requires new facilities to be at least at an elevation of 17.0 feet (NAVD88).[17] The proposed RSA deck has been designed to elevation 15.75 feet (NAVD88) to match Runway 9-27; raising it higher is not possible given the elevation of the Runway 27 End. The elevation results in a deck which would be higher than the Runway 4R light pier and Runway 33L RSA deck.

Due to the FAA's design guidelines, the maximum elevation above Mean Sea Level of the RSA is tied directly to existing runway and taxiway elevations. Its runway-end position cannot be adjusted beyond the FAA design specifications. In the unlikely event the RSA deck is flooded, Runway 9-27 would likely be taken out of service until safe operating conditions can resume. The RSA would not be occupied other than for periodic maintenance or in the event of an aviation emergency at that location. As stated in Section 3.3.1 of Chapter 3, *Alternatives Considered,* the deck substructure would be designed to withstand anticipated coastal storm events and sea level rise. In addition, the proposed RSA deck concrete and EMAS blocks would be light gray, reducing their contribution to temperature increase.

Greenhouse Gas Emissions

There are no airfield operational changes anticipated as part of this Project, and therefore there would be no changes/direct impacts to operational GHG emissions.

5.9.2 Indirect Impacts

Designing the Project to withstand anticipated changes in the City of Boston's climate would result in positive impacts to safety and mobility, as the RSA would sustain fewer damages and service interruptions over time. Failing to design the Project in line with future climate projections has the potential to increase its climate risk, which could have negative implications to Logan Airport's larger stormwater system.

17 Massachusetts Port Authority, *Floodproofing Design Guide*, November 2014, revised April 2015.

5.9.3 Temporary Construction Impacts

Construction of the proposed RSA improvements would result in temporary GHG emissions associated with construction equipment. While the Project EIR is subject to the EEA GHG Emissions Policy (May 5, 2010), the EEA GHG Emissions Policy does not require the quantification of GHG emissions related to construction activities for projects that are not expected to generate an usually large amount of construction trips.[18] Per the EEA GHG Emissions Policy, examples of this type of project may include projects where significant amounts of soil need to be disposed of off-site through use of hauling trucks (e.g., closure of a hazardous waste disposal site). As such, the Proposed Project would be expected to fall under the *de minimis* exemption, as described in the ENF and the associated ENF Certificate.

The Secretary's Certificate stipulated the DEIR should describe any disproportionate adverse impacts that may result to environmental justice (EJ) populations because of the temporary shifting of flights during the construction period, including any associated increases in emissions and noise that may impact populations that would not otherwise experience such impacts during normal airport operations. Construction associated with the Proposed Project would result in the temporary closure of Runway 9-27 during each of the planned 60-day construction periods. During the closures, aircraft operations are anticipated to temporarily shift from Runway 9-27 to other runways, temporarily increasing the number of operations along the flight paths of the other runways (overall operations would remain the same with the equivalent decrease in Runway 9-27 operations). The temporary shift in aircraft operations will depend on wind and weather. If the FAA is utilizing a northeast flow aircraft traffic pattern, aircraft that would have departed from Runway 9 are expected to shift primarily to Runway 4R; in a southwest flow, aircraft that would have landed on Runway 27 are expected to primarily shift to Runway 22L. In a northwest flow, aircraft that would have landed or departed on Runway 27 are expected to shift primarily to Runway 33L or Runway 32. There is expected to be minimal impact by the Project to the availability of the late-night noise abatement preference of Runway 15R departures/Runway 33L arrivals. The choice of which runway configurations to utilize will continue to be primarily driven by changes in weather.

As described in Chapter 6, *Environmental Justice and Public Outreach*, there are census block groups within 1 mile of the Project Site that are considered EJ populations according to the EEA Environmental Justice Maps Viewer (EJ Maps Viewer).[19] No disproportionate impacts associated with GHG emissions would be expected with the temporary re-routing of aircraft operations away from these EJ communities in the vicinity of Runway 9-27.

Additionally, the Certificate stated that the DEIR should identify ways that the Proponent will incorporate measures to avoid and minimize GHG emissions (and other air pollutants) during the construction period. It is anticipated that construction associated with the Proposed Project would incorporate best practices such as limiting idling and using Tier III or Tier IV equipment where feasible in off-road construction equipment, to avoid and minimize emissions. While these considerations fall under climate and sustainability, they are addressed directly in Section 5.10.3.3 and in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings.* Temporary constructions impacts are not anticipated to affect the Project's ability to adapt to climate change.

18 The Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs, "Revised MEPA Greenhouse Gas Emissions Policy and Protocol," Effective May 5, 2020, https://www.mass.gov/doc/greehouse-gas-emissions-policy-and-protocol/download.
19 These data were obtained from https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations.

5.9.4 Findings

As Project design and analyses advance, Massport would incorporate consideration of climate change adaptation and resiliency where possible within the FAA's design guidelines for these safety improvements. The deck substructure specifically would be designed to withstand anticipated coastal storm events and sea level rise. There are no operational changes anticipated as part of the Proposed Project; therefore, there would be no changes/direct impacts to GHG emissions.

5.10 Other Construction Impacts

This section examines the potential effects of construction activities on traffic and the transportation network in the vicinity of Logan Airport, noise that would affect area residents, and emission of air pollutants during the construction period, in response to the requirements of the Secretary's Certificate. Construction period impacts to other resource areas were described prior in their appropriate section.

The Secretary's Certificate required the DEIR:

- Identify the potential vulnerabilities faced by EJ populations using the EJ Viewer released by the Department of Public Health (see Chapter 6, *Environmental Justice and Public Outreach)*;
- Explain whether the impacts of the Project may be disproportionate and adverse when considering the existing vulnerabilities of the surrounding EJ communities (see Chapter 6, *Environmental Justice and Public Outreach)*;
- Describe any disproportionate adverse impacts that may result to EJ populations because of the potential re-routing of flights during the construction period, including any associated increases in emissions and noise that may impact populations that would not otherwise experience such impacts during normal airport operations (see Section 5.9.3); and
- Identify ways that the Proponent will incorporate measures to avoid and minimize GHG emissions (and other air pollutants) during the construction period (see Section 5.10.3).

The construction schedule and potential airfield operational impacts are discussed in Chapter 3, *Alternatives Considered*. The construction analysis assumes that work would be completed in two periods of 60 consecutive days, one each between July 1 and September 30 of 2025 and 2026 as follows:

- 2025 – Install piles and pile-caps to support deck; install steel sheet pile and abutment wall and protective riprap; construct transition slab.
- 2026 – Install deck structure and EMAS; realign the perimeter road; construct the emergency egress ramps; complete final grading.

Work is anticipated to primarily occur on weekdays from 7 AM to 7 PM, on Saturdays from 8 AM to 7 PM, and on Sundays and from 9 AM to 7 PM. The surface transportation, noise, and air quality impacts discussed below were evaluated based on the proposed construction equipment usage shown in **Table 5-4.**

Table 5-4 Anticipated Construction Equipment Use

Equipment	Number of Pieces of Equipment	
	2025 Quarter 3	2026 Quarter 3
250 Ton Crane	3	3
2500 Gallon Water Truck	1	1
300 Ton Crane	2	2
Bulldozer	1	2
Cold Planer, Tandem Roller and Paver	-	2
Compressor	7	9
Concrete Pump	5	4
Crew Boat	1	1
Delivery Truck	3	3
Dozer	1	2
Dump Truck	3	6
EMAS Tractor Trailer	-	8
Escort Vehicle	3	3
Excavator	1	3
Forklift	-	6
Heavy Duty Concrete Power Screed	4	4
Hydraulic Hammers with Powerpak	3	-
Hydraulic Pile Cutting Machine	2	-
Loader	1	3
Man Boat	1	1
Material Barge	6	6
Mechanic Truck	2	2
Mortar Concrete Mixer	4	4
Pickup Truck	3	7
Portable Generator	7	7
Ready Mix Concrete Truck	20	16
Ride On Power Trowel	4	4
Survey Van	1	1
Tack Coat Truck	-	2
Truck Mounted Concrete Pump	4	4
Tugboat	2	2
Vacuum Sweeper Truck	1	1
Vibratory Roller	1	2

Table 5-4 Anticipated Construction Equipment Use

	Number of Pieces of Equipment	
Equipment	**2025 Quarter 3**	**2026 Quarter 3**
Vibro Hammer with Powerpak	4	2
Welder Machine	6	4
Work Boat	5	5
Worker Van	1	1
At Off-site Staging Area (not included in noise analysis)		
250 Ton Crane	1	1
Forklift	1	1
Delivery Truck	4	4

5.10.1 Surface Transportation

Construction of the Proposed Project would be primarily undertaken from the water and most of the materials would be delivered to the Runway 27 End RSA construction area by barge. Materials to be delivered by truck to the Airport would primarily include asphalt pavement, the EMAS blocks, and concrete. Construction workers would be encouraged to take public transportation and not drive or park at the Airport except for limited supervisory personnel. Most workers would be transported to the site by marine vessel.

Massport has analyzed potential construction-related impacts, including surface transportation impacts. Temporary, construction-related impacts would occur on a short-term basis during the construction period based on construction methods, duration, materials, and equipment. Massport has identified best practices that would minimize the likelihood of negative impacts on the natural and built environments.

Information relevant to surface transportation on construction phasing, work hours, and equipment to be used is presented in Section 5.10.

5.10.1.1 Coordination with Other Construction Activities

The planned Airport projects presented in **Table 5-5** may be ongoing during construction of the Proposed Project.

Due to the minimal impact of the construction on the roadways and the location of the other construction activities in different areas of the Airport, the concurrent construction of these projects could be accommodated by the Airport and regional roadway systems.

Table 5-5 Foreseeable Logan Airport Projects Anticipated During Proposed Project Construction

Project	Construction Period
Terminal Roadways	2025
Airfield Electrical Upgrades	2025
Rehabilitate Taxiway A North	2025
Second Airfield Lighting Vault	2025-2026
Soundproofing	2025-2026
Rehabilitate Taxiway M North and Associated Geometry Improvements (Taxiways R and Y)	2026
Rehabilitate Taxiway B East and South	2026

Source: Massachusetts Port Authority, May 2022.

5.10.1.2 Construction Surface Transportation Impacts

Short-term construction impacts are expected to be limited to the roadways that provide direct access to the Airport's North and South Gates: Service Road (SR-2), Transportation Way, Harborside Drive, and Prescott Street. For trucks and equipment that arrive via roadway, the Coughlin Bypass, Route 1A, and I-90 will facilitate regional connections. As documented in Massport's construction management specifications, construction vehicles are restricted from using local roads.

Project construction would be primarily undertaken from a defined work area. All materials and workers that cannot be delivered by marine vessel would be expected to be delivered to the construction area with via secure escort from either Logan Airport's North or South Gates along Prescott Street or Harborside Drive, respectively. Materials to be delivered by truck to the Airport would primarily include asphalt pavement, concrete, structural steel, granular base and subbase materials, and EMAS blocks/materials. Construction workers would be encouraged to take public transportation and not drive or park at the Airport (except for limited supervisory personnel). Most workers would be transported to the site by shuttle bus from a remote contractor lot or arrive on existing Airport shuttles.

Construction Traffic Methodology

The estimated numbers of pieces of construction equipment associated with the construction schedule are provided in **Table 5-4** for 2025 and 2026. Work is only anticipated to occur in Quarter 3 of each year.

Construction Truck Traffic

Peak construction activity related to the Project elements occurs at various times. The combined peak is anticipated to occur during the third quarter of 2026.

Most of the heavy construction equipment, including some mobile cranes, excavators, concrete pump trucks, EMAS trailers, water trucks, pavers, and miscellaneous equipment (welders, compressors, vibrocompactors) would be stored on the Airport during non-work hours. The heavy construction equipment would be used during most workdays; however, the equipment would not enter or leave the Airport as a daily construction trip.

The following types of equipment would enter and leave the Airport for each work shift:

- Delivery Trucks;
- Dump Trucks;
- Escort Vehicles;
- Mechanic Trucks;
- Pick-up Trucks;
- Survey Vans; and
- Limited number of worker trucks.

The projected daily need for these types of heavy and light trucks was used to estimate the daily number of total truck trips (arrivals plus departures) to the Airport, as presented in **Table 5-6**. The construction would generate approximately 36 to 68 total truck trips per weekday, depending on the Project phase. Construction is expected to take place seven days a week, starting at 7 AM on weekdays, at 8 AM on Saturday, and at 9 AM on Sunday and ending at 7 PM on all days. It is possible that occasional specialized deliveries or construction activities could occur outside these hours. Most light duty trucks, such as escort trucks and pick-up trucks associated with supervisory workers, are assumed to all arrive to the construction area during the morning peak hour and exit during the evening peak hour.

Table 5-6 Total Daily Construction Trips

Year	2025				2026			
Period	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec
Total Daily Trips	0	0	36	0	0	0	68	0

Source: WSP

Construction Truck Routes

Massport would require the contractor to process all airside construction through the Airport's North or South Security Gate for the duration of construction. Airport access by the contractor would be limited to federal or state highways and segments of local roadways that provide direct access to the Airport's entrances. As noted previously, construction vehicles are restricted from using local roadways through East Boston. Truck trips directly to the Approximate Construction Area are anticipated to come from all directions and would be routed in any of the following ways:

- Access via McClellan Highway (Route 1A) southbound, Transportation Way, Hotel Drive, SR-2, and Prescott Street; egress via Prescott Street, SR-2, and the Airport Exit ramp from Terminal E to Route 1A northbound.
- Access via Callahan Tunnel, Route 1A Northbound, Frankfort Street off-ramp, Frankfort Street southbound and Prescott Street; egress via Prescott Street, SR-2, the Airport Exit ramp from Terminal E, Route 1A Southbound to the Sumner Tunnel.

- Access via Ted Williams Tunnel, Ramp T-S, Hotel Drive, SR-2, and Prescott Street; Egress via Prescott Street, SR-2, and the Airport Exit ramp from Terminal E to Ted Williams Tunnel.

Construction Traffic Management

Vehicular traffic flow on the Airport roadway network during construction would be managed to maintain acceptable levels of service. If necessary, Massport can modify contractor schedules and access routes to minimize impacts.

Based on the maximum of 68 total daily construction truck trips and the access restrictions described above, the Proposed Project would have minimal impact on Airport or regional roadways. The Airport roadway infrastructure accommodates over 120,000 daily trips each weekday (pre-COVID-19) and can accommodate the anticipated 68 additional daily construction truck trips associated with the Proposed Project's construction without further impacting capacity or delay. Due to the minimal impact of the Proposed Project's construction on the roadways and considering other construction activities (shown in **Table 5-6**) in different areas of the Airport, the concurrent construction of the other ongoing and reasonably foreseeable projects would be accommodated by the Airport and regional roadway systems.

5.10.1.3 Mitigation/Beneficial Measures – Surface Transportation

Construction Traffic Mitigation

The Airport roadways can support the anticipated construction-related traffic; therefore, no specific mitigation is proposed and no Project-specific transportation access plan is proposed. Massport requires all contractors to limit construction-related traffic to access and egress through the North or South Gates using only state and federal highways and the Airport roadway network, prohibiting construction-related traffic on the local East Boston roadways.

Massport requires contractors to implement construction worker vehicle trip management, including requiring off-Airport parking and high-occupancy vehicle transportation modes for employees.

Construction Traffic Maintenance

Vehicular traffic flow on the Airport roadway network during construction will be managed to maintain acceptable levels of service. If necessary, Massport can modify contractor schedules and access routes to minimize impacts.

5.10.2 Noise

The proposed Runway 27 End RSA Improvements Project would generate noise associated with construction activities. Because the Proposed Project would not extend runways nor have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway, once construction is complete, the presence of the RSA would have no impact on noise from aircraft operations. Accordingly, the noise analysis evaluates the temporary impacts associated with construction of the safety improvements.

This section provides background information for understanding noise and the potential noise impacts to humans, describes the methodology used to evaluate construction noise impacts, identifies the noise receptors closest to the Project Site, construction and existing noise levels, and presents the results of modeling the noise levels expected to occur during construction of the Proposed Project. Appendix D.6, *Noise Analysis*, provides more detailed information understanding noise and noise impacts and provides detailed data from the noise analysis.

5.10.2.1 Noise Background

Noise is defined as unwanted or excessive sound. Sound becomes unwanted when it interferes with normal activities such as sleep, work, or recreation. The individual human response to noise is subject to considerable variability since there are many emotional and physical factors that contribute to the differences in reaction to noise.

Sound (noise) is described in terms of loudness, frequency, and duration. Loudness is the sound pressure level measured on a logarithmic scale in units of decibels (dB). For community noise impact assessment, sound level frequency characteristics are based upon human hearing, using an A-weighted (dBA) frequency filter. The A-weighted filter is used because it approximates the way humans hear sound. **Figure 5-1** presents a list of common indoor and outdoor sound levels. The duration characteristics of sound account for the time varying nature of sound sources.

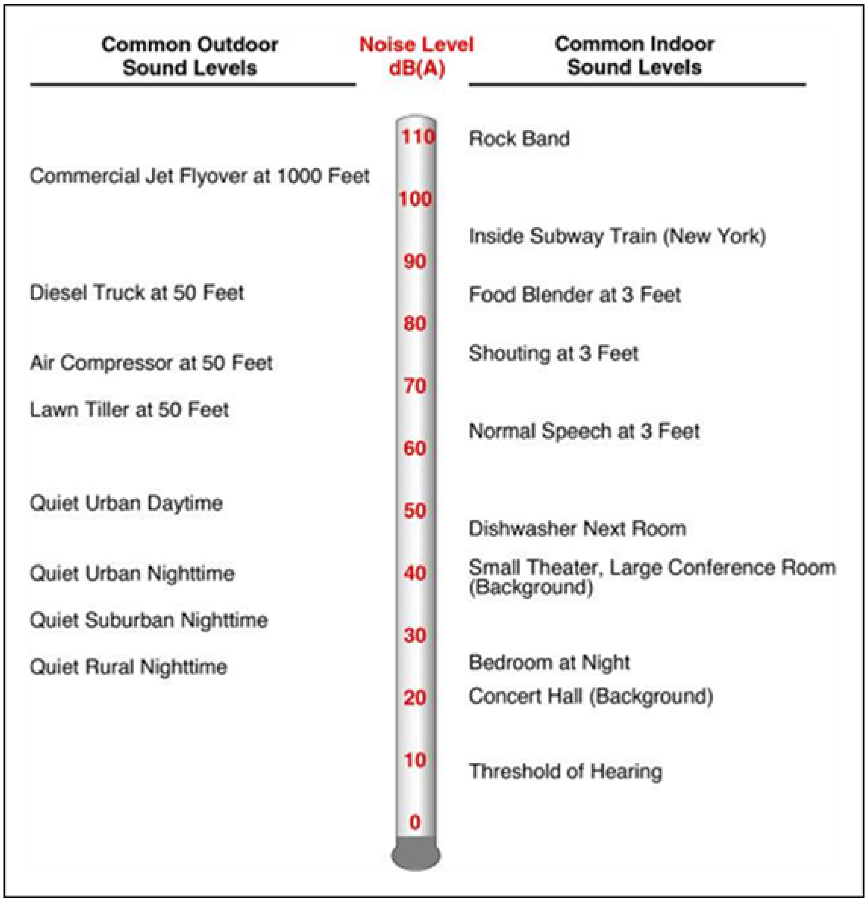
Sound level data can be presented in statistical terms in diverse ways to help describe the noise environment. The following is a list of other sound level descriptors:

- L_{dn} or Day-Night Average Sound Level (DNL) represents the day-night average sound level. L_{dn} is an A-weighted equivalent level that accounts for all sound energy occurring over a 24-hour period. This metric applies a 10 dB penalty to all noise events occurring during nighttime (10 PM to 7 AM).
- L_{eq} represents the equivalent sound level which averages the background sound levels with short term transient sound levels and provides a uniform method for comparing sound levels that vary over time.
- L_{max} is the maximum A-weighted sound level measured during a specified period.
- L_{10} is the A-weighted sound level which is exceeded 10 percent of the time during a specified period. During a 10- minute period, the L_{10} would be the sound level which was exceeded by other sound levels for one minute.

The following general relationships and human perceptions exist:

- A 1 or 2 dBA increase is not perceptible to the average person.
- A 3 dBA increase is a doubling of acoustic energy but is just barely perceptible to the human ear.
- A 10 dBA increase is a tenfold increase in acoustic energy but is perceived as a doubling in loudness to the average person.

Figure 5-1 Representative A-Weighted Sound Levels



dBA = A-weighted decibels describe pressure logarithmically with respect to 20 μPa (the reference pressure level).
Source: HMMH, 2011.

5.10.2.2 Methodology

Noise impacts from construction of the Runway 27 End RSA Improvements Project were evaluated by determining the noise levels generated by distinct types of construction activity and calculating the construction-related noise level at the closest noise-sensitive receptor locations. Noise sensitive receptors include residential, educational, health, and religious structures and sites, and parks, recreational areas, areas with wilderness characteristics, wildlife refuges, and cultural and historical sites (for the Proposed Project, the receptors are primarily residences and a park). Construction noise levels can vary depending on equipment type, condition of the equipment, number of pieces of each type of equipment used, the type of work the equipment is doing, and the distance between the construction equipment and the sensitive receptors. Overall construction sound levels are governed primarily by the noisiest pieces of equipment operating at a given time. Annoyance due to construction noise is variable and can result from the use of specific equipment, such as impact pile driving or pavement breakers, as well as mobile equipment working on-site and engines idling for extended periods of time.

As required by FAA Order 1050.1F, noise sources other than aircraft departures and arrivals should be evaluated using accepted methodologies implemented for other agencies where the FAA does not provide specific guidance.[20] The FAA does not provide specific guidance for evaluating noise from construction equipment. The U.S. Department of Transportation (USDOT) Federal Highway Administration's (FHWA) Roadway Construction Noise Model (version 2.0) was used to calculate the sound levels associated with the construction equipment at the closest sensitive receptor locations to the Project Site. The FHWA's Roadway Construction Noise Model incorporates a construction equipment noise database. The model can analyze multiple pieces of equipment simultaneously at multiple receptor locations, considering the number, the percent of usage, and sound levels of each piece of equipment. Total sound levels are predicted for the receptor locations based upon the terrain, which is mostly water, and the acoustical propagation over distances.

Based on a schedule of equipment to be used, the noise analysis evaluated sound levels of construction activities for the proposed Runway 27 End RSA Improvements Project during the periods for which construction is planned to occur: the third quarter of 2025 and the third quarter of 2026. **Table 5-4** provides equipment usage for each of these periods.

As discussed in Section 4.13.1 of Chapter 4, *Existing Environment,* the City of Boston has established regulations for evaluating sound levels associated with construction activities in terms of L_{10} and L_{max}. While Massport is exempt from local regulations, the noise criteria in the City of Boston's regulations were used to evaluate whether the Proposed Project would generate sound levels that result in adverse impacts.

5.10.2.3 Receptor Locations

Potential noise impacts due to the construction of the Proposed Project were evaluated for the closest noise-sensitive land uses, which are primarily in the Town of Winthrop. The noise analysis identified 10 representative sensitive receptor locations which are located between approximately 3,100 feet to approximately 10,000 feet from the Project Site, as shown in **Table 5-7**. The receptor locations are predominately residential. These receptor locations were selected based on land use considerations and represent the most sensitive locations that are likely to experience changes in sound levels due to the proposed construction. These receptor locations include one location to the southwest, four locations to the north, two locations to the northeast, and three locations to the east. These receptor locations are shown in **Figure 5-2**.

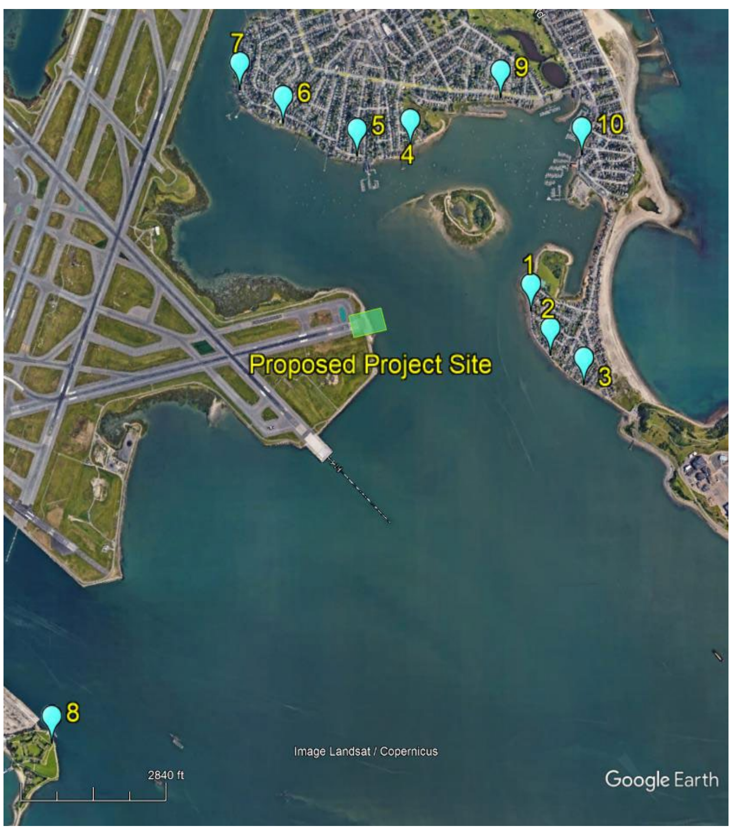
20 U.S. Department of Transportation, Federal Aviation Administration, Order 1050.1F: *Environmental Impacts: Policies and Procedures*, pages B-6 to B-7, July 16, 2015.

Table 5-7 Noise-Sensitive Receptor Locations

Receptor	Location[1]	Approximate Distance from Proposed Project (feet)[2]
1	Grand View Avenue between Undine Avenue and Foam Street	3,300
2	Grand View Avenue between Shirley Street and Billows Street	3,700
3	Townsend Street and Maryland Avenue	4,400
4	Frances Street and Pico Avenue	3,100
5	Woodside Park, Baker Road, and Bartlett Parkway	3,100
6	Johnson Avenue between Bellevue Avenue/Sargent Street	4,200
7	Court Road between Sargent Street/Albert Avenue	4,900
8	Fort Independence Park (South Boston)	10,000
9	Washington Avenue between Bates Avenue and Lewis Avenue	5,000
10	Shirley Street between Crystal Cove Avenue and Park Avenue	5,400

1 See Figure 5-2.
2 Distance measured from the center of the Proposed Project.

Figure 5-2 Proposed Project Site and Noise-Sensitive Receptor Locations



Note: See Table 5-7 for distances to each receptor location.

5.10.2.4 Existing Sound Levels

Massport maintains 30 noise monitoring stations that gather noise data 24 hours a day at various locations across the Boston Metropolitan area. Massport uses these data to monitor and minimize the noise impacts to the community, associated with activities at Logan Airport. Daily readings are taken from the noise monitors throughout the year. The detailed data can be separated such that the sound level of a passing plane thousands of feet overhead and be distinguished from sound levels from general traffic in the neighborhood below.

The existing sound levels reported in **Table 5-8** are based on measured L_{dn} sound levels from noise monitoring stations located in communities surrounding Logan Airport. To compare to the City of Boston's noise criteria, the L_{dn} sound levels were converted into daytime (7 AM to 7 PM) L_{10} sound levels. The daytime sound levels were based on the overall L_{dn} measured value, which includes both aircraft and community noise. The conversion process was based upon the FHWA's Roadway Construction Noise Model and the Federal Transit Administration's Transit Noise and Vibration Impact Assessment Manual.[21] Noise Monitoring Stations 4 and 5 are located to the east of the Runway 27 End and Noise Monitoring Station 6 is located northwest of the Runway 27 End, as shown in **Figure 5-3**.

Table 5-8 Sound Levels (dBA) at Massport's Existing Winthrop Noise Monitoring Stations

Noise Monitoring Station	Monitoring Location[1]	L_{dn}	Daytime L_{10} (7 AM to 7 PM)[2]
4	Bay View Avenue and Grand View Avenue – Winthrop	75	80
5	Harborview and Faun Bar – Winthrop	62	67
6	Somerset Avenue near Johnson Avenue – Winthrop	69	74

Source: Logan International Airport 2019 Annual DNL Report. The daytime background sound levels represent both community and aircraft noise sources. Total DNL reported at the monitor was used because it includes both community and aircraft noise sources.
1 See Figure 5-3.
2 Stations measure L_{dn}. L_{10} was derived from L_{dn}.

21 U.S. Department of Transportation, Federal Transit Administration, *Transit Noise and Vibration Impact Assessment Manual,* FTA Report No. 0123, prepared by John A. Volpe National Transportation Systems Center, September 2018.

Figure 5-3 Massport Noise Monitoring Station Locations

Source: Logan International Airport 2019 Annual DNL Report.

5.10.2.5 Direct Impacts

There would be no permanent direct impacts to noise sensitive land uses resulting from the proposed Runway 27 End RSA because the proposed Runway 27 End RSA Improvements Project would not change the daily aircraft operations, type of aircraft, or location in which aircraft operate.

5.10.2.6 Indirect Impacts

No indirect impacts to noise sensitive land use are anticipated because the proposed Runway 27 End RSA Improvements Project would not change the daily aircraft operations, type of aircraft, or location in which aircraft operate.

5.10.2.7 Construction Period Impacts

There may be some temporary changes in aircraft noise due to the closure of Runway 9-27 during each of the 60-day construction periods in 2025 and 2026. During the closure, aircraft operations would shift from Runway 9-27 to other runways, temporarily increasing the number of overflights related to the other runways. Depending on wind and weather and which runway configuration the FAA is utilizing, additional overflights would temporarily occur on Runways 4R-22L, 4L-22R, Runway 33L, and Runway 32. It is expected that utilization of Runway 15R-33L for late nighttime operations would not be impacted by the Project. However, the primary source of noise during construction would be construction equipment and the marine vessels used for transporting construction equipment, supplies, and workers to the site.

Construction of the proposed Runway 27 End RSA End Improvements Project is expected to generate typical sound levels associated with construction activities, including use of heavy equipment for excavation, material transport, pile driving, and installation of the concrete deck and EMAS. The noise analysis was conducted for noise propagation over a hard surface, such as water, and provides noise levels for each of the two 60-day construction periods, one each in 2025 and 2026, based on the equipment anticipated to be used during each period. The results of the noise modeling are shown in **Table 5-9** and **Table 5-10**, which show the construction sound levels anticipated from the Proposed Project in each construction period for L_{10} and L_{max}, respectively.

As shown in **Table 5-9**, L_{10} sound levels from construction would range from a low of 60 dBA in 2026 at Fort Independence Park in South Boston, the receptor that is located farthest from the Project Site, to a high of 73 dBA in 2025 at the closest locations to the Project Site at Frances Street and Pico Avenue and Woodside Park, Baker Road, and Bartlett Parkway in Winthrop. These sound levels are below the City of Boston's criteria on noise emitted from construction sites, which is L_{10} = 75 dBA for residential land uses and L_{10} = 80 dBA for recreational land uses.

Table 5-9 Predicted Construction Sound Levels (L_{10}, dBA)[1,2]

Receptor	Location[3]	2025[4]	2026[4]
1	Grand View Avenue between Undine Avenue and Foam Street	72	70
2	Grand View Avenue between Shirley Street and Billows Street	71	69
3	Townsend Street and Maryland Avenue	70	68
4	Frances Street and Pico Avenue	73	71
5	Woodside Park, Baker Road, and Bartlett Parkway	73	71
6	Johnson Avenue between Bellevue Avenue/Sargent Street	70	68
7	Court Road between Sargent Street/Albert Avenue	69	67
8	Fort Independence Park	63	60
9	Washington Avenue between Bates Avenue and Lewis Avenue	69	66
10	Shirley Street between Crystal Cove Avenue and Park Avenue	68	66

1 L_{10} represents total sound level of all equipment.
2 City of Boston noise criteria from construction sites is limited to L_{10} = 75 dBA at a residential or institutional land use and L_{10} = 80 dBA at recreational land use.
3 See Figure 5-2.
4 Construction is anticipated to occur for a 60-day period between July 1 and September 30 of each year.

Table 5-10 shows the L_{max} sound levels at all receptors. The predicted L_{max} during construction would range from 58 dBA at Fort Independence Park in both 2025 and 2026 to 69 dBA at Frances Street and Pico Avenue and Woodside Park, Baker Road, and Bartlett Parkway in both periods. These construction noise levels are below the City of Boston's criteria for noise emitted from construction sites of L_{max} 86 dBA for residential uses. The L_{max} is based on the loudest piece of equipment used in each construction period and is experienced only during the period when the equipment is in use. For the RSA construction, the loudest piece of equipment is a vibratory pile driver. Pile driving is expected to occur for a limited period of approximately 30 days in 2025.

Table 5-10 Predicted Maximum Construction Sound Levels (L_{max}, dBA)[1,2]

Receptor	Location[3]	2025	2026
1	Grand View Avenue between Undine Avenue and Foam Street	68	68
2	Grand View Avenue between Shirley Street and Billows Street	67	67
3	Townsend Street and Maryland Avenue	66	66
4	Frances Street and Pico Avenue	69	69
5	Woodside Park, Baker Road, and Bartlett Parkway	69	69
6	Johnson Avenue between Bellevue Avenue/Sargent Street	66	66
7	Court Road between Sargent Street/Albert Avenue	65	65
8	Fort Independence Park	58	58
9	Washington Avenue between Bates Avenue and Lewis Avenue	64	64
10	Shirley Street between Crystal Cove Avenue and Park Avenue	64	64

1 L_{max} represents the highest A-weighted sound level predicted during construction.
2 City of Boston noise criteria from construction sites is limited to L_{max} 86 dBA at residential or institutional land uses.
3 See Figure 5-2.

5.10.2.8 Noise Avoidance, Minimization, and Mitigation Measures

Although the Project would not result in significant impacts from construction equipment and although construction noise from the Proposed Project would be below the City of Boston criteria for noise emitted from construction sites for both L_{10} and L_{max}, the following measures will be implemented, where possible, to reduce the effects of construction noise on noise sensitive areas:

- Provide appropriate manufacturer's noise reduction devices, including, but not limited to a manufacturer's muffler (or equivalently rated material) that is free of rust, holes, and exhaust leaks on construction equipment operating on-site.
- Ensure that the engine housing doors are kept closed on construction devices with internal combustion engines.
- Cover equipment, such as compressors, generators, pumps, and other such devices with noise insulating fabric as well as operate the device at lower engine speeds during work to the maximum extent possible.
- Use operational controls, such as limiting vehicle engine idling on-site and time-of-day restrictions for certain activities.
- Use quieter or ambient-sensitive back-up alarms on construction equipment whenever practical.
- Strategically position construction vehicles so as to minimize operation near noise sensitive receptors and direct construction haul vehicles away from noise sensitive receptors when traveling to and from the work site.
- Use noise pathway controls where possible, including temporary noise barriers and enclosures free from gaps and holes, placed as close as possible to construction areas.

- Fit any air-powered equipment with pneumatic exhaust silencers.
- Keep the public informed about construction activities and efforts to minimize noise in the community.
- Use the Massport Noise Complaint system for prompt response and corrective action to noise complaints during construction.

5.10.3 Air Quality and GHG Emissions

The proposed Runway 27 End RSA Improvements Project would temporarily generate emissions associated with construction activities. Because the Proposed Project would not extend runways nor have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway, it would not affect emissions from aircraft operations. The RSA improvements would not result in any permanent changes to existing surface transportation access/egress routes nor influence the amount of vehicle traffic.

5.10.3.1 Direct Impacts

There would be no permanent direct impacts to air quality resulting from the proposed Runway 27 End RSA Improvements Project. The Proposed Project would not change the daily aircraft operations, type of aircraft, or location in which aircraft operate; the Proposed Project would not directly affect surface transportation traffic patterns or the number of vehicles accessing the Airport.

5.10.3.2 Indirect Impacts

No indirect impacts to air quality are anticipated because the Proposed Project would not change the daily aircraft operations, type of aircraft, or location in which aircraft operate.

5.10.3.3 Construction Period Impacts

The Proposed Project would not change the operational levels at Logan Airport. Therefore, operational emissions are also not expected to change. However, the construction is expected to generate short-term construction-related air emissions, including exhaust emissions from on-road construction vehicles, off-road construction equipment and marine transport vessels; evaporative emissions from asphalt placement and curing; and the generation of fugitive dust from disturbance of unpaved areas.

For this Project, project-related GHG emissions will be temporarily emitted from construction activity. Refer to Section 5.9.3 for a discussion of GHG emissions related to construction activities. Existing air quality conditions pertinent to the air quality assessment are discussed in Section 4.12 of Chapter 4, *Existing Environment*. The construction emission assessment methodology and emissions analysis results are discussed in further detail below.

Construction Emissions Analysis Methodology

Construction activities resulting from the RSA improvements represent a short-term source of air emissions and include:

- Exhaust emissions from on-road construction vehicles;
- Off-road construction equipment;
- Marine transport vessels;
- Evaporative emissions from asphalt placement and curing; and
- Generation of fugitive dust from disturbance of unpaved areas.

To estimate exhaust emissions from on-road vehicles and construction equipment, emissions factors were developed using the USEPA's Motor Vehicle Emissions Simulator model (MOVES3)(on road and nonroad modules). The factors were applied to the anticipated levels of activity identified in the Project construction schedule. Marine vessel emissions were quantified according to separate guidance published by USEPA and incorporated usage and travel estimates contained within the construction schedule. Asphalt paving and fugitive dust emissions factors were obtained from the USEPA emission factor document AP-42 and other relevant publications and were applied to estimated Study Areas to be paved and/or disturbed by the construction activities. Appendix D.7, *Air Quality Analysis*, contains more detailed data and assumptions used in the construction air quality analysis.

Construction Emissions Analysis Results

Table 5-11 summarizes the results of the construction emissions inventory for the Proposed Project for each year when construction activity is anticipated to occur (2025 and 2026). For ease of comparison, the applicable General Conformity Rule *de minimis* levels are also shown. As shown, volatile organic compounds (VOC), carbon monoxide (CO), and nitrous oxides (NOx) Project emissions would be well below the applicable *de minimis* thresholds. Sulfur dioxide (SO_2), particulate matter smaller than or equal to 10 microns in diameter (PM_{10}), and particulate matter smaller than or equal to 2.5 microns in diameter ($PM_{2.5}$) do not have applicable *de minimis* thresholds because Suffolk County (the county in which the Proposed Project is located) is in attainment for these pollutants.

Table 5-11 Construction Emissions Inventory

	VOC (tons)	CO (tons)	NO_x (tons)	SO_2 (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)
2025 Emissions	8.27	1.95	13.89	0.02	1.38	0.58
2026 Emissions	2.93	1.49	9.50	0.01	1.13	0.37
General Conformity *de minimis* Threshold (per year)	*50*	*100*	*100*	*Not Applicable*	*Not Applicable*	*Not Applicable*
Proposed Project *de minimis* Applicability Result (Pass/Fail)	***Pass***	***Pass***	***Pass***	*Not Applicable*	*Not Applicable*	*Not Applicable*

Source: WSP 2022

5.10.3.4 Avoidance, Minimization, and Mitigation Measures

As shown in **Table 5-11**, estimated emissions from construction in each year that construction would occur are below applicable General Conformity *de minimis* thresholds for those pollutants for which the area is designated nonattainment or maintenance. For fugitive dust emission sources, the PM_{10} and $PM_{2.5}$ emissions estimate include the use of dust suppression techniques as standard practice (primarily application of water) to reduce dust emissions by 75 percent. Construction equipment will be maintained according to manufacturers' specifications and operated using USEPA-compliant fuels for on-road and off-road equipment and vehicle applications to minimize emissions. Best practices such as limiting idling and using Tier III or Tier IV equipment would be implemented where feasible, to avoid and minimize temporary construction emissions. No further avoidance, minimization and mitigation measures would be needed.

5.10.3.5 Findings

The analysis provided in this section shows that the proposed construction traffic would be minimal and could be accommodated on the Airport access road system without disrupting traffic patterns or affecting the level of service.

There would be no permanent air quality impact because the RSA improvements would not change the daily aircraft operations, type of aircraft, or location in which aircraft operate. As documented in this section, the proposed Runway 27 End RSA Improvements would be below the *de minimis* thresholds under the NAAQS and would comply with the General Conformity Rule; therefore, there no significant construction-related impacts to air quality are anticipated.

5.11 Summary

Table 5-12 summarizes the impacts associated with the Proposed Project. The Proposed Project would have minimal, but direct impacts to coastal wetlands, waterways and tidelands, fish and wildlife habitat, and plants, because of constructing a new pile-supported deck. The Project would not permanently affect coastal processes, such as waves, currents, or other hydrodynamics but would result in a minor amount of habitat loss, which supports shellfish and other wildlife. The Project will require several local, state, and federal environmental permits that will be obtained prior to construction. Full review of the Project by regulatory and resource agencies and the public will be occur during the permitting process.

As documented in Section 5.10, construction would result in minor increases in truck traffic, noise, and emissions of air pollutants. However, these increases would not adversely affect the roadway system or local traffic conditions, would not exceed applicable noise impact criteria, and would be below applicable General Conformity *de minimis* thresholds.

Table 5-12 Summary of Potential Impacts

Impact Category	Adverse Effect (yes/no)
Coastal Resources	**Yes.** The RSA deck pilings would result in the direct alteration of approximately 880 square feet of LSTA and Land Under the Ocean, including Coastal Bank, Coastal Beach/Tidal Flats, and Land Containing Shellfish. An additional 9,460 square feet of coastal resources previously disturbed by the ISA would be altered to construct the two emergency egress ramps. No changes are anticipated in wave direction or velocity, and no increases are anticipated in erosion or deposition in the marine environment. Minor scour effects in the immediate vicinity of each piling would be anticipated.
Tidelands/Public Benefits and Navigation	**No.** The Project would alter the shoreline due to the installation of a pile-supported deck structure. However, at the distance from which the shoreline is viewed by the closest residential neighborhood, the RSA would be no higher than the existing shoreline and the view is not anticipated to be perceived as noticeably different than the existing view. The Project would be constructed within the Legislated Logan Airport Security Zone and would not limit vessel navigation outside the deck or between the deck and the navigation channel. The RSA deck would be no higher than the existing shoreline and the view is not anticipated to be noticeably different.
Finfish Resources	**No.** Some finfish habitat would be displaced by the pilings. However, the pilings would offer new hard substrate for encrusting marine animals and algae, providing additional feeding habitat for fish.
State-Listed Threatened, Endangered, or Species of Special Concern	**Possible.** A portion of the Project is within priority upland habitat identified for two grassland bird species: the upland sandpiper (*Bartramia longicauda*) [State endangered] and Eastern meadowlark (*Sturnella magna*) [State special concern]. About 18,000 square feet of mowed grass in this area would be removed by realigning the existing perimeter road. Massport's intent is to replace this area of grassland elsewhere on the Airport. The NHESP is reviewing the Project to determine if any potential adverse impacts to these listed species are anticipated.
Federally Listed Threatened or Endangered Species	**Not Likely.** No adverse impacts to federally listed threatened or endangered species under USFWS jurisdiction (terrestrial species) are anticipated. Consultation with NOAA Fisheries is ongoing (marine species) to determine potential adverse effects.
Stormwater and Water Quality	**No.** The Project is not anticipated to have any permanent adverse effects on water quality. The Project does not include any new stormwater conveyances, or new discharges of untreated stormwater. The Project is not anticipated to result in a higher pollutant load than existing conditions nor is it anticipated to increase TSS.
Historical, Architectural, Archaeological, and Cultural	**No.** No construction period or permanent impacts to historical/cultural resources are anticipated, as there are no identified above ground or archaeological resources (including marine) in the APE.
Hazardous Materials and Solid Waste	**No.** No adverse impacts related to hazardous materials, solid waste, and/or pollution prevention are anticipated. No sites within the Study Area are listed on the USEPA's NPL or in the MassDEP's online database.
Climate Change, Adaptation and Resiliency, and Sustainability	**No.** Per the RMAT Tool, the Project Site is in an area that is at an elevated risk from sea level rise/storm surges, extreme precipitation, and extreme heat. The RSA deck substructure would be designed to withstand anticipated coastal storms and sea level rise. The Project is not anticipated to increase climate risk to other properties in the vicinity. The proposed safety improvements would not change Airport operations or surface transportation patterns. Other than temporarily during construction, the Project would not increase GHG emissions.

Table 5-12 Summary of Potential Impacts

Impact Category	Adverse Effect (yes/no)
Environmental Justice (EJ)	**No.** There are three census block groups in a one-mile radius of the Project Site; each contains EJ minority populations; these EJ communities in the Town of Winthrop would not be disproportionately affected by the Project. There are no vulnerable health criteria at a community level for Winthrop.
Construction	**Yes.** Construction would result in short-term impacts associated with temporary increases in noise, air emissions, elevated turbidity, and traffic. Noise: Construction noise is anticipated for 120 days total during two separate 60-day periods. While noise levels are not anticipated to exceed the City of Boston's construction noise limit criteria, Massport will employ noise-dampening measures during pile-driving to minimize noise impacts, where possible. Air Quality and GHG Emissions: Emissions of air pollutants during construction would be below the *de minimis* standards for General Conformity with the NAAQS. Water Quality: Turbidity may be generated during installation of piles and could temporarily affect water quality in a localized area adjacent to the Project. A turbidity curtain would be deployed around the immediate work area to contain sediment resuspended during pile-driving activities. Surface Transportation: Most construction materials, equipment, and personnel would be transported by marine vessel and would not substantially contribute to surface traffic in the vicinity of the Airport. Construction vehicles would be prohibited from local roads.

6

Environmental Justice and Public Outreach

6.1 Introduction

The state environmental review process requires public outreach and consideration of designated environmental justice (EJ) populations. To meet or exceed these requirements, the Massachusetts Port Authority (Massport) consulted with the Massachusetts Environmental Policy Act (MEPA) Office prior to filing the Environmental Notification Form (ENF) and again prior to filing the Draft Environmental Impact Report (DEIR). Massport's consultation with MEPA was a result of the evolving guidance on EJ populations and the appropriate EJ outreach strategy for the Runway 27 End Runway Safety Improvement (RSA) Project. This chapter summarizes EJ populations within 1 mile of the Project Site, potential impacts, Massport's outreach conducted to date, and the continued outreach plan for the Proposed Project. Potential impacts to EJ populations associated with the Proposed Project, and avoidance, minimization, and mitigation measures based on each resource, are evaluated based on findings identified in Chapter 5, *Impact Assessment.*

The Project would enhance safety for aircraft and their passengers in emergency situations by constructing improvements to the RSA at the end of Runway 27 consistent with current Federal Aviation Administration (FAA) requirements. **This Project is a required FAA safety project that would not extend the runway or have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway.** Appendix G.1, *Environmental Justice Outreach Plan*, provides additional details of Massport's ongoing outreach plan.

6.2 Regulatory Overview

Governor Baker signed *An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy*[1] (the Climate Roadmap Act) on March 26, 2021, Session Law 2021, c. 8, ss. 57-60, which defined EJ principles and populations, and environmental benefits and burdens. The *Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs*[2] (2021 EJ Policy), originally issued in 2002 and updated on June 24, 2021, incorporates the definitions from the Climate Roadmap Act and reinforces an inclusive community involvement in the environmental decision-making process. The 2021 EJ Policy also builds upon federal guidelines under Executive

1 Commonwealth of Massachusetts. 2021. *An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy.* https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8.
2 Commonwealth of Massachusetts. 2021. *Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs.* https://www.mass.gov/doc/environmental-justice-policy6242021-update/download.

Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.* Federal Executive Order 12898 has since been amended under Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad,* effective January 27, 2021.

The MEPA Office embarked on developing protocols to implement the requirements set forth in the Climate Roadmap Act and 2021 EJ Policy. During the development of the ENF, the MEPA Office released the *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* effective October 1, 2021. The *Transition Rules for Public Involvement Requirements for Environmental Justice Populations,* effective June 24, 2021, require 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 Maps Viewer). In advance of the *Transition Rules for Public Involvement Requirements for Environmental Justice Populations,* which were not yet in effect at the time of the ENF filing, Massport followed the Executive Office of Energy and Environmental Affairs' (EEA) *Interim Protocol for Environmental Justice Outreach* and conducted EJ outreach prior to the ENF filing.

Since the filing of the ENF for the Proposed Project, the MEPA Office has finalized the two MEPA EJ Protocols, *MEPA Public Involvement Protocol for Environmental Justice Populations* and *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations,* which were effective as of January 1, 2022 for all new filings. Additionally, the MEPA Office amended its regulations under 301 Code of Massachusetts Regulations (CMR) 11.00 which were promulgated on December 24, 2021. Although this DEIR is not a new filing and therefore not subject to the finalized protocols and amended regulations, Massport is voluntarily complying with these updates, and is working closely with the MEPA Office to strive for appropriate and comprehensive outreach and analysis of EJ populations in proximity to the Project.

6.3 Environmental Justice Populations

This section provides a definition of EJ populations and identifies EJ populations within the Study Area. The Study Area includes the communities within 1-mile[3] of the Project Site.

6.3.1 Definition of EJ Populations

The Climate Roadmap Act[4] defines EJ as "the equal protection and meaningful involvement of all people and communities" regarding environmental issues, laws, regulations, and policies, including the equitable allocation of benefits and burdens. It provides a new definition of EJ populations in Massachusetts, which is a neighborhood (defined as a census block group), that meets one of the following specific demographic characteristics:

- **Income:** The annual median household income is not more than 65 percent of the statewide annual median household income;

3 A 1-mile radius was evaluated to align with MEPA's EJ protocols. The Proposed Project does not exceed MEPA review thresholds under 310 CMR 11.03(8)(a)-(b) nor generate 150 or more new average daily traffic (adt) of diesel vehicle traffic over a duration of one year or more; therefore, a 5-mile radius study area is not required.
4 Commonwealth of Massachusetts. 2021. *An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy.* https://malegislature.gov/Laws/SessionLaws/Acts/2021/Chapter8.

- **Minority:** Minorities (i.e., individuals who identify themselves as Latino/Hispanic, Black/African American, Asian, Indigenous people, and people who otherwise identify as non-white) comprise 40 percent or more of the population;
- **English Language Isolation:** 25 percent or more of households lack English language proficiency; or
- **Minority + Income:** Minorities comprise 25 percent or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 percent of the statewide annual median household income.

Additionally, the Secretary can designate a geographic portion of a neighborhood as an EJ population.

6.3.2 EJ Populations within the Study Area

The EJ populations were identified and evaluated within 1 mile of the Project Site, as shown in **Figure 6-1**, using the EEA Environmental Justice Maps Viewer (EJ Maps Viewer).[5] Based on the 2020 census data provided by the EJ Maps Viewer, **Table 6-1** summarizes the EJ demographics of the census block groups that fall partially or fully within 1 mile of the Project Site. All EJ block groups within 1 mile of the Project Site are considered "Minority" populations according to the EJ Maps Viewer. Two of these census tracts are "Languages spoken by at least 5 percent of population in the census tract who do not speak English very well," which helps inform translation services that should be considered for outreach. Languages identified at the census tract level include 6.4 percent Spanish or Spanish Creole in Census Tract 9801.01 and 20.2 percent Spanish or Spanish Creole in Census Tract 9813.

Table 6-1 Environmental Justice Block Groups Within 1 Mile of Project Site

Block Group	Census Tract	Location	Median Household Income	Total Minority Population	% of Households with English Isolation	Languages (at census tract level)[1]
0[2]	9901.01	Boston	N/A	N/A	N/A	N/A
1	9801.01	Boston	Not available	62%	0%	Spanish or Spanish Creole (6.4%)
2	1804.00	Winthrop	$113,906 (133% of state median)	26%	2%	N/A
2	9813.00	Boston	$128,000 (149% of state median)	41%	4%	Spanish or Spanish Creole (20.2%)

Source: EJ Maps Viewer, 2022.
Notes: The data presented in Table 6-1 is directly from the classifications in the EJ Maps Viewer, which differs from MEPA's definition of EJ populations under the Climate Roadmap Act. Refer to Figure 6-1, which explains the discrepancy.
1 Data is from "Languages Spoken in Massachusetts" tab of the EJ Maps Viewer to determine languages spoken by at least 5 percent of population in the census tract who do not speak English very well. These data inform outreach and translation services.
2 No relevant EJ data likely due to location in Boston Harbor.

5 These data were obtained from https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations.

Figure 6-1: Environmental Justice Populations **Runway 27 End RSA Improvements Project**

*Although Block Group 2 Census Tract 180400 is classified as Minority, it meets the Climate Roadmap Act definition of Minority and Income.

6.4 Assessment of Existing Unfair or Inequitable Environmental Burden

Under Section 58 of Chapter 8 of the Climate Roadmap Act and consistent with 301 CMR 11.06(7)(b) and 11.07(6)(n), each project to which this most recent Environmental Impact Report (EIR) requirement applies must submit an EIR that contains "statements about the results of an assessment of any existing unfair or inequitable environmental burden and related public health consequences impacting the environmental justice population from any prior or current private, industrial, commercial, state, or municipal operation or project that has damaged the environment." Since the environmental review process for the Proposed Project was initiated prior to the June 24, 2021 ruling, this DEIR is therefore not subject to the finalized protocols and amended regulations, Massport is voluntarily complying with these updates.

This section evaluates existing vulnerable health criteria, potential sources of pollution, and climate change vulnerability to help assess whether an existing unfair or inequitable environmental burden related to public health consequences has been placed upon the EJ communities, as compared to the general population, within 1 mile of the Project Site.

6.4.1 Vulnerable Health Criteria

To understand potential health vulnerabilities faced by EJ populations within the Study Area, Vulnerable Health EJ Criteria, as defined by the Massachusetts Department of Public Health (DPH) EJ Tool (DPH EJ Tool),[6] were identified within the 1-mile radius. The DPH provides information at the community level (defined as cities and towns). These criteria include four environmentally-related health indicators to determine populations that may have higher than average rates of environmentally related health outcomes, which are:

- **Heart Attack:** Heart Attack vulnerability is evaluated as the 5-year average age-adjusted rates of hospitalizations for Heart Attack that is equal to or greater than 110 percent of the state rate. It is a criterion because air pollution exposure can increase the risk for heart attack and other forms of heart disease. The Heart Attack vulnerable health criterion is shown at the community level in the DPH EJ Tool.
- **Elevated Blood Lead Prevalence:** Elevated Blood Lead vulnerability is evaluated as the 5-year average prevalence of elevated childhood blood lead levels that is equal to or greater than 110 percent of the state rate. It is a criterion because lead exposure disproportionately impacts EJ communities. Additionally, low levels of lead exposure to children can cause severe and irreversible health effects. The Elevated Blood Lead Prevalence vulnerable health criterion is shown at the census tract and community level in the DPH EJ Tool.
- **Low Birth Weight:** Low Birth Weight vulnerability is evaluated as the 5-year average Low Birth Weight rate among full-term births that is equal to or greater than 110 percent of the state rate. It is a criterion because there is an increased risk of delivering a Low Birth Weight baby when exposed to environmental contaminants. Additionally, women of color and women of low income have a higher risk. The Low Birth Weight vulnerable health criterion is shown at the census tract and community level in the DPH EJ Tool.
- **Childhood Asthma:** Childhood Asthma vulnerability is defined as the 5-year average rate of emergency department visits for Childhood Asthma that is equal to or greater than 110 percent of the state rate. It is a criterion because EJ populations experience a greater risk of asthma due to an increased exposure to asthma triggers, which impacts one's overall health and wellbeing. The Childhood Asthma vulnerable health criterion is shown at the community level in the DPH EJ Tool.

6 Commonwealth of Massachusetts. 2021. *MA DPH Environmental Justice Tool.* https://matracking.ehs.state.ma.us/Environmental-Data/ej-vulnerable-health/environmental-justice.html.

Tables G.2-1 and **G.2-2** in Appendix G.2, *Environmental Justice Supporting Documentation*, provide a summary of the census tracts within the 1-mile radius of the Project that have Elevated Blood Lead Prevalence and Low Birth Weight Rate per 1,000, respectively. Census tracts that include EJ census blocks identified in **Table 6-1** are noted within these tables. Per the DPH EJ Tool, no Elevated Blood Lead Prevalence nor Low Birth Weight Rate census tracts, significantly higher than the state rate, are within 1-mile radius of the Project Site.

As noted earlier in this section, the Heart Attack and Childhood Asthma criteria are only shown at the community level. **Tables G.2-3** and **G.2-4** in Appendix G.2, *Environmental Justice Supporting Documentation,* present these vulnerabilities, as well as Elevated Blood Lead Prevalence and Low Birth Weight Rate per 1,000 at the community level, for Boston and Winthrop, respectively, using a 1-mile radius. No vulnerable health criteria at the community level in Winthrop were identified as significantly higher compared to the state rate per the DPH EJ Tool. Elevated Blood Lead Prevalence, Low Birth Weight, and Childhood Asthma were identified as significantly higher at the community level in Boston; however, these findings do not directly correlate to the census tracts that include EJ census blocks because these data are presented at the community level.

6.4.2 Other Sources of Pollution

The DPH EJ Tool was also consulted to identify other sources of pollution within 1 mile of the Project Site. Relevant sources of pollution that were evaluated include major air and waste facilities and hazardous material sources. **Table 6-2** summarizes these findings. One underground storage tank was identified but is not within an EJ census block.

Table 6-2 Sources of Pollution Within 1 Mile

DPH Source	Number of Sources within 1 Mile
MassDEP Major Air and Waste Facilities	
Air Operating Permits	1 (Massport LOGBM-0147)
Hazardous Waste Treatment, storage/disposal	0
Hazardous Waste Recycler	0
Large Quantity Generators	0
Large Quantity Toxic Users	0
MassDEP Tier Classified 21E Sites[1]	0
MassDEP Tier II Facilities	0
MassDEP Sites with Activity and Use Limitations (AUL)	0
Underground Storage Tanks	1 (Pico Avenue Sewage Pumping Station)
USEPA Facilities	
Toxic Release Inventory sites 2017	0
Superfund Site Boundaries	0

Source: DPH EJ Tool, 2021.
MassDEP Massachusetts Department of Environmental Protection
EPA Environmental Protection Agency
1 The approximate location of oil and/or hazardous material disposal sites that have been Tier Classified under M.G.L. Chapter 21E and the Massachusetts Contingency Plan (MCP).

6.4.3 Climate Change Vulnerability

Massport utilized the latest version of the Resilient Massachusetts Action Team (RMAT) Tool for this DEIR, to determine potential climate risks to the surrounding communities. The RMAT Tool identified the Project Site as having a high exposure to sea level rise/storm surge, extreme precipitation-urban flooding, and extreme heat. As noted in the *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations,* a high risk rating for sea level rise/storm surge or extreme precipitation could indicate elevated climate risks for EJ populations that immediately surround the Project Site (i.e., within the Project Site boundaries). Because the Project Site boundaries are restricted to the airfield and surrounding harbor at Logan Airport, elevated climate risks to EJ populations, which would create an existing unfair or inequitable environmental burden, are not anticipated. Additionally, the *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations* notes that the risk rating for extreme heat should not be used as a definitive indicator of elevated climate risks.

The Federal Flood Hazards and Sea Level Rise data within the DPH EJ Tool were also consulted. Below summarizes findings within 1 mile of the Project Site using these data:

- **Federal Emergency Management Agency (FEMA) National Flood Hazard:** The Project Site is within FEMA National Flood Hazard VE, defined as a high risk coastal area, which falls within the 1-mile radius. Portions of the 1-mile radius are within FEMA National Flood Hazard AE, defined as a 1 percent annual chance of flooding, with base flood elevation.
- **Hurricane Inundation Zones:** Inundation zones represent inundation correlated with Hurricane Categories 1 through 4. Inundation zones within 1 mile of the Project Site vary from Zones 1 to 4. The end of Runway 27 is within inundation Zone 2, with slivers of the runway located within Zone 3. The majority of the Project Site and the coastal area surrounding the runway are within Zone 1.[7]
- **Hurricane Evacuation Zones:** Hurricane evacuation Zones A and B are within the 1-mile radius of the Project Site. The majority of the airfield is within Zone B, with the edge of the airfield within Zone A.

6.5 Analysis of Project Impacts to EJ Populations

This section identifies if the Project is anticipated to cause unfair or inequitable burden to EJ populations as defined under Section 58 of the Climate Roadmap Act. It examines the nature and severity of the Project's construction impacts, how the Project impacts affect EJ populations compared to non-EJ populations, and Project benefits.

7 Massachusetts Emergency Management Agency. 2022. *Massachusetts Hurricane Inundation Zones* https://memamaps.maps.arcgis.com/apps/OnePane/basicviewer/index.html?appid=fab594f51b114342af9a597d24120026.

6.5.1 Climate Change

There would be no adverse impacts on EJ populations or disproportionate adverse impacts to EJ populations due to climate change. As mentioned in Section 6.4.1.3, the Project location is subject to sea level rise and is within a high risk coastal area. Additionally, the RMAT Tool identified that the Project Site has a high exposure to sea level rise/storm surge, extreme precipitation-urban flooding, and extreme heat. As noted in the *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations,* a high risk rating for sea level rise/storm surge or extreme precipitation could indicate elevated climate risks for EJ populations that immediately surround the Project Site (i.e., within the Project Site boundaries).

In 2020, Massport performed a safety rehabilitation of Runway 9-27 to improve the surface of the runway. As part of that effort, and with the knowledge that some type of improvement to the Runway 27 End RSA would be upcoming, the runway threshold was raised 10 inches from its existing elevation. The 10-inch 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 maximum extent practicable in relation to the remainder of the airfield. The FAA has set criteria and requirements in relation to grade change. Additionally, the deck sub-structure would be designed to withstand anticipated coastal storm events and sea level rise. The Project is not anticipated to increase climate risk to other properties in the vicinity.

Because the Project Site boundaries are restricted to the secured airfield at Logan Airport, elevated climate risks to EJ populations and non-EJ populations from this Project are not anticipated. Additionally, the *MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations* notes that the risk rating for extreme heat should not be used as a definitive indicator of elevated climate risks. Section 5.9 in Chapter 5, *Impact Assessment*, provides additional details.

6.5.2 Traffic

There would be no disproportionate adverse impacts to EJ populations due to traffic. The Proposed Project would not generate any new traffic once complete. Construction would be primarily undertaken from the water, as most materials and workers would be delivered to the Runway 27 RSA construction area by barge. Short-term construction impacts are expected to be limited to on-Airport roadways (Transportation Way, Service Road, and Harborside Drive) with minimal impacts to local roadways. All trucks would access the site by Route lA, Interstate 90, and the main Airport roadways only. Trucks would be prohibited from using local streets unless they are seeking construction-related access to or from local businesses. Based on the maximum of 38 total daily construction truck trips and the access restrictions described above, the Proposed Project would have minimal impact on Airport or regional roadways. Section 5.10.1 in Chapter 5, *Impact Assessment*, provides additional details.

6.5.3 Air Quality and Greenhouse Gas Emissions (GHG)

There would be no disproportionate adverse impacts to EJ populations due to air quality or greenhouse gas emissions (GHG). There would be no permanent direct impacts or indirect impacts to air quality or GHG resulting from the proposed Runway 27 End RSA because the Proposed Project would not change the daily aircraft operations, type of aircraft, or location in which aircraft operate.

No disproportionate adverse impacts to EJ populations are anticipated as a result of potential shifting of flights during the construction period. Any shifting of flights would be utilizing existing flight paths and use of those approach and departure routes is subject to wind, weather and FAA safety requirements. Construction is expected to generate short-term construction-related air and GHG emissions, including exhaust emissions from on-road construction vehicles, off-road construction equipment and marine transport vessels; evaporative emissions from asphalt placement and curing; and fugitive dust from disturbance of unpaved areas. Estimated emissions from construction in each year that construction would occur are below applicable General Conformity *de minimis* thresholds for those pollutants for which the area is designated nonattainment or maintenance. Section 5.10.3 in Chapter 5, *Impact Assessment*, provides additional details on measures Massport will use to minimize GHG and other air pollutants during the construction period.

6.5.4 Noise

There would be no disproportionate adverse impacts to EJ populations due to noise. There would be no permanent direct impacts or indirect impacts to noise-sensitive land uses resulting from the proposed Runway 27 RSA because the proposed Runway 27 RSA improvements would not change the daily aircraft operations, type of aircraft, or location in which aircraft operate.

The Proposed Project would generate temporary noise associated with construction activities. No disproportionate adverse impacts to EJ populations are anticipated as a result or potential re-routing of flights during the construction period. Any shifting of flights would be utilizing existing flight paths and use of those approach and departure routes is subject to wind, weather and FAA safety requirements. The maximum sound levels at all receptors would be below the City of Boston's residential criterion of 86 dBA for all construction phases. The predicted maximum construction sound levels would be experienced at locations that are not within an EJ block group. These construction period sound levels are not anticipated to result in significant noise impacts at any off-airport location. Section 5.10.2 in Chapter 5, *Impact Assessment*, provides additional details.

6.5.5 Natural and Water Resources

There would be no disproportionate adverse impacts to EJ populations due to unavoidable impacts to natural and water resources. There would be no significant impacts to the public's existing interests in these tideland areas. Due to legislated access restrictions, the only interests relevant to the proposed RSA Project Site are shellfishing, living marine resources, and water quality. Limited shellfishing would continue as permitted under the provisions of the Airport Security Zone Statute in those areas that have historically supported that activity. The Project would be designed to protect, restore, and enhance living marine resources, as described in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*. Sections 5.2 through 5.5 in Chapter 5, *Impact Assessment*, provide additional details.

6.5.6 Project Benefits

The Project would enhance safety for aircraft and their passengers in emergency situations by constructing improvements to the RSA at the end of Runway 27 consistent with current FAA requirements. This Project is a required FAA safety project that would not extend the runway or have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway. This beneficial project would serve all (EJ and non-EJ) populations that rely on Logan Airport for travel.

6.5.7 Conclusion

Project-related impacts on the public and surrounding communities are confined to the construction period, which will occur for two seasons. No disproportionate adverse impacts to EJ populations are anticipated. This Project would not extend the runway or have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway.

6.6 Summary of Avoidance, Minimization, and Mitigation Measures

There would be no disproportionate adverse effects or increased climate change risks to EJ populations. Therefore, no specific mitigation to EJ populations is required. Other than temporary construction phase impacts, no adverse impacts are anticipated to the surrounding community as there will be no changes to airport operations due to the presence of an RSA at the end of Runway 27. The Project would be designed to protect, restore, and enhance living marine resources, as described in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*. Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, details avoidance, minimization, and mitigation measures proposed for the Project.

6.7 Public Outreach

This section summarizes the outreach conducted prior to the ENF filing. It also discusses Massport's continued outreach and coordination with MEPA since the ENF was filed, and planned outreach as the Project proceeds through design and construction.

6.7.1 Summary of Outreach Conducted

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. In advance of the meeting, a Project summary was posted on Massport's website in English and Spanish (see ENF Attachment G). In preparation for the pre-ENF filing public 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 opportunity to request additional languages for the virtual meeting. No additional languages were requested for the pre-filing meeting. During the virtual meeting, a translator simultaneously streamed the meeting in Spanish. 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 from State Representative Adrian Madaro's office, the City of Boston, the Town of Winthrop, various community interest groups, and private citizens.

Table 6-3 summarizes the outreach conducted to date.

Table 6-3 Summary of Public Outreach Conducted to Date

Date	Outreach Type	Outreach Method
July 30, 2019	Environmental Status and Planning Report (ESPR)	Project description and status presented in 2017 ESPR.
December 31, 2020	Environmental Data Report (EDR)	Project description and status presented in 2018/2019 EDR.
February 23, 2021	ENF Agency Consultation Meeting	Approximately 25 agency representatives attended a project briefing and discussion led by Massport. Attendees represented the FAA, MEPA, Massachusetts Department of Environmental Protection (MassDEP), Massachusetts Natural Heritage and Endangered Species Program (NHESP), Massachusetts Division of Marine Fisheries (DMF), U.S. Fish and Wildlife Service (USFWS), NOAA Fisheries, Massachusetts Office of Coastal Zone Management Program (CZM), U.S. Environmental Protection Agency (USEPA), and U.S. Army Corps of Engineers (USACE).
June 29, 2021	ENF Pre-Filing Virtual Meeting	Translated project summary on Massport website (remains available) and in meeting invite. Public notices in English and Spanish published in East Boston Times, Winthrop Transcript, and El Mundo. Phone calls/emails to MCAC, elected officials, neighborhood associations, organizations. Spanish translation during meeting.
August 31, 2021	ENF Filing	Filing posted on Massport's website. Translated Project summary on Massport website (remains available). Distribution included agencies, municipalities from surrounding area, MCAC, and Community Organizations. ENF public notice translated in Spanish and published in the Boston Herald.
September 22, 2021	ENF Virtual Consultation Session/Public Meeting	Translated Project summary on Massport website (remains available). Distribution included agencies, municipalities from surrounding area, MCAC, and Community Organizations. ENF public notice translated in Spanish and published in the Boston Herald. Spanish translation during meeting.
June 6, 2022	DEIR Agency Consultation Meeting	Approximately seven agency representatives attended a project briefing and discussion led by Massport. Attendees represented NOAA, USEPA, NHESP, MassDEP, DMF, CZM, and Boston Conservation Commission (BCC).
June 30, 2022	DEIR Filing	Email to EJ Reference List provided by MEPA. Executive summary translated in Spanish posted on Massport website.

6.7.2 Outreach Plan

In coordination with the MEPA Office, Massport will continue to conduct outreach with local EJ communities. As has been Massport's past practice, Massport will offer translation and interpretation services in Spanish and other languages (with reasonable notice). These language services will apply to notices, documents, and community meetings that pertain to the proposed Project. **Table 6-4** presents a summary of the proposed outreach plan post-DEIR filing. Massport has engaged with the MEPA Office on the outreach plan and will provide an update on outreach conducted since the DEIR filing in the FEIR. The more detailed public outreach plan is provided in Appendix G.1, *Environmental Outreach Plan*.

Since the Proposed Project is also subject to the National Environmental Policy Act (NEPA), which is anticipated to require the preparation of a federal Environmental Assessment (EA), Massport will coordinate with the FAA and, where possible, will hold meetings that will comply with both MEPA and NEPA requirements for outreach. In the event that the FAA determines the need for an Environmental Assessment, that document could be combined with the FEIR. Once the FAA makes that determination, Massport will seek FAA guidance on the appropriate EJ coordination under NEPA. If a public meeting is recommended by the FAA, Massport would strive to align that outreach with the MEPA review process.

Table 6-4 Outreach Plan Summary

When	Type	Plan
During DEIR comment period	Voluntary Virtual Public Meeting	Spanish translation streaming present. Spanish translated Project summary will be posted on Massport's website in advance.
6 Months Prior to Construction	Public Notice	English and Spanish notice published in Boston Herald, El Mundo, and Winthrop Times providing Project status update.
3 Months Prior to Construction	Public Notice	English and Spanish notice published in Boston Herald, El Mundo, and Winthrop Times providing Project status update.
3 Months Prior to Construction	Virtual Public Meeting	Spanish translation streaming present.
2 Weeks Prior to Construction	Public Notice	English and Spanish notice published in Boston Herald, El Mundo, and Winthrop Times providing Project status update.

7

Proposed Mitigation and Draft Section 61 Findings

7.1 Mitigation

The Massachusetts Environmental Policy Act (MEPA) regulations, at 301 Code of Massachusetts Regulations (CMR) 11.07(j), outline mitigation measures to be addressed in the Environmental Impact Report (EIR) process, including an "assessment of physical, biological and chemical measures and management techniques designed to limit negative environmental impacts or to cause positive environmental impacts during development and operation of a Project." The Secretary's Certificate on the Environmental Notification Form (ENF) for the Proposed Project included requirements for the scope of the Draft Environmental Impact Report (DEIR). The Certificate required that the DEIR include a mitigation chapter that:

- Summarizes all proposed mitigation measures, including construction period measures;
- Includes draft Section 61 Findings for each permit to be issued by State Agencies;
- Contains clear commitments to implement mitigation measures, estimates of the individual costs for each measure, identifies responsible parties for implementation, and schedule for implementation;
- Identifies which mitigation measures will be constructed or implemented based upon project phasing by tying mitigation commitments to either overall project square footage/phase or environmental impact thresholds which ensure that adequate measures are in place to mitigate impacts associated with each developmental phase.

This chapter provides a description of Massport's proposed commitments to mitigation during construction, and information requested in the MEPA Certificate, as well as a description of consultation with federal and state agencies pertaining to mitigation

7.2 Summary of Beneficial Measures and Mitigation Commitments

As described throughout this DEIR, from Project inception, the Federal Aviation Administration (FAA) and Massport have strived to meet the critical aviation safety need of the Project, to appropriately balance the direct and indirect natural resources impacts of the safety improvements, and to seek effective mitigation strategies. This iterative process will continue to identify and incorporate additional avoidance and minimization strategies through design, construction, and operation. Impacts to natural resources are unavoidable for any of the safety area improvement alternatives that would meet the FAA's design criteria for runway safety areas (RSAs), as demonstrated in Chapter 3, *Alternatives Considered*. For the Proposed Project, the evaluation of alternatives focused on options that minimized unavoidable impacts to coastal wetlands and waters to the extent practicable. This Project is a required FAA safety project that will not extend the runway or have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway. The permanent and construction period impacts are due to the construction and final condition of this Project and no changes to airport operations are proposed.

This section describes the proposed mitigation for unavoidable impacts to coastal wetland resource areas. The analysis describes efforts to avoid impacts, minimize impacts, and provide compensatory mitigation.

7.2.1 Coastal Wetland Resource Areas

The Secretary's Certificate included specific requirements for coastal wetland resource areas mitigation to be addressed in the DEIR. These requirements include proposed mitigation measures to offset impacts to coastal wetland resource areas. This section describes proposed mitigation measures for coastal wetland resource areas by looking at avoidance, minimization, and mitigation measures and their associated costs.

7.2.1.1 Avoidance

Construction of the RSA is necessary to address the FAA's design criteria and provide an additional level of safety for the public. Therefore, the No-Build Alternative that would have avoided impacts to the coastal resource areas was not an option.

7.2.1.2 Minimization

Based on experience with the RSA at the adjacent Runway 33L End, from the outset, the FAA agreed that an equivalent level of safety could be achieved by constructing a reduced area, pile-supported deck with an Engineered Materials Arresting System (EMAS). This fundamental "minimization" decision avoided the need for a larger intrusion into Boston Harbor on a deck or filled structure. Having the minimum deck size established by the FAA, Massport evaluated several deck support options based on the pile arrangement or type of support pile (pile or caisson). Deck Support Alternative 2, the Proposed Project, was the clear choice because of several factors:

1. It has the smallest total direct impact (footprint) to coastal wetland resource areas,
2. It would take the shortest time to construct, thereby reducing indirect impacts related to in-water construction activities, and
3. It has the least direct and indirect impacts of the deck support designs that were considered.

From a construction perspective, during pile driving, the work area would be surrounded with a turbidity curtain to contain any sediment resuspended by the construction activities. In addition, at the direction of state and federal environmental resource agencies, in-water construction will avoid the winter flounder Time-of-Year (TOY) restriction of February 1 to June 30 of any year.

7.2.1.3 Compensatory Mitigation

Impacts to coastal wetland resources have been kept to a minimum. There is no salt marsh or eelgrass within the Study Area that would typically require replacement. Direct impacts to the shoreline and seabed (below Annual High Water) would be approximately 880 square feet under the approximately 3.3-acre deck, or less than one percent of the Project Site. The adjacent emergency access ramps will generally convert previously disturbed Coastal Bank to a more stabilized surface. Since the Project will likely be considered non-water dependent in a Chapter 91/Waterways context, the Project must demonstrate no adverse impacts to Land Under the Ocean or Land Subject to Tidal Action. The Massachusetts Wetlands Protection Act (WPA) resource area performance standards are addressed in Chapter 5, *Impact Assessment*, and demonstrate that although there will be some loss of habitat, there will not be significant impact from the Project. Loss of Land Containing Shellfish due to the installation of pilings will result in a less than 900 square feet reduction in shellfish habitat that could reduce commercial value for badged shellfishers. While harvestable densities of soft shell clam resources in and adjacent to the proposed safety area expansion are very depressed due to disease, the Division of Marine Fisheries (DMF) has indicated mitigation will be required and likely in the form of a mitigation fee to a state shellfish habitat restoration program.

The mud flat habitat that includes the coastal beach and the lower intertidal zone is a special aquatic site and the U.S. Army Corps of Engineers (USACE) requires lost habitat be mitigated by replacement of lost area or by payment of an in-lieu fee. The in-lieu fee program charges a per square foot fee based on the impact area. The fee is based on the cost to create similar habitat from an upland site. The collected fee is provided to a state agency and must be used on ecological restoration projects.

7.2.1.4 Mitigation Costs

The cost of the mitigation that will be required must be discussed with DMF and USACE. The DMF has not indicated the amount that will be required as mitigation, which will be addressed during the permitting of the Project. The USACE currently uses an in-lieu fee of $14.26 per square foot.

7.3 Construction Period Mitigation Measures

The Secretary's Certificate included specific requirements regarding construction-period mitigation to be addressed in the DEIR. These requirements include:

- Describing construction impacts on lawful public access and navigation and proposed mitigation.
- Reviewing impacts and mitigation relative to noise, air quality, water quality, transportation (including pedestrians, bicyclists, and transit rider).
- Minimizing damage to the site and adjacent areas from coastal storms during the construction period.
- Presenting a draft Construction Management Plan (CMP) with project-specific Best Management Practices (BMPs).

This section addresses the requirements of the Certificate and includes a description of proposed construction methods to minimize impacts to resources.

7.3.1 Coastal Wetland Resources

A number of measures would be used during construction to mitigate the impacts on the environment and Boston Harbor. A Time-of Year (TOY) restriction would be followed for in-water construction activities that have the potential for producing turbidity. Consistent with the TOY, between February 15 and June 30 of any year, no in-water turbidity producing work, such as pile driving, will occur. In addition, pile driving activities will include measures to minimize noise such as soft starts and buffering blocks on the top of the piles. During active turbidity producing work, a floating turbidity curtain will be installed around the work area to contain any turbidity that is generated.

Most of the construction activities will be conducted by equipment operating from barges. During construction, the construction barges will not be allowed to ground during low tide. As necessary, the barges will be moved to deeper water during low tide, until the rising tide provides adequate water depth for the barges to be relocated inshore.

Another mitigation measure is getting the work done quickly. As noted above, the Preferred Alternative (Alternative 2) is the design with the fewest piles and shortest in-water work schedule. Approximately 30 days will be needed to complete the pile driving needed for the RSA deck. Completing the work quickly will reduce the opportunity for impact to marine resources.

7.3.2 Public Access/Navigation

The RSA improvements will occur near an active navigation channel that provides public boating access to Belle Isle Inlet and other areas of Winthrop and East Boston. Although near the channel, the proposed RSA deck will be approximately 175 feet away from the edge of the channel. During construction, most of the equipment and materials will be brought to the Project Site by barge or other water borne transport. These vessels may occupy portions of the navigation channel intermittently but will not preclude use of the channel by the general public. As the RSA deck is constructed, a maneuvering barge may periodically enter the navigation channel. The maneuvering barge may temporarily restrict a portion of the channel, but public use will not be completely restricted.

Logan Airport is surrounded by a legislated 500-foot security zone that restricts access by individuals that have not received a valid security access badge. Badged shellfishers under the guidance of DMF are, however, allowed onto the airport property, with proper notice, to harvest clams from the conditionally restricted mud flats. As occurred for the Runway 33L RSA deck, during construction, these shellfishers will be temporarily restricted from access to the active work zone. Following construction, shellfishers will have access as previously allowed.

Massport has coordinated with U.S. Coast Guard (USCG) to discuss impacts to the navigation channel as well as ensure that the Logan Airport Security Zone and deck are adequately marked. The UCSG would be notified whenever a construction barge enters the navigation channel. The UCSG additionally recommended relocating and adding buoys that mark the Logan Airport Security Zone as well as adding yellow or white lights to the end of the deck for visibility. As design advances, Massport will continue to coordinate with the UCSG to address any project-related issues within their jurisdiction.

7.3.3 Water Quality

Measures would be taken to avoid water quality impacts from construction. These include, as part of the requirements for the National Pollutant Discharge Elimination System (NPDES) Construction General Permit, developing and implementing a Stormwater Pollution Prevention Plan and a Soil Erosion and Sediment Control Plan. Measures to be included in the Plan would include:

- Use of sediment control methods (such as silt fences and biodegradable fiber rolls) to prevent silt and sediment entering the stormwater system and waterways.
- Application of water to dry soil to prevent fugitive dust.
- Stabilization of highly erodible soil, if any, with erosion control blankets or similar stabilization methods.
- Maintenance of equipment to prevent oil and fuel leaks.
- Silt curtains around in-water work, such as pile installation.

7.3.4 Transportation

Transport to the Project Site for the majority of the construction equipment, supplies, and workers would be via barge. The Airport roadways can support the anticipated construction-related traffic; therefore, no specific mitigation is proposed, and no Project-specific transportation access plan is proposed. Massport requires all contractors to limit construction-related traffic to access and egress through the secured North or South airfield gates using only state and federal highways and the Airport roadway network, prohibiting construction related traffic on the local East Boston roadways.

Massport recommends contractors to implement construction worker vehicle trip management, including requiring off-Airport parking and high-occupancy vehicle transportation modes for workers.

7.3.5 Noise

The Project would not result in significant impacts from construction equipment, however, depending on the specific machinery, Massport will consider the following measures to reduce the effects of construction noise on adjacent noise sensitive areas:

- Provide appropriate manufacturer's noise reduction devices, including, but not limited to a manufacturer's muffler (or equivalently-rated material) that is free of rust, holes, and exhaust leaks on construction equipment operating on-site.
- Ensure that the engine housing doors are kept closed on construction devices with internal combustion engines.
- Cover equipment, such as compressors, generators, pumps, and other such devices with noise insulating fabric as well as operate the device at lower engine speeds during work to the maximum extent possible.
- Use operational controls, such as limiting vehicle engine idling on-site and time-of-day restrictions for certain activities.

- Strategically position construction vehicles so as to minimize operation near noise sensitive receptors and direct construction haul vehicles away from noise sensitive receptors when traveling to and from the work site.
- Use noise pathway controls where possible, including temporary noise barriers and enclosures free from gaps and holes, placed as close as possible to construction areas, including around pile driving equipment.
- Keep the public informed about construction activities and efforts to minimize noise in the community.
- Use the Massport Noise Complaint system for prompt response and corrective action to noise complaints during construction.

7.3.6 Air Quality

Estimated emissions from equipment in each year that construction would occur would be minor and temporary. Emissions would be below any applicable federal General Conformity *de minimis* thresholds as Suffolk County is an Attainment area for all current NAAQS. For fugitive dust emission sources, the PM_{10} and $PM_{2.5}$ emissions estimate include the use of dust suppression techniques as standard practice (primarily application of water) to reduce dust emissions by 75 percent. Construction equipment will be maintained according to manufacturer's specifications and operated using U.S. Environmental Protection Agency (USEPA) compliant fuels for on road and off-road equipment and vehicle applications to minimize emissions. Construction equipment will also be required to comply with the Massachusetts Anti-idling law.

7.3.7 Draft Construction Management Plan (CMP)

In accordance with the DEIR scope within the ENF Certificate, the Project requires a Draft CMP describing Project activities, schedule, and sequencing for proposed RSA improvements. A Draft CMP is attached to this DEIR in Appendix H, *Draft Construction Management Plan*. It includes Project-specific BMPs to avoid and minimize adverse environmental impacts and addresses potential mitigation related to land disturbance. It also includes a disposal plan for excess construction materials.

7.4 Draft Section 61 Findings by Permit

Massachusetts General Law Chapter 30, Section 61 authorizes state agencies with permitting responsibilities to make an official determination regarding potential impacts from a proposed project and whether impacts have been avoided, minimized, and/or mitigated for appropriately. The Law requires agencies/authorities to issue a determination that includes a finding describing the environmental impact, if any, of the project and whether all feasible measures have been taken to avoid or minimize said impact.

This section provides a brief overview of the Project, explains the history of the MEPA review process for the proposed Runway 27 End RSA Improvements Project, outlines required state and federal permits and their authorities, summarizes mitigation commitments for permanent and construction-related impacts, and provides draft Section 61 determination language for state agencies.

7.4.1 Project Description

The Proposed Project includes measures that are part of a continuing safety program and are required to improve the RSA, to the extent feasible, consistent with the 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**.

To minimize environmental impacts to Boston Harbor, in 2019, the 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 with an EMAS installed on the deck. An EMAS is constructed of collapsible concrete blocks with predictable deceleration forces. When, under an emergency situation, an aircraft rolls into an EMAS, 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 approximately 450 feet over Boston Harbor. The option that would not lengthen the existing Runway 9-27 is the subject of the environmental review for this Project. Since the Project, once completed, would not change how Logan Airport operates, this DEIR focuses on measures to avoid and minimize construction impacts and associated mitigation.

7.4.2 History of MEPA Review

In coordination with the FAA, Massport obtained public input throughout the scoping, planning, and analysis of the Project. In accordance with the new MEPA requirements for projects within 1 mile of an Environmental Justice (EJ) community, Massport held a virtual pre-ENF filing public meeting on June 29, 2021 after reaching out to local and state elected officials, representatives in East Boston and Winthrop, the Massport Community Advisory Committee (MCAC), and community interest groups. Notice of the meeting, along with a Project summary, was placed in English and Spanish in the *East Boston Times*, *Winthrop Transcript*, *El Mundo*, and on Massport's website. The meeting was attended by representatives from State Representative Adrian Madaro's office, the City of Boston, the Town of Winthrop, and by various community interest groups and private citizens.

In August 2021, Massport submitted an ENF to the Executive Office of Energy and Environmental Affairs (EEA), per MEPA and accompanying regulations (301 CMR 11). The ENF explained the purpose of the Project, which is to increase safety for aircraft and their passengers in emergency situations by enhancing the RSA at the end of Runway 27 consistent with the FAA's orders and regulations.

The ENF was circulated to interested parties and a Public Notice of Environmental Review was published on September 8, 2021, in accordance with MEPA regulations 301 CMR 11.05 and 301 CMR 11.15. A public scoping meeting was held virtually on September 22, 2021, to solicit public input on development of the DEIR scope. The Secretary issued a Certificate on the ENF on October 8, 2021, confirming the need to prepare an EIR.

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

7.4.3 Related Permits and Approvals

In addition to compliance with the National Environmental Policy Act (NEPA) and MEPA, a number of local, state, and federal permits are needed for the Proposed Project, as listed in **Table 7-1**. Chapter 5, *Impact Assessment*, provides additional Project details relative to the Project impacts.

Table 7-1 Required Permits and Approvals

Agency/Department	Permit/Approval/Action	Status/Timeframe
Federal		
U.S Federal Aviation Administration	National Environmental Policy Act (NEPA)	NEPA documentation forthcoming.
U.S Army Corps of Engineers	Section 10 of the Rivers and Harbors Act/ Section 404 of the Clean Water Act (CWA)	To be obtained prior to construction.
National Oceanic and Atmospheric Administration Fisheries Service	Section 7 Endangered Species Act Consultation	To be completed prior to construction.
U.S Environmental Protection Agency	National Pollutant Discharge Elimination System Construction General Permit	To be completed prior to construction. Contractor will develop Stormwater Pollution Prevention Plan.
Commonwealth of Massachusetts		
Executive Office of Energy and Environmental Affairs	Massachusetts Environmental Policy Act (MEPA) Review	Draft Environmental Impact Report (DEIR) submitted herein.
	Public Benefit Determination	To be issued by MEPA after Final Environmental Impact Report (FEIR) review.
Coastal Zone Management	Consistency Statement with Massachusetts Coastal Zone Management Plan	To be obtained prior to construction.
Massachusetts Department of Environmental Protection	Individual Water Quality Certification	If required, prior to construction.
	Chapter 91 Waterways Program License Modification	To be obtained prior to construction.
Massachusetts Natural Heritage and Endangered Species Program	Conservation and Management Permit (if required)	If required, prior to construction.
City of Boston		
Boston Conservation Commission	Massachusetts Wetlands Protection Act Order of Conditions	To be obtained prior to construction.

Note: This is a preliminary list of permits and approvals that may be sought for the Project. This list is based on current information about the Project and is subject to change as the design of the Project evolves.

7.4.4 Overview of Project Impacts and Mitigation Measures

The Proposed RSA Improvements Project would result in impacts to Coastal Bank, Coastal Beach, Land Under the Ocean, and Land Containing Shellfish. Massport has proposed compensation for impacts to these resources. Temporary impacts to environmental resources would also be mitigated through contractor equipment specifications, TOY restrictions and silt curtains for in-water work as well as soil and erosion controls to prevent adverse water quality impacts.

7.4.4.1 Permanent Impacts

Permanent impacts resulting from construction of the RSA deck would be mitigated, as described in **Section 7.2.1** and summarized in **Table 7-2.** There would be no impacts to ground transportation, air quality, socio-economic impacts, environmental justice, children's health and safety risks, historic resources, Section 4(f) resources, wild and scenic rivers, farmland, natural resources, light emissions, and energy supply. Therefore, mitigation is not required for these resources.

7.4.4.2 Construction Impacts

Temporary, short-term impacts from construction activities would be mitigated to the extent practicable (see **Table 7-2**). Appropriate construction mitigation measures would be incorporated into the contract documents and specifications governing the activities of contractors and subcontractors constructing elements of the Proposed Project. All construction activities would comply with FAA Advisory Circular 150/5370-10H, *Standard Specifications for Construction of Airports*.[2] On-site resident engineers and inspectors will monitor construction activities to ensure that mitigation measures are properly implemented. These construction-period mitigation measures would be the responsibility of Massport. Specific mitigation measures would be developed during the final design phase of the RSA Improvements Project and would be reviewed by the appropriate regulatory agencies as part of the permit applications. Construction-period mitigation requirements would be incorporated into the final plans and specifications that would serve as the basis for the construction contract.

2 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5370-10H, *Standard Specifications for Construction of Airports*, December 2018.

Table 7-2 Proposed Mitigation Measures and Commitments

Environmental Categories	Mitigation Measure	Approximate Cost	Implementation Schedule
Land Containing Shellfish	Provide mitigation fee for off-site restoration.	TBD	Prior to Construction
Habitat	Replace lost upland grass habitat, where possible.	TBD	During Construction
	Implement winter flounder Time-of-Year (TOY) restriction from February 1 to June 30 for in-water construction activities.	TBD	During Construction
Coastal Wetlands	Provide in-lieu fee (U.S. Army Corps of Engineers [USACE]) for impacts to mud flat	TBD	Following Permitting
Water Quality	Develop and implement a comprehensive Soil Erosion and Sediment Control Plan in accordance with National Pollutant Discharge Elimination System (NPDES) and Massachusetts Department of Environmental Protection (MassDEP) standards.	TBD	During Construction
	Apply water to dry soil to prevent fugitive dust.	TBD	During Construction
	Stabilize any highly erosive soils with erosion control blankets and other stabilization methods, as necessary.	TBD	During Construction
	Use sediment control methods (such as silt fences and hay bales) to prevent silt and sediment entering the stormwater system and waterways.	TBD	During Construction
	Maintain equipment to prevent oil and fuel leaks.	TBD	During Construction
	Silt curtains around pile installation and silt fencing.	TBD	During Construction
Noise	Maintain mufflers on construction equipment in accordance with Occupational Safety and Health Administration (OSHA) standards.	TBD	During Construction
	Minimize engine idling in accordance with Massachusetts anti-idling regulations.	TBD	During Construction
	Fit any air-powered equipment with pneumatic exhaust silencers.	TBD	During Construction
	Minimize nighttime construction.	TBD	During Construction
	Minimize noise during pile driving activities where possible.	TBD	During Construction
Transportation	Implement construction worker vehicle trip management techniques	TBD	During Construction
Air Quality and Greenhouse Gas Emissions	Keep truck idling to a minimum in accordance with Massachusetts anti-idling regulations.	TBD	During Construction
	Retrofit appropriate diesel construction equipment with diesel oxidation catalysts and/or particulate filters.	TBD	During Construction
	Implement construction worker vehicle trip management techniques	TBD	During Construction
Hazardous Materials and Solid Waste	Pre-characterize any materials excavated from the Study Area and require disposal (if any) to determine course of action for removal.	TBD	During Construction

TBD To be determined

Appendix A- Response to ENF Comments

This Page Intentionally Left Blank.

Response to Comments

The Massachusetts Environmental Policy Act (MEPA) requires Environmental Impact Reports (EIRs) to include a section of responses to comments received on the previous review document. In accordance with 301 Code of Massachusetts Regulations (CMR) 11.07(6)(l), this appendix includes Massport's responses to comments received on the Environmental Notification Form (ENF) for the Runway 27 End Runway Safety Area (RSA) Improvements Project filed with the MEPA Office on October 8, 2021. Delineated letters are included in the appendix followed by responses to each comment. **Table A-1** lists the agencies and/or individuals that provided written comments on the ENF.

Table A-1 ENF Commenters

Comment Letter #	Commenter
C	Secretary of the Executive Office of Energy and Environmental Affairs (Certificate)
1	Massachusetts Division of Marine Fisheries (DMF)
2	Massachusetts Department of Environmental Protection (MassDEP) Boston Waterways Regulation Program
3	MassDEP New England Regional Office (NERO)
4	Massachusetts Office of Coastal Zone Management (CZM)
5	Massachusetts Division of Fisheries & Wildlife Natural Heritage & Endangered Species Program (NHESP)
6	Commonwealth of Massachusetts Board of Underwater and Archaeological Resources (BUAR)
7	Air Inc.
8	Miriam Regan-Fiore
9	Bill Schmidt
10	John Vitagliano (1)
11	John Vitagliano (2)
12	Jerry Falbo and Hannah Belcher
13	Dawn Quirk
14	Margaret Roberts

This Page Intentionally Left Blank.

Letter C

The Commonwealth of Massachusetts

Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Charles D. Baker
GOVERNOR

Karyn E. Polito
LIEUTENANT GOVERNOR

Kathleen A. Theoharides
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1181
http://www.mass.gov/eea

October 8, 2021

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME	: Boston Logan International Airport Runway 27 End Runway Safety Area (RSA) Improvement Project
PROJECT MUNICIPALITY	: Boston
PROJECT WATERSHED	: Boston Harbor
EEA NUMBER	: 16433
PROJECT PROPONENT	: Massport
DATE NOTICED IN MONITOR	: September 9, 2021

Pursuant to the Massachusetts Environmental Policy Act (M.G.L. c. 30, ss. 61-62I) and Section 11.03 of the MEPA Regulations (301 CMR 11.00), I hereby determine that this project **requires** the preparation of a mandatory Draft Environmental Impact Report (DEIR).

Project Description

As described in the Environmental Notification Form (ENF), the Massachusetts Port Authority (Massport) is proposing improvements to the Runway Safety Area (RSA)[1] located at the end of Runway 27 at Boston Logan International Airport. The Federal Aviation Authority (FAA) requires that airports receiving federal funding for airport improvement projects and

[1] As described by the Federal Aviation Authority (FAA), an RSA is a defined surface surrounding the runway, typically 500-feet wide and extending 1,000-feet beyond each runway end.

commercial service airports provide standard RSAs where possible.[2] The RSA is intended to reduce the risk of damage to aircraft and protection of passengers in the event of an unintentional excursion from the runway.[3]

The project proposes the construction of 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 which can decelerate an aircraft. An EMAS component is included in RSA projects when the project site is not sufficiently large to meet the FAA RSA standards. 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. It is expected that the 306-foot-wide deck would extend between 450 to 500 feet over Boston Harbor.

As indicated in the ENF, the proposed RSA improvement is a safety improvement and does not extend the runway or have any effect on runway operations, runway capacity, or the types of aircraft that can use the runway.

Project Site

The project is located within Logan International Airport (Logan Airport), which is owned and operated by Massport. Logan Airport is New England's primary international and domestic airport and includes approximately 2,400 acres in East Boston and Winthrop, including 700 acres in Boston Harbor. Logan Airport is one of the most land-constrained hub airports 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.

The 10-acre project area is focused on the east end of Runway 9-27 which is comprised of Runway 9 on the west end and Runway 27 on the east end. The project 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. 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.

Portions of the Project site include priority habitat as mapped by the Natural Heritage and Endangered Species Program (NHESP) *Massachusetts Natural Heritage Atlas* (15th Edition).

[2] Because many runways were built before the current 1000-foot RSA standard was adopted approximately 20 years ago, the FAA implemented the Runway Safety Area Program to make practicable improvements to existing RSAs for priority runways.
[3] An excursion from the runway can include an overrun (when an arriving aircraft fails to stop before the end of the runway), an undershoot (when an aircraft arriving on a runway touches down before the start of the paved runway surface), or an event in which an aircraft veers off to one side of a runway.

The project is located adjacent to and within Boston Harbor and contains coastal wetland resource areas including Coastal Beach, Land Containing Shellfish, Land Subject to Coastal Storm Flowage (LSCSF) and Land Under Ocean (LUO). The project site includes areas within mapped Federal Emergency Management Agency (FEMA) flood zone VE (an area that is subject to high velocity waters and waves and is inundated by a 100-year storm) with a base flood elevation (BFE) of elevation (el.) 13 ft NAVD88. The landward area of the project site is mapped as FEMA flood zone AE (an area inundated by a 100-year storm but not subject to high velocity waters), with BFE el. 12 ft NAVD88 according to FEMA flood insurance rate map (FIRM) number 25025C0082J effective March 16, 2016.

The project site is located within an Environmental Justice (EJ) population characterized as Minority and is within 1 mile of EJ Populations characterized as Minority and Income.

Environmental Impacts and Mitigation

Environmental impacts associated with the project include the disturbance of 2.4 acres of land; creation of 3.8 acres of new impervious surface; permanent alteration of 107,200 sf of LUO, 10,100 sf of Coastal Beach, 117,300 sf Land Containing Shellfish, and 64,800 sf of LSCSF. The project will impact 2.46 acres of filled and flowed tidelands.

The project will minimize and mitigate environmental impacts by constructing an RSA with EMAS which will shorten the necessary length of the deck and reduce impacts to coastal wetland resources and implementation of construction period best management practices and adherence to time-of-year (TOY) restrictions, as applicable. Additional mitigation measures will be developed in the DEIR.

Jurisdiction and Permitting

The project is subject to the preparation of a Mandatory EIR pursuant to 301 CMR 11.03(3)(a)(5) because it requires a State Agency Action and involves a 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. The project also exceeds the ENF threshold at 11.03(3)(b)(1)(f) because it will result in the alteration of one or more acres of any other wetland (LUO, Coastal beach, Land Containing Shellfish, LSCSF). The project requires a Chapter 91 (c. 91) License and 401 Water Quality Certification (WQC) from MassDEP. The project is being undertaken by Massport, a State Agency.

The project will require a National Pollutant Discharge Elimination System (NPDES) Stormwater General Permit from the Environmental Protection Agency (EPA). The Project will also be subject to review by the FAA under the National Environmental Policy Act (NEPA).

Because Massport is the Proponent of the project, MEPA jurisdiction is broad and extends to those aspects of the project that are likely, directly or indirectly, to cause Damage to the Environment as defined in the MEPA regulations.

Review of the ENF

The ENF included a description of existing site conditions, project description and conceptual plans of proposed conditions. The DEIR should provide a more detailed description of existing and proposed conditions and a comprehensive review of the project's impacts and measures to avoid, minimize and mitigate such impacts, as set forth in the Scope below. C.1

SCOPE

General

The DEIR should follow Section 11.07 of the MEPA regulations for outline and content and provide the information and analyses required in this Scope. It should clearly demonstrate that the Proponent has sought to avoid, minimize and mitigate Damage to the Environment to the maximum extent practicable. C.2

Project Description and Permitting

The DEIR should describe the project and identify any changes since the filing of the ENF. C.3 It should identify and describe State, federal and local permitting and review requirements associated with the project and provide an update on the status of each of these actions. C.4 The DEIR should include a description and analysis of applicable statutory and regulatory standards and requirements, and a discussion of the project's consistency with those standards. The DEIR should include detailed site plans for existing and post-development conditions at a legible scale. C.5 The plans should include sections, and elevations to accurately depict existing and proposed conditions, including proposed above- and below-ground structures.

Alternatives Analysis

As described in the ENF, the 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*).* 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, evaluated six potential options to enhance the Runway 27 RSA which is the basis of the alternatives analysis included in the ENF. The RIM/Runway 9-27 RSA Alternative Study identified six alternatives including:

- No Build Alternative
- 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 (Preferred Alternative)

The No Build Alternative would maintain the existing conditions of the RSA which is 500 ft wide and 150 ft long. 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. Although the No-Build Alternative does not impact the environment, this alternative does not address the primary safety purpose and need of the project and it is not consistent with the FAA's RSA guidelines.

Alternative 1 (Declared Distances) would involve changing the pavement markings on the runway to provide a full dimension RSA within the existing runway footprint by shortening the runway. 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 would likely require aircraft to reduce their weight. 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. While this strategy could achieve standard RSA dimensions by reducing the available runway length, there is no functional safety enhancement achieved and airport operations would be negatively impacted. For these reasons, this alternative was dismissed.

Alternative 2 (Displaced Threshold Markings) would involve shifting the beginning of Runway 9 to the west by 195 feet. This alternative would provide a 655 ft RSA length, not a 1,000 RSA length consistent with the FAA criteria. Additionally, 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. Additionally, this alternative would result in a decrease in the distances for aircraft to decelerate before entering Taxiway E, potentially resulting in aircraft entering the taxiway at higher speed which could pose safety risks. For these reasons, this alternative was dismissed.

Alternative 3A (Full RSA in Boston Harbor, Fill Option) would involve extending 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. The RSA extension would be constructed on compacted fill, creating a flat, graded area. This alternative would provide a fully compliant standard RSA for both overrun and undershoot. Over 425,000 square feet (approximately 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 involve a substantial extension 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 significant temporary and permanent to coastal wetlands area including 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. For these reasons, this alternative was dismissed.

Alternative 3B (Full RSA in Boston Harbor, Deck Option) 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. 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. 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. For these reasons, this alternative was dismissed.

Alternative 4A (EMAS on 500-Foot-Wide Deck) would extend the length of the existing RSA from 150 feet to a maximum of 650 feet, with a 500-foot-wide deck. This alternative complies with FAA's RSA undershoot requirements. 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. 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 and would impact coastal wetlands and tidal and intertidal habitats of marine species. For these reasons, this alternative was dismissed.

Alternative 4B (EMAS on 306-Foot-Wide Deck) 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. 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. The EMAS would be approximately 500 feet in length and approximately 170 feet in width, with final dimensions to be confirmed during project design. It would do so with reduced impacts to environmental resources in Boston Harbor and the navigation channel, compared to the other alternatives. The deck foundation structure, and dimensions of the EMAS bed would be determined in future design.

As described in the ENF, the two primary types of supporting elements for the Preferred Alternative 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. 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.

The DEIR should provide additional details around the injunction preventing Alternative C.6
2. The DEIR should include an alternative analysis for the deck support of the Preferred C.7
Alternative. The DEIR should quantify the environmental impacts of each of the support C.8

alternatives in a tabular format including estimates of temporary and permanent impacts to each coastal wetland resource area, shading impacts and navigation channel impacts. As further C.8 cont.
described below, the alternatives analysis should be supported by modeling developed to
estimate changes to coastal processes in the vicinity of the deck. The DEIR should clearly C.9
identify the criteria used to evaluate each alternative and the basis by which alternative was
dismissed. As described in the ENF, any support structure alternative must be structurally C.10
sufficient to support the deck, the EMAS, an aircraft, and emergency vehicles. The support C.11
structure must also be designed to withstand the most severe anticipated coastal storm events and
sea level rise. Consideration will also be given to constructability issues, including minimizing C.12
runway closures, airfield disruptions, and construction impacts to environmental resources, surrounding neighborhoods, and the navigation channel.

EJ Populations

As described in the ENF, 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, Massport will offer translation and interpretation services during the course of MEPA review. These language service requirements will apply to notices, documents, and community meetings that pertain to the proposed Project. 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 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.

The DEIR should describe the overall EJ outreach plan that the project intends to follow C.13
for the remainder of the MEPA review process, including any outreach it will conduct as part of the parallel federal NEPA process. The Proponent should clarify which languages were identified as those spoken by a substantial portion of the surrounding EJ populations, whether they comport to the languages identified in the EEA EJ Viewer,[4] and how an offer of translation will be communicated to the surrounding EJ communities. The Proponent should consult with the MEPA Office and the EEA EJ director to develop the outreach plan, which could include as appropriate:

- Notification of public meetings and/or filings of the DEIR and permit applications at non-traditional information repositories, such as houses of worship, community centers, community web sites, environmental and community justice organizations, as well as

[4] https://mass-eoeea.maps.arcgis.com/apps/MapSeries/index.html?appid=535e4419dc0545be980545a0eeaf9b53

traditional repositories, including libraries and government offices;
- Use of alternative and/or community-specific media outlets to provide public notice, including local public broadcasting stations, social media and community newspapers;
- Engaging EJ organizations and other community-based organizations directly for assistance in outreach efforts;
- Public education efforts regarding the technical aspects of the project, such as fact sheets with visuals that include a summary of the project and associated technologies and processes along with a description of potential impacts of similar facilities, using lay-person language and terms in an effort to ensure the community understands the potential impacts of the project and can provide meaningful input;
- Scheduling public meetings at locations and times convenient for neighborhood stakeholders, and in consideration of public transportation availability;
- Establishing a local information repository that is convenient and accessible for the EJ Population, as well as providing such information on-line; and
- Taking affirmative steps to make an *offer* of translation available in the languages identified for the project, including through the project website or through notifications to local EJ or community groups.

As noted, the project will increase impervious area, impact coastal wetland resource areas, filled and flowed tidelands and extend into Boston Harbor. The project will also have construction period impacts, including traffic and noise and potential changes to flight routes that could increase impacts on certain neighborhoods that may not experience such impacts during normal operating conditions. The DEIR should identify the potential vulnerabilities faced by EJ populations using the EJ Viewer released by the Department of Public Health (DPH).[5] The DEIR should explain whether the impacts of the project may be disproportionate and adverse when considering the existing vulnerabilities of the surrounding EJ populations. The DEIR should describe any additional measures that will be taken to address such disproportionate adverse impacts. The DEIR should specifically discuss any disproportionate impacts that may result to surrounding communities due to changes in flight routes, including associated emissions and noise impacts, that may become necessary during the construction period. C.14 C.15

Impervious Area and Stormwater

The project will increase impervious area by 3.8 acres. The total impervious area associated with Runway 9/27 will increase from 3.4 to 7.2 acres. The DEIR should describe the stormwater mitigation measures that will be constructed to mitigate the increased impervious area associated with the project and how the system is consistent with MassDEP's stormwater management standards. C.16

Wetlands and Fisheries

[5] "Vulnerable health criteria" is defined to mean health criteria that are measured to be equal to or greater than 110% of the state average base on a 5-year average. Four health criteria are tracked in the DPH EJ Viewer, of which some are tracked on a municipal level and others on a census tract level. The "custom mapping" feature allows the viewer to map various other sources of potential pollution in the area, including major MassDEP air and waste permitted facilities and M.G.L. c. 21E cleanup sites.

As noted above, the project will result in permanent impacts to LUO, Coastal Beach, Land Containing Shellfish and LSCSF. The ENF notes that a Notice of Intent will be filed with the Boston Conservation Commission to obtain an Order of Conditions under the Wetlands Protection Act and implementing regulations (310 CMR 10.00). The ENF states that the proposed project will not require a variance under the WPA. As noted in MassDEP's comment letter, the DEIR should discuss and address how the performance standards for each wetland resource area affected by the proposed deck will be met. If the performance standards cannot be fully met for this non-water dependent project, a variance may be necessary under the Wetlands Protection Act. C.17

As described in the ENF, 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. The DEIR should include the results of the modeling and describe how the modeling results support the preferred alternative including adherence to applicable performance standards andproposed mitigation measures to offset impacts to coastal wetland resource areas. C.18

As noted in comments from the Divisions of Marine Fisheries (DMF), the project area includes mapped shellfish habitat by DMF for soft-shell clam (*Mya arenaria*) and blue mussel (*Mytilus edulis*). The shellfish survey conducted by the proponent in April 2021 identified the presence of low numbers of live soft-shell clams (*Mya arenaria*), razor clams (*Ensis directus*) and surf clams (*Spisula solidissima*). The shellfish survey also identified several areas of numerous dead adult soft-shell clams and the presence of blue mussels attached to the armoring rock in the vicinity of the project area. Subtidal video surveys conducted by the proponent in July 2021 identified the presence of European oysters (*Ostrea edulis*). The project site includes areas mapped as essential habitat for the spawning and early development of winter flounder (*Pseudopleuronectes americanus*) Video surveys conducted by the proponent in June 2021 identified the presence of juvenile flounder. Side scan sonar and underwater video surveys conducted by the proponent within the Project Area did not detect the presence of eelgrass (*Zostera marina*). The DEIR should describe a plan for shellfish mitigation as applicable and note applicable TOY restrictions. Comments from DMF recommend the proponent coordinate with DMF to present the project plans and environmental impacts to the group of Logan Badged Shellfishers. The DEIR should document this coordination. C.19

Chapter 91/Tidelands

As indicated in the ENF, approximately 150 linear feet of the RSA improvement would be located at the eastern end of the runway on filled tidelands, with approximately 500 linear feet of the structure located in flowed tidelands. On the filled tidelands section, the RSA improvement structure would be 300 ft wide; in flowed tidelands it will be narrowed to 150 ft.

As described in MassDEP Waterways Regulation Program (WRP)'s comment letter, in accordance with Massport's Enabling Act, St. 1956, c. 465, Massport can undertake activities without any form of prior authorization by the Department if the proposed activities are: (a) water-dependent industrial per the definitions found at 310 CMR 9.12(2)(b); or, (b) if the proposed activities are located on the filled tidelands within boundaries of Logan Airport. Since a significant portion of the proposed RSA improvement would be conducted in flowed tidelands, and the described work is, by definition, an adjunct use for aircraft safety, the Proponent's project would require c.91 authorization.

As noted in MassDEP's comment letter, pursuant to 310 CMR 9.12(2)(a)&(b), as an airport-related function, the proposed project does not appear to meet the definition of either a Water-Dependent nor a Water-Dependent Industrial use. In 2012, Massport obtained a License for the extension of the runway lighting system in flowed tidelands (License #13263). The procedural pathway for that authorization was through a Variance, in accordance with the standards and procedures described at 310 CMR 9.21. In the DEIR filing, using the alternatives C.20 analysis, the Proponent should document why there are no reasonable conditions or alternatives aside from the preferred option that will achieve the desired outcomes of the project, and propose mitigation measures to minimize interference with the public interests in waterways and propose measures designed to compensate for the remaining detriments. The WRP acknowledges that the provisions of M.G.L. c.90, sec. 61, the Massport Security Zone, will affect this analysis. This legislation limits public access and navigational access within this Security Zone, which extends 500' seaward of the Airport's Mean High Water Mark (MHWM) from Wood Island Basin to the eastern end of Jeffrey's Cove in East Boston.

The DEIR filing should clarify the location of and areal amount of flowed tidelands C.21 affected by the project; ensure that the proposed project meets the engineering and construction standards enumerated at 310 CMR 9.37, including whether there are any Harbor Lines established pursuant to M.G.L. c.91 section 34; describe any construction impacts on lawful public access and navigation; and include proposed mitigation for any effects associated with the items above.

Public Benefit Determination

The project site is comprised of tidelands subject to the provisions of *An Act Relative to Licensing Requirements for Certain Tidelands* (2007 Mass. Acts ch. 168) and the Public Benefit Determination regulations (301 CMR 13.00). Consistent with Section 8 of the legislation, I must conduct a Public Benefit Review as part of the review of EIR projects located on tidelands that entail new use or modification of an existing use. I will issue a PBD within 30 days of the issuance of a Certificate on the Final Environmental Impact Report (FEIR).

Section 3 of this legislation requires that any project that is subject to MEPA review and proposes a new use or structure or modification of an existing use or structure within tidelands address the project's impacts on tidelands and groundwater within the ENF. It indicates that the ENF *"shall include an explanation of the project's impact on the public's right to access, use and enjoy tidelands that are protected by chapter 91, and identify measures to avoid, minimize or mitigate any adverse impacts on such rights set forth herein."* If a project is 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, the ENF *"shall also include an explanation of the project's impacts on groundwater levels, and identification and commitment to taking measures* *to avoid, minimize, or mitigate any adverse impacts on groundwater levels."* The legislation notes that these provisions apply to the filing of an EIR if one is required.

The legislation states the following regarding the PBD:

> "In making said public benefit determination, the secretary shall consider the purpose and effect of the development; the impact on abutters and the surrounding community; enhancement to the property; benefits to the public trust rights in tidelands or other associated rights, including, but not limited to, benefits provided through previously obtained municipal permits; community activities on the development site; environmental protection and preservation; public health and safety; and the general welfare; provided further, that the secretary shall also consider the differences between tidelands, landlocked tidelands and great pond lands when assessing the public benefit and shall consider the practical impact of the public benefit on the development."

The DEIR should include information regarding the project's consistency with the above criteria and public benefits associated with the project and describe how the project will meet the standards for a non-water-dependent use project (301 CMR 13.04). The PBD will be integrated into the Certificate on the Final EIR (FEIR) or issued separately within 30 days of the issuance of the FEIR Certificate. C.22

<u>Rare Species</u>

As noted above and indicated is NHESP's comment letter, the proposed project site is mapped as *Priority Habitat* for a state-listed species: Upland Sandpiper (*Bartramia longicauda*), Endangered and Eastern Meadowlark (*Sternella magna*), Special Concern as indicated in the *Massachusetts Natural Heritage Atlas* (15th Edition).

Comments from NHESP indicate that is unclear whether or not the project would result in temporary or permanent impacts to grassland habitat. If the project is limited to temporary grassland impacts that occur outside of the grassland bird breeding season (April 15- August 15) and the grassland is restored with a compatible native seed mix, NHESP anticipates that this project could be conditioned to avoid a prohibited Take of state-listed species and their habitats. However, if the project will result in the permanent loss of grassland habitat, then the project may result in a prohibited Take of state-listed species habitat. Based on the conceptual nature of the project plan within the ENF, it is not clear whether the Enhancements to the Runway Safety Area will or will not result in a Take (321 CMR 10.18(2)(b)) of state-listed species. The DEIR should identify all permanent and or temporary impacts to grassland habitat and continue to consult the Division as the project design progresses C.23

Comments from NHESP note that while it may be possible to design the proposed project to avoid a Take, NHESP notes that projects resulting in a Take of state-listed species may only be permitted if they meet the performance standards for a Conservation and Management Permit (CMP; 321 CMR 10.23). In order for a project to qualify for a CMP, the applicant must demonstrate that the project has avoided, minimized and mitigated impacts to state-listed species consistent with the following performance standards: (a) adequately assess alternatives to both temporary and permanent impacts to the state-listed species, (b) demonstrate that an insignificant portion of the local population will be impacted, and (c) develop and agree to carry out a C.24

conservation and management plan that provides a long-term net benefit to the conservation of the state-listed species.. C.24 cont.

Climate Change

Governor Baker's Executive Order 569: Establishing an Integrated Climate Change Strategy for the Commonwealth (EO 569; the Order) was issued on September 16, 2016. The Order recognizes the serious threat presented by climate change and directs Executive Branch agencies to develop and implement an integrated strategy that leverages state resources to combat climate change and prepare for its impacts. The Order seeks to ensure that Massachusetts will meet greenhouse gas (GHG) emissions reduction limits established under the Global Warming Solution Act of 2008 (GWSA) and will work to prepare state government and cities and towns for the impacts of climate change. I note that the MEPA statute directs all State Agencies to consider reasonably foreseeable climate change impacts, including additional GHG emissions, and effects, such as predicted sea level rise, when issuing permits, licenses and other administrative approvals and decisions. M.G.L. c. 30, § 61. The urgent need to address climate change was also recognized b with the recent passage into law of St. 2021, c. 8 - An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy.

Adaptation and Resiliency

As described in the ENF, 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. As the 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. Runway 9-27 was recently rehabilitated in 2020. 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.

The ENF included the output report for the project generated from the RMAT Climate Resilience Design Standards Tool.[6] Based on the output report, the project is identified as having a high initial risk rating due to exposure to sea level rise/ storm surge; extreme precipitation due to urban flooding and extreme heat. The project has a 75-year design life. As indicated in the ENF, the proposed RSA is required by the 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. 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 DEIR should include a comprehensive discussion of the potential effects of climate change on the project site and describe features incorporated into the project design that will increase the resiliency of the site to these changes. The DEIR should explain whether the C.25

[6] https://resilientma.org/rmat_home/designstandards/

proposed deck support is being elevated to account for climate conditions (within the constraints of FAA regulations), and, if so, identify the projected climate conditions and assumptions, such as temperature, sea level rise and precipitation rates, that will be used in design. The DEIR should discuss how the stormwater system will be sized to address future climate conditions, including during the construction period. C.25 cont.

Greenhouse Gas (GHG) Emissions

The project is subject to the MEPA GHG Policy because it exceeds thresholds for a mandatory EIR. According to the ENF, GHG emissions are anticipated during the construction period of the project only and are not expected to be ongoing. As such, this project may fall under the de minimus exemption. The ENF included a brief discussion of how the project meets this exemption.

As noted, the DEIR should describe any disproportionate adverse impacts that may result to EJ populations as a result of the potential re-routing of flights during the construction period, including any associated increases in emissions and noise that may impact populations that would not otherwise experience such impacts during normal airport operations. The DEIR should identify ways that the Proponent will incorporate measures to avoid and minimize GHG emissions (and other air pollutants) during the construction period such as limiting idling and using bio-fuels in off-road construction equipment. C.26 C.27

Construction Period

The DEIR should provide a comprehensive review of the project's construction-period impacts and mitigation relative to noise, air quality, water quality, and transportation, including pedestrians, bicyclists and transit riders. The DEIR should include measures that will minimize damage to the site and adjacent areas that could result from coastal storms during the construction period. It should identify the schedule for construction of various project elements, including open space. It should confirm that the project will require its construction contractors to use Ultra Low Sulfur Diesel fuel, and discuss the use of after-engine emissions controls, such as oxidation catalysts or diesel particulate filters. More information regarding construction-period diesel emission mitigation may be found on MassDEP's web site at http://www.mass.gov/dep/air/diesel/conretro.pdf. C.28 C.29

The DEIR should 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. C.30

The project will be required to develop a Stormwater Pollution Prevention Plan (SWPP) in accordance with its NPDES CGP to manage stormwater during the construction period. The DEIR should describe stormwater management measures that will be implemented during construction. It should describe potential construction period dewatering requirements, discuss how dewatering will be conducted in a manner consistent with applicatory regulations/guidelines, and identify any necessary permits. C.31 C.32

Mitigation and Draft Section 61 Findings

The DEIR should include a separate chapter summarizing all proposed mitigation measures, including construction-period measures. This chapter should also include draft Section 61 Findings for each permit to be issued by State Agencies. The DEIR should contain clear commitments to implement these mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and a schedule for implementation. The DEIR should clearly indicate which mitigation measures will be constructed or implemented based upon project phasing, either tying mitigation commitments to overall project square footage/phase or environmental impact thresholds, to ensure that adequate measures are in place to mitigate impacts associated with each development phase. C.33 C.34

Responses to Comments

The DEIR should contain a copy of this Certificate and a copy of each comment letter received. It should include a comprehensive response to comments on the ENF that specifically address each issue raised in the comment letter; references to a chapter or sections of the DEIR alone are not adequate and should only be used, with reference to specific page numbers, to support a direct response. This directive is not intended to, and shall not be construed to, enlarge the Scope of the DEIR beyond what has been expressly identified in this certificate. C.35

Circulation

The Proponent should circulate the DEIR to those parties who commented on the ENF, to any State Agencies from which the Proponent will seek permits or approvals, to any parties specified in section 11.16 of the MEPA regulations. Per 301 CMR 11.16(5), the Proponent may circulate copies of the EIR to commenters in CD-ROM format or by directing commenters to a project website address. However, the Proponent must make a reasonable number of hard copies available to accommodate those without convenient access to a computer and distribute these upon request on a first-come, first-served basis. The Proponent should send correspondence accompanying the CD-ROM or website address indicating that hard copies are available upon request, noting relevant comment deadlines, and appropriate addresses for submission of comments. The DEIR submitted to the MEPA office should include a digital copy of the complete document. C.36

K. Theoharides

October 8, 2021
Date

Kathleen A. Theoharides

Comments received:

09/26/2021	John Vitagliano
09/27/2021	Hannah Belcher and Jerry Falbo
09/27/2021	Margaret Roberts
09/27/2021	Miriam Regan-Fiore
09/27/2021	Office of Coastal Zone Management (CZM)
09/28/2021	Bill Schmidt
09/28/2021	Dawn Quirk
09/28/2021	Division of Marine Fisheries (DMF)
09/28/2021	John Vitagliano
09/28/2021	Massachusetts Department of Environmental Protection (MassDEP) Northeast Regional Office (NERO)
09/28/2021	MassDEP Waterways Regulation Program (WRP)
09/29/2021	Natural Heritage and Endangered Species Program (NHESP)
09/30/2021	AIR Inc.

KAT/EFF/eff

This Page Intentionally Left Blank.

MEPA Certificate

ID #	Comment	Response
C.1	The DEIR should provide a more detailed description of existing and proposed conditions and a comprehensive review of the project's impacts and measures to avoid, minimize and mitigate such impacts, as set forth in the Scope below.	Chapter 1, *Project Description and Permitting*, includes a description of the proposed Runway 27 End RSA Improvements Project (the Proposed Project). Refer to Chapter 4, *Existing Environment*, for a description of the existing conditions for each applicable environmental resource category as specified in 301 Code of Massachusetts Regulations CMR Section 11.07(g). The analysis in Chapter 4, *Existing Environment*, provides a baseline of the existing environmental resources present where the Proposed Project would occur, which are then used to describe and analyze potential impacts. Chapter 5, *Impact Assessment*, discusses construction period and permanent impacts for each impact category in accordance with MEPA regulations. Measures to avoid, minimize, and/or mitigate potential impacts for each affected environmental resource category are discussed in the Draft Environmental Impact Report (DEIR) Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*.
C.2	The DEIR should follow Section 11.07 of the MEPA regulations for outline and content and provide the information and analyses required in this Scope. It should clearly demonstrate that the Proponent has sought to avoid, minimize, and mitigate Damage to the Environment to the maximum extent practicable.	The organizational framework, methodology, analysis, and content contained in the DEIR has been prepared in accordance with MEPA Regulations set forth in 301 CMR Section 11.00 et seq., including 301 CMR Section 11.07, "EIR Preparation and Filing." The DEIR contains the information and analyses required per the Scope issued by the Secretary of Energy and Environmental Affairs. Measures to avoid, minimize, and/or mitigate potential impacts for each affected environmental resource category have been developed and are discussed in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*. Proposed mitigation commitments are summarized in Table 7-2.

ID #	Comment	Response
C.3	The DEIR should describe the project and identify any changes since the filing of the ENF.	There have not been significant changes since the ENF (see Section 1.1.1 of Chapter 1, *Project Description and Permitting)*; however, the alternatives analysis has advanced in this DEIR to evaluate foundation structure alternatives for the proposed RSA deck (see Chapter 3, *Alternatives Considered).* Additionally, a detailed assessment of environmental impacts associated with the Project has been conducted (see Chapter 4, *Existing Environment*, and Chapter 5, *Impact Assessment*).
C.4	It should identify and describe State, federal and local permitting and review requirements associated with the project and provide an update on the status of each of these actions. The DEIR should include a description and analysis of applicable statutory and regulatory standards and requirements, and a discussion of the project's consistency with those standards.	Refer to Section 1.4 in Chapter 1, *Project Description and Permitting*, for a summary of the permits and approvals required for the Proposed Project at the federal, state, and municipal level. The anticipated approvals that are required are also summarized in Table 1-1, which includes the status of each permit, approval, or action at the time of the DEIR. Chapter 5, *Impact Assessment,* addresses regulatory standards and how the Project meets those standards.
C.5	The DEIR should include detailed site plans for existing and post-development conditions at a legible scale. The plans should include sections, and elevations to accurately depict existing and proposed conditions, including proposed above- and below-ground structures.	Conceptual site plans for the proposed RSA deck support alternatives are provided in Chapter 3, *Alternatives Considered.* Refer to Figure 3-9. Chapter 4, *Existing Environment*, describes the existing conditions for each applicable environmental resource category as specified in 301 CMR 11.07(g). Refer also to Figure 4-3, which identifies the coastal resources in proximity to the Project Site.
C.6	The DEIR should provide additional details around the injunction preventing Alternative 2	Additional details regarding the existing Runway 9 threshold injunction as it relates to Tier 1 Alternative 2, "Displaced Threshold Markings," are provided in Chapter 3, *Alternatives Considered*. As described in Section 3.2.2.2, the action to lift or modify the injunction would require a lengthy court review process, compliance with federal and state environmental review procedures, filing a full environmental impact statement, approval of the U.S. Secretary of Transportation, and potential litigation. The required safety improvements are an immediate airfield need and cannot be deferred pending resolution of an uncertain injunction reversal and any ensuing environmental studies and regulatory procedures.

ID #	Comment	Response
C.7	The DEIR should include an alternatives analysis for the deck support of the Preferred Alternative.	Chapter 3, *Alternatives Considered*, Section 3.3, describes the development and screening of alternatives ("Tier 2 Alternatives Screening") for supporting the proposed RSA deck at the end of Runway 27. The evaluation includes the screening criteria established by Massport that were used to assess the four deck support alternatives and determine whether each alternative should be carried forward for further analysis or eliminated from further consideration. The four RSA deck support alternatives are depicted on Figure 3-9.
C.8	The DEIR should quantify the environmental impacts of each of the support alternatives in a tabular format including estimates of temporary and permanent impacts to each coastal wetland resource area, shading impacts and navigation channel impacts. As further described below, the alternatives analysis should be supported by modeling developed to estimate changes to coastal processes in the vicinity of the deck.	Chapter 3, *Alternatives Considered*, provides an alternatives screening analysis ("Tier 2 Alternatives Screening") for supporting the proposed RSA deck at the end of Runway 27 (see Section 3.3.1). The evaluation includes the screening criteria that were used to assess the four deck support alternatives and determined whether each alternative should be carried forward for further analysis or eliminated from further consideration. A quantification of the environmental impacts of each proposed RSA deck support alternative is provided in Table 3-4 and Table 3-5, with design concept illustrations included in Figure 3-9. As described in Section 3.3.1, the evaluation of the four Runway 27 End RSA deck support alternatives (Tier 2 Alternatives Screening) addressed temporary and permanent environmental impacts associated with wetland resource areas, construction impacts, and potential impacts to maritime navigation. Refer also Figure 4-2, "Environmental Resource Areas," and Figure 4-3, "Coastal Resources Located within the Project Site," which depicts the approximate area of each resource area in proximity to the Proposed Project Site, including Land Under the Ocean, Coastal Beach, Land Subject to Tidal Action, and Land Subject to Coastal Storm Flowage.

ID #	Comment	Response
C.9	The DEIR should clearly identify the criteria used to evaluate each alternative and the basis by which an alternative was dismissed.	Chapter 3, *Alternatives Considered*, describes the process undertaken by the Federal Aviation Administration (FAA) and Massport to identify and evaluate reasonable alternatives for enhancing the existing RSA at the Runway 27 End. Section 3.2 presents the "Tier 1 Screening of Runway 27 End RSA Alternatives" analysis (refer also to ENF Appendix D). The FAA's design criteria (FAA Advisory Circular [AC] 150/5300-13B, *Airport Design*) established the needs and guidelines used to identify the Preferred Alternative in the Tier 1 Alternatives Screening, which analyzed six build alternatives and the No-Build Alternative. Section 3.3 describes the development and screening of a second tier of alternatives (Tier 2 Alternatives Screening) for supporting the proposed RSA deck at the end of Runway 27. The evaluation includes the screening criteria established by Massport (Section 3.3.2) that were used to assess the four deck support alternatives and determined whether each alternative should be carried forward for further analysis or eliminated from further consideration.
C.10	As described in the ENF, any support structure alternative must be structurally sufficient to support the deck, the EMAS, an aircraft, and emergency vehicles.	All substructure or deck support alternatives were developed to support the deck, the Engineered Materials Arresting System (EMAS), an aircraft, and emergency vehicles. See Section 3.3.1 of Chapter 3, *Alternatives Considered.*
C.11	The support structure must also be designed to withstand the most severe anticipated coastal storm events and sea level rise.	As described in Section 3.3.1 of Chapter 3, *Alternatives Considered*, all Runway 27 End RSA deck support alternatives were designed to be capable of withstanding the most severe anticipated coastal storm events, were developed to meet design requirements for a 75-year design life and were designed to withstand anticipated sea level rise to the greatest extent possible while also meeting the FAA's design criteria established in AC 150/5300-13B, *Airport Design*.

ID #	Comment	Response
C.12	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.	As described in Section 3.3.2 of Chapter 3, *Alternatives Considered*, the evaluation of the four Runway 27 End RSA deck support alternatives (Tier 2 Alternatives Screening) included consideration of constructability and potential construction impacts to environmental resources. The Tier 2 alternatives screening criteria addressed permanent environmental impacts and short-term impacts to operation of the airfield including permanent wetland resource area impacts and construction impacts to airfield operations. The evaluation also considered flexibility to demobilize and remobilize during pile installation (if Runway 9-27 must be temporarily reopened during the closure periods due to an emergency or weather affecting the other runways), construction noise impacts to surrounding neighborhoods, and potential impacts to maritime navigation.
C.13	The DEIR should describe the overall EJ) outreach plan that the project intends to follow for the remainder of the MEPA review process, including any outreach it will conduct as part of the parallel federal NEPA process. The Proponent should clarify which languages were identified as those spoken by a substantial portion of the surrounding EJ populations, whether they comport to the languages identified in the EEA EJ Viewer and how an offer of translation will be communicated to the surrounding EJ communities. The Proponent should consult with the MEPA Office and the EEA EJ director to develop the outreach plan.	Details on the Project's public outreach plan and outreach conducted to date are summarized in Section 6.7 of Chapter 6, *Environmental Justice and Public Outreach*. Massport's outreach plan is included in Appendix G.1, *EJ Outreach Plan*. The outreach plan was developed in consultation with the MEPA Office and the Executive Office of Energy and Environmental Affairs (EEA) Environmental Justice (EJ) director. Massport continues to coordinate with the MEPA Office on assessing impacts to EJ populations and its outreach process. Spanish translation services will continue to be offered as part of the outreach conducted in the outreach plan.
C.14	The DEIR should identify the potential vulnerabilities faced by Populations using the EJ Viewer released by the Department of Public Health (DPH).	To understand potential health vulnerabilities faced by EJ populations within the Project Area, Vulnerable Health EJ Criteria were identified within a 1-mile radius of the Project Site using the Massachusetts DPH EJ Tool. Refer to Section 6.4 in Chapter 6, *Environmental Justice and Public Outreach*, and Appendix G.2, *EJ Supporting Documentation*, for more information. The EJ census blocks within the 1-mile of the Project Site are not within census tracts that have rates of Elevated Blood Lead Prevalence and Low Birth Weight Rate per 1,000 that are significantly higher than the state rate. No vulnerable health criteria at the community level in Winthrop were identified as significantly higher compared to the state rate. Elevated Blood Lead Prevalence, Low Birth Weight, and Childhood Asthma were identified as significantly higher at the community level in Boston; however, these findings do not directly correlate to the census tracts that include EJ census blocks because these data are presented at the community level.

ID #	Comment	Response
C.15	The DEIR should explain whether the impacts of the project may be disproportionate and adverse when considering the existing vulnerabilities of the surrounding EJ populations. The DEIR should describe any additional measures that will be taken to address such disproportionate adverse impacts. The DEIR should specifically discuss any disproportionate impacts that may result to surrounding communities due to changes in flight routes, including associated emissions and noise impacts, that may become necessary during the construction period.	The Proposed Project would not affect how Logan Airport operates, including the numbers or types of aircraft. Construction impacts have been identified and discussed in Chapter 5, *Impact Assessment*, Section 5.10, which includes a discussion of construction mitigation measures. Please also refer to Section 6.4 in Chapter 6, *Environmental Justice and Public Outreach*, which evaluates existing vulnerable health criteria, potential sources of pollution, and climate change vulnerability to help assess whether an existing unfair or inequitable environmental burden related to public health consequences has been placed upon EJ communities, as compared to the general population, located within 1 mile of the Project Site. An analysis confirming that the Project would not cause disproportionate and adverse effects to EJ populations is described in Section 6.5.
C.16	The DEIR should describe the stormwater mitigation measures that will be constructed to mitigate the increased impervious area associated with the project and how the system is consistent with MassDEP's stormwater management standards.	A description of stormwater mitigation measures to offset the increased impervious area associated with the Proposed Project are described in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*. Section 7.3 describes avoidance, minimization, and mitigation measures and their associated costs, and demonstrates consistency with MassDEP's stormwater management standards.
C.17	As noted in MassDEP's comment letter, the DEIR should discuss and address how the performance standards for each wetland resource area affected by the proposed deck will be met. If the performance standards cannot be fully met for this non-water dependent project, a variance may be necessary under the Wetlands Protection Act	Refer to Section 5.2.1 in Chapter 5, *Impact Assessment*, for an evaluation of impacts related to wetlands protected by the Massachusetts Wetlands Protection Act. This section outlines the performance standards set by the Wetland Protection Act and details how the Proposed Project is able to meet all performance standards.

ID #	Comment	Response
C.18	As described in the ENF, 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. The DEIR should include the results of the modeling and describe how the modeling results support the preferred alternative including adherence to applicable performance standards and proposed mitigation measures to offset impacts to coastal wetland resource areas.	The impacts on water circulation and scour are predicted to be minimal. A summary from the results of the model is located in Chapter 5, *Impact Assessment*, Section 5.2.2. A full summary of findings from the coastal modeling is in Appendix D, *Technical Memoranda*. Sediment will temporarily be suspended due to pile driving during construction; however, turbidity curtains as discussed is Section 7.3.1 in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, will reduce the movement of sediment.
C.19	The DEIR should describe a plan for shellfish mitigation as applicable and note applicable TOY restrictions. Comments from DMF recommend the proponent coordinate with DMF to present the project plans and environmental impacts to the group of Logan Badged Shellfishers. The DEIR should document this coordination.	Approximately 900 square feet of shellfish habitat below annual high water within the intertidal and subtidal zones will be directly lost due to piling installation. In addition, approximately 8,630 square feet of Land Containing Shellfish will be directly impacted by the proposed emergency egress ramps. Most of the area of the egress ramps are within the existing stone Inclined Safety Area (ISA) and does not provide shellfish habitat. A plan that includes measures to mitigate potential impacts to shellfish is provided in Section 7.2.1 of Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*. Agency coordination with the Massachusetts Department of Marine Fisheries (DMF) and outreach to the Logan Badged Shellfishers regarding the Proposed Project and its potential environmental impacts was conducted as part of the DEIR and is documented in Appendix C, *Agency Correspondence*.

ID #	Comment	Response
C.20	In the DEIR filing, using the alternatives analysis, the Proponent should document why there are no reasonable conditions or alternatives aside from the preferred option that will achieve the desired outcomes of the project, and propose mitigation measures to minimize interference with the public interests in waterways and propose measures designed to compensate for the remaining detriments	Chapter 3, *Alternatives Considered*, describes the process undertaken by the FAA and Massport to identify and evaluate reasonable alternatives for enhancing the existing RSA at the Runway 27 End. Chapter 3, *Alternatives Considered*, Section 3.2 includes a summary of the Tier 1 Alternatives Screening analysis (refer also to ENF Appendix D). The FAA's design criteria (FAA AC 150/5300-13B, *Airport Design*) established the needs and guidelines used to identify the Preferred Alternative in the Tier 1 Alternatives Screening, which analyzed six build alternatives and the No-Build Alternative. Section 3.3 describes the development and screening of a second tier of alternatives (Tier 2 Alternatives Screening) for supporting the proposed RSA deck at the end of Runway 27. The evaluation includes the screening criteria established by Massport that were used to assess the four deck support alternatives and determined whether each alternative should be carried forward for further analysis or eliminated from further consideration. Mitigation measures to minimize potential interference with public interests in waterways are provided in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, Section 7.3.2.
C.21	The DEIR filing should clarify the location of and areal amount of flowed tidelands affected by the project; ensure that the proposed project meets the engineering and construction standards enumerated at 310 CMR 9.37, including whether there are any Harbor Lines established pursuant to M.G.L. c.91 section 34; describe any construction impacts on lawful public access and navigation; and include proposed mitigation for any effects associated with the items above	Refer to Section 5.3.1 in Chapter 5, *Impact Assessment*, for an analysis of the potential impacts to coastal waterways and tidelands. Impacts to tidelands from construction of the deck, pile supports, and emergency egress ramps total approximately 154,350 square feet. The Project Site is not publicly accessible as it is located within the Logan Airport Security Zone. During construction, barges with construction equipment may move within the nearby navigation channel, but the presence of these barges would not prevent public use. Measures to avoid, minimize, and/or mitigate potential impacts to tidelands and navigation channels are discussed in Section 7.3.2 of Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*.
C.22	The DEIR should include information regarding the project's consistency with the above criteria and public benefits associated with the project and describe how the project will meet the standards for a non-water-dependent use project (301 CMR 13.04). The PBD will be integrated into the Certificate on the Final EIR (FEIR) or issued separately within 30 days of the issuance of the FEIR Certificate	The Project was determined to be non-water dependent as the use of the Project is for passenger and aircraft safety as discussed in Section 5.3.4 of Chapter 5, *Impact Assessment.* The Project is consistent with criteria laid out by Massachusetts General Law (MGL) Chapter 91 and provides public benefit by offering increased safety for passengers and aircraft in the event of an emergency. Refer to Section 5.3 in Chapter 5, *Impact Assessment*. Section 7.3.1.2 in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings,* discusses avoidance, mitigation, and minimization measures for construction related impacts to the nearby navigation channel.

ID #	Comment	Response
C.23	Based on the conceptual nature of the project plan within the ENF, it is not clear whether the Enhancements to the Runway Safety Area will or will not result in a Take (321 CMR 10.18(2)(b)) of state-listed species. The DEIR should identify all permanent and or temporary impacts to grassland habitat and continue to consult the Division as the project design progresses.	Massport's goal is to avoid a Take of state-listed species habitat, and where possible, balance any loss by removing excess pavement on the Logan Airport airfield, as needed. Potential impacts to State-listed species are described in Sections 5.4 and 5.5 of Chapter 5, *Impact Assessment*. Potential impacts include minor loss of grassland. Review from the Massachusetts Natural Heritage and Endangered Species Program (NHESP) is ongoing. If an adverse effect is identified by NHESP, avoidance, minimization, and mitigation measures will be developed.
C.24	Comments from NHESP note that while it may be possible to design the proposed project or avoid a Take, NHESP notes that projects resulting in a Take of state-listed species may only be permitted if they meet the performance standards for a Conservation and Management Permit (CMP; 321 CMR 10.23). In order for a project to qualify for a CMP, the applicant must demonstrate that the project has avoided, minimized and mitigated impacts to state-listed species consistent with the following performance standards: (a) adequately assess alternatives to both temporary and permanent impacts to the state-listed species, (b) demonstrate that an insignificant portion of the local population will be impacted, and (c) develop and agree to carry out a conservation and management plan that provides a long-term net benefit to the conservation of the state-listed species.	Massport's goal is to avoid a Take of state-listed species habitat, and where possible, balance any loss by removing excess pavement on the Logan Airport airfield, as needed. As described in Sections 5.3, 5.5, and 5.6 of Chapter 5, *Impact Assessment*, loss of habitat is relatively minor. Wildlife can use similar habitat on Airport property or elsewhere in Boston Harbor. Potential impacts include some loss of grassland and aquatic habitat. The small loss of aquatic habitat is not anticipated to affect shorebirds or waterfowl. Review from the NHESP is ongoing. If an adverse effect is identified by NHESP, avoidance, minimization, and mitigation measures will be developed. If any adverse effects are identified, the Project will document all measures to avoid, minimize and mitigate impacts to state listed species in accordance with performance standards.
C.25	The DEIR should include a comprehensive discussion of the potential effects of climate change on the project site and describe features incorporated into the project design that will increase the resiliency of the site to these changes. The DEIR should explain whether the proposed deck support is being elevated to account for climate conditions (within the constraints of FAA regulations), and, if so, identify the projected climate conditions and assumptions, such as temperature, sea level rise and precipitation rates, that will be used in design. The DEIR should discuss how the stormwater system will be sized to address future climate conditions, including during the construction period.	This project will not affect how Logan Airport operates, including the number of operations or types of aircraft. The project will be constructed to meet a 75-year design standard and assumes more intense storms and sea level rise to the maximum extent practicable within the FAA's design standards. As discussed in Chapter 4, *Existing Environment*, Section 4.14.2.1, the threshold of Runway 9-27 was raised 10 inches in 2020 to account for sea level rise. The proposed RSA deck will be at an elevation of 15.75 feet in order to remain level with the runway as required by the FAA's design guidelines. The deck would be designed to accommodate increased coastal storms including stormwater systems sized to handle increased precipitation. Concrete and EMAS blocks would be light in color, reducing heat impact. Potential impacts related to climate change, greenhouse gas emissions, adaptation, resiliency, and sustainability are described in Section 5.9 of Chapter 5, *Impact Assessment*.

ID #	Comment	Response
C.26	As noted, the DEIR should describe any disproportionate adverse impacts that may result to EJ populations as a result of the potential re-routing of flights during the construction period, including any associated increases in emissions and noise that may impact populations that would not otherwise experience such impacts during normal airport operations.	The Proposed Project will not affect how Logan Airport operates, including the number of operations or types of aircraft. Construction impacts have been identified and discussed in Chapter 5, *Impact Assessment*, which includes a discussion of construction mitigation measures. Section 6.5 in Chapter 6, *Environmental Justice and Public Outreach*, which evaluates potential project impacts to environmental justice populations located within 1 mile of the Project Site. No disproportionate adverse impacts to EJ populations are anticipated as a result of potential shifting of flights during the construction period. Any shifting of flights would be utilizing existing flight paths and use of those approach and departure routes is subject to wind, weather, and FAA safety requirements (refer to Section 5.9.3).
C.27	The DEIR should identify ways that the Proponent will incorporate measures to avoid and minimize GHG emissions (and other air pollutants) during the construction period such as limiting idling and using bio-fuels in off-road construction equipment.	Refer to Section 7.3 in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, for information on construction-related mitigation measures that would be implemented with the Proposed Project to minimize potential air quality impacts. As noted in Table 7-2, proposed mitigation measures include keeping truck idling to a minimum in accordance with MA anti-idling regulations; retrofitting appropriate diesel construction equipment with diesel oxidation catalyst and/or particulate filters where appropriate; and implementing construction worker vehicle trip management, including requiring contractors to provide off-airport parking, and use high-occupancy vehicle transportation modes for employees.

ID #	Comment	Response
C.28	The DEIR should provide a comprehensive review of the project's construction-period impacts and mitigation relative to noise, air quality, water quality, and transportation, including pedestrians, bicyclists and transit riders. The DEIR should include measures that will minimize damage to the site and adjacent areas that could result from coastal storms during the construction period.	Refer to Chapter 5, *Impact Assessment*, for a comprehensive review of the Proposed Project's construction-period impacts. As described in Section 5.10, construction would result in short-term impacts associated with temporary, minor increases in noise, emissions of air pollutants, water quality effects (turbidity), and surface traffic. Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, Section 7.3, describes proposed mitigation measures that would be implemented. Project-specific Best Management Practices (BMPs) to avoid and minimize adverse environmental impacts and mitigation methods to be used by the contractor are described in Appendix H, *Draft Construction Management Plan*. Most of the construction equipment and materials would be deployed via marine vessels. Truck delivering equipment/ materials would be prohibited from local roads and would use airport roads which would be able to accommodate additional traffic. Air Quality and Noise construction impacts are both below *de minimis* levels and noise criteria and would use mitigation measures to further decrease their impact. Construction period impacts to water quality would be managed through use of turbidity curtains, seasonal Time-of-Year restrictions, among other techniques.
C.29	It should identify the schedule for construction of various project elements, including open space. It should confirm that the project will require its construction contractors to use Ultra Low Sulfur Diesel fuel, and discuss the use of after-engine emissions controls, such as oxidation catalysts or diesel particulate filters.	The anticipated timeline for the Proposed Project is identified in Section 5.10 of Chapter 5, *Impact Assessment,* and justification for the timeline is discussed in Section 3.3.2 of Chapter 3, *Alternatives Considered*. As described in Section 3.3.2, a two-season construction schedule is proposed that would account for operational and runway restrictions. The construction generally would be completed as follows: • Season 1 (2025) – Install piles and pile-caps to support the RSA deck; install steel sheet pile and abutment wall and protective riprap; construct transition slab. • Season 2 (2026) – Install deck structure and EMAS; realign the existing perimeter road; construct the emergency egress ramps; and complete final grading. Refer to Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, Section 7.3, for information on construction-related mitigation measures that would be implemented with the Proposed Project, including the use of ultra-low sulfur diesel (ULSD) fuel and emission control devices.

ID #	Comment	Response
C.30	The DEIR should 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.	A Draft Construction Management Plan (CMP) is included in Appendix H, *Draft Construction Management Plan*. The CMP includes the items outlined in this scope, such as Project activities and their schedule, project-specific BMPs, time-of-year restrictions, and a disposal plan.
C.31	The project will be required to develop a Stormwater Pollution Prevention Plan (SWPPP) in accordance with its NPDES CGP to manage stormwater during the construction period.	A SWPPP will be developed in accordance with the NPDES Construction General Permit (CGP) for stormwater discharges from construction activities. Refer to Section 7.3.1.3 in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, for information on mitigation measures that would be implemented with the Proposed Project, including the development of a SWPPP.
C.32	The DEIR should describe stormwater management measures that will be implemented during construction. It should describe potential construction period dewatering requirements, discuss how dewatering will be conducted in a manner consistent with applicatory regulations/guidelines, and identify any necessary permits.	Refer to Section 7.3.1.3 in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, for information on mitigation measures that would be implemented with the Proposed Project, including stormwater management measures for construction period impacts. Refer to Table 7-1 for a list of the local, state, and federal permits anticipated to be required for the Proposed Project. Appendix H, *Draft Construction Management Plan*, notes dewatering is not expected during construction. It is anticipated that the contractor will perform any work for the sheet pile or ramp in coordination with low tides and utilize sandbags or other similar equipment to maintain dry areas during this work. If dewatering is deemed necessary based on the contractor's means and methods, a plan will be issued for review and approval prior to the start of any dewatering activities.
C.33	The DEIR should include a separate chapter summarizing all proposed mitigation measures, including construction-period measures. This chapter should also include draft Section 61 Findings for each permit to be issued by State Agencies	Refer to Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, for information on mitigation measures that would be implemented with the Proposed Project, including mitigation measures for construction period impacts. Draft Section 61 Findings are provided in Section 7.4 for each permit to be issued by state agencies.

ID #	Comment	Response
C.34	The DEIR should contain clear commitments to implement these mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and a schedule for implementation. The DEIR should clearly indicate which mitigation measures will be constructed or implemented based upon project phasing, either tying mitigation commitments to overall project square footage/phase or environmental impact thresholds, to ensure that adequate measures are in place to mitigate impacts associated with each development phase.	Refer to Table 7-2 in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, for information on the proposed mitigation commitments, including the approximate cost, implementation schedule, and responsible party.
C.35	The DEIR should contain a copy of this Certificate and a copy of each comment letter received. It should include a comprehensive response to comments on the ENF that specifically address each issue raised in the comment letter; references to a chapter or sections of the DEIR alone are not adequate and should only be used, with reference to specific page numbers, to support a direct response. This directive is not intended to, and shall not be construed to, enlarge the Scope of the DEIR beyond what has been expressly identified in this certificate.	A copy of the ENF Certificate issued by the Secretary of the EEA on October 8, 2021, a copy of each comment letter received, and response to comments, are included in Appendix A, *Response to Comments*.
C.36	The Proponent should circulate the DEIR to those parties who commented on the ENF, to any State Agencies from which the Proponent will seek permits or approvals, to any parties specified in section 11.16 of the MEPA regulations	The DEIR will be circulated to all parties who provided comments on the ENF, including federal, state, and municipal agencies from which Massport will seek required permits or approvals. Refer to Appendix B, *Distribution List*, for a list of representatives of governmental agencies, community groups, and/or residents to whom information on the Proposed Project was distributed.

This Page Intentionally Left Blank.

Letter 1

The Commonwealth of Massachusetts
Division of Marine Fisheries

251 Causeway Street, Suite 400, Boston, MA 02114
p: (617) 626-1520 | f: (617) 626-1509
www.mass.gov/marinefisheries

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lt. Governor

KATHLEEN A. THEOHARIDES
Secretary

RONALD S. AMIDON
Commissioner

DANIEL J. MCKIERNAN
Director

September 28, 2021

Kathleen Theoharides, Secretary
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office, Erin Flaherty
100 Cambridge Street, suite 900
Boston, Ma 02114

RE: EEA# 16433 Boston Logan International Airport Runway 27 End Runway Safety Area (RSA) Improvements Project

Dear Secretary Theoharides:

The Massachusetts Division of Marine Fisheries (MA DMF) has reviewed the proposed Runway Safety Area Improvements Project located along Boston Harbor in Boston, MA. The project proposes the construction of a new 198,900sf deck of which, approximately 153,000sf would extend over Boston Harbor. The work may include the installation of piles and/or caissons in the project area to support the deck and the construction of two emergency egress ramps on either side of the proposed deck.

The Project Area includes the following marine fisheries resources:

- 117,300sf of subtidal and intertidal area mapped as shellfish habitat by DMF for soft-shell clam (*Mya arenaria*) and blue mussel (*Mytilus edulis*) within shellfish growing areas GBH5.2 and GBH5.3, classified as Conditionally Restricted for shellfish harvest, and GBH5.0, classified as Prohibited for shellfish harvest. The shellfish survey conducted by the proponent on April 29, 2021 identified the presence of low numbers of live soft-shell clams (*Mya arenaria*), razor clams (*Ensis directus*) and surf clams (*Spisula solidissima*). The shellfish survey also identified several areas of numerous dead adult soft-shell clams and the presence of blue mussels attached to the armoring rock in the vicinity of the project area. Subtidal video surveys conducted by the proponent on June 10, 2021 identified the presence of European oysters (*Ostrea edulis*).
- 10,100sf of Intertidal area mapped as tidal flats by the MA DEP Wetlands Conservancy Program.
- 107,200sf of subtidal area mapped as essential habitat for the spawning and early development of winter flounder (*Pseudopleuronectes americanus*) by DMF. Video surveys conducted by the proponent on June 10, 2021 identified the presence of juvenile flounder.

- Side scan sonar and underwater video surveys conducted by the proponent within the Project Area did not detect the presence of eelgrass (*Zostera marina*).

MA DMF concurs with the proponents intentions to present additional environmental analysis to resource and permitting agencies and the public in a Draft Environmental Impact Report (DEIR). Based on the information provided in the Environmental Notification Form and a virtual site visit on 22 September 2021, we offer the following recommendations and comments:

Impacts to Marine Resources

- We recommend a detailed plan for the structures supporting the deck including: estimates of area impacted, construction BMPs to be used, and an alternatives analysis be presented in the DEIR. 1.1

- We recommend the proponent coordinate with DMF and other resource agencies to develop a detailed plan for shellfish mitigation (if needed). We concur that this coordination be recorded in the DEIR. 1.2

- We recommend the proponent coordinate with DMF to present the project plans and environmental impacts to the group of Logan Badged Shellfishers. 1.3

- We recommend the timeline of the project be described in detail in the DEIR, particularly the amount of time expected to complete all in-water work. Time of year restrictions may be needed for in-water silt-producing work, e.g. pile and/or caisson installation, to minimize impact to winter flounder, likely February 15 to June 30. More about time of year restrictions can be found on our website under Time of Year Restriction Guidelines Appendix A and B 2015 Revisions. http://www.mass.gov/eea/agencies/dfg/dmf/programs-and-projects/technical-review.html [1]. 1.4

Thank you for considering our comments. If you have questions about this review, please email Forest Schenck at Forest.Schenck@mass.gov.

Sincerely,

Daniel J. McKiernan
Director

DM/fs/te/sd

cc.
C. Jacek, USACE
R. Boeri, MA CZM
K. Shaw, NMFS
S. Dalzell, Massport
G. Bettencourt, MA DMF
J. Kennedy, MA DMF

References:

[1] Evans, NT, KH Ford, BC Chase and JJ Sheppard (2011). Recommended Time of Year Restrictions (TOYs) for Coastal Alteration Projects to Protect Marine Fisheries Resources in Massachusetts. Technical Report DMF TR-47.

Letter 2

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Kathleen A. Theoharides
Secretary

Martin Suuberg
Commissioner

Memorandum

To: Kathleen A. Theoharides, Secretary, EOEEA

Thru: Erin Flaherty, MEPA

From: MassDEP/Boston Waterways Regulation Program

Cc: Daniel Padien, MassDEP/Boston Waterways Regulation Program

Re: **Comments from the Chapter 91 Waterways Regulation Program - EEA #16433), Environmental Notification Form (ENF); Boston Logan International Airport, Runway 27 End Runway Safety Improvement Project; Filled and Flowed Tidelands of Boston Harbor, Boston, Suffolk County.**

Date: September 28, 2021

The Department of Environmental Protection Waterways Regulation Program (the "Department") has reviewed the above referenced ENF (EEA #16433) submitted by the Proponent, Massachusetts Port Authority ("Massport"). In this filing, the Proponent seeks to undertake a Runway Safety Improvement ("RSA") project on Logan Airport's Runway 27. The improvements are required by the Federal Aviation Administration ("FAA"), and state that to the extent feasible, the RSA should be consistent with the FAA design criteria with the intention to enhance rescue access in the event of an in-water emergency. The Project will have an Engineered Materials Arresting System (EMAS) integrated into the structure. EMAS are included in RSA projects when the project site is not sufficiently large to meet the FAA RSA standards. In the ENF, the Proponent asserts that the subject RSA project is not an extension of the runway, nor will it increase runway capacity or facilitate a broader range of aircraft types that could use the runway; it is solely for enhanced safety protocols. The project will impact both filled and flowed tidelands.

Runway 27 End RSA Improvement
Logan Airport
Massachusetts Port Authority
NPC #16433
MassDEP Chapter 91 Waterways Program Comments
September 28, 2021

Project Description

Based on a study of the alternatives, the FAA determined the preferred RSA improvements at the eastern end of Runway 27 should include an extension of an approximately 650’-0” long structure. Approximately 150’-0” linear feet of the RSA improvement would be located at the eastern end of the runway on filled tidelands, with approximately 500’-0” linear feet of the structure located in flowed tidelands. On the filled tidelands section, the RSA improvement structure would be 300’-0” wide; in flowed tidelands it will be narrowed to 150’-0”. The Proponent states that a detailed environmental review will be provided in the Draft Environmental Impact Report (DEIR). The Project is described as having a 75-year design life with the projected sea-level rise during that same time period having been taken into consideration in the design of the project.

Waterways Comments

In accordance with Massport’s Enabling Act, St. 1956, c. 465, Massport can undertake activities without any form of prior authorization by the Department if the proposed activities are: (a) water-dependent industrial per the definitions found at 310 CMR 9.12(2)(b); or, (b) if the proposed activities are located on the filled tidelands within boundaries of Logan Airport. Since a significant portion of the proposed RSA improvement would be conducted in flowed tidelands, and the described work is, by definition, an adjunct use for aircraft safety, the Proponent’s project would require c.91 authorization.

Pursuant to 310 CMR 9.12(2)(a)&(b), as an airport-related function, the proposed project does not appear to meet the definition of either a Water-Dependent nor a Water-Dependent Industrial use. In 2012, Massport obtained a License for the extension of the runway lighting system in flowed tidelands (License #13263). The procedural pathway for that authorization was through a Variance, in accordance with the standards and procedures described at 310 CMR 9.21. In the DEIR filing, 2.1
using the alternatives analysis, the Proponent should document why there are no reasonable conditions or alternatives aside from the preferred option that will achieve the desired outcomes of the project, and propose mitigation measures to minimize interference with the public interests in waterways and propose measures designed to compensate for the remaining detriments. The Department acknowledges that the provisions of M.G.L. c.90, sec. 61, the Massport Security Zone will affect this analysis. This legislation limits public access and navigational access within this Security Zone, which extends 500’ seaward of the Airport’s Mean High Water Mark (MHWM) from Wood Island Basin to the eastern end of Jeffrey’s Cove in East Boston.

Beyond the requirements described above, the DEIR filing should specifically clarify the location 2.2
of and areal amount of flowed tidelands affected by the project; ensure that the proposed project meets the engineering and construction standards enumerated at 310 CMR 9.37, including whether

there are any Harbor Lines established by the legislature pursuant to M.G.L. c.91 section 34; and, describe any construction impacts on lawful public access and navigation, and include proposed mitigation for any effects associated therewith. 2.2 cont.

Waterways Application Status- the Department looks forward to the receipt and the opportunity to comment upon of DEIR.

Letter 3

MassDEP

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Northeast Regional Office • 205B Lowell Street, Wilmington MA 01887 • 978-694-3200

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Kathleen A. Theoharides
Secretary

Martin Suuberg
Commissioner

September 28, 2021

Kathleen A. Theoharides, Secretary
Executive Office of
Energy & Environmental Affairs
100 Cambridge Street
Boston MA, 02114

Attn: MEPA Unit

RE: Boston
Boston Logan International Airport Runway 27 End Runway Safety Area Improvements Project
EEA # 16433

Dear Secretary Theoharides:

The Massachusetts Department of Environmental Protection Northeast Regional Office (MassDEP-NERO) has reviewed the Final Environmental Notification Form (ENF) for the proposed Boston Logan International Airport Runway 27 End Runway Safety Area (RSA) Improvements Project in Boston. MassDEP provides the following comments.

Wetlands

The Project Area is focused on the east end of 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 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. Runway 27 was constructed before the current FAA design guidelines were in place. The Runway 27 End RSA is 500 feet wide, but only 150 feet of length beyond the runway end before Boston Harbor.

Before preparation of this ENF, the FAA and Massport conducted a detailed alternatives analysis to identify and enhancements to the Runway 27 End RSA, as documented in the Logan International Airport Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study. The 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, which will slow the aircraft in a way that minimizes damage. This allows the acceptable length of the RSA to be shortened. To further minimize environmental impacts, the FAA determined that the deck over the harbor could be 300 feet wide, with the 306-foot width for accommodating safety rails. 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, called Alternative 4B, is the basis of the preliminary design and permitting associated with this Project. 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. All options would need to include emergency access/egress ramps.

The selected alternative proposes construction of a Runway Safety Area (RSA) deck at the end of runway 27. The RSA deck will be 306 feet wide and would be supported by pilings and/or caissons starting on land for approximately 150 feet, then extending 450 to 500 feet into the harbor. The EMAS dimensions will determine the final dimensions of the RSA deck. This will result in a surface area of approximately 198,900 square feet, of which approximately 153,000 square feet of decking (approximately 3.5 acres) would be over the harbor.

The following wetland resource areas will be impacted by the deck: 38,000 sf of Land Subject to Tidal Action (includes Coastal Beach); 64,800 sf of Land Subject to Coastal Storm Flowage (LSCSF) (100-year floodplain); 10,100 sf of Coastal Beach; 107,200 sf of Land Under the Ocean (LUO); and 117,300 sf Land Containing Shellfish (includes Coastal Beach and Land Under the Ocean). The project triggers the requirements for a mandatory EIR.

The ENF states that while compared to a structure built on fill, the pile-supported structure would have less impact on waves, tidal circulation, and flow, but still has the potential to result in some changes to coastal processes, including wave action, tidal circulation, erosion, scour, and accretion. The proponent states that the DEIR and NEPA review documents will include a detailed analysis of the preferred pier support structure, including the number and types of pilings, caissons, and an 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 may also result in indirect impacts to coastal wetland resources and to benthic organisms. The ENF states that "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." The ENF also acknowledges that there could be potential changes in productivity of Land Containing Shellfish beneath the deck due to changes in the distribution of sediment.

The ENF notes that a Notice of Intent will be filed with the Boston Conservation Commission to obtain an Order of Conditions under the WPA and states that the proposed project will not require a Variance under the WPA. This conclusion assumes the deck construction over the affected resource areas will meet all relevant regulatory performance standards. The ENF states that this question will be further addressed by the EIR. Impacts to wetland resource areas will differ depending on the type of deck support systems that is utilized. The EIR should discuss and address how the performance standards for each wetland resource area affected by the proposed deck will be met. If the performance standards cannot be fully met for this non-water dependent project, a Variance may be necessary under the Wetlands Protection Act. In addition, the DEIR should address how the project will meet the Mass. Stormwater Standards. 3.1 3.2

The MassDEP appreciates the opportunity to comment on this proposed project. Please contact Rachel.Freed@mass.gov at (978) 694-3258 for further information on wetlands issues. If you have any general questions regarding these comments, please contact me at John.D.Viola@mass.gov or at (978) 694-3304.

Sincerely,

This final document copy is being provided to you electronically by the Department of Environmental Protection. A signed copy of this document is on file at the DEP office listed on the letterhead.

John D. Viola
Deputy Regional Director

cc: Brona Simon, Massachusetts Historical Commission
Eric Worrall, Rachel Freed, Jill Provencal, Phil DiPietro, MassDEP-NERO

Letter 4

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

MEMORANDUM

TO:	Kathleen A. Theoharides, Secretary, EEA
ATTN:	Erin Flaherty, MEPA Office
FROM:	Lisa Berry Engler, Director, CZM
DATE:	September 27, 2021
RE:	EEA #16433, Boston Logan International Airport Runway 27 End Runway Safety Area Improvements Project, Boston

Lisa Berry Engler

The Massachusetts Office of Coastal Zone Management (CZM) has completed its review of the above-referenced Environmental Notification Form (ENF) noticed in the *Environmental Monitor* dated September 8, 2021, and recommends the following comments are addressed in the mandatory draft environmental impact report (DEIR).

Project Description

With this ENF, the Massachusetts Port Authority (Massport) proposes to improve the runway safety area (RSA) for Runway 27 at Logan International Airport in Boston in order to be consistent with the Federal Aviation Administration's (FAA) design standards for RSAs and to enhance rescue access in the event of an airfield emergency. The preferred alternative is an approximately 650-foot-long by 306-foot-wide RSA on a pile- or caisson-supported pier with an Engineered Materials Arresting System (EMAS). The pier would extend 450 to 500 feet into Boston Harbor, permanently impacting 107,200 square feet (SF) of Land Under Ocean, 10,100 SF of Coastal Beach, 117,300 SF of Land Containing Shellfish, and 64,800 SF of Land Subject to Coastal Storm Flowage (LSCSF). The Project Site is located within Priority Habitat of Rare Species (upland sandpiper and eastern meadowlark). The project is non-water-dependent and will require a license for approximately 2.46 acres of tidelands.

Project Comments

Resource Area Impacts

Massport is considering both piles and caissons for the pier substructure; the DEIR should include an analysis of impacts to resource areas, resulting changes in water flow that may result in scour, and different shaded area profiles, all of which may have a range of impacts on the various resources present in the Project Site. 4.1 On-going consultation with the Massachusetts Department of Environmental Protection (DEP), Division of Marine Fisheries (DMF), and National Marine Fisheries Service is recommended as the design of the project progress. 4.2 Temporary impacts during construction should be avoided, minimized, and/or mitigated in consultation with these agencies. 4.3

Navigation

The ENF indicates that the project will not affect the narrow navigation channel east of the Project Site. Massport should coordinate with the U.S. Coast Guard regarding construction period 4.4

impacts that may affect the channel and ensure that appropriate lighting is installed to designate the structure. 4.4 cont.

Federal Consistency

The proposed project is subject to CZM federal consistency review. For further information on this process, please contact Robert Boeri, Project Review Coordinator, at robert.boeri@mass.gov or visit the CZM website at https://www.mass.gov/federal-consistency-review-program. As indicated in the ENF, the DEIR should include a consistency statement for review. 4.5

LBE/ts/elh

cc: Tay Evans, Massachusetts DMF
Rachel Freed, Jill Provencal, MassDEP-NERO
Daniel Padien, MassDEP Waterways Regulation Program
Paul Maniccia, U.S. Army Corps of Engineers, New England District
Nicholas Moreno, City of Boston Conservation Commission

Letter 5

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

September 28, 2021

Kathleen A. Theohardies, Secretary
Executive Office of Energy and Environmental Affairs
Attention: MEPA Office
Erin Flaherty, EEA No. 16433
100 Cambridge St.
Boston, Massachusetts 02114

Project Name:	Boston Logan International Airport, Runway 27 End Runway Safety Area (RSA) Improvements Project
Proponent:	Massachusetts Port Authority (Massport)
Location:	One Harborside Drive, Boston – Boston Logan International Airport
Project Description:	Enhance the RSA at Runway 27 End with a 650-foot long by 306-foot wide pile or pier supported deck with Engineered Materials Arresting System (EMAS) to meet Federal Aviation Administration (FAA) requirements
Document Reviewed:	Environmental Notification Form
EEA File Number:	16433
NHESP Tracking No.:	21-40134

Dear Secretary Theohardies:

The Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries & Wildlife (the Division) has reviewed the *Environmental Notification Form* (ENF) for the proposed Boston Logan International Airport, Runway 27 End Runway Safety Area (RSA) Improvements Project in Boston, Massachusetts and would like to offer the following comments.

As indicated in the *Massachusetts Natural Heritage Atlas* (15th Edition), the proposed project site is mapped as *Priority Habitat* for a state-listed species: Upland Sandpiper (*Bartramia longicauda*), Endangered and Eastern Meadowlark (*Sternella magna*), Special Concern. These species and their habitats are protected pursuant to the Massachusetts Endangered Species Act (M.G.L c. 131A) and its implementing regulations (MESA, 321 CMR 10.00). Portions of the proposed projects will occur within *Priority Habitat*, which will require a direct filing with the Division for compliance with the Massachusetts Endangered Species Act (MESA 321 CMR 10.00).

According to the information submitted within the ENF, the proposed Runway Safety Area (RSA) Improvements Project has been designed in consultation with FAA to enhance safety at the Runway 27 End. The Preferred Alternative includes a 650-foot long by 306-foot wide pile (or pier) supported deck with an Engineered Materials Arresting System (EMAS) bed to slow aircraft that extend into the RSA. The proposed deck will extend from the Runway 27 End into Boston Harbor.

Based on the information presented in the ENF, it is unclear whether the project would result in temporary or permanent impacts to grassland habitat. If the project is limited to temporary grassland impacts that occur outside of the grassland bird breeding season (April 15- August 15) and the grassland is restored with a compatible native seed mix, the Division anticipates that this project could be conditioned to avoid a prohibited Take of state-listed species and their habitats. However, if the project will result in the permanent loss of grassland habitat, then the project may result in a prohibited Take of state-listed species habitat.

Based on the conceptual nature of the project plan within the ENF, it is not clear whether the 5.1
Enhancements to the Runway Safety Area will or will not result in a Take (321 CMR 10.18(2)(b)) of state-listed species. The Proponent should identify all permanent and or temporary impacts to grassland habitat and continue to consult the Division as the project design progresses. The Division anticipates working with the Proponent to resolve concerns for state-listed species and their habitats associated with the Project through the MESA review process (321 CMR 10.18, 10.23).

While it may be possible to design the proposed project to avoid a Take, the Division notes that projects 5.2
resulting in a Take of state-listed species may only be permitted if they meet the performance standards for a Conservation and Management Permit (CMP; 321 CMR 10.23). In order for a project to qualify for a CMP, the applicant must demonstrate that the project has avoided, minimized and mitigated impacts to state-listed species consistent with the following performance standards: (a) adequately assess alternatives to both temporary and permanent impacts to the state-listed species, (b) demonstrate that an insignificant portion of the local population will be impacted, and (c) develop and agree to carry out a conservation and management plan that provides a long-term net benefit to the conservation of the state-listed species. If the Project is determined to result in a Take and requires a CMP to proceed, the Division will not render a final decision until the MEPA review process and its associated public and agency comment period is complete.

As our MESA review is not complete, no alteration to the soil, surface, or vegetation and no work associated with the proposed project shall occur on the property until the Division has made a final determination.

If you have any questions about this letter, please contact Amy Hoenig, Endangered Species Review Biologist, at (508) 389-6364 or Amy.Hoenig@mass.gov. We appreciate the opportunity to comment on this project.

Sincerely,

Everose Schlüter

Everose Schlüter, Ph.D.
Assistant Director

cc: Stewart Dalzell, Massport
Boston City Council
Boston Conservation Commission
Boston Planning Department
DEP Northeast Regional Office, MEPA

Letter 6

The COMMONWEALTH OF MASSACHUSETTS
BOARD OF UNDERWATER ARCHAEOLOGICAL RESOURCES
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
251 Causeway Street, Suite 800, Boston, MA 02114-2136
Tel. (617) 626-1014 Fax (617) 626-1240
www.mass.gov/orgs/board-of-underwater-archaeological-resources

September 21, 2021

Kathleen A. Theoharides, Secretary
Executive Office of Energy and Environmental Affairs
Attention: Erin Flaherty, MEPA Unit (via email attachment)
100 Cambridge Street, Suite 900
Boston, MA 02114

RE: Logan International Airport Runway 27 End Runway Safety Area Improvements (EEA# 16433), Boston

Dear Secretary Theoharides,

The staff of the Massachusetts Board of Underwater Archaeological Resources has reviewed the above-referenced proposed project as detailed in the *Environmental Monitor* of September 8, 2021 and offers the following comments.

The Board has conducted a preliminary review of its files and secondary literature sources to identify known and potential underwater archaeological resources within the proposed project area. No record of any underwater archaeological resources was found. Based on the results of this review and the nature and extent of the project's anticipated impacts, the Board expects this project is unlikely to adversely impact submerged cultural resources.

6.1

However, should heretofore-unknown underwater archaeological resources be encountered during the course of the project, the Board expects that the project's sponsor will take steps to limit adverse effects and notify the Board and the Massachusetts Historical Commission, as well as other appropriate agencies, immediately, in accordance with the Board's *Policy Guidance for the Discovery of Unanticipated Archaeological Resources*.

The Board appreciates the opportunity to provide these comments as part of the MEPA review process. Should you have any questions regarding this letter, please do not hesitate to contact me at the address above or by email at david.s.robinson@mass.gov.

Sincerely,

David S. Robinson
Director

/dsr
Cc: Brona Simon, MHC
Bettina Washington, WTGH/A (via email attachment)
David Weeden, MWT (via email attachment)
Robert Boeri and Erikk Hokenson, MCZM (via email attachment)
Stewart Dalzell, Massport (via email attachment)

Letter 7

AIR Airport Impact Relief

September 30, 2021

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

Re: Logan Runway 27 RSA Project

Dear Secretary Theoharides,
Airport Impact Relief, Incorporated (AIR, Inc.) thanks you for the opportunity to comment on the Massport Runway 27 RSA EMAS Project

While Runway Safety Areas are important projects which strive to eliminate certain risks associated to overshoots and undershorts of runways, FAA provides 3 options: 1. Elongate the runway, 2. Build an EMAS and, 3. Displace the runway threshold (which means shortening, or shifting the runway). FAA does not differentiate amping these options in terms of their effectiveness or safety benefits; each option is considered to be of equal value.

Massport chose #2 because #1 would be expensive and impractical involving a huge fill operation and lots of permits and opposition due to environmental impacts and because option#3 -displacing the thresholds would mean clearances for overweight aircraft would be more difficult to achieve with the effective runway landing and take off area pushed toward the tall buildings downtown.

That concern is mainly a hypothetical however ever since Massport and FAA ‘turned’ 15/33 around and started departing 33L. While departing 33L, 27 is used for arrivals. They used to use 15R (the other end of 33L) for arrivals and 27 for takeoffs. The problem there, is that since these runways cross each other, they’re called ‘converging runways’ and the rule is that a departing aircraft on a converging runway can’t start its roll until AFTER the arriving aircraft passes the point of convergence or gets off the converging runway. Since the convergence point of runways 27/9 and 15/33 is at the southeast part of the airport, this slows things down considerably. Once they turned 15/33 around to have aircraft taking off 33L and landing 27, the landing aircraft are almost instantly clear of the convergence point. This improves the number of operations which can be performed in an hour.

Therefore, the current most popular use of 27 is for landings and so the option of displacing the threshold wouldn’t be that damaging.

AIR, Inc. would like Massport to explain in greater detail why they didn't choose the displacement option as it would have less environmental impacts being that it would not involve any disturbance to the shoreline, water sheet, ocean bed, or public access to the watersheet. 7.1

A loss of eelgrass at the 33 EMAS has been noted, and should be expected if the EMAS is constructed.

Another issue is loss of use of the watersheet. East Boston has over 15 miles of shoreline 7.2
(which is nearly a third of Boston's total shoreline. Logan Airport has made just over half of that shoreline (53%) inaccessible to EJ communities in East Boston surrounding the airport. When Massport builds this EMAS out 400' into the harbor, they will then likely enforce a preset security area around the new perimeter.

We ask Massport to explain how they will handle this enforcement. Normally, if a boater breeches the security zone, the state police come out on speed boats and clear them out. Whereas Massport has other options (displacing the threshold) this EMAS is arbitrary and costs such as loss of public use of the watersheet are choices grounded not in necessity, but in a preference to protect future airport capacity. Further reduction in EJ community access to the natural environment along with degradation in the natural systems surrounding the shoreline are environmental costs which should not be dismissed.

IMG_0643.png

AIR, Inc. proposes that Massport offset these burdens with additional shoreline restoration at 7.3
the EMAS site as well as at additional alternate locations, and; by creating additional mitigation to offset the loss of use of the watersheet in the area at the eastern end of runway 27. We propose that Massport fund the Constitution Beach Kayaking Program, or a similar free public kayaking program in Winthrop as mitigation. The Constitution Beach Program costs about $15,000 per year with an up front cost of about $5,000 in boats and gear that should last a good 5 - 10 years. So this is not an unreasonable ask. The Town of Winthrop may have a Youth group which could contact NOAH about the design of the East Boston kayaking program and use that successful program as a template.

CONCLUSION

This 3.5 acre EMAS structure will result in damage to the shoreline and restriction in public access to tidelands and the watersheet, and will increase I State Police enforcement of more expansive no-boat zones around the perimeter of the airport.

There are less intrusive alternatives (displacing the thresholds of runway 27, essentially shifting it 1000' toward Boston) which were rejected to conserve potential capacity in seldom used runway configurations (if they decide they want to depart 27, clearances of the buildings in the Seaport would change the geometry and could restrict certain aircraft per FAA rules).

Massport should provide additional mitigation as a result of selecting a more adverse alternative than necessary while other less intrusive options exist. 7.4

Sincerely,

AIR, Inc.
395 Maverick Street
East Boston, MA 02128

Letter 8

September 27, 2021

The Honorable Kathleen A. Theoharides, Secretary of Energy and Environmental Affairs
Executive Office of Energy and Environmental Affairs (EEA)
Attn: MEPA Office Erin Flaherty, EEA No. 16433
100 Cambridge Street, Suite 900
Boston, MA 02114

RE: Massport ENF-EEA No 16433, Runway 27 End RSA Improvement Project

Dear Secretary Theoharides,

I am writing to express my opposition to the DEIR scope of the Runway 27 End Runway safety Improvement Project as proposed in the subject ENF.

Other Alternatives should be considered:

Alternative 1 (Declared Distances) and Alternative 2 (Displaced Threshold Markings) should be further considered as preferred alternatives given both make use of existing runway space to meet the FAA safety standards, thus eliminating or reducing further runway intrusion into the Harbor with its attendant negative environmental impacts. 8.1

A key reason for eliminating Alternative 2 is the Runway 9 court injunction. However this reason should be challenged since the ENF states this will not expand runway capacity or operations vs. (1) the 1976 injunction relates to expansion concerns and failure to follow MEPA process; (2) the injunction was partially lifted to build the limited-use Runway 14/32. 8.2 The "lengthy" process to resolve this with the court is also cited as a reason to eliminate Alternative 2. But this should not be accepted as a valid reason to permanently increase the encroachment on the Harbor and Winthrop residents because Massport failed to commence the court review process years ago when the FAA notified them of the new Runway safety requirements. 8.3

Town of Winthrop approval should be required:

The Town of Winthrop will be most impacted by this project - from the marine ecosystem and Snake Island, to the navigation of the channel, and the potential for increased use of this runway for heavier/larger aircraft once this EMAS deck is built. The latter concern is raised because the EMAS bed size will be based on the Critical Design Aircraft (biggest planes) as well as the potential for FAA rules to change to allow the EMAS deck to count towards runway length, thus increasing use of Runway 27. 8.4 It is also unclear how none of this project is within Winthrop boundaries and this should be verified. 8.5 Given the known and potential impacts of this project on the Town of Winthrop, bodies such as the Conservation Commission and Town Council should be officially included to review and approve this project.

Impacts on Snake Island should be comprehensive:

I understand the impact of the Snake Island wildlife will be assessed, but it is unclear if the DEIR scope also includes the impact of a change in currents from both construction and the pilings on Snake Island. Given Snake Island sand bar has been steadily enlarging, the DEIR should include this analysis. 8.6

Thank-you for your consideration of these comments.

Miriam Regan-Fiore
15 Frances St
Winthrop, MA 02152
mimregan@aol.com

Letter 9

BILL SCHMIDT
32 BUCHANAN STREET
WINTHROP, MA 02152
(617) 846-1392

September 28, 2021

The Honorable Kathleen A. Theoharides, Secretary
Tori Kim, Director of MEPA Office
Executive Office of Energy and Environmental Affairs (EOEA)
Attention: Erin Flaherty, MEPA Analyst
100 Cambridge Street, Suite 900
Boston, Massachusetts 02114

Re: Boston Logan International Airport
Runway 27 Safety Area Project, ENF-EEA No. 16433

Dear Secretary Theoharides and Director Kim:

I am submitting these comments in response to ENF-EEA No. 16433, the proposed Runway 27 End Runway Safety Area Improvements Project.

I believe that the Project as proposed is detrimental to the health and environmental interests of the residents of the Town of Winthrop.

I recommend that you reject the ENF-EEA No. 16433 and the Preferred RSA enhancement option described in Section 3.3.6 Alternative 4B.

I believe that the Preferred Alternative intrudes on the boundary of the Town of Winthrop, yet there is no acknowledgment of this in the ENF. 9.1

I believe that the Preferred Alternative impacts filled tidelands on the site, including land containing shellfish, within Winthrop's boundaries and should be required to be reviewed and approved by the Winthrop Conservation Commission and possibly other appropriate Town agencies and regulatory boards. 9.2

I believe that the Preferred Alternative is detrimental to Winthrop's health and environmental interests, and quality of life because of its potential to increase the current excessive noise and air pollution on the densely populated Point Shirley neighborhood.

Sincerely,
Bill Schmidt
Chair, Winthrop Board of Health

Letter 10

John Vitagliano
19 Seymour Street
Winthrop, MA 02152
617-846-1105

September 24, 2021

The Honorable Kathleen A. Theoharides, Secretary
Tori Kim, Director of MEPA Office
Executive Office of Environmental Affairs (EOEA)
Attn: Erin Flaherty, MEPA Analyst
100 Cambridge Street, Suite 900
Boston, Massachusetts 02114

Re: Boston Logan International Airport
Runway 27 End Runway Safety Area Improvements Project, ENF-EEA No. 16433-(The Project)

Dear Secretary Theoharides and Director Kim:

I submit these comments in response to EEA No. 16433, the proposed Runway 27 End Runway Safety Improvements Project (The Project).

The Project is egregiously flawed and detrimental to the environmental interests and rights of the Town of Winthrop. I urge the EOEA to reject the EEA No. 16433 ENF, specifically the "Preferred Alternative" described in Section 3.3.6 of the document.

- The Project clearly intrudes on the boundary of the Town of Winthrop, as indicated by the series of charts (including Massport documents) entitled "Winthrop Incursion", yet The Project fails to acknowledge this critical aspect. 10.1

  The ENF states that the Project will impact 574,500 sf of filled tidelands on the site, including 117,300 sf of land containing shellfish, which as indicated on the charts, clearly lie within Winthrop's boundaries and therefore should be required to be reviewed and approved by Winthrop's Conservation Commission and other appropriate Town agencies and regulatory bodies including the Town Council. 10.2

  The Project would also impact the Winthrop navigation channel which provides maritime access to three yacht clubs in Winthrop and two in East Boston, and the Winthrop Landing which services the Winthrop Ferry service. 10.3

The project is detrimental to Winthrop's environmental interests, rights and quality of life because of its potential to increase the current excessive noise and air quality pollution on the densely populated Point Shirley neighborhood which presently is impacted by 30% (127,288) of Logan Airport's total annual operations from Runway 9/27:

61,216 departures from Runway 9 (direct overflights).
41,974 arrivals from Runway 27(direct overflights).
24,076 departures from Runway 27 (sideline noise).
-Based on 2019 Massport data.

While the current Federal Aviation Administration (FAA) regulations do not allow the dimensions of new Runway Safety Areas (RSA) to be incorporated into allowable aircraft takeoff/landing operational runway length criterion of existing runways there is the potential that a future FAA administration might change the current policy and add RSA's to existing runways for assessing allowable runway lengths for takeoff criteria. Such a policy change would increase the allowable operational length of Runway 9/27 by 650 ft. to 7,651 ft. in accordance with The Project's recommendations, which would increase its daily operational utilization and ensuing direct noise and air quality pollution increases on the Point Shirley community. Therefore, it is in Point Shirley's environmental interest for The Project not to proceed.

A potentially acceptable alternative could be "Alternative 1-Declared Distances", a technique broadly used applied at numerous airports in the U.S. It would provide a full dimension RSA for Runway 27 without having to construct a facility in Boston/Winthrop Harbor. The Declared Distance alternative would likely require a modified Taxiway E to prevent Runway 9/27 and Runway 4R/22L conflicts.

I question the basic Massport premise of selecting the Logan Airport Runway 27 end for a Runway Safety Area project when there are three other locations-Runways 4R, 4L and 22L- that experience similar levels of aircraft operations that would benefit from an RSA:

- The proposed Runway 27 RSA location experiences an annual total of 61,216 Runway 9 flights which are all departures. Interestingly, there aren't *any* Runway 9 arrivals as indicated by the attached Massport chart indicating 0 Runway 9 approaches for the past 20 years which significantly limits the number of flights that would benefit from a Runway 27 RSA and significantly limits its functionality.
- However, the Runway 4R end experiences an annual total of 65,086 flights, including 22L departures and 4R arrivals., a significant increase compared to the Runway 27 end.
  Yet the Massprt proposal has no provisions for a Runway 4R RSA.
- Also, the Runway 4L end experiences a total of 61,108 annual flights, including 22R departures and 4L arrivals, nearly equal to the Runway 27 location. Yet the Massport proposal has no provisions for a Runway 4L RSA.
- Also, the Runway 22L end experiences a total of 63,167 annual flights, including 22L arrivals and 4R departures, more than the Runway 27 end yet the Massport proposal has no provisions for a Runway 4L RSA.
  Based on Massport data.

I have assumed that RSA's are statistically more beneficial to aircraft overshoots, departures and arrivals, than undershoots.

Since the Runways 4L, 4R and 22L ends experience equal or greater aircraft operations compared to the ENF proposed Runway 27 RSA location which would negatively impact the Point Shirley neighborhood of Winthrop I urge Massport to withdraw the Runway 27 ENF and develop less environmentally consequential alternatives. 10.4

Thank You,
John Vitagliano

Member: Winthrop, Airport Hazards Committee

:attachments

2004 General Location Plan

Legend:

Approximate Massport Property Lines

Index of Prominent Airport Locations

1. Sky Chefs
2. MPA Wood Island Substation
3. MPA Facilities II
4. MPA Facilities III
5. U.S. Airways Hangar
6. MPA Pumping Station
8. Delta Hangar
8A. CNG Fuel Station
9. Northwest Hangar
11. Delta Reservations
13. UPS Cargo
14. Temporary Signature General Aviation Terminal
16. American Hangar
17. Terminal E West Parking Area
18. MPA Facilities I / Heating Plant
19. Terminal E
20. Terminal D
21. Terminal C Pier B
22. Terminal C Main Terminal
23. Terminal C Pier C
24. Terminal C Pier D
25. MPA Administration Building
26. ATC Tower
27. Terminal B Pier A(American)
28. Terminal B Parking Garage
29. Terminal B Pier B(USAirways)
30. Central Parking Garage
31. Terminal A Main Terminal (under renovations)
31A. Terminal A Passenger Tunnel
31B. Terminal A Satellite Terminal
33. Gate Gourmet Flight Kitchen
34. Hilton Hotel
37. MBTA Airport Station
38. Dollar Rent a Car
38A. Dollar Rent a Car
39. Avis Rent a Car
40. Electrical Maintenance Stockroom
41. Porter Street Substation
42. Hertz Rent a Car
45. Taxi Pool
46. BOS Fuel Farm/ Fuel Operations & Control Bldg.
47. MTA Response Station/ Electrical Substation
48. Future Toll Plaza at TWT
49. Budget Rent a Car
50. National Rent a Car
51. B.U. Office Building
53. Fire Dept. Boat House
54. General Aviation Hangar/ Continental Maintenance
55. Amelia Earhart Building Support
56. Northwest Cargo
57. FedEx Cargo
58. American & FedEx Cargo
59. Post Office Staging Area
60. MLR Properties
61. U.S. Postal Facility
62. U.S. Air/ United/ Continental Cargo
63. Cargo Building #63
65. Logan Office Center
66. Field Lighting Vault
67. BIF Electric Substation
68. Sky Chefs
69. Alamo Rent a Car
70. Harborside Hyatt Hotel
73. Terminal E Baggage Screening Building
74. Water Shuttle Pier
76. Limo Pool
77. Fuel Farm
78. Massport Fire-Rescue Headquarters
79. Satellite Fire Station
80. State Police K-9 Facility
81. West Parking Garage
82. Vent Building #7
83. Economy Lot #1
83A. Economy Lot #2
83B. Employee Parking
84. Bird Island Flats Garage
85. Fire-Rescue Boat Dock
86. Citgo Gas Station
87. Terminal E Walkway
88. Terminal A Walkway
89. Terminal C Walkway
90. Terminal B Walkways
91. Central Stockroom
92. Batch Plant and Trailers
93. United GSE Facility
94. United Hangar Support Facility
95. United Hangar

N

0 450 900 1800
in feet

This plan is intended for informational purposes only, and no use may be made of the same without the express written permission of the Massachusetts Port Authority ("the Authority"). The Authority does not certify the accuracy, information or title to the properties contained in this plan nor make any warranties of any kind, express or implied, in fact or by law, with respect to any boundaries, easements, restrictions, claims, overlaps or other encumbrances affecting such properties.

Warning: This document is the property of the Massachusetts Port Authority. It is one of a numbered series that must be returned to the Authority immediately upon request. This document contains sensitive security information, the unauthorized release of which is prohibited under state and Federal law. No part of this document or any information contained therein may be photocopied or reproduced in any way or released to any person without the prior written permission of the Authority's Director of Corporate Security. Unauthorized possession, photocopying, reproduction or release of this document or its contents, or failure to return it to the Authority immediately upon request, is subject to criminal and civil sanctions, including, without limitation, fine, imprisonment and disqualification from doing business with the Authority

Logan International Airport
East Boston, MA

massport

Massachusetts Port Authority
Capital Programs Department
March 2004

JV

massport

\\vhb.com\gis\proj\Wat-EV\14792.00 WSP - MPA Runway 9-27\Project\Runway9 2 ENFFigures\ENF3.aprx

FIGURE 4: Preliminary Resource Areas

Runway 27 End RSA Improvements Project

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

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

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.

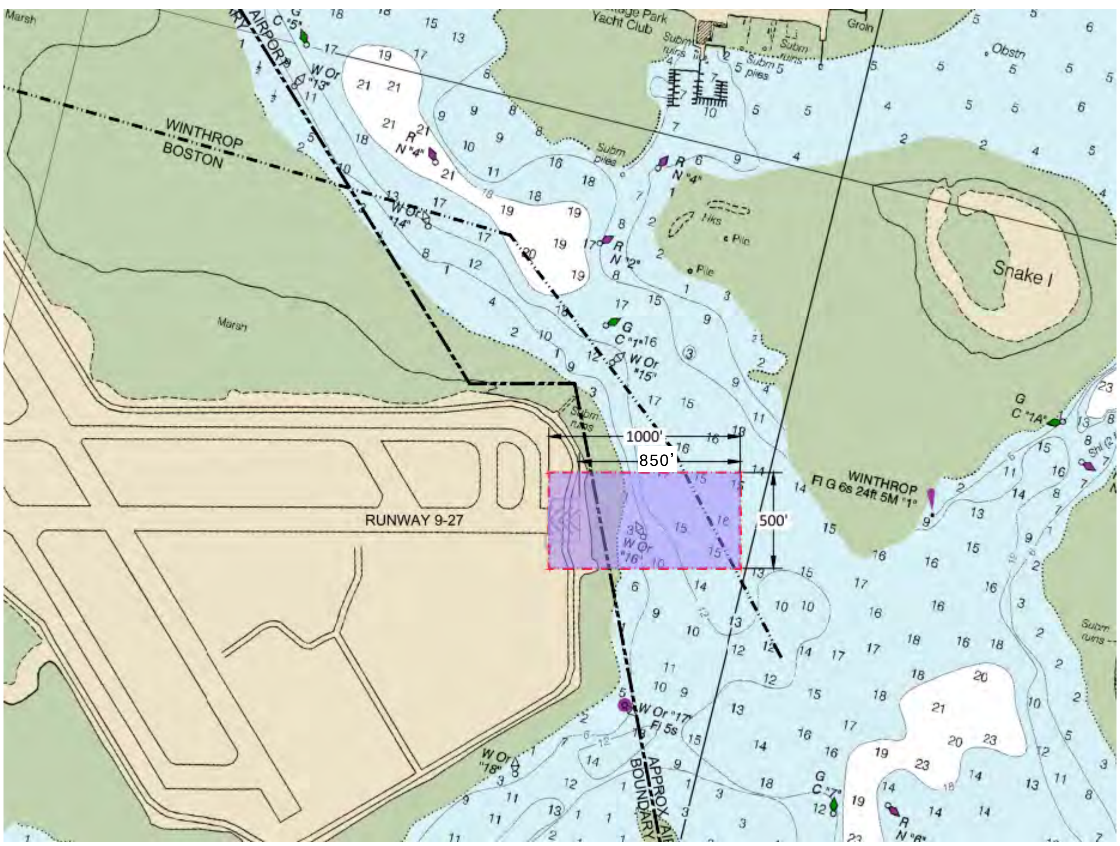
- Very high cost (Alternative 3B is likely more costly than 3A).

- 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)

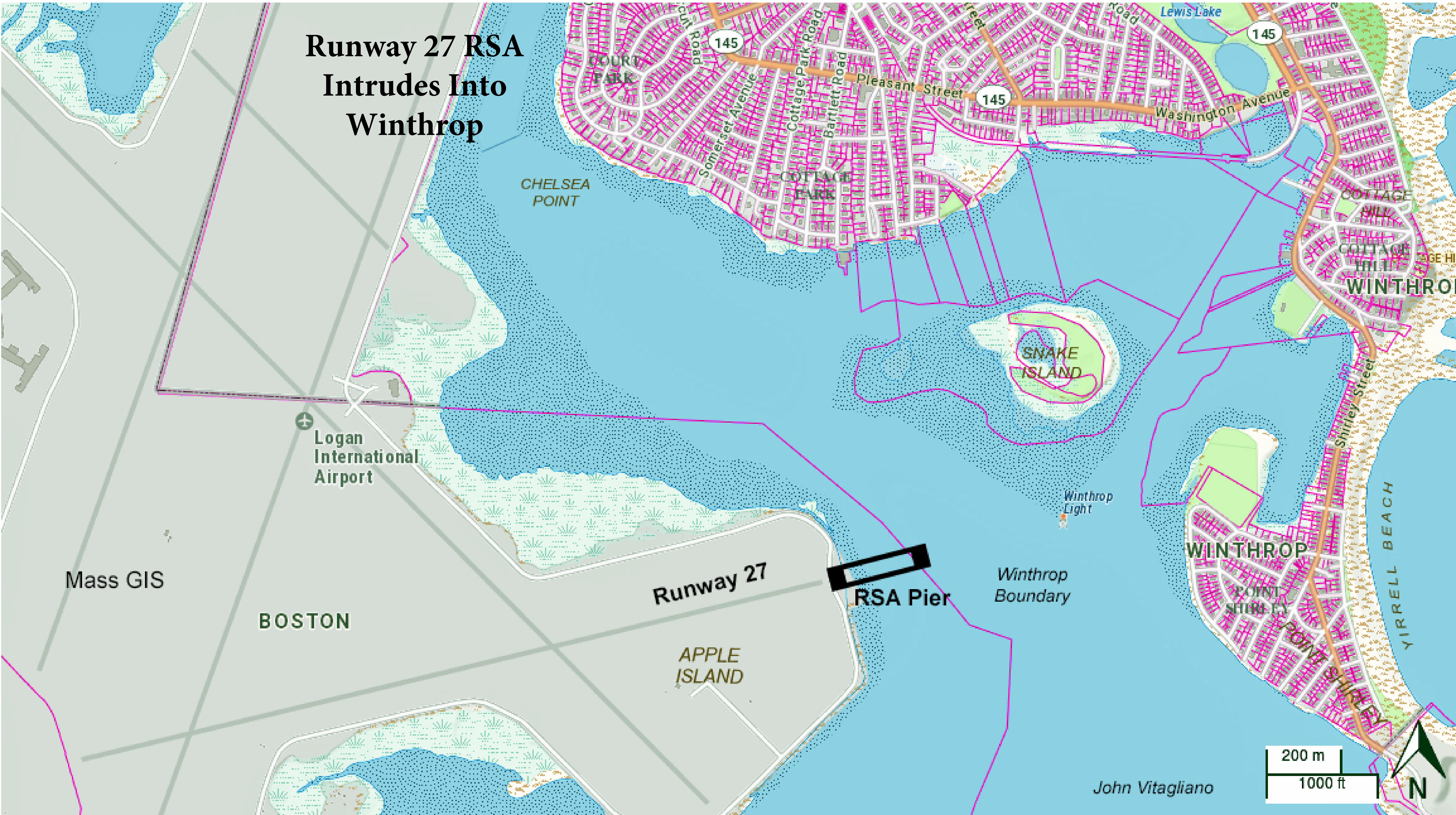
- Both Alternatives would be subject to lengthy community outreach process.

- 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



Runway 27 RSA
Intrudes Into
Winthrop
Lewis Lake
145
Pleasant Street
Washington Avenue
Somerset Avenue
Cottage Park Road
Bartlett Road
COURT PARK
COTTAGE PARK
CHELSEA POINT
COTTAGE HILL
WINTHROP
SNAKE ISLAND
Logan International Airport
Winthrop Light
Winthrop Boundary
RSA Pier
Runway 27
Mass GIS
BOSTON
APPLE ISLAND
WINTHROP
POINT SHIRLEY
Shirley Street
YIRRELL BEACH
John Vitagliano
200 m
1000 ft
N


Runway 27 Inclined Safety Area (ISA)
JV

Runway 22L-Inclined Safety Area (ISA)

JV


Runway 22R Inclined Safety Area (ISA)
JV

Table H-8 presents a historical summary of runway use by jets. Since 2009, the radar data have been analyzed with Massport's Harris NOMS. Data from 2001 through 2008 were compiled with Massport's PreFlight™ software, an analysis package used to access fleet, day/night splits, and runway use information from radar data. Data prior to 2001 were derived from Massport's original noise monitoring system, supplemented with field records. Note that Logan Airport Noise Rules prevent arrivals to Runway 22R and departures from Runway 4L by jet aircraft except for certain circumstances.

Table H-8 Summary of Jet Aircraft Runway Use – 1990 to 2019

Runway	4L	4R	9	14[1]	15R	22L	22R	27	32[1]	33L
1990										
Departures	0%[2]	3%	21%	N/A	10%	2%	36%	20%	N/A	7%
Arrivals	1%	25%	0%	N/A	2%	14%	0%	28%	N/A	29%
1992[2]										
Departures	0%	6%	31%	N/A	7%	2%	38%	10%	N/A	6%
Arrivals	1%	37%	0%	N/A	3%	12%	0%	30%	N/A	17%
1993										
Departures	0%	9%	33%	N/A	7%	3%	40%	4%	N/A	4%
Arrivals	2%	44%	0%	N/A	1%	11%	0%	28%	N/A	15%
1994										
Departures	0%	9%	33%	N/A	4%	3%	32%	12%	N/A	5%
Arrivals	3%	42%	0%	N/A	1%	8%	0%	27%	N/A	19%
1995										
Departures	0%	8%	36%	N/A	5%	5%	29%	11%	N/A	5%
Arrivals	3%	41%	0%	N/A	2%	8%	0%	27%	N/A	17%
1996										
Departures	0%	8%	32%	N/A	5%	6%	33%	12%	N/A	5%
Arrivals	2%	38%	0%	N/A	2%	11%	0%	29%	N/A	18%
1997										
Departures	0%	8%	30%	N/A	5%	6%	31%	15%	N/A	5%
Arrivals	2%	36%	0%	N/A	2%	9%	0%	30%	N/A	20%
1998										
Departures	0%	8%	35%	N/A	6%	5%	28%	14%	N/A	5%
Arrivals	2%	41%	0%	N/A	2%	7%	0%	28%	N/A	19%
1999										
Departures	0%	8%	31%	N/A	5%	4%	30%	15%	N/A	6%
Arrivals	3%	37%	0%	N/A	2%	10%	0%	28%	N/A	21%
2000										
Departures	0%	8%	35%	N/A	4%	3%	30%	15%	N/A	6%
Arrivals	4%	40%	0%	N/A	1%	7%	0%	28%	N/A	20%

Table H-8	Summary of Jet Aircraft Runway Use – 1990 to 2019 (Continued)									
Runway	**4L**	**4R**	**9**	**14[1]**	**15R**	**22L**	**22R**	**27**	**32[1]**	**33L**
2001										
Departures	0%	7%	34%	N/A	4%	3%	35%	12%	N/A	5%
Arrivals	5%	36%	0%	N/A	1%	8%	0%	32%	N/A	18%
2002										
Departures	0%	4%	31%	N/A	6%	3%	35%	16%	N/A	6%
Arrivals	6%	31%	0%	N/A	1%	12%	0%	30%	N/A	21%
2003										
Departures	0%	4%	33%	N/A	7%	2%	34%	14%	N/A	6%
Arrivals	7%	33%	0%	N/A	1%	14%	0%	28%	N/A	18%
2004										
Departures	0%	5%	34%	N/A	10%	4%	24%	18%	N/A	6%
Arrivals	6%	34%	0%	N/A	1%	12%	0%	24%	N/A	23%
2005										
Departures	0%	5%	36%	N/A	7%	1%	31%	13%	N/A	7%
Arrivals	8%	33%	0%	N/A	1%	11%	0%	29%	N/A	17%
2006										
Departures	0%	4%	33%	0%	3%	1%	40%	13%	0%	6%
Arrivals	7%	29%	0%	0%	1%	14%	0%	33%	0.2%	16%
2007										
Departures	0%	5%	31%	0%	4%	1%	33%	7%	0%	19%
Arrivals	5%	31%	0%	0%	1%	15%	0%	36%	2%	11%
2008										
Departures	0%	6%	33%	<1%	3%	<1%	36%	6%	0%	16%
Arrivals	6%	30%	0%	0%	2%	17%	0%	33%	2%	11%
2009[3]										
Departures	0%	7%	32%	0%	3%	2%	34%	6%	0%	16%
Arrivals	7%	31%	0%	0%	3%	17%	0%	30%	1%	11%
2010										
Departures	0%	4%	28%	<1%	8%	2%	31%	10%	0%	17%
Arrivals	5%	28%	0%	0%	1%	15%	0%	32%	1%	16%
2011[4]										
Departures	0%	6%	36%	<1%	5%	2%	36%	7%	0%	7%
Arrivals	7%	37%	0%	0%	<1%	16%	0%	28%	1%	11%
2012[4]										
Departures	0%	6%	33%	<1%	5%	3%	38%	6%	0%	9%
Arrivals	6%	34%	0%	0%	1%	16%	0%	33%	<1%	9%
2013										
Departures	<1%	5%	30%	<1%	5%	2%	35%	12%	0%	12%
Arrivals	6%	29%	0%	0%	1%	16%	<1%	32%	1%	15%

Table H-8 Summary of Jet Aircraft Runway Use – 1990 to 2019 (Continued)

Runway	4L	4R	9	14[1]	15R	22L	22R	27	32[1]	33L
2014										
Departures	0%	5%	31%	<1%	5%	2%	28%	13%	0%	17%
Arrivals	5%	30%	0%	0%	2%	25%	<1%	21%	1%	16%
2015										
Departures	0%	4%	29%	<1%	5%	2%	32%	12%	0%	15%
Arrivals	5%	29%	0%	0%	2%	25%	<1%	23%	1%	16%
2016[5]										
Departures	0%	4%	30%	0%	6%	2%	27%	13%	0%	18%
Arrivals	4%	31%	0%	0%	1%	24%	<1%	23%	1%	16%
2017[6]										
Departures	0%	2%	25%	0%	5%	1%	28%	15%	0%	23%
Arrivals	5%	21%	0%	0%	5%	23%	<1%	27%	2%	18%
2018										
Departures	<1%	4%	30%	0%	5%	2%	34%	10%	0%	16%
Arrivals	4%	30%	0%	0%	<1%	32%	<1%	21%	1%	12%
2019										
Departures	0%	4%	30%	0%	4%	2%	28%	12%	0%	20%
Arrivals	4%	28%	0%	0%	<1%	29%	<1%	22%	2%	15%

Source: HMMH 2020, Massport Noise Office.

Notes: These data reflect actual percentages of jet aircraft operations on each runway end. They should not be confused with effective runway use, which is used by the Preferential Runway Advisory System (PRAS) to derive recommendations for use of a particular runway. Effective runway percentages include a factor of 10 applied to nighttime operations so that use of a runway at night more closely reflects its effect on total noise exposure.
Jet aircraft are not able to use Runway 15L or 33R due to its length of only 2,557 feet.
Values may not add to 100 percent due to rounding.
N/A - not available.

1 Runway 14-32 opened in late November 2006. (Runway 14-32 is unidirectional with no arrivals to Runway 14 and no departures from Runway 32.)

2 The *1990 Final Generic Environmental Impact Report* was published and submitted to the Secretary of Environmental Affairs in July 1993. It included modeled operations and resulting noise contours for 1987, 1990, and a 1996-forecast year. The *1993 Annual Update* published in July 1994 included operations and contours for 1992 and 1993. 1991 data are not available.

3 Runway 9-27 had extended weekend closings for resurfacing during 2009.

4 Runway 15R-33L was closed for 3 months in 2011 and in 2012.

5 Runway 4L-22Rwas closed for 31 days in 2016.

6 Runway 4R-22L was closed for 35 days in 2017, with limited availability for Runway 4R arrivals for about 80 additional days.

Letter 11

John Vitagliano
19 Seymour Street
Winthrop, MA 02152
617-846-1105

September 28, 2021

The Honorable Kathleen A. Theoharides, Secretary
Tori Kim, Director of MEPA Office
Executive Office of Environmental Affairs (EOEA)
Attn: Erin Flaherty, MEPA Analyst
100 Cambridge Street, Suite 900
Boston, Massachusetts 02114

Re: Boston Logan International Airport
Runway 27 End Runway Safety Area Improvements Project, ENF-EEA No. 16433-(The Project)

Addendum to Previous Submitted Comments:

Dear Secretary Theoharides and Director Kim:

I respectfully submit this addendum to previously submitted comments concerning EEA No. 16433:

I question the basic Massport premise of selecting the Logan Airport Runway 27 end for a Runway Safety Area project when there are two other locations-Runways 4R, 4L- that experience similar levels of aircraft operations which would benefit from an RSA with fewer environmental constraints:

- The proposed Runway 27 RSA location experiences an annual total of 61,216 Runway 9 flights which are all departures. Interestingly, there aren't *any* Runway 9 arrivals as indicated by the attached Massport chart indicating 0 Runway 9 approaches for the past 20 years which significantly limits the number of flights that would benefit from a Runway 27 RSA and significantly limits its functionality.
- However, the Runway 4R end experiences an annual total of 65,086 flights, including 22L departures and 4R arrivals, substantially more than the Runway 27 end.
  Yet the Massprt proposal has no provisions for a Runway 4R RSA.
- Also, the Runway 4L end experiences a total of 61,108 annual flights, including 22R departures, nearly equal to the Runway 27 location. Yet the Massport proposal has no provisions for a Runway 4L RSA.

  Based on Massport data (Year 2019 operations).

It is important to note that the 4R and 4L runway ends are not equipped with Inclined Safety Areas, so that both runway ends would realize greater incremental safety enhancements from individual RSA's than the Runway 27 end which is currently equipped with a fully functional Inclined Safety Area which provides a significant measure of overshoot protection. Therefore, the Runways 4L and 4R ends would functionally benefit more from RSA projects than the Runway 27 RSA project and would entail significantly fewer environmental conflicts while avoiding any negative impacts on the Town of Winthrop. Therefore, I urge Massport to reassess its RSA priority assignment by replacing the Runway 27 RSA proposal with two alternative RSA's for the Runway 4L and 4R ends which, together, would provide enhanced RSA safety for twice as many annual Logan Airport flights than the single controversial Runway 27 RSA proposal. 11.1

I have assumed that RSA's are statistically more beneficial to aircraft overshoots, departures and arrivals, than undershoots.

Thank You,
John Vitagliano

Member: Winthrop Airport Hazards Committee

:attachments

2004 General Location Plan

Legend:

Approximate Massport Property Lines

Index of Prominent Airport Locations

1. Sky Chefs
2. MPA Wood Island Substation
3. MPA Facilities II
4. MPA Facilities III
5. U.S. Airways Hangar
6. MPA Pumping Station
8. Delta Hangar
8A. CNG Fuel Station
9. Northwest Hangar
11. Delta Reservations
13. UPS Cargo
14. Temporary Signature General Aviation Terminal
16. American Hangar
17. Terminal E West Parking Area
18. MPA Facilities I / Heating Plant
19. Terminal E
20. Terminal D
21. Terminal C Pier B
22. Terminal C Main Terminal
23. Terminal C Pier C
24. Terminal C Pier D
25. MPA Administration Building
26. ATC Tower
27. Terminal B Pier A(American)
28. Terminal B Parking Garage
29. Terminal B Pier B(USAirways)
30. Central Parking Garage
31. Terminal A Main Terminal (under renovations)
31A. Terminal A Passenger Tunnel
31B. Terminal A Satellite Terminal
33. Gate Gourmet Flight Kitchen
34. Hilton Hotel
37. MBTA Airport Station
38. Dollar Rent a Car
38A. Dollar Rent a Car
39. Avis Rent a Car
40. Electrical Maintenance Stockroom
41. Porter Street Substation
42. Hertz Rent a Car
45. Taxi Pool
46. BOS Fuel Farm/ Fuel Operations & Control Bldg.
47. MTA Response Station/ Electrical Substation
48. Future Toll Plaza at TWT
49. Budget Rent a Car
50. National Rent a Car
51. B.U. Office Building
53. Fire Dept. Boat House
54. General Aviation Hangar/ Continental Maintenance
55. Amelia Earhart Building Support
56. Northwest Cargo
57. FedEx Cargo
58. American & FedEx Cargo
59. Post Office Staging Area
60. MLR Properties
61. U.S. Postal Facility
62. U.S. Air/ United/ Continental Cargo
63. Cargo Building #63
65. Logan Office Center
66. Field Lighting Vault
67. BIF Electric Substation
68. Sky Chefs
69. Alamo Rent a Car
70. Harborside Hyatt Hotel
73. Terminal E Baggage Screening Building
74. Water Shuttle Pier
76. Limo Pool
77. Fuel Farm
78. Massport Fire-Rescue Headquarters
79. Satellite Fire Station
80. State Police K-9 Facility
81. West Parking Garage
82. Vent Building #7
83. Economy Lot #1
83A. Economy Lot #2
83B. Employee Parking
84. Bird Island Flats Garage
85. Fire-Rescue Boat Dock
86. Citgo Gas Station
87. Terminal E Walkway
88. Terminal A Walkway
89. Terminal C Walkway
90. Terminal B Walkways
91. Central Stockroom
92. Batch Plant and Trailers
93. United GSE Facility
94. United Hangar Support Facility
95. United Hangar

0 450 900 1800
In feet

Logan International Airport
East Boston, MA

Massachusetts Port Authority
Capital Programs Department
March 2004

JV

Table H-8 presents a historical summary of runway use by jets. Since 2009, the radar data have been analyzed with Massport's Harris NOMS. Data from 2001 through 2008 were compiled with Massport's PreFlight™ software, an analysis package used to access fleet, day/night splits, and runway use information from radar data. Data prior to 2001 were derived from Massport's original noise monitoring system, supplemented with field records. Note that Logan Airport Noise Rules prevent arrivals to Runway 22R and departures from Runway 4L by jet aircraft except for certain circumstances.

Table H-8 Summary of Jet Aircraft Runway Use – 1990 to 2019

Runway	4L	4R	9	14[1]	15R	22L	22R	27	32[1]	33L
1990										
Departures	0%[2]	3%	21%	N/A	10%	2%	36%	20%	N/A	7%
Arrivals	1%	25%	0%	N/A	2%	14%	0%	28%	N/A	29%
1992[2]										
Departures	0%	6%	31%	N/A	7%	2%	38%	10%	N/A	6%
Arrivals	1%	37%	0%	N/A	3%	12%	0%	30%	N/A	17%
1993										
Departures	0%	9%	33%	N/A	7%	3%	40%	4%	N/A	4%
Arrivals	2%	44%	0%	N/A	1%	11%	0%	28%	N/A	15%
1994										
Departures	0%	9%	33%	N/A	4%	3%	32%	12%	N/A	5%
Arrivals	3%	42%	0%	N/A	1%	8%	0%	27%	N/A	19%
1995										
Departures	0%	8%	36%	N/A	5%	5%	29%	11%	N/A	5%
Arrivals	3%	41%	0%	N/A	2%	8%	0%	27%	N/A	17%
1996										
Departures	0%	8%	32%	N/A	5%	6%	33%	12%	N/A	5%
Arrivals	2%	38%	0%	N/A	2%	11%	0%	29%	N/A	18%
1997										
Departures	0%	8%	30%	N/A	5%	6%	31%	15%	N/A	5%
Arrivals	2%	36%	0%	N/A	2%	9%	0%	30%	N/A	20%
1998										
Departures	0%	8%	35%	N/A	6%	5%	28%	14%	N/A	5%
Arrivals	2%	41%	0%	N/A	2%	7%	0%	28%	N/A	19%
1999										
Departures	0%	8%	31%	N/A	5%	4%	30%	15%	N/A	6%
Arrivals	3%	37%	0%	N/A	2%	10%	0%	28%	N/A	21%
2000										
Departures	0%	8%	35%	N/A	4%	3%	30%	15%	N/A	6%
Arrivals	4%	40%	0%	N/A	1%	7%	0%	28%	N/A	20%

Table H-8 Summary of Jet Aircraft Runway Use – 1990 to 2019 (Continued)

Runway	4L	4R	9	14[1]	15R	22L	22R	27	32[1]	33L
2001										
Departures	0%	7%	34%	N/A	4%	3%	35%	12%	N/A	5%
Arrivals	5%	36%	0%	N/A	1%	8%	0%	32%	N/A	18%
2002										
Departures	0%	4%	31%	N/A	6%	3%	35%	16%	N/A	6%
Arrivals	6%	31%	0%	N/A	1%	12%	0%	30%	N/A	21%
2003										
Departures	0%	4%	33%	N/A	7%	2%	34%	14%	N/A	6%
Arrivals	7%	33%	0%	N/A	1%	14%	0%	28%	N/A	18%
2004										
Departures	0%	5%	34%	N/A	10%	4%	24%	18%	N/A	6%
Arrivals	6%	34%	0%	N/A	1%	12%	0%	24%	N/A	23%
2005										
Departures	0%	5%	36%	N/A	7%	1%	31%	13%	N/A	7%
Arrivals	8%	33%	0%	N/A	1%	11%	0%	29%	N/A	17%
2006										
Departures	0%	4%	33%	0%	3%	1%	40%	13%	0%	6%
Arrivals	7%	29%	0%	0%	1%	14%	0%	33%	0.2%	16%
2007										
Departures	0%	5%	31%	0%	4%	1%	33%	7%	0%	19%
Arrivals	5%	31%	0%	0%	1%	15%	0%	36%	2%	11%
2008										
Departures	0%	6%	33%	<1%	3%	<1%	36%	6%	0%	16%
Arrivals	6%	30%	0%	0%	2%	17%	0%	33%	2%	11%
2009[3]										
Departures	0%	7%	32%	0%	3%	2%	34%	6%	0%	16%
Arrivals	7%	31%	0%	0%	3%	17%	0%	30%	1%	11%
2010										
Departures	0%	4%	28%	<1%	8%	2%	31%	10%	0%	17%
Arrivals	5%	28%	0%	0%	1%	15%	0%	32%	1%	16%
2011[4]										
Departures	0%	6%	36%	<1%	5%	2%	36%	7%	0%	7%
Arrivals	7%	37%	0%	0%	<1%	16%	0%	28%	1%	11%
2012[4]										
Departures	0%	6%	33%	<1%	5%	3%	38%	6%	0%	9%
Arrivals	6%	34%	0%	0%	1%	16%	0%	33%	<1%	9%
2013										
Departures	<1%	5%	30%	<1%	5%	2%	35%	12%	0%	12%
Arrivals	6%	29%	0%	0%	1%	16%	<1%	32%	1%	15%

Table H-8 Summary of Jet Aircraft Runway Use – 1990 to 2019 (Continued)

Runway	4L	4R	9	14[1]	15R	22L	22R	27	32[1]	33L
2014										
Departures	0%	5%	31%	<1%	5%	2%	28%	13%	0%	17%
Arrivals	5%	30%	0%	0%	2%	25%	<1%	21%	1%	16%
2015										
Departures	0%	4%	29%	<1%	5%	2%	32%	12%	0%	15%
Arrivals	5%	29%	0%	0%	2%	25%	<1%	23%	1%	16%
2016[5]										
Departures	0%	4%	30%	0%	6%	2%	27%	13%	0%	18%
Arrivals	4%	31%	0%	0%	1%	24%	<1%	23%	1%	16%
2017[6]										
Departures	0%	2%	25%	0%	5%	1%	28%	15%	0%	23%
Arrivals	5%	21%	0%	0%	5%	23%	<1%	27%	2%	18%
2018										
Departures	<1%	4%	30%	0%	5%	2%	34%	10%	0%	16%
Arrivals	4%	30%	0%	0%	<1%	32%	<1%	21%	1%	12%
2019										
Departures	0%	4%	30%	0%	4%	2%	28%	12%	0%	20%
Arrivals	4%	28%	0%	0%	<1%	29%	<1%	22%	2%	15%

Source: HMMH 2020, Massport Noise Office.

Notes: These data reflect actual percentages of jet aircraft operations on each runway end. They should not be confused with effective runway use, which is used by the Preferential Runway Advisory System (PRAS) to derive recommendations for use of a particular runway. Effective runway percentages include a factor of 10 applied to nighttime operations so that use of a runway at night more closely reflects its effect on total noise exposure.
Jet aircraft are not able to use Runway 15L or 33R due to its length of only 2,557 feet.
Values may not add to 100 percent due to rounding.
N/A - not available.

1 Runway 14-32 opened in late November 2006. (Runway 14-32 is unidirectional with no arrivals to Runway 14 and no departures from Runway 32.)

2 The *1990 Final Generic Environmental Impact Report* was published and submitted to the Secretary of Environmental Affairs in July 1993. It included modeled operations and resulting noise contours for 1987, 1990, and a 1996-forecast year. The *1993 Annual Update* published in July 1994 included operations and contours for 1992 and 1993. 1991 data are not available.

3 Runway 9-27 had extended weekend closings for resurfacing during 2009.

4 Runway 15R-33L was closed for 3 months in 2011 and in 2012.

5 Runway 4L-22Rwas closed for 31 days in 2016.

6 Runway 4R-22L was closed for 35 days in 2017, with limited availability for Runway 4R arrivals for about 80 additional days.

Letter 12

Erin Flaherty
Executive Office of Energy and Environmental Affairs
ATTN: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

September 24, 2021

Dear Ms. Flaherty,

We have reviewed the virtual presentation of the alternatives to satisfy the FAA Rules and Regulations regarding the Runway 9-27 safety area enhancements. At this point in the Massport/FAA study, we are opposed to the addition of a 500' extension on runway 9-27.

The construction and sinking of concrete pilings will harm the marine life and disrupt the use and health of the channel. Throughout the Massport presentation of the alternatives, the concern of harm to the marine ecosystem in the area became more prominent. More research must be done on the proposed alternative options. 12.1

We would like research done to ensure that the minimum number of pilings are used for the RSA enhancement and every effort is made to utilize existing runway space for as much of the RSA as possible. By using existing runway space for more of the RSA and having planes take off from farther back on the tarmac, less impact to the marine environment can be achieved. The viability of this alternative must be examined. 12.2

Additionally, the extension will offset the environment adversely in another way. Such an extension will move the noise and pollution closer to the residents of the Point Shirley neighborhood in Winthrop who presently experience noise levels of 70-75 DNL according to the 2019 sound contour. The FAA deems any area over 65 DNL as uninhabitable yet continues to allow for projects that risk increased noise and airplane volume for Winthrop's most affected areas. 12.3

Massport has refused to expedite the FAA's effort to discuss re-soundproofing homes that have experienced loss of noise protection due to being originally soundproofed in 1993 or earlier. Massport has postponed even the beginning investigative phases of this project, including preliminary evaluation of homes that qualify for re-soundproofing due to loss of revenue as a result of the pandemic. Massport has received $344,382,352 through CARES, CRRSAA, and ARPA funds.

The above is our personal opinion and does not represent the position of any local or state agency that we represent.

Respectfully Submitted,

Jerry E. Falbo, 1 Seal Harbor Rd., Unit 505, Winthrop, MA 02152
Hannah C. Belcher, 892 Shirley St., Winthrop, MA 02152

cc: MEPA, MCAC Chair David Carlon, community@massport, Mike Vatalaro, Stewart Dalzell, Congresswoman Clark via W. Blackman, Winthrop Town Council, Winthrop Air, Noise, Airport Hazards Committee

Energy & Environmental Affairs
Public Comments Portal

erin.flaherty@mass.gov

View Comment

Comment Details

EEA #/MEPA ID*
16433

Comments Submit Date
9-28-2021

Certificate Action Date
9-28-2021

Reviewer
Erin Flaherty, 617-626-1128, erin.flaherty@mass.gov

First Name
Dawn

Last Name
Quirk

Phone
--

Email
quirk.da@northeastern.edu

Address Line 1
78 Morgan Street

Address Line 2
--

State
MASSACHUSETTS

Zip Code
02740

Organization
--

Affiliation Description
Individual

Status
Opened

Comment Title or Subject

Topic: Heat Island and Climate Change

Comments

Segoe UI 10 pt Paragraph

The impacts of Massport's plan to lengthen Runway 27 involve negative long-term effects not addressed with the project filing. All runway expansions add to climate change's heat island effect and expand the airport's footprint in the Boston Harbor. While this project is indicated to be a small one, impact evaluation needs to be looked at within a larger geographic context and the closing window for climate change solutions. If this project is approved, the expansion and resulting loss of ocean space and eelgrass will occur within the timeframe of the redevelopment of Suffolk Downs, which is an overflow area for Belle Isle Marsh waters. Therefore, I implore the Energy and Environmental Affairs Office to examine this project while considering the degradation of the surrounding neighborhoods, climate change impacts, and the lovely Boston Harbor. 13.1

Attachments

Update Status

Status

Opened

SUBMIT

Share Comment

SHARE WITH A REGISTERED USER

BACK TO SEARCH RESULTS

Letter 14

From: Margaret Roberts
To: Flaherty, Erin (EEA)
Subject: Logan Runway 27 RSA Enhancement Project 16433
Date: Monday, September 27, 2021 11:42:59 AM

I am opposed to this project. I live at 10 Billows Street in Winthrop MA 02152. I have lived at this address since 1978. I did not complain about the noise from runway 9/27 until 2019. Flights form runway 9 departed over my home less than a minute apart for hours on end and days at a time. They arrived from runway 27 over Coughlin Park (which includes a children's playground) in greater frequency at very low altitudes. If this RSA project goes forward, I fear that the frequency of these flights will only increase the terrific noise and pollution already impacting this community. Winthrop Harbor is used by 5 yacht clubs, The Elks Club, 2 marinas, and the pier and boat ramp of the Winthrop Public Landing. It also includes Snake Island, which is a bird sanctuary. Orient Heights Beach, and Donovan Beach, and Pico Beach are located in this Harbor. The marine life in this part of the harbor will also be adversely affected. This project if allowed to go forward will negatively affect the health and well being of Winthrop and her neighbors. It will also disparately interfere with important recreational opportunities for our children and anyone who might enjoy our harbor.

Sent from Mail for Windows

Thank you, Margaret Roberts

This Page Intentionally Left Blank.

ENF Comment Letters

ID #	Commenter	Comment	Response
1.1	DMF	We recommend a detailed plan for the structures supporting the deck including: estimates of area impacted, construction BMPs to be used, and an alternatives analysis be presented in the DEIR.	Chapter 3, *Alternatives Considered*, describes the process undertaken by the Proponent to identify and evaluate reasonable alternatives. Section 3.3 describes the development and screening of alternatives for supporting the proposed RSA deck at the end of Runway 27. The evaluation includes the screening criteria that were used to assess the four RSA deck support alternatives. The specific pile configurations of each deck support alternative are described in Section 3.3 and summarized in Table 3-4. A quantification of the environmental impacts of each proposed RSA deck support alternative is provided in Table 3-5, which includes estimates of areas impacted. The four deck support alternatives have a total footprint area of 1,160 square feet, 910 square feet, 3,140 square feet, and 2,510 square feet respectively. Design concept illustrations for each RSA deck support alternative are included in Figure 3-9 and the Proposed Project is detailed on Figure 3-10. Figure 4-3 depicts the approximate area of each coastal resource in proximity to the footprint of Proposed Project Site, which are described in detail in Chapter 4, *Existing Environment*, in sections for each resource. Figure 4-2 also provides an overview of the Proposed Project in proximity to environmental resources. Section 7.3 in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, addresses construction period mitigation and includes a description of proposed construction methods to minimize potential impacts. A Draft CMP is included in DEIR Appendix H*, Draft Construction Management Plan*, and includes Project-specific BMPs to avoid and minimize adverse impacts and addresses potential mitigation measures.

1.2	DMF	We recommend the proponent coordinate with DMF and other resource agencies to develop a detailed plan for shellfish mitigation (if needed). We concur that this coordination be recorded in the DEIR.	Massport has initiated discussion with DMF and badged shellfishers regarding impacts to softshell clam and associated habitat. Mitigation for the lost shellfish habitat will be developed in consultation with the DMF and other applicable agencies. While there would be a loss in shellfish habitat, new hard surface offered by the pilings would provide new shellfish habitat for species such as blue mussel. Due to the Loss of Land Containing Shellfish and mud flats, there could be a loss in commercial value for clams. Compensatory mitigation in the form of an in-lieu fee would account for this loss and would be paid to the U.S. Army Corps of Engineers as well as a state shellfish habitat restoration program as guided by the DMF. These and additional mitigation measures are described in DEIR Chapter 7, *Proposed Mitigation and Draft Section 61 Findings* Section 7.2.1.3 and Section 7.3.1.1. Coordination with the DMF, as well as other agencies, is documented in Appendix C, *Agency Correspondence*.
1.3	DMF	We recommend the proponent coordinate with DMF to present the project plans and environmental impacts to the group of Logan Badged Shellfishers.	Agency coordination with the DMF and outreach to the Logan Badged Shellfishers regarding the Proposed Project and its potential environmental impacts was conducted as part of the DEIR and is documented in Appendix C, *Agency Correspondence*. A meeting with DMF and the Master Diggers was held to describe the Project and answer any initial questions of the Shellfishers. The meeting is also documented in Appendix C, *Agency Correspondence*.
1.4	DMF	We recommend the timeline of the project be described in detail in the DEIR, particularly the amount of time expected to complete all in-water work. Time of year restrictions may be needed for in-water silt-producing work, e.g. pile and/or caisson installation, to minimize impact to winter flounder, likely February 15 to June 30. More about time of year restrictions can be found on our website under Time of Year Restriction Guidelines Appendix A and B 2015 Revisions. Http://www.mass.gov/eea/agencies/dfg/dmf/programs-and-projects/technical-review.html [1].	Requirements for time-of-year (TOY) restrictions identified by regulatory and resource agencies will be followed by the Proponent to protect marine resources as described in Section 3.4.4 of Chapter 3, *Alternatives Considered*. This includes the TOY restriction recommended by the Massachusetts DMF and the National Oceanic and Atmospheric Administration (NOAA)/National Marine Fisheries Service (NMFS) for in-water, silt producing work extending from February 15 through June 30 to protect winter flounder (*Pseudopleuronectes americanus*) using near shore areas for spawning, larval settlement, and juvenile development (see Table 7-2). It is anticipated this Project would be conducted between July 1 and September 30 in two construction seasons of 2025 and 2026. The anticipated timeline for the Proposed Project is further detailed in Section 3.3.2.

2.1	MassDEP WRP	In the DEIR filing, using the alternatives analysis, the Proponent should document why there are no reasonable conditions or alternatives aside from the preferred option that will achieve the desired outcomes of the project, and propose mitigation measures to minimize interference with the public interests in waterways and propose measures designed to compensate for the remaining detriments.	Chapter 3, *Alternatives Considered*, describes the process undertaken by the FAA and Massport to identify and evaluate reasonable alternatives for enhancing safety at the Runway 27 End. Chapter 3, *Alternatives Considered*, includes a summary of the Tier 1 Alternatives Screening analysis (see Section 3.2 and ENF Appendix D). The FAA's design criteria (FAA AC 150/5300-13B, *Airport Design*) established the needs and guidelines used to identify the Proposed Project in the Tier 1 Alternatives Screening, which analyzed six build alternatives and the No-Build Alternative. Section 3.3 describes the development and screening of a second tier of alternatives (Tier 2 Alternatives Screening) for supporting the proposed RSA deck at the end of Runway 27. The evaluation includes the screening criteria established by Massport that were used to assess the four deck support alternatives and determined whether each alternative should be carried forward for further analysis or eliminated from further consideration. A quantification of the environmental impacts of each proposed RSA deck support alternative is provided in Table 3-4 and Table 3-5, with design concept illustrations included in Figure 3-9. As described in Section 3.3.1, the evaluation of the four Runway 27 End RSA deck support alternatives (Tier 2 Screening) addressed temporary and permanent environmental impacts. The alternative selected has the smallest environmental impact and the project includes proposed mitigation for impacts to existing shellfish habitat. Due to airport security requirements, the area in which work is proposed is not fully accessible to the public. These areas are within the state-legislated Logan Airport security zone restrictions on public access. This security zone extends 500 feet seaward of the Mean High Water level. For portions of the Proposed Project within the jurisdiction of Massachusetts General Law Chapter 91, which protects the public's interest in the waterways of the Commonwealth, the waterways regulations set forth in 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. Construction equipment is anticipated to periodically move within the adjacent navigation channel. These occurrences would be of short duration and would not fully block the channel from public use and the U.S. Coast Guard would be notified of the movement of the construction barges into the channel. Potential mitigation measures related to Chapter 91 are discussed in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings,* Section 7.3.

2.2	MassDEP WRP	Beyond the requirements described above, the DEIR filing should specifically clarify the location of and areal amount of flowed tidelands affected by the project; ensure that the proposed project meets the engineering and construction standards enumerated at 310 CMR 9.37, including whether there are any Harbor Lines established by the legislature pursuant to M.G.L. c.91 section 34; and, describe any construction impacts on lawful public access and navigation, and include proposed mitigation for any effects associated therewith.	The proposed Runway 27 End RSA Improvements were analyzed to determine potential impacts to tidelands in accordance with the Massachusetts Waterways Regulations (310 CMR 9.00), as described in Section 5.3 of Chapter 5, *Impacts Assessment*. Section 5.3 includes a demonstration that the Proposed Project meets the engineering and construction standards in 310 CMR 9.37, including whether there are any Harbor Lines established pursuant to M.G.K. c.91 Section 34. Construction equipment is anticipated to periodically move within the adjacent navigation channel. These occurrences would be of short duration and would not fully block the channel from public use. The U.S. Coast Guard would be notified of the movement of the construction barges into the channel. Potential mitigation measures related to Chapter 91 are discussed in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings,* Section 7.3.
3.1	MassDEP NERO	The EIR should discuss and address how the performance standards for each wetland resource area affected by the proposed deck will be met. If the performance standards cannot be fully met for this non-water dependent project, a Variance may be necessary under the Wetlands Protection Act.	Section 5.2 of Chapter 5, *Impact Assessment*, discusses the potential impacts on Wetland resources and compliance with the respective performance standards. The Proposed Project would not require a variance since all performance measures would be met.
3.2	MassDEP NERO	In addition, the DEIR should address how the project will meet the Mass. Stormwater Standards	Section 5.6 of Chapter 5, *Impact Assessment*, describes how the Project would meet the Massachusetts Stormwater Standards. As described in Chapter 5, *Impact Assessment*, the Proposed Project is not anticipated to have an adverse effect on Boston Harbor water quality. The Proposed Project does not include any new stormwater conveyances or new discharges of untreated stormwater and has been designed to avoid scour caused by runoff. RSAs are not land uses with a higher pollutant load and are not anticipated to increase total suspended solids (TSS) in the waters adjacent to the Runway 27 End.
4.1	CZM	Massport is considering both piles and caissons for the pier substructure; the DEIR should include an analysis of impacts to resource areas, resulting changes in water flow that may result in scour, and different shaded area profiles, all of which may have a range of impacts on the various resources present in the Project Site.	Section 5.2.2 of Chapter 5, *Impact Assessment*, discusses the impacts on resource areas that are affected by water flow scour and changes in shading. Table 3-5 of Chapter 3, *Alternatives Considered*, provides a summary of the estimated number of piles or caissons anticipated to be required for each RSA deck support alternative, including estimates of areas impacted. Based on those analyses, Massport's preferred option is Deck Support Alternative 2 which has the smallest environmental footprint and can be constructed in the shortest time. It includes a footprint of 910 square feet from 326 piles. The sediment transport analysis indicates scour from the piles will be a negligible change from existing conditions. These results are reported in comparison with the other alternatives in Table 3-5 of Chapter 3, *Alternatives Considered*.

4.2	CZM	On-going consultation with the Massachusetts Department of Environmental Protection (DEP), Division of Marine Fisheries (DMF), and National Marine Fisheries Service is recommended as the design of the project progress.	Consultation with the MassDEP, DMF, and NOAA Fisheries (National Marine Fisheries Services) was undertaken as part of the Project and is documented in Appendix C, *Agency Correspondence*. Coordination will continue as needed during the forthcoming permitting phase.
4.3	CZM	Temporary impacts during construction should be avoided, minimized, and/or mitigated in consultation with these agencies.	Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, identifies mitigation measures that will be implemented for construction period impacts. Documentation related to agency consultation regarding construction-related impacts is included in Appendix C, *Agency Correspondence*.
4.4	CZM	Massport should coordinate with the U.S. Coast Guard regarding construction period impacts that may affect the channel and ensure that appropriate lighting is installed to designate the structure.	A discussion with the U.S. Coast Guard (USCG) was held where a Project overview was given followed by a discussion of potential impacts to the navigation channel, markings to the Logan Airport Security Zone, and lighting of the pier. The navigation channel will occasionally have construction barges maneuvering but will not impact public use of the channel. The USCG suggested relocating and possibly adding an additional buoy to better delineate the security zone and discussed the likely need for some form of lighting to mark the edge of the deck. Massport will continue to work with USCG to provide appropriate navigation signage and/or lighting is installed in alignment with best practices for safety and navigation, and that appropriate notice to mariners is provided. Coordination with the U.S. Coast Guard is documented in Appendix C, *Agency Correspondence*.
4.5	CZM	The proposed project is subject to CZM federal consistency review in the ENF, the DEIR should include a consistency statement for review.	A draft CZM federal consistency review is included in Appendix D.1, *Draft Coastal Management Consistency Statement*.
5.1	NHESP	Based on the conceptual nature of the project plan within the ENF, it is not clear whether the Enhancements to the Runway Safety Area will or will not result in a Take (321 CMR 10.18(2)(b)) of state-listed species. The Proponent should identify all permanent and or temporary impacts to grassland habitat and continue to consult the Division as the project design progresses. The Division anticipates working with the Proponent to resolve concerns for state-listed species and their habitats associated with the Project through the MESA review process (321 CMR 10.18, 10.23).	Massport's goal is to avoid a Take of state-listed species habitat, and where possible, balance any loss by removing excess pavement on the Logan Airport airfield, as needed. Section 5.5 in Chapter 5, *Impact Assessment*, discusses construction period and permanent impacts to grassland habitats and state-listed species. It is anticipated that approximately 18,000 square feet of mowed grass would be impacted from relocating the perimeter road and Massport will continue to coordinate with the Division regarding to address issues related to state-listed species and their habitats associated with the Project through the Massachusetts Endangered Species Act (MESA) review process.

5.2	NHESP	While it may be possible to design the proposed project to avoid a Take, the Division notes that projects resulting in a Take of state-listed species may only be permitted if they meet the performance standards for a Conservation and Management Permit (CMP; 321 CMR 10.23). In order for a project to qualify for a CMP, the applicant must demonstrate that the project has avoided, minimized and mitigated impacts to state-listed species consistent with the following performance standards: (a) adequately assess alternatives to both temporary and permanent impacts to the state-listed species, (b) demonstrate that an insignificant portion of the local population will be impacted, and (c) develop and agree to carry out a conservation and management plan that provides a long-term net benefit to the conservation of the state-listed species. If the Project is determined to result in a Take and requires a CMP to proceed, the Division will not render a final decision until the MEPA review process and its associated public and agency comment period is complete.	Comment Noted. Chapter 5, *Impact Assessment*, Section 5.5, describes the potential impacts of the Proposed Project on state-listed species. Massport's goal is to avoid a Take of state-listed species habitat. Massport will continue to coordinate with the Division regarding the NHESP to determine if the Proposed Project, including construction phase activities, could alter NHESP Priority Habitat of a protected species, evaluate the effects on the local population, and determine if a Conservation and Management Permit would be required for the proposed work. Measures to avoid, minimize, and mitigate impacts to state-listed species, if required, would be documented in Section 7.2 or Section 7.3 of Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*. Refer also to Table 7-1.
6.1	BUAR	Should heretofore-unknown underwater archaeological resources be encountered during the course of the project, the Board expects that the project's sponsor will take steps to limit adverse effects and notify the Board and the Massachusetts Historical Commission, as well as other appropriate agencies, immediately, in accordance with the Board's Policy Guidance for the Discovery of Unanticipated Archaeological Resources.	As documented in the Board of Underwater Archaeology (BUAR) letter dated September 21, 2021, there are no anticipated impacts on archaeological resources, as described in Section 5.7 of Chapter 5, *Impact Assessment*. However, if underwater archaeological resources are encountered, Massport will immediately notify the BUAR and appropriate agencies and take steps to limit adverse impacts. Coordination with BUAR is documented in Appendix C, *Agency Correspondence.*

7.1	AIR, Inc.	AIR, Inc. would like Massport to explain in greater detail why they didn't choose the displacement option as it would have less environmental impacts being that it would not involve any disturbance to the shoreline, water sheet, ocean bed, or public access to the water sheet.	Massport did not advance RSA Alternative 2 as it did not meet the FAA requirements for a full dimension RSA. The FAA design requirements for a full dimension RSA require it to be 1,000 feet in length. Currently, the RSA is 150 feet long. RSA Alternative 2 would result in an RSA of only 345 feet in length. As described in Section 3.2.2.2, the action to lift or modify the injunction would require a lengthy court review process, compliance with federal and state environmental review procedures, filing a full environmental impact statement, approval of the U.S. Secretary of Transportation, and potential litigation. The required safety improvements are an immediate airfield need and cannot be deferred pending resolution of an uncertain injunction reversal and any ensuing environmental studies and regulatory procedures. For these reasons the alternative was dismissed as it could not provide an RSA compliant with the FAA's design standards. This is discussed in Section 3.2.2.2 of Chapter 3, *Alternatives Considered*, and in Appendix E, *RIM Study.*
7.2	AIR, Inc.	Another issue is loss of use of the water sheet. East Boston has over 15 miles of shoreline (which is nearly a third of Boston's total shoreline. Logan Airport has made just over half of that shoreline (53%) inaccessible to EJ communities in East Boston surrounding the airport. When Massport builds this EMAS out 400' into the harbor, they will then likely enforce a preset security area around the new perimeter. We ask Massport to explain how they will handle this enforcement.	The coastal perimeter of Logan Airport is protected by the legislated Logan Airport Security Zone. This zone extends seaward 500 feet from the top of the coastal bank and is intended to exclude airfield access by unauthorized parties. The proposed RSA deck will fall entirely within the existing legislated 500-foot Airport Security Zone. A portion of the security zone would be occupied by the deck, otherwise there would be no change in access within the security zone.
7.3	AIR, Inc.	AIR, Inc. proposes that Massport offset these burdens with additional shoreline restoration at the EMAS site as well as at additional alternate locations, and; by creating additional mitigation to offset the loss of use of the water sheet in the area at the eastern end of runway 27. We propose that Massport fund the Constitution Beach Kayaking Program, or a similar free public kayaking program in Winthrop as mitigation.	Comment noted; any additional mitigation measures would be addressed as part of the Ch. 91 License amendment process.
7.4	AIR, Inc.	Massport should provide additional mitigation as a result of selecting a more adverse alternative than necessary while other less intrusive options exist.	This is a safety project and design is guided by FAA standards and requirements. Based on criteria discussed in Chapter 3, *Alternatives Considered*, Massport has developed the least environmentally damaging practicable alternative that meets FAA safety requirements. Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, discusses mitigation measures for the Proposed Project.

8.1	Miriam Regan-Fiore	Alternative 1 (Declared Distances) and Alternative 2 (Displaced Threshold Markings) should be further considered as preferred alternatives given both make use of existing runway space to meet the FAA safety standards, thus eliminating or reducing further runway intrusion into the Harbor with its attendant negative environmental impacts.	Chapter 3, *Alternatives Considered*, discusses the methodology for evaluating the alternatives and the factors for identifying the Proposed Project. Runway 9-27 is one of Logan Airport's busiest runways and uniquely utilized by the FAA as part of the all primary, three-runway configurations at Logan Airport. As described in Section 3.2.2.1, RSA Alternative 1 was eliminated from further consideration since it would adversely affect airfield operating efficiency and negatively impact the Airport's operating flows, particularly during warmer temperatures when aircraft may be subject to greater takeoff weight restrictions. Additionally, RSA Alternative 1 would result in increased runway occupancy time, decreased arrival capacity on Runway 27, and potential operational impacts to Runway 22L departure capacity. As described in Section 3.2.2.2, RSA Alternative 2 was eliminated from further consideration because it would not result in Runway 9-27 meeting the FAA's design requirements for the full dimension RSA and would likely require a several-year court review process for approval to remove the Runway 9 threshold injunction, which may not be successful. The required safety improvements are an immediate airfield need and cannot be deferred pending resolution of an uncertain injunction reversal and any ensuing environmental studies and regulatory procedures.
8.2	Miriam Regan-Fiore	A key reason for eliminating Alternative 2 is the Runway 9 court injunction. However this reason should be challenged since the ENF states this will not expand runway capacity or operations vs. (1) the 1976 injunction relates to expansion concerns and failure to follow MEPA process; (2) the injunction was partially lifted to build the limited-use Runway 14/32.	Additional details regarding the existing Runway 9 threshold injunction as it relates to Tier 1 Screening of Evaluation Criteria are provided in Section 3.2.2. of Chapter 3, *Alternatives Considered*. The Logan Airport Specific injunctions prohibit moving the runway thresholds of Runways 4L, 22R and 9. The process to lift or make changes to these injunctions would require and lengthy court review process, a full environmental impact statement, approval from the U.S. Secretary of Transportation, and other actions. After this, the outcome would not be guaranteed. The required safety improvements are an immediate airfield need. The proposed project has been designed to avoid and minimize environmental impacts to the maximum extent practicable and cannot be deferred pending resolution of an uncertain injunction reversal and any ensuing environmental studies and regulatory procedures. Mitigation for both temporary and permanent environmental impacts have been built into the project design and construction plans.

8.3	Miriam Regan-Fiore	The "lengthy" process to resolve this with the court is also cited as a reason to eliminate Alternative 2. But this should not be accepted as a valid reason to permanently increase the encroachment on the Harbor and Winthrop residents because Massport failed to commence the court review process years ago when the FAA notified them of the new Runway safety requirements.	The required safety improvements are an immediate airfield need. The proposed project has been designed to avoid and minimize environmental impacts to the maximum extent practicable and cannot be deferred pending resolution of an uncertain injunction reversal and any ensuing environmental studies and regulatory procedures. Mitigation for both temporary and permanent environmental impacts have been built into the project design and construction plans. Additionally, the Proposed Project is entirely within the Logan Airport Security Zone. This zone extends seaward 500 feet from the top of the coastal bank and is intended to exclude airfield access by unauthorized parties. A portion of the security zone would be occupied by the deck, otherwise there would be no change in access within the security zone.
8.4	Miriam Regan-Fiore	It is also unclear how none of this project is within Winthrop boundaries and this should be verified.	The Proposed Project, while adjacent to the Town of Winthrop, will be fully constructed within the City of Boston. The project site in relation to the property boundaries of Boston and the Town of Winthrop is shown on Figure 4-1. Potential impacts associated with the Proposed Project are discussed in Chapter 5, *Impact Assessment*.
8.5	Miriam Regan-Fiore	Given the known and potential impacts of this project on the Town of Winthrop, bodies such as the Conservation Commission and Town Council should be officially included to review and approve this project.	As shown in Figure 4-1, the proposed RSA improvements, while adjacent to the Town of Winthrop, will be fully constructed within the City of Boston. Potential impacts associated with the Proposed Project are discussed in Chapter 5, *Impact Assessment*. Massport has presented a project briefing to the Winthrop Conservation Commission and will continue to coordinate through permitting and construction. The Final Environmental Impact Report (FEIR) will provide responses to comments and the Town of Winthrop, including the Conservation Commission, Town Council, and members of the public, will continue to have opportunities to provide comments. Massport will continue regular coordination with Winthrop officials.
8.6	Miriam Regan-Fiore	I understand the impact of the Snake Island wildlife will be assessed, but it is unclear if the DEIR scope also includes the impact of a change in currents from both construction and the pilings on Snake Island. Given Snake Island sandbar has been steadily enlarging, the DEIR should include this analysis.	Chapter 5, *Impact Assessment*, Section 5.5 addresses the impacts, both temporary and permanent, to Snake Island and the wildlife associated with it. Based on field investigations and current modelling, it is anticipated that the tidal currents and sediment transport would not be altered and there would be no change or impact to Snake Island. Based on the survey of birds on Snake Island, there was no evidence of impact from the existing aircraft activity and this Project would not change current use of Runway 9-27.
9.1	Bill Schmidt	I believe that the Preferred Alternative intrudes on the boundary of the Town of Winthrop, yet there is no acknowledgment of this in the ENF.	As shown in Figure 4-1, the proposed RSA improvements, while adjacent to the Town of Winthrop, will be fully constructed within the City of Boston. Potential impacts associated with the Proposed Project are discussed in Chapter 5, *Impact Assessment*.

9.2	Bill Schmidt	I believe that the Preferred Alternative impacts filled tidelands on the site, including land containing shellfish, within Winthrop's boundaries and should be required to be reviewed and approved by the Winthrop Conservation Commission and possibly other appropriate Town agencies and regulatory boards.	As shown in Figure 4-1, the proposed RSA improvements, while adjacent to the Town of Winthrop, will be fully constructed within the City of Boston. Figure 4-3 depicts the approximate area of coastal resources in proximity to the footprint of the Proposed Project Site. These resource areas are described in detail in Chapter 4, *Existing Environment*, in sections for each resource. Figure 4-2 also provides an overview of the Proposed Project in proximity to environmental resources nearby. The location of the Proposed Project in relation to the property boundaries of Boston and the Town of Winthrop is shown on Figure 4-1. Potential impacts associated with the Proposed Project are discussed in Chapter 5, *Impact Assessment*. The FEIR will respond to comments and the Town of Winthrop, including the Conservation Commission, Town Council, and members of the public, will continue to have opportunities to provide comments.
10.1	John Vitagliano	The Project clearly intrudes on the boundary of the Town of Winthrop, as indicated by the series of charts (including Massport documents) entitled "Winthrop Incursion", yet The Project fails to acknowledge this critical aspect.	As shown in Figure 4-1, the proposed RSA improvements, while adjacent to the Town of Winthrop, will be fully constructed within the City of Boston. Potential impacts associated with the Proposed Project are discussed in Chapter 5, *Impact Assessment*. The FEIR will provide responses to comments and the Town of Winthrop will continue to have opportunities to provide comments throughout permitting and as part of regular coordination between the Town and Massport.
10.2	John Vitagliano	The ENF states that the Project will impact 574,500 square feet of filled tidelands on the site, including 117,300 square feet of land containing shellfish, which as indicated on the charts, clearly lie within Winthrop's boundaries and therefore should be required to be reviewed and approved by Winthrop's Conservation Commission and other appropriate Town agencies and regulatory bodies including the Town Council	As shown in Figure 4-1, the proposed RSA improvements, while adjacent to the Town of Winthrop, will be fully constructed within the City of Boston. Figure 4-3 depicts the approximate area of coastal resources in proximity to the footprint of the Proposed Project Site, including Land Under the Ocean, Coastal Beach, Land Subject to Tidal Action, and Land Subject to Coastal Storm Flowage. These specific resources are described in detail in Chapter 4, *Existing Environment*, in sections for each resource. Figure 4-2 also provides an overview of the Proposed Project in proximity to environmental resources nearby. The location of the Proposed Project in relation to the property boundaries of Boston and the Town of Winthrop is shown on Figure 4-1. Potential impacts associated with the Proposed Project are discussed in Chapter 5, *Impact Assessment*. The FEIR will respond to comments and the Town of Winthrop, including the Conservation Commission, Town Council, and members of the public, will continue to have opportunities to provide comments. Massport will continue to coordinate with the Winthrop Conservation Commission.

10.3	John Vitagliano	The Project would also impact the Winthrop navigation channel which provides maritime access to three yacht clubs in Winthrop and two in East Boston, and the Winthrop Landing which services the Winthrop Ferry service.	As described in Chapter 5, *Impact Assessment*, Section 5.3.1, the proposed RSA deck would be approximately 175 feet away from the designated maritime navigational channel at its closest point and would not be expected to adversely affect recreational or commercial boating within this area of Boston Harbor (refer to Figure 4-2, "Environmental Resource Areas"). As described in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings*, Section 7.3.2, construction equipment is anticipated to periodically move within the adjacent navigation channel. These occurrences would be of short duration and would not fully block the channel from public use and the U.S. Coast Guard would be notified of the movement of the construction barges into the channel.
10.4	John Vitagliano	Since the Runways 4L, 4R and 22L ends experience equal or greater aircraft operations compared to the ENF proposed Runway 27 RSA location which would negatively impact the Point Shirley neighborhood of Winthrop I urge Massport to withdraw the Runway 27 ENF and develop less environmentally consequential alternatives.	The Proposed Project includes measures that are part of a continuing safety program and are required to enhance the RSA, to the extent feasible, consistent with the FAA airport design standards for RSAs, and to enhance rescue access in the event of an emergency. This Project will further 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. Alternatives were evaluated to reduce environmental impacts and the proposed project represents the least damaging practicable alternative. Mitigation measures to minimize impacts are described in Chapter 7, *Proposed Mitigation and Draft Section 61 Findings.*
11.1	John Vitagliano-2	It is important to note that the 4R and 4L runway ends are not equipped with Inclined Safety Areas, so that both runway ends would realize greater incremental safety enhancements from individual RSA's than the Runway 27 end which is currently equipped with a fully functional Inclined Safety Area which provides a significant measure of overshoot protection. Therefore, the Runways 4L and 4R ends would functionally benefit more from RSA projects than the Runway27 RSA project and would entail significantly fewer environmental conflicts while avoiding any negative impacts on the Town of Winthrop. Therefore, I urge Massport to reassess its RSA priority assignment by replacing the Runway 27 RSA proposal with two alternative RSA's for the Runway 4L and 4R ends which, together, would provide enhanced RSA safety for twice as many annual Logan Airport flights than the single controversial Runway 27 RSA proposal.	Runway 9-27 is one of Logan Airport's busiest runways and utilized by the FAA as part of all primary, three-runway configurations at Logan Airport. With the existing 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 of Chapter 2, *Project Purpose and Need*). Therefore, physical improvements to the Runway 27 End RSA are needed to further enhance the safety of aircraft and passengers during takeoff and landing.

12.1	Falbo Belcher	The construction and sinking of concrete pilings will harm the marine life and disrupt the use and health of the channel. Throughout the Massport presentation of the alternatives, the concern of harm to the marine ecosystem in the area became more prominent. More research must be done on the proposed alternative options.	Chapter 3, *Alternatives Considered*, addresses the methodology, including environmental considerations, for identifying the Proposed Project. Both screening tiers of alternative analysis considered environmental impact in their criteria and the alternatives advanced had the most minimal environmental impacts of all alternatives as discussed in Section 3.2.3 and Section 3.3.4. Permanent impacts to marine species are limited to loss of habitat due to the installation of pilings as described in Chapter, *Impact Assessment*, Section 5.2 with construction period impacts resulting in temporary disturbance to habitat at the Project Site. Mitigation measures are described Chapter 7, *Proposed Mitigation and Draft Section 61 Findings,* Section 7.2 and Section 7.3 and include compensatory mitigation, use of time-of-year restrictions, and turbidity curtains among others.
12.2	Falbo Belcher	We would like research done to ensure that the minimum number of pilings are used for the RSA enhancement and every effort is made to utilize existing runway space for as much of the RSA as possible.	Chapter 3, *Alternatives Considered*, addresses the methodology, including environmental considerations, for identifying the Proposed Project. Deck Support Alternative 2 was selected after a detailed alternatives analysis as it provided the required structural using the least number of piles (326) which will cause minimal environmental impact. This alternative also allowed for the shortest work schedule for in-water construction.
12.3	Falbo Belcher	Additionally, the extension will offset the environment adversely in another way. Such an extension will move the noise and pollution closer to the residents of the Point Shirley neighborhood in Winthrop who presently experience noise levels of 70-75 DNL according to the 2019 sound contour.	The RSA would not result in permanent direct or indirect impacts to noise, air quality, or surface transportation. The Proposed Project consists of safety enhancements only and would not extend the operational length of Runway 9-27 nor have any effect on normal runway operations, runway capacity, or the types of aircraft that could use the runway. A discussion on construction-related noise, air quality, and surface transportation is provided in Chapter 5, *Impact Assessment*. No significant impacts associated with construction-related noise, air quality, or traffic are anticipated.
13.1	Dawn Quirk	While this project is indicated to be a small one, impact evaluation needs to be looked at within a larger geographic context and the closing window for climate change solutions.	Climate change in the context of the Proposed Project is discussed in Section 5.9 of Chapter 5, *Impact Assessment*. 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.

Appendix B- Distribution List

This Page Intentionally Left Blank.

Appendix B- Distribution List

The Draft Environmental Impact Report (DEIR) for the Runway 27 End RSA Improvements Project will be circulated and distributed in accordance with recipients as noted in 301 CMR 11.16 (3). 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 DEIR. The 'P' indicates Massport mailed a printed copy of the DEIR.

This DEIR is available on Massport's website (https://www.massport.com/logan-airport/about-logan/environmental-reports/). A limited number of printed copies of the DEIR are available and 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

- **U.S. Senators and Representatives**

N The Honorable Ed Markey
JFK Federal Building, Suite 975
15 New Sudbury Street
Boston, MA 02203

N The Honorable Katherine Clark
Attn: Kelsey Perkins
U.S. House of Representatives
157 Pleasant Street, Suite 4
Malden, MA 02148

N The Honorable Stephen F. Lynch
Attn: Nicholas Zaferakis
U.S. House of Representatives
One Harbor Street, Suite 304
Boston, MA 02210

N The Honorable Elizabeth Warren
Attn: Olivia Paulo
2400 JFK Federal Building
15 New Sudbury Street
Boston, MA 02203

N The Honorable Ayanna Pressley
Attn: Eric White
U.S. House of Representatives
1700 Dorchester Avenue
Dorchester, MA 02124

- **U.S. Environmental Protection Agency**

N Deborah Szaro
U.S. Environmental Protection Agency
New England Region
5 Post Office Square – Suite 100
Mail Code ORA 17-1
Boston, MA 02109-3912

N Timothy Timmermann, Director
National Environmental Policy Act Office
EPA New England (Region 1)
5 Post Office Square – Suite 100
Boston, MA 02109-3912

N EPA New England (Region 1)
Attn: NPDES Permit Division
5 Post Office Square – Suite 100
Boston, MA 02109-3912

■ U.S. Environmental Protection Agency (continued)

[N] Philip Colarusso
EPA New England (Region 1)
5 Post Office Square – Suite 100
Boston, MA 02109-3912

■ Federal Aviation Administration

[P] Gail Lattrell
Director
Federal Aviation Administration
New England Region
1200 District Avenue
Burlington, MA 01803

[P] Cheryl Quaine, Environmental Protection Specialist
Federal Aviation Administration
New England Region, Airports Division
1200 District Avenue
Burlington, MA 01803

[P] Lisa Lesperance, Lead Community Planner
Federal Aviation Administration
New England Region, Airports Division
1200 District Avenue
Burlington, MA 01803

[N] Chris Quigley, Tower Manager
Department of Transportation
Federal Aviation Administration
Logan International Airport
600 Control Tower, 19th Floor
East Boston, MA 02128

■ National Oceanic and Atmospheric Administration

[N] Chris Boelke
Chief, New England Branch
Greater Atlantic Regional Fisheries Office
55 Great Republic Drive
NOAA Fisheries Service
Gloucester, MA 01930

[N] Kaitlyn Shaw
Greater Atlantic Regional Fisheries Office
55 Great Republic Drive
NOAA Fisheries Service
Gloucester, MA 01930

■ U.S. Army Corps of Engineers

[N] Paul Sneeringer
Project Manager
US Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

State Government

■ Department of Environmental Protection

[E] MEPA Coordinator
Northeast Regional Office
Department of Environmental Protection
205B Lowell Street
Wilmington, MA 01887
john.d.viola@mass.gov

[E] Department of Environmental Protection
Commissioner's Office
One Winter Street
Boston, MA 02108
helena.boccadoro@mass.gov

[N] Glenn Keith, Director
Air and Climate Division
Department of Environmental Protection
One Winter Street, 9th Floor
Boston, MA 02108

[N] Sharon Weber, Deputy Director
Air and Climate Division
Department of Environmental Protection
One Winter Street, 9th Floor
Boston, MA 02108

[N] Daniel Padien, Director
Boston Waterways Regulation Program
Department of Environmental Protection
One Winter Street
Boston, MA 02108

[N] Bureau of Waste Site Cleanup
Section Chief
Permits/Risk Reduction - NERO
Department of Environmental Protection
205B Lowell Street
Wilmington, MA 01887

■ Department of Environmental Protection (continued)

N Lisa Rhodes, Director
Wetlands Program Division
Department of Environmental Protection
One Winter Street
Boston, MA 02108

N John D. Viola, Deputy Regional Director
Northeast Regional Office
Department of Environmental Protection
205B Lowell Street
Wilmington, MA 01887

N Rachel Freed, Deputy Regional Director
Bureau of Water Resources
Northeast Regional Office
Department of Environmental Protection
205B Lowell Street
Wilmington, MA 01887

■ Senate/House of Representatives

N Senate President Karen Spilka
Massachusetts State House
24 Beacon Street, Room 332
Boston, MA 02133

N Senator Lydia Edwards
Massachusetts State House
24 Beacon Street, Room 520
Boston, MA 02133

N Representative Marcos A. Devers
Vice Chair, Joint Committee on Transportation
Massachusetts State House
24 Beacon Street, Room 134
Boston, MA 02133

N Speaker of the House Ronald Mariano
Massachusetts State House
24 Beacon Street, Room 356
Boston, MA 02133

N Representative William M Straus
Chair, Joint Committee on Transportation
Massachusetts State House
24 Beacon Street, Room 134
Boston, MA 02133

N Representative Adrian Madaro
Massachusetts State House
24 Beacon Street, Room 33
Boston, MA 02133

N Senator Brendan P. Crighton
Chair, Joint Committee on Transportation
Massachusetts State House
24 Beacon Street, Room 109-C
Boston, MA 02133

■ Office of the Attorney General

N Meghan Davoren
Environmental Protection Division
Office of the Attorney General
One Ashburton Place, 18th Floor
Boston, MA 02108

■ Executive Office of Energy and Environmental Affairs

E Beth Card, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114
env.internet@mass.gov

E Tori Kim, Assistant Secretary and MEPA Director
Executive Office of Energy and Environmental Affairs, MEPA Office
100 Cambridge St, Suite 900
Boston, MA 02114
tori.kim@mass.gov

P MEPA Analyst
Executive Office of Energy and Environmental Affairs, MEPA Office
100 Cambridge St, Suite 900
Boston, MA 02114

E Executive Office of Energy and Environmental Affairs, MEPA Office
100 Cambridge St, Suite 900
Boston, MA 02114
MEPA@mass.gov

E Rishi Reddi, Director of Environmental Justice
Executive Office of Energy and Environmental Affairs
MEPA-EJ@mass.gov

- **Metropolitan Area Planning Council**

N Marc Draisen, Executive Director
Metropolitan Area Planning Council
60 Temple Place
Boston, MA 02111

N Eric Bourassa, Transportation Director
Metropolitan Area Planning Council
60 Temple Place, 6th Floor
Boston, MA 02111

N Martin Pillsbury, Director
Environmental Planning
Metropolitan Area Planning Council
60 Temple Place, 6th Floor
Boston, MA 02111

- **Central Transportation Planning Staff**

N Tegin Teich
Executive Director
Central Transportation Planning Staff
10 Park Plaza, Room 2150
Boston, MA 02116

N Gina Perille
Deputy Executive Director
Central Transportation Planning Staff
10 Park Plaza, Room 2150
Boston, MA 02116

- **Coastal Zone Management**

N Lisa Berry Engler, Director
Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

E Coastal Zone Management
Attn: Robert Boeri, Project Review and Dredging Coordinator
251 Causeway Street, Suite 800
Boston, MA 02114-2138
robert.boeri@mass.gov

N Coastal Zone Management
Attn: Patrice Bordonaro, Project Review
251 Causeway Street, Suite 800
Boston, MA 02114-2138

- **Commonwealth of Massachusetts Division of Marine Fisheries**

N Daniel J. McKiernan, Director
Division of Marine Fisheries
251 Causeway Street, Suite 400
Boston, MA 02114

N Tay Evans, Environmental Review
Division of Marine Fisheries
251 Causeway Street, Suite 400
Boston, MA 02114

N Forest Schenck
Division of Marine Fisheries
Annisquam River Marine Fisheries Field Station
30 Emerson Ave.
Gloucester, MA 01930

- **Massachusetts Division of Fisheries and Wildlife**

N Everose Schluter, Assistant Director
1 Rabbit Hill Road
Westborough, MA 01581

- **Massachusetts Department of Transportation**

N Jamey L. Tesler, Secretary of Transportation
MassDOT
10 Park Plaza, Suite 4160
Boston, MA 02116

N Jonathan L. Gulliver, Administrator
MassDOT Highway
10 Park Plaza, Suite 7410
Boston, MA 02116

E MassDOT District 6
Attn: MEPA Coordinator
185 Kneeland Street
Boston, MA 02111
michael.garrity@dot.state.ma.us

E MassDOT Public/Private Development Unit
10 Park Plaza, Suite #4150
Boston, MA 02116
MassDOTPPDU@dot.state.ma.us

N Jeffrey DeCarlo, Administrator
MassDOT Aeronautics
Logan Office Center
One Harborside Drive, Suite 205N
East Boston, MA 02128-2909

- **Massachusetts Secretary of the Commonwealth**

N William Francis Galvin
Secretary of the Commonwealth
220 Morrissey Boulevard
Boston, Massachusetts 02125

■ **Department of Energy Resources**

[E] Paul F. Ormond, P.E., Efficiency Division
Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114
paul.ormond@mass.gov

■ **Massachusetts Water Resources Authority**

[E] Massachusetts Water Resources Authority
Attn: MEPA Coordinator
100 First Avenue, Building 39
Charlestown Navy Yard
Boston, MA 02129
katherine.ronan@mwra.com

■ **Massachusetts Historical Commission**

[P] Massachusetts Historical Commission
The MA Archives Building
220 Morrissey Boulevard
Boston, MA 02125

■ **Massachusetts Port Authority Board of Directors**

[P] Lewis G. Evangelidis, Chairman
Massport Board of Directors
Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909

[P] Jamey Tesler
Massport Board of Directors
Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909

[P] Laura Sen
Massport Board of Directors
Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909

[P] Warren Fields
Massport Board of Directors
Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909

[P] John Nucci
Massport Board of Directors
Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909

[P] Sean M. O'Brien
Massport Board of Directors
Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909

[P] Patricia Jacobs
Massport Board of Directors
Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909

■ **Natural Heritage and Endangered Species Program**

[E] Amy Hoenig
Natural Heritage and Endangered Species
Program
Division of Fisheries & Wildlife
1 Rabbit Hill Road
Westborough, MA 01581
amy.hoenig@mass.gov

■ **The Commonwealth Board of Massachusetts Board of Underwater Archaeological Resources**

[E] David S. Robinson, Director
251 Causeway Street, Suite 800
Boston, MA 02114-2136
david.robinson@mass.gov

■ **Federally Recognized Tribes in Massachusetts**

E Bettina Washington, Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, MA 02535
thpo@wampanoagtribe-nsn.gov

E Brian Weeden, Chair
Mashpee Wampanoag Tribe
483 Great Neck Road S
Mashpee, MA 02649
Brian.Weeden@mwtribe-nsn.gov

E Bonney Hartley, Historic Preservation Manager
Stockbridge-Munsee Tribe
MA
bonney.hartley@mohican-nsn.gov

Municipalities

■ **City of Boston**

Office of the Mayor

N Michelle Wu, Mayor
City of Boston
One City Hall Square, Suite 500
Boston, MA 02201

Boston Transportation Department

N Brad Gerratt, Interim Commissioner
Boston Transportation Department
One City Hall Square, Room 721
Boston, MA 02201

Boston Planning & Development Agency

N Arthur Jemison, Chief of Planning
Boston Planning and Development Agency
One City Hall Square, 9th Floor
Boston, MA 02201

City Clerk's Office

N Alex Geourntas
Boston City Clerk
One City Hall Square, Room 601
Boston, MA 02201

Boston Environment Department

N Dr. Alison Brizius
City of Boston Environment Department
One City Hall Square, Room 709
Boston, MA 02201

Environmental Services Cabinet

N Reverend Mariama White-Hammond, Chief of Environment Energy, and Open Space
One City Hall Square, Room 709
Boston, MA 02201

Boston Water and Sewer Commission

N John Sullivan, Chief Engineer
Boston Water and Sewer Commission
980 Harrison Avenue
Boston, MA 02119

Boston City Council

N Gabriela Coletta, District 1
1 City Hall Square
Suite 550
Boston, MA 02201-2043

Neighborhood Services

N Enrique Pepen, Director
Mayor's Office of Neighborhood Services
1 City Hall Square, Room 805
Boston, MA 02201

Neighborhood Services

N Nathalia Benitez
City of Boston
1 City Hall Square, Room 805
Boston, MA 02201

Boston Public Health Commission

E Boston Public Health Commission
1010 Massachusetts Ave, 2nd Floor
Boston, MA 02118
info@bphc.org

Boston Conservation Commission

E Nicholas Moreno, Executive Director
Boston Conservation Commission
One City Hall Square, Room 709
Boston, MA 02201
nicholas.moreno@boston.gov

■ **Town of Winthrop**

N Terence Delehany, Acting Town Manager
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

N Hannah Belcher, Chair
Winthrop Air Pollution, Noise, and Airport Hazards Committee
One Metcalf Square
Winthrop, MA 02152

N Richard Bangs
Winthrop Air Pollution, Noise, and Airport Hazards Committee
One Metcalf Square
Winthrop, MA 02152

N Bill Schmidt
Winthrop Board of Health
One Metcalf Square
Winthrop, MA 02152

P Karen T Winn, Chair
Winthrop Conservation Commission
One Metcalf Square
Winthrop, MA 02152

N James Letterie, Council President
Winthrop Town Hall
One Metcalf Square
Winthrop, MA 02152

- **City of Chelsea**

[N] Thomas Ambrosino, City Manager
Chelsea City Hall
500 Broadway
Chelsea, MA 02150

- **City of Revere**

[N] Brian Arrigo, Mayor
City Hall
281 Broadway
Revere, MA 02151

Community Groups and Interested Parties

- **MEPA Environmental Justice Reference List**

Community-based organizations and tribal organizations are receiving project notifications in accordance with the MEPA Public Involvement Protocol for Environmental Justice Populations, which took effect on January 1, 2022. More information is available on the MEPA website.[1]

[E] May Lui, Community Outreach Coordinator
Asian Community Development Corporation
Boston, MA
may.lui@asiancdc.org

[E] Alice Brown, Chief of Planning and Policy
Boston Harbor Now
Boston, MA
abrown@bostonharbornow.org

[E] Bruce Berman
Save the Harbor/Save the Bay
Boston, MA
Bruce@bostonharbor.com

[E] Deb Fastino, Executive Director
Coalition for Social Justice
Boston, MA
dfastino@aol.com

[E] Patricia Alvarez
Southwest Boston Community Development Coalition
Boston, MA
palvarez@swbcdc.org

[E] Melanie Gárate, Climate Resiliency Project Manager
Mystic River Watershed Association
Winthrop, MA
melanie.garate@mysticriver.org

[E] Heather Miller
Charles River Watershed Association
Boston, MA
hmiller@cwra.org

[E] Karen Chen, Executive Director
Chinese Progressive Association
Boston, MA
karen@cpaboston.org

[E] Lydia Lowe, Executive Director
Chinatown Community Land Trust
Boston, MA
lydia@chinatownclt.org

[E] Laura Jasinski, Executive Director
Charles River Conservancy
Boston, MA
ljasinski@thecharles.org

[E] Hing Sang
Chinatown Residence Association
Boston, MA
chinatownresidents@gmail.com

[E] David Queeley, Director of Projects
Mystic River Watershed Association
East Boston, MA
david.queeley@mysticriver.org

[E] Joy Gary, Executive Director
Boston Farms Community Land Trust
Boston, MA
joy@bostonfarms.org

[E] Lee Matsueda, Executive Director
Mass Community Labor United
Boston, MA
lee@massclu.org

[E] Noemi Mimi Ramos, Executive Director
New England United for Justice
Boston, MA
mimi.neunited4justice@gmail.com

[E] Andres Ripley, Natural Resource Specialist
Neponset River Watershed Association
Boston, MA
ripley@neponset.org

[E] Maria Belen Power, Associate Executive Director
GreenRoots, Inc.
East Boston, MA
mariabelenp@greenrootschelsea.org

[E] Julie Wormser, Deputy Director
Mystic River Watershed Association
East Boston, MA
julie.wormser@mysticriver.org

1 Federally recognized tribes included in the MEPA Environmental Justice Reference are listed in a prior section.

■ **MEPA Environmental Justice Reference List (continued)**

E Chris Marchi, Vice President
Air, Inc.
East Boston, MA
cbmarchi@gmail.com

E Julia Blatt, Executive Director
Mass Rivers Alliance
MA
danielledolan@massriversalliance.org
juliablatt@massriversalliance.org

E Claire B.W. Muller, Movement Building Director
Unitarian Universalist Mass Action Network
MA
claire@uumassaction.org

E Heather Clish, Director of Conservation & Recreation Policy
Appalachian Mountain Club
MA
hclish@outdoors.org

E Kerry Bowie, Board President
Browning the GreenSpace
MA
kerry@msaadapartners.com

E Pat Stanton, Project Manager
E4TheFuture
MA
pstanton@e4thefuture.org

E Sarah Dooling, Executive Director
Mass Climate Action Network (MCAN)
MA
sarah@massclimateaction.net

E Winston Vaughan, Director of Climate Solutions
Healthcare without Harm
MA
wvaughan@hcwh.org

E John Peters, Jr., Executive Director
Massachusetts Commission on Indian Affairs (MCIA)
MA
john.peters@mass.gov

E Patricia D. Rocker, Council Chair
Chappaquiddick Tribe of the Wampanoag Nation, Whale Clan
MA
rockerpatriciad@verizon.net

E Eugene Benson, Former City Planning & Urban Affairs Professor
GreenRoots, Inc.
East Boston, MA
eugene.benson@gmail.com

E Andrea Nyamekye, Associate Director
Neighbor to Neighbor
MA
Andrea@n2nma.org
elvis@n2nma.org

E Cindy Luppi, New England Director
Clean Water Action
MA
cluppi@cleanwater.org

E Heidi Ricci, Director of Policy
Mass Audubon
MA
hricci@massaudubon.org

E Linda Orel, Director of Policy
The Trustees of Reservations
MA
lorel@thetrustees.org

E Rob Moir, Executive Director
Ocean River Institute
MA
rob@oceanriver.org

E Staci Rubin, Senior Attorney
Conservation Law Foundation
MA
srubin@clf.org

E Alma Gordon, President
Chappaquiddick Tribe of the Wampanoag Nation
MA
tribalcouncil@chappaquiddick-wampanoag.org

E Kenneth White, Council Chairman
Chaubunagungamaug Nipmuck Indian Council
MA
acw1213@verizon.net

E Raquel Halsey, Executive Director
North American Indian Center of Boston
MA
rhalsey@naicob.org

E Brian Weeden, Chair
Mashpee Wampanoag Tribe
MA
Brian.Weeden@mwtribe-nsn.gov

E Ben Hellerstein, MA State Director
Environment Massachusetts
MA
ben@environmentmassachusetts.org

E Deb Pasternak, Director, MA Chapter
Sierra Club MA
MA
deb.pasternak@sierraclub.org

E Kelly Boling, MA & RI State Director
The Trust for Public Land
MA
kelly.boling@tpl.org

E Nancy Goodman, Vice President for Policy
Environmental League of MA
MA
ngoodman@environmentalleague.org

E Robb Johnson, Executive Director
Mass Land Trust Coalition
MA
robb@massland.org

E Sylvia Broude, Executive Director
Community Action Works
MA
sylvia@communityactionworks.org

E Cheryll Toney Holley, Chair
Nipmuc Nation (Hassanamisco Nipmucs)
MA
crwritings@aol.com

E Melissa Ferretti, Chair
Herring Pond Wampanoag Tribe
MA
melissa@herringpondtribe.org

E Cora Pierce
Pocassett Wampanoag Tribe
MA
Coradot@yahooe.com

■ MEPA Environmental Justice Reference List (continued)

[E] Elizabeth Soloman
Massachusetts Tribe at Ponkapoag
MA
Solomon.Elizabeth.e@gmail.com

■ Massport Community Advisory Committee (CAC)

[N] Roseann Bongiovanni, Chairwoman
Massport Community Advisory Committee
300 Washington Street
Brookline, MA 02445

[N] Aaron Toffler, Executive Director
Massport Community Advisory Committee
300 Washington Street
Brookline, MA 02445

■ Logan Badged Shellfishers

[P] Bob Stanley, Master Digger

■ East Boston Community

[N] Rachel Blomerth, Co-Chair
Jeffries Point Neighborhood Assoc.
184 Webster Street
East Boston, MA 02128

[N] Debra Cave, President
Eagle Hill Civic Association
106 White Street
East Boston, MA 02128

[N] Mary Berninger
156 Saint Andrew Road
East Boston, MA 02128

[N] Karen Maddalena
Friends of the East Boston Greenway
4 Lamson Street
East Boston, MA 02128

[N] Matthew Barison
Harborview Community Association
East Boston, MA 02128

[N] Gove Street Neighborhood Association
36 Frankfort Street
East Boston, MA 02128

[N] Noah Lewkowitz
Orient Heights Neighborhood Association
54 Ashley Street
East Boston, MA 02128

[N] Patricia D'Amore
95 Webster Street
East Boston, MA 02128

[N] Matthew Small
156 Porter Street Condo Association
156 Porter Street
East Boston, MA 02128

[N] Veronica Robles, President
East Boston Chamber of Commerce
464 Bremen Street, Suite 2
East Boston, MA 02128

[N] Lorene Schettino
East Boston Foundation
245 Sumner Street, Suite 110
East Boston, MA 02128

[N] Gladys Oliveros, Executive Director
East Boston Main Streets
154 Maverick Street, Suite 210
East Boston, MA 02128

[N] Dean Hashimoto
East Boston Neighborhood Health Center
153 Westchester Road
Newton, MA 02158

[N] Gail Miller, President
Airport Impact Relief, Inc.
232 Orient Avenue
East Boston, MA 02128

[N] Michelle Moon
East Boston Greenway
215 Summer Street
Somerville, MA 02143

[N] Gloribell Mota, Lead Organizer
Neighbors United for a Better East Boston
19 Meridian Street, Suite 4
East Boston, MA 02128

[N] Margaret Farmer, Co-Chair
Jeffries Point Neighborhood Association
241 Webster Street
East Boston, MA 02128

[N] Dr. Jackie S. Fantes, Chief Medical Officer
East Boston Neighborhood Health Center
10 Gove Street
East Boston, MA 02128

[N] Albert Mangini, Immediate Past President
East Boston Chamber of Commerce
464 Bremen Street, Suite 2
East Boston, MA 02128

[N] AIR, Inc
395 Maverick Street
East Boston, MA 02128

- **Winthrop Community**

N Winthrop Chamber of Commerce
207 Hagman Road
Winthrop, MA 02152

N Winthrop Yacht Club
649 Shirley Street
Winthrop, MA 02152

N Jerry E. Falbo
1 Seal Harbor Road, Unit 505
Winthrop, MA 02152

N Cottage Park Yacht Club
76 Orlando Ave
Winthrop, MA 02152

N Margaret Roberts
10 Billows Street
Winthrop, MA 02152

N Robert Pulsifer
30 Sagamore Avenue
Winthrop, MA 02152

N John Vitagliano
19 Seymour Street
Winthrop, MA 02152

N Miriam Regan-Fiore
15 Frances Street
Winthrop, MA 02152

- **Other ENF Commenters**

N Kathy Abbott, President and CEO
Boston Harbor Now
15 State St #1100
Boston, MA 02109

N Frank Kerr
Hull Neighbors for Quiet Skies
33 Holbrook Avenue
Hull, MA 02045

N Dawn Quirk
78 Morgan Street
New Bedford, MA 02740

Appendix C- Agency Correspondence

This Page Intentionally Left Blank.

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

April 19, 2022

Stewart Dalzell
Massachusetts Port Authority
One Harborside Drive, Suite 200N
East Boston MA 02128

RE: Project Location: Logan International Airport Runway 9/27 & Snake Island
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 1322 & 1304* (PH 1322 & PH 1304) and *Estimated Habitat 936* (EH 936) as indicated in the *Massachusetts Natural Heritage Atlas* (15th Edition) for the following state-listed rare species:

Priority Habitat 1322 (PH 1322):

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

Priority Habitat 1304 (PH 1304) and Estimated Habitat 936 (EH 936):

Scientific name	Common Name	Taxonomic Group	State Status
Sterna hirundo	Common Tern	Bird	Special Concern
Sternula antillarum	Least Tern	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 available. When filing a Notice of Intent (NOI), the applicant may file concurrently under the MESA on the same NOI form and qualify for a 30-day streamlined joint review. For a copy of the NOI form, please visit the MA Department of Environmental Protection's website: https://www.mass.gov/how-to/wpa-form-3-wetlands-notice-of-intent.

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: https://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

Appendix D- Technical Memoranda

This Page Intentionally Left Blank.

D.1- Draft Coastal Zone Management Consistency Statement

This Page Intentionally Left Blank.

Runway 27 End Runway Safety Area Improvements Project Draft Coastal Zone Management Consistency Review

Boston Logan International Airport
East Boston, Massachusetts

Prepared for **Massachusetts Port Authority**
One Harborside Drive
East Boston, MA 02128-2909

Prepared by vhb
101 Walnut Street
Watertown, Massachusetts

June 2022

This Page Intentionally Left Blank.

Contents

Tables

Figures

1

Introduction

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 (refer to **Figure D.1-1**). The proposed Runway 27 End RSA Improvements Project (the Project or the Proposed Project) is required to meet the RSA design criteria in the Federal Aviation Administration's (FAA) Advisory Circular (AC) 150/5300-13B, *Airport Design*,[1] and to enhance rescue access in the event of an emergency**.**

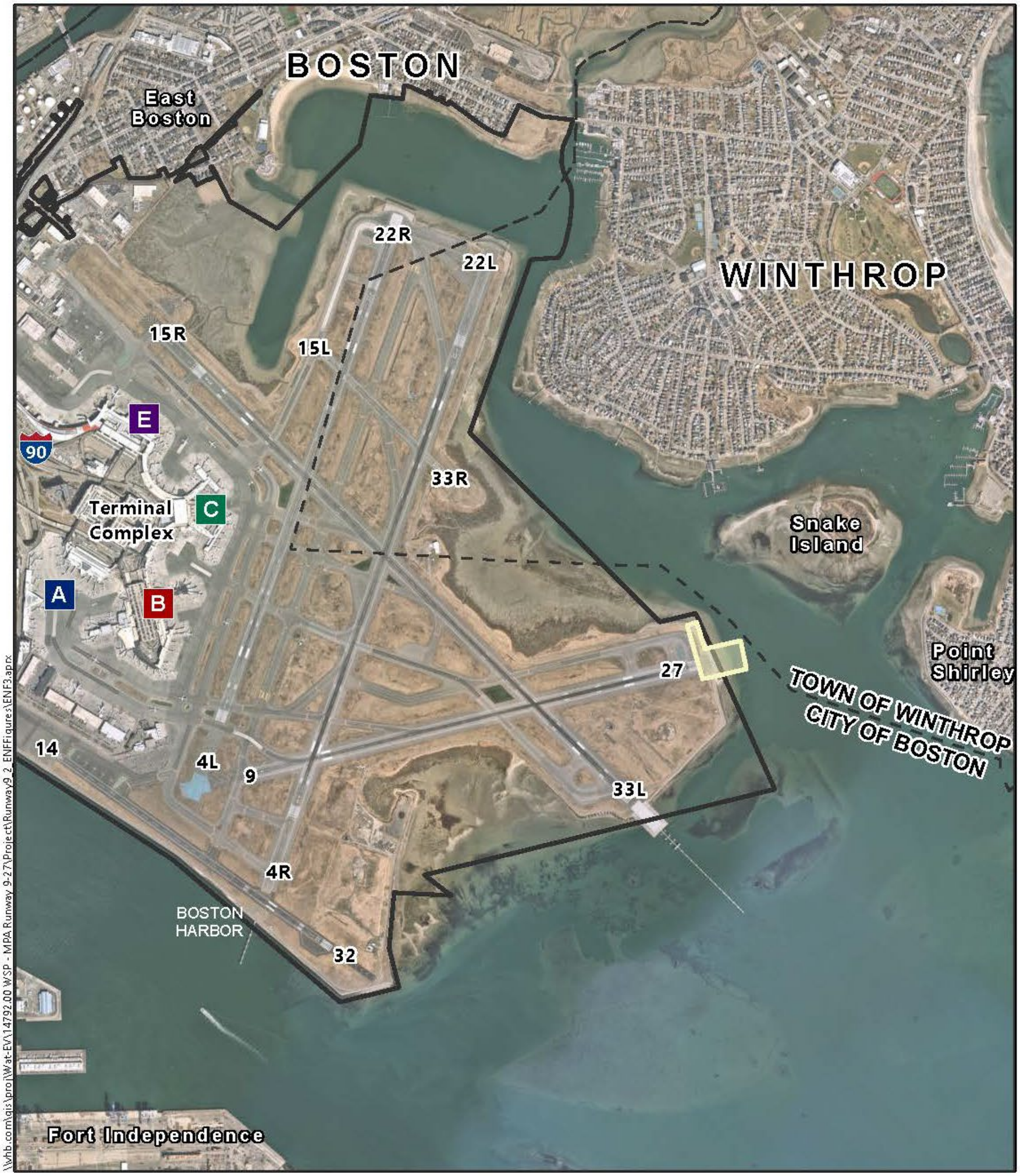
The Massachusetts Office of Coastal Zone Management (CZM) implements the state's coastal program under the federal Coastal Zone Management Act (CZMA) of 1972. The CZM reviews federal projects to ensure they meet state standards articulated in the Massachusetts Coastal Zone Management Plan through a process called federal consistency review. The federal consistency review requirement of the CZMA holds that federal actions that have reasonably foreseeable effects on any land or water use or natural resources of a state coastal zone must be consistent with the enforceable policies of the federally approved coastal management program for that state. Federal consistency review is required for most projects that:

1) Are in or can reasonably be expected to affect a use or resource of the Massachusetts coastal zone, and/or
2) Require certain federal licenses or permits, receive certain federal funds, are a direct action of a federal agency, or are part of outer continental shelf plans for exploration, development, and production.

The proposed safety project is within the Massachusetts Coastal Zone (Boston Harbor) region. Massport has prepared this draft federal consistency review for CZM in accordance with Title 301 of the Code of Massachusetts Regulations (CMR) 20.00, *Coastal Zone Management Program*. The Project will be partially funded by the FAA and will require a Section 10/404 permit from the U.S. Army Corps of Engineers (USACE).

The proposed activity complies with the program policies of the Massachusetts approved coastal management program and will be conducted in a manner consistent with such policies.

1 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022.



\\vhb.com\gis\proj\Wat-EV\14792.00 WSP - MPA Runway 9-27\Project\Runway9_2_ENFFigures\ENF3.aprx

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

Proposed Project Site
Logan Airport Property Line
Political Jurisdictions

0 1000 2000 4000 Feet

Sources: VHB 2021, ESRI, Nearmap Imagery March 2022

As required by 301 CMR 20.00 and as described in the CZM Policy Guide,[2] this application includes:

- A description of the proposed safety project (Chapter 2, *Project Description*);
- A listing of the specific CZM enforceable program policies relevant to the Project and complete analysis and descriptions of how the Project is consistent with these policies and their underlying authorities (Chapter 3, *Compliance with CZM Program Policies*); and
- A certification that "the proposed activity complies with the program policies of the Massachusetts approved coastal management program and will be conducted in a manner consistent with such policies" (Chapter 1, *Introduction*).

The USACE authorization would require an approved Coastal Zone Management Consistency Statement from the CZM demonstrating the Proposed Project is consistent with the approved Massachusetts Coastal Zone Management Program and program policies. Massport believes that the proposed Runway 27 End RSA Improvements Project can be designed and constructed to be consistent with the CZM Program and program policies as set forth in 301 CMR 20.00.

1.1 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 FAA requirements. **This Project is a required FAA safety project that would not extend the runway or have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway.**

1.2 Need for the Project

Logan Airport, certificated under 14 Code of Federal Regulations (CFR) Part 139, is a commercial service and general aviation airport that receives federal funding for airport improvement projects, and is therefore federally obligated by FAA Order 5200.8[3] to meet the RSA design criteria contained in FAA AC 150/5300-13B, *Airport Design,* to the extent practicable.[4]

2 Massachusetts Office of Coastal Zone Management, Policy Guide, October 2011.
3 U.S. Department of Transportation, Federal Aviation Administration, Order 5200.8, *Runway Safety Area Program*, October 1, 1999.
4 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022.

1.3 MEPA and NEPA Status

On August 31, 2021, Massport filed an Environmental Notification Form (ENF) with the Massachusetts Executive Office of Energy and Environmental Affairs (EEA), in accordance with the Massachusetts Environmental Policy Act (MEPA) and its implementing regulations specified in 301 CMR 11.00. The ENF was circulated to interested parties in accordance with 301 CMR 11.16(2) and a Public Notice of Environmental Review was published on September 2, 2021. A virtual public consultation session on the ENF was held on September 22, 2021, to receive comments on the Project, and for MEPA's and the FAA's use in determining the scope for a state Environmental Impact Report (EIR) and the National Environmental Policy Act (NEPA) review document. The Secretary of EEA issued a Certificate on the ENF on October 8, 2021, confirming the need to prepare an EIR and describing the Draft Environmental Impact Report (DEIR) scope elements.

The Project constitutes a federal action and therefore requires that the FAA also comply with the requirements of NEPA. Based on their review of materials in the DEIR, the FAA will be able to determine the appropriate level of NEPA review. It is possible that the FAA could elect to have Massport prepare a joint NEPA Environmental Assessment (EA) and MEPA Final Environmental Impact Report (FEIR/Draft EA) to be filed with the MEPA Office and the FAA following completion of the DEIR review process.

The DEIR will be circulated to those who commented on the ENF and other interested parties. A Public Notice of Environmental Review will be published in the Environmental Monitor in accordance with MEPA regulations 301 CMR 11.05 and 301 CMR 11.15. There will be a 30-day public comment period following publishing of the Environmental Monitor. The Secretary of EEA will issue a Certificate on the DEIR, and the FEIR must address the topics outlined in the Certificate. It is anticipated that a NEPA EA would be prepared, and the FAA will issue its decision document at the completion of the review process.

The USACE authorization requires a CZM Consistency Statement demonstrating the proposed RSA improvements are consistent with the approved Massachusetts Coastal Zone Management Plan. The CZM's ENF comment letter, dated September 27, 2021, stated the DEIR should evaluate and document the analysis of impacts to resource areas, resulting changes in water flow that may result in scour, and shaded areas. Massport will continue to consult MassDEP, Massachusetts Division of Marine Fisheries (DMF), National Oceanic and Atmospheric Administration (NOAA) Fisheries Service, and the U.S. Coast Guard on potential Project impacts to ensure consistency with the Coastal Zone Management Plan.

1.4 Permits and Approvals

In addition to compliance with the CZM Consistency Statement, it is anticipated that the following federal, state, and local/city permits are also needed for the proposed Runway 27 End RSA Improvements Project, as listed in **Table D.1-1**.

Table D.1-1 Anticipated Project Permits and Approvals

Agency/Department	Permit/Approval/Action
Federal	
Federal Aviation Administration (FAA)	• National Environmental Policy Act (NEPA)
U.S. Army Corps of Engineers (USACE)	• Section 10 of the Rivers and Harbors Act • Section 404 of the Clean Water Act
National Oceanic and Atmospheric Administration (NOAA) Fisheries Service	• Section 7 Endangered Species Consultation
U.S. Coast Guard (USCG)	• Navigation Coordination
U.S. Environmental Protection Agency (USEPA)	• National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP)
Commonwealth of Massachusetts	
Executive Office of Energy and Environmental Affairs (EEA)	• MEPA Review • Public Benefit Determination
Massachusetts Department of Environmental Protection (MassDEP)	• Individual Section 401 Water Quality Certification • Chapter 91 Waterways Program License Modification
Massachusetts Natural Heritage and Endangered Species Program (NHESP)	• Conservation and Management Permit (if required)
City of Boston	
Boston Conservation Commission (BCC)	• Massachusetts Wetlands Protection Act (WPA) Order of Conditions

Note: This is a preliminary list of local, state, and federal permits and approvals that may be sought for the Project. This list is based on current information about the Project and is subject to change as the design of the Project evolves.

This Page Intentionally Left Blank.

2 Project Description

As described in FAA Order 5100.38D, Change 1, *Airport Improvement Program Handbook*,[5] RSAs are one of the most critical safety features on an airfield. An RSA is a flat surface surrounding the runway that is clear of obstructions. The FAA requires airports to provide RSAs at runway ends and on the sides of a runway to reduce the risk of injury to persons and damage to aircraft in the event of 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 proposed Runway 27 End RSA Improvements Project would advance an overriding public interest of safety consistent with Title 49 of U.S. Code Section 47101, which states "that the safe operation of the airport and airway system is the highest aviation priority."[6]

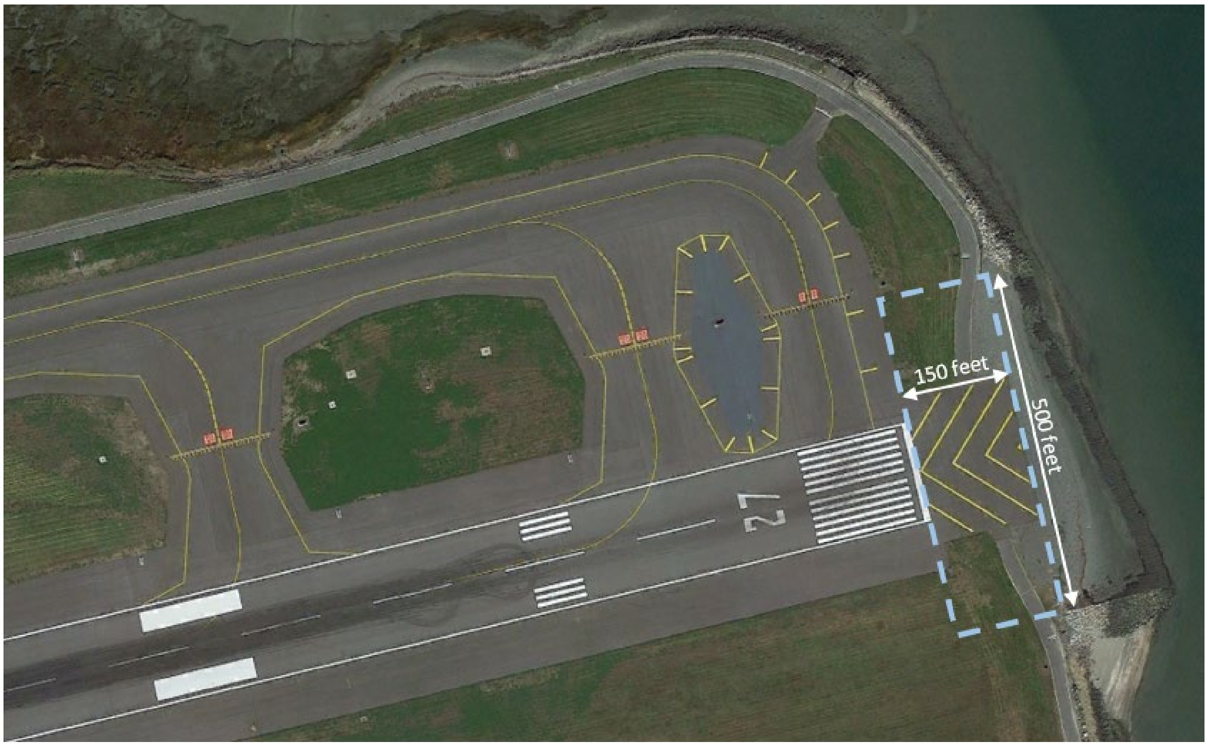
In November 2005, Congress mandated that all commercial service airports (including Logan Airport) improve their RSAs to meet FAA minimum standards, to the extent feasible, by 2015.[7] On March 3, 2009, the U.S. Department of Transportation Office of Inspector General (DOT OIG) released a report[8] indicating that, while the FAA had made significant progress in improving RSAs, further action is needed. The DOT OIG report recommended that the FAA take action at 11 of the nation's largest airports, which includes Logan Airport. Logan Airport, certificated under 14 CFR Part 139, receives federal funding for airport improvement projects and is therefore federally obligated by FAA Order 5200.8[9] to meet the RSA design criteria contained in FAA AC 150/5300-13B, *Airport Design*, to the extent practicable.[10]

Logan Airport Runway 9-27 is 7,001 feet long and 150 feet wide. The FAA design standards require a standard RSA measuring 1,000 feet long beyond each end of the runway and 500 feet wide.[11] As shown in **Figure D.1-1**, the Runway 27 End (east end of Runway 9-27) is on the eastern edge of the airfield, adjacent to Boston Harbor. While the RSA at the west end of Runway 9-27 (Runway 9 End) meets the design requirement, the RSA at the

5 U.S. Department of Transportation, Federal Aviation Administration, Order 5100.38D, *Airport Improvement Program Handbook*, Change 1, February 26, 2019.
6 U.S. Code, Title 49, Subtitle VII, Part B, Chapter 471, Subchapter I, Section 47101 – Policies, (a) General (1),
7 Congressional Bill H.R. 3058: *Transportation, Treasury, Housing and Urban Development, the Judiciary, the District of Columbia, and Independent Agencies Appropriations Act, 2006*; Public Law 109–115, November 30, 2005, 119 STAT. 2401.
8 U.S. Department of Transportation, 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.
9 U.S. Department of Transportation, Federal Aviation Administration, Order 5200.8, *Runway Safety Area Program*, October 1, 1999.
10 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022.
11 U.S. Department of Transportation, Federal Aviation Administration, Standard Operating Procedure 8.00, Runway Safety Area Determination, Appendix B: RSA Determination Form, "Runway 27 End RSA Improvements Project, Boston Logan International Airport," signed January 2019.

east end (Runway 27 End) is only 150 feet long and therefore does not meet the RSA length requirement of 1,000 feet for a full-dimension RSA as specified in FAA AC 150/5300-13B (refer to **Figure D.1-2**).

Figure D.1-2 Existing Runway 27 End Runway Safety Area



Like many established airports, Logan Airport today is subject to different design and safety standards than were in effect when airport facilities were constructed. In particular, the design criteria contained in FAA AC 150/5300-13B are a substantial upgrade over earlier standards. 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.

Previous improvements to the RSA at the Runway 27 End were made in 1992 through construction of an Inclined Safety Area (ISA), a graded crushed stone ramp into Boston Harbor (visible in **Figure D.1-2** east of the outlined 150-foot-long RSA). While the ISA provides some additional degree of safety, it does not meet the current RSA length requirements of 1,000-foot overrun or 600-foot undershoot protection. The ISA was installed prior to the formation of the FAA Runway Safety Area Program, the FAA's current RSA standards, and current technologies and research conducted by the FAA and the National Transportation Safety Board on runway safety improvements. Therefore, physical improvements to the Runway 27 End RSA remain needed.

Terrain, natural obstacles, and local development can limit the availability of land and make a full dimension RSA not practicable. Providing a full-dimension RSA is also challenging for runways that were constructed prior to the 1,000-foot-long RSA standard adopted about 20 years ago. To address these challenges, Engineered Materials Arresting System (EMAS) technology was invented to arrest overrunning aircraft and was approved by the FAA to be used in place of a full-dimension 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.[12] In an emergency, when an aircraft rolls into an EMAS, the tires of the aircraft collapse the energy-absorbing material, and the aircraft is slowed down in a way that minimizes damage to the aircraft and potential injuries to passengers and crew members. An EMAS is often used when a full-dimension RSA is not possible due to lack of available land or to minimize environmental impacts. An EMAS provides an FAA-approved level of safety that is equivalent to a full-dimension RSA.[13]

2.1 Alternatives Considered

In 2017, the FAA directed Massport to conduct a *Boston Logan Airport Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study* to determine feasible and reasonable alternatives to bring the Runway 27 End RSA into compliance.[14] Six build alternatives and the No-Build Alternative were evaluated in the Tier 1 Alternatives Screening, as summarized in **Table D.1-2**.

Table D.1-2 Tier 1 Alternatives Screening Results

	Alternative						
Screening Criteria	1 Declared Distances[1]	2 Displaced Thresholds	3A Full RSA, Fill	3B Full RSA, Deck	4A EMAS on 500' Deck	4B EMAS on 306' Deck	No-Build
Provide overrun and undershoot protection for aircraft consistent with the FAA design criteria	🟢	🔴	🟢	🟢	🟢	🟢	🔴
Preserve airfield utility and efficiency	🔴	🟢	🟢	🟢	🟢	🟢	🟢
Retain perimeter road	🟢	🟢	🟢	🟢	🟢	🟢	🟢
Avoid triggering runway injunction requirements	🟢	🔴	🟢	🟢	🟢	🟢	🟢
Avoid impacts to the navigation channel	🟢	🟢	🔴	🔴	🔴	🟢	🟢
Avoid and minimize environmental impacts	🟢	🟢	🔴	🔴	🔴	🟠	🟢

Key:
🟢 Green indicates that the criterion is met and/or that no negative effect is anticipated; the alternative is favorable in comparison to the other alternatives.
🟠 Orange indicates that the criterion is partially met and/or that there is some negative effect anticipated.
🔴 Red indicates that the criterion is not met and/or that a negative effect is anticipated; the alternative is not favorable in comparison to the other alternatives.
1 Although RSA Alternative 1 scored positively against several screening criteria, it would adversely affect airfield operations and pose takeoff limitations.

Based on the findings of the Study, the FAA concluded that Alternative 4B, which consists of an approximately 650-foot-long RSA with an EMAS on a 306-foot-wide deck, was the Preferred Alternative. A No-Build Alternative was also carried forward as part of the environmental review process, per MEPA requirements.

A second-tier alternatives evaluation was conducted to determine the appropriate deck support structure. Two types of support structures were considered: piles and caissons/drilled shafts. Piles are long, circular or square elements made from precast concrete that would be driven into the ground using vibration or impact (pile

12 U.S. Department of Transportation, Federal Aviation Administration, "Engineered Material Arresting System (EMAS)," updated January 5, 2022, https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=13754.
13 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022.
14 U.S. Department of Transportation, Federal Aviation Administration, Standard Operating Procedure 8.00, *Runway Safety Area Determination*, Appendix B: *RSA Determination Form*, "Runway 27 End RSA Improvements Project, Boston Logan International Airport," signed January 2019.

driving). Caissons, which are circular columns typically much larger than piles, would involve drilling a hole into the bedrock into which structural steel would be placed and concrete pumped to form a column.

Four alternatives for supporting the RSA deck at the end of Runway 27 were identified and evaluated, as summarized in **Table D.1-3.**

Table D.1-3 Tier 2 Screening Results of Deck Support Alternatives

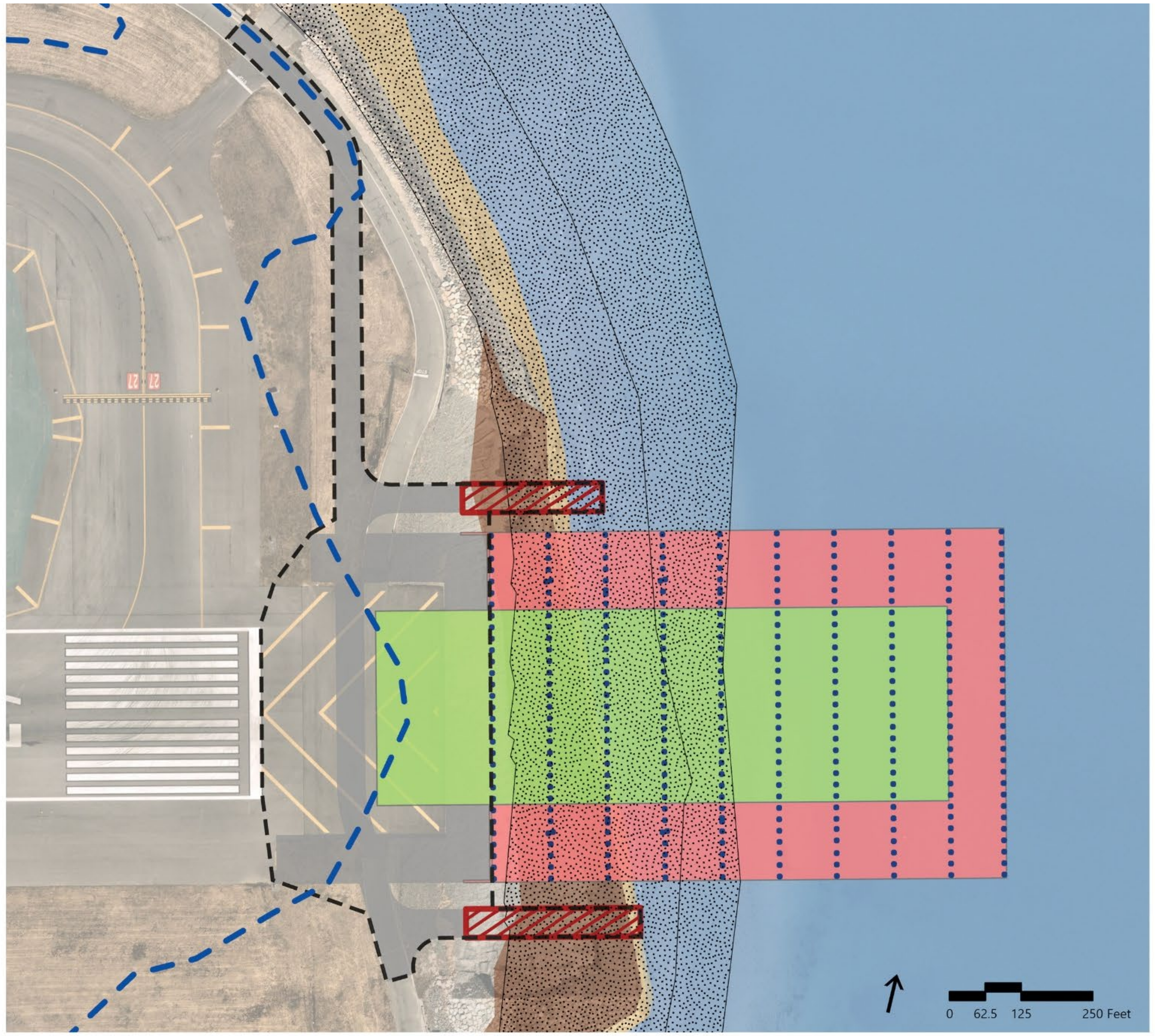
Screening Criteria	Deck Support Alternatives			
	Alternative 1: 416 Piles	Alternative 2: 326 Piles	Alternative 3: 160 Caissons	Alternative 4: 128 Caissons
Coastal Wetlands Resource Area Impact:				
Permanent total footprint of piles/caissons (total square feet)	1,160	910	3,140	2,510
Permanent total scour (total cubic yards)	380	340	1,060	1,120
Runway Closure/Airfield Disruption: Can construction be completed in 120 days or less?	No	Yes	No	No

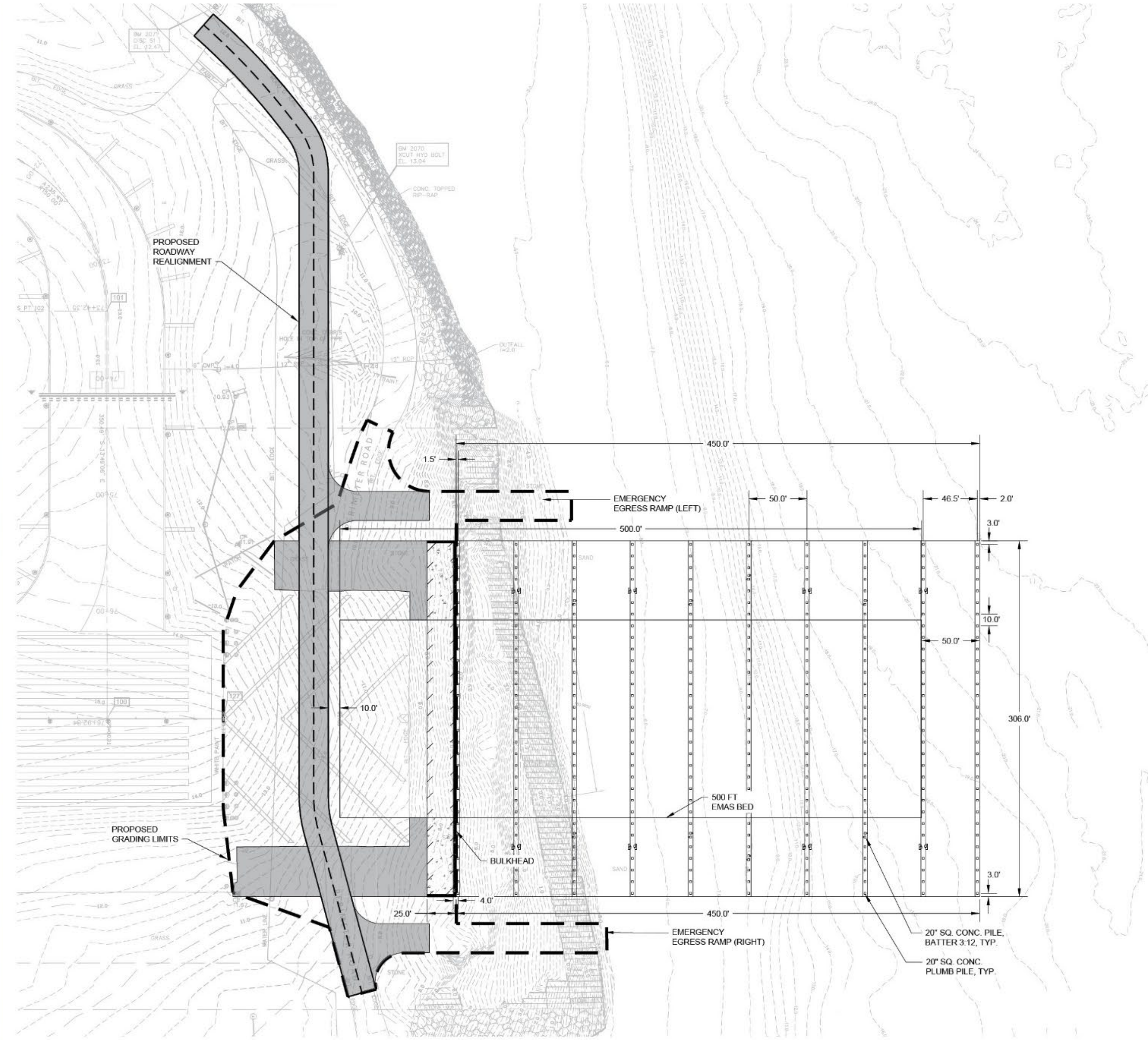
The analysis found that Deck Support Alternative 2 would have the least impact on environmental resources and could be constructed with the least operational impacts to the airfield. Deck Support Alternative 2 was carried forward as the Proposed Project for further analysis, along with the No-Build Alternative.

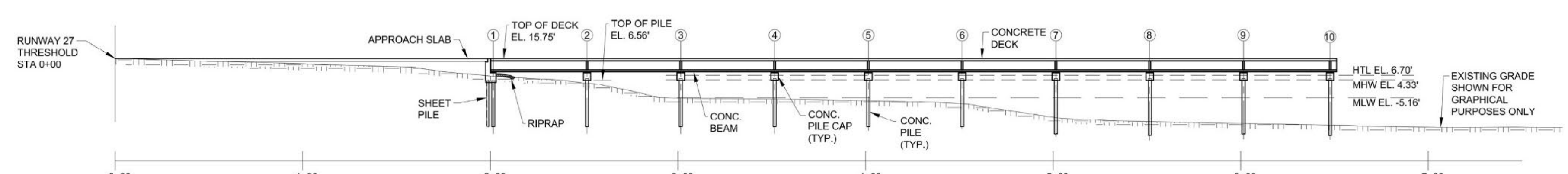
2.2 Summary of Proposed Improvements

As shown in **Figure D.1-3**, the Project would construct a 600-foot-long RSA with an EMAS on a pile-supported deck (approximately 450 feet long by 306 feet wide). The Project would consist of the following components:

- Extend the existing Runway 27 End RSA to accommodate a steel sheet pile wall at the inshore limit of the deck to prevent settlement and erosion of the upland areas;
- Install a transition slab spanning from the land to the pile-supported structure;
- Install a deck structure approximately 450 feet long and 306 feet wide (an area of approximately 137,700 square feet [3.2 acres]), supported by 326 twenty-inch square concrete piles;
- Install an EMAS approximately 500-feet long by 170-feet wide located within the RSA deck;
- Straighten and realign the existing 20-foot-wide airport perimeter road to enhance vehicular sight lines and situational awareness;
- Install two emergency access ramps, one on each side of the proposed deck; and
- Add life rings on the sides and end of the deck to enhance access in and out of the water in an emergency.







326 20-Inch Square Concrete Piles

The pile configuration includes:

- 326 total piles (294 vertical piles and 32 batter piles)
- 20-inch square concrete piles driven to rock in 10 bents[1] of 31 piles each
- Bents spaced 50 feet apart and piles within each bent spaced 11 feet apart

FIGURE D.1-3: RSA Deck Support Alternative 2 **Runway 27 End RSA Improvements Project**

- Proposed Grading Limits
- Pile-Supported Deck
- Proposed Engineered Materials Arresting System (EMAS) Bed
- Proposed Pavement
- Proposed Piles
- Proposed Caissons
- Proposed Approach Slab
- Proposed Emergency Ramp
- Coastal Beach
- Land Under Ocean
- Land Subject to Tidal Action
- Federal Emergency Management Agency (FEMA) 100-Year Flood Level
- Land Containing Shellfish

1 A bent is an array of piles in a row and fastened together at the top by a pile cap.

\\vhb\gbl\proj\Wat-EV\14792.00 WSP - MPA Runway 9-27\Reports\DEIR-EA\Drafts\Figures

This Page Intentionally Left Blank.

3
Compliance with CZM Program Policies

The proposed Runway 27 End RSA Improvements Project and associated mitigation would be designed and constructed in compliance with the program policies of the federally approved Massachusetts CZM Coastal Zone Management Program set forth in 301 CMR 20.00. The CZM Policy Guide is the official statement of the Massachusetts coastal program policies and legal authorities, especially as they relate to the process of federal consistency review.[15] These program policies provide the legal frame of reference for project reviews undertaken by CZM and also inform non-regulatory aspects of other programs. A subset of these policies are known as the CZM enforceable program policies. Per 16 U.S. Code Section 1453, "The term "enforceable policy" means State policies which are legally binding through constitutional provisions, laws, regulations, land use plans, ordinances, or judicial or administrative decisions, by which a State exerts control over private and public land and water uses and natural resources in the coastal zone."[16] Proponents must demonstrate that projects subject to federal consistency review are consistent with these policies. **Table D.1-4** presents the CZM enforceable program policies and identifies which polices are applicable to the proposed Runway 27 End RSA Improvements Project.

Table D.1-4 Enforceable Program Policies

Enforceable Program Policy	Applicability
Coastal Hazards Policy 1	**Applicable**
Coastal Hazards Policy 2	**Applicable**
Coastal Hazards Policy 3	**Applicable**
Energy Policy 1	Not applicable; the Proposed Project is not for the development or siting of an energy facility.
Habitat Policy 1	**Applicable**
Habitat Policy 2	**Applicable**
Ocean Resources Policy 1	Not applicable; aquaculture is not proposed as part of the Project.
Ocean Resources Policy 2	Not applicable; the Proposed Project does not involve the extraction of oil, natural gas, or marine minerals.
Ocean Resources Policy 3	Not applicable; offshore sand and gravel extraction are not proposed as part of the Project.

15 Massachusetts Office of Coastal Zone Management, Policy Guide, page 18, October 2011.
16 U.S. Code, Title 16 – Conservation, Chapter 33 – Coastal Zone Management, Section 1453 Definitions, (6a), 2020.

Table D.1-4 Enforceable Program Policies

Enforceable Program Policy	Applicability
Ports and Harbors Policy 1	Not applicable, the Proposed Project does not include dredging or disposal of dredged material associated with a navigation improvement project.
Ports and Harbors Policy 2	Not applicable; the Proposed Project does not include channel dredging.
Ports and Harbors Policy 3	Not applicable; the Proposed Project is not within a Commonwealth Designated Port Area (DPA).
Ports and Harbors Policy 4	**Applicable**
Protected Areas Policy 1	Not applicable; no work is proposed in a Massachusetts Area of Critical Environmental Concern (ACEC).
Protected Areas Policy 2	Not applicable; no designated Scenic and Recreational Rivers and Streams of the Commonwealth are in the vicinity of the Proposed Project.
Protected Areas Policy 3	Not applicable; the Proposed Project is not in or near a designated or registered historic district or site.
Public Access Policy 1	Not applicable; the Proposed Project is within a site where public access is prohibited and is not near any public recreation sites.
Water Quality Policy 1	**Applicable**; there are no new point-source discharges proposed.
Water Quality Policy 2	**Applicable**
Water Quality Policy 3	Not applicable; there are no subsurface waste discharges proposed.

Source: Massachusetts Office of Coastal Zone Management, Policy Guide, October 2011.

The following sections describe the CZM's enforceable program policies and the associated authorizing legislation that are applicable to the Project and explains how the Proposed Project is consistent with these policies.

3.1 Coastal Hazard Policy 1

Preserve, protect, restore, and enhance the beneficial functions of storm damage prevention and flood control provided by natural coastal landforms, such as dunes, beaches, barrier beaches, coastal banks, land subject to coastal storm flowage, salt marshes, and land under the ocean.

The CZM implements the Coastal Hazard Policy 1 through technical assistance to project proponents and to other public agencies and review of projects proposed on coastal landforms. The proposed Runway 27 End RSA Improvements Project would not affect the flood control or storm damage functions of the coastal bank at the Runway 27 End.

The proposed Runway 27 End RSA Improvements Project, including the pile-supported deck, would not have any effect on the stability of the man-made shoreline. The existing placed stone and riprap shoreline stabilization north and south of the Project Site contribute to the stability of the shoreline and would continue to contribute to the prevention of storm damage and flooding. A new sheet steel bulkhead at the landward edge of the RSA deck at the top of the coastal bank would help stabilize the shoreline and prevent erosion.

3.2 Coastal Hazard Policy 2

Ensure construction in water bodies and contiguous land areas will minimize interference with water circulation and sediment transport. Approve permits for flood or erosion control projects only when it has been determined that there will be no significant adverse effects on the project site or adjacent or downcoast areas.

Design and construction of solid fill piers, bulkheads, groins, jetties, revetments, or other permanent structures in coastal waters will be examined by CZM to determine:

- *The Project's alteration of wave- or tide-generated sediment transport at the project site or on adjacent or downcoast areas (of particular concern are significant adverse changes in depositional patterns or natural storm damage prevention or buffering functions).*
- *Alterations to bottom topography that may result in increased storm damage or erosion of coastal beaches, coastal banks, coastal dunes, or salt marshes;*
- *Sediment transport processes that may increase flood or erosion hazards by affecting the natural replenishment of beaches;*
- *Erosion rates and the form and volume of adjacent or downdrift beaches; and Littoral drift volumes and patterns, as well as flushing rates and discharge capacity in estuaries and coastal embayments.*

The proposed Runway 27 End RSA Improvements are not part of a flood or erosion control project. The construction of the proposed pile-supported deck structure at the Runway 27 End is not a solid fill structure. The deck supports may have a minor change to coastal processes. Currents in the vicinity of the deck would not be significantly altered and only negligible erosion may occur at the pilings. The two proposed emergency access ramps are solid fill structures, but these structures would not affect coastal processes. The proposed ramps would be constructed primarily within the existing crushed rock ISA (refer to **Figure D.1-3**). The crushed rock area surrounding the proposed ramps is designed not to be easily erodible or transportable material and it has remained stable for nearly 30 years. Impacts would be localized and generally affect the area under the deck and along the immediately adjacent shoreline. The Project Site is not a source or fine-grained sediment that could erode or be transported to replenish nearby beaches. The proposed pile-supported deck design, in addition to substantially reducing fill, seeks to minimize changes to coastal processes.

The proposed pile-supported deck was evaluated to determine if it could cause localized scour impacts over time resulting from water movement around the piles underneath the deck within the land under the ocean. A study of the potential sediment transport and scour impacts due to the construction of the proposed pile-supported RSA deck was conducted. The modeling analysis focused on the local seabed and nearby shorelines of Snake Island, and the Cottage Park and Winthrop Yacht Clubs. The study used available seabed mapping and two months of site-specific tidal and current modeling. As velocity (of the water) and bed shear stress (pressure exerted along the seabed surface) are core attributes to the processes of sediment transport and scour (i.e., increased bed sheer stress and velocity indicate increased sediment transport capacity and scour conditions), a model was developed to evaluate these two parameters under existing conditions as compared to proposed conditions.

Based on the coastal modeling results, there are no appreciable changes to the movement of sediments at the Project Site, and none anticipated for Snake Island, or the Cottage Park or Winthrop Yacht Clubs. By adding an array of deck support piles, the RSA deck was projected to result in a small increase in the velocity of the water.

However, the values are well below the critical velocity and bed shear stress values required to result in movement of the seabed material. The maximum velocities in the vicinity of the Project Site are 0.116 meters per second (or 0.226 knots) for the existing condition compared to 0.212 meters per second (or 0.412 knots) for the proposed condition. These values are well below the critical velocity value of 0.69 meters per second (or 1.34 knots). Similarly, the model predicted minor increases in bed shear stresses. The maximum shear stresses in the vicinity of the Proposed Project are 0.025 Pascals (0.0005 pounds per square foot) for the existing condition and would be 0.199 Pascals (0.0004 pounds per square foot) for the proposed condition. Based on the properties of the seabed material, the critical shear stress required to move the existing seabed material would be 2.24 to 2.33 Pascals (0.047-0.049 pounds per square foot), which is an order-of-magnitude higher than the predicted increase in bed shear stress under the proposed condition.

3.3 Coastal Hazard Policy 3

Ensure that state and federally funded public works projects proposed for location within the coastal zone will:

- *Not exacerbate existing hazards or damage natural buffers or other natural resources;*
- *Be reasonably safe from flood and erosion related damage;*
- *Not promote growth and development in hazard-prone or buffer areas, especially in velocity zones and Areas of Critical Environmental Concern (ACEC); and*
- *Not be used on Coastal Barrier Resource Units for new or substantial reconstruction of structures in a manner inconsistent with the Coastal Barrier Resource/Improvement Acts.*

The Coastal Hazard Policy 3 is aimed at ensuring the soundness of public investment for public works projects in hazardous coastal areas. The CZM implements the policy through technical assistance to project proponents and to other public agencies.

The proposed pile-supported deck at the Runway 27 End has been designed to withstand flood and erosion related damage as it would be elevated above the annual high tide line (Elevation 6.7 feet), thereby diminishing damage from erosion. The emergency access ramps would be stable structures reinforced by riprap.

The Project Site is within a hazard prone area and a velocity zone but has been designed to withstand the forces that can reasonably be anticipated. The safety project would not be promoting additional growth or development by creating support for other development (like a public road) in the coastal zone.

3.4 Habitat Policy 1

Protect coastal resource areas including salt marshes, shellfish beds, submerged aquatic vegetation, dunes, beaches, barrier beaches, banks, salt ponds, eelgrass beds, tidal flats, rocky shores, bays, sounds, and other ocean habitats, and coastal freshwater streams, ponds, and wetlands to preserve critical wildlife habitat and other important functions and services including nutrient and sediment attenuation, wave and storm damage protection, and landform movement and processes.

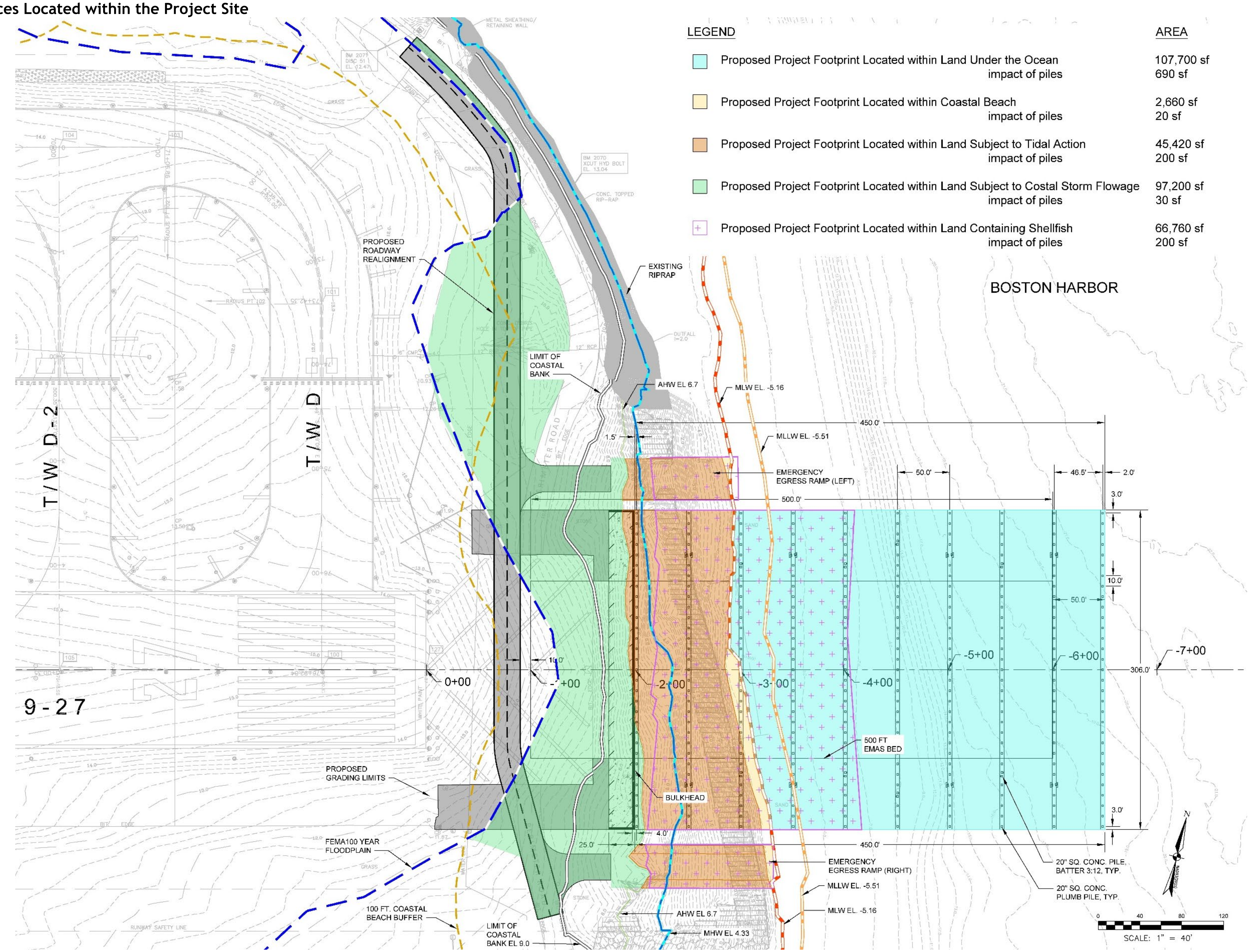
The CZM implements Habitat Policy 1 policy through participation in and review of the Massachusetts Wetlands Protection Act (WPA), the Clean Water Act (CWA) 401 Water Quality Certification, the Chapter 91 License program, and the Massachusetts Endangered Species Act. Coastal Beach, Coastal Bank, and Land Under Water wetlands resources will be protected through careful design of the Project. Minor impacts to shellfish beds are unavoidable to accomplish the safety goals. Massport would mitigate for the loss of these resources and work collaboratively with the DMF and the USACE to develop an appropriate mitigation plan. The proposed Runway 27 End RSA Improvements Project would comply with the policy.

At the Runway 27 End, there are no salt marshes, dunes, barrier beaches, salt ponds, or freshwater wetlands. The resources present at the Runway 27 End are shellfish beds supporting soft shell clams (*Mya arenaria*) and blue mussel (*Mytilus edulis*). The proposed Runway 27 End RSA Improvements Project would have unavoidable impacts to shellfish beds present at the runway end. Of about 58,130 square feet of Land Containing Shellfish, the proposed pile driving would impact approximately 350 square feet or less than one percent of the available habitat. Based on the low density of soft-shell clams present and the small area impacted by the deck piles, the impact to Land Containing Shellfish would not be significant (**Figure D.1-4**). Impacts to mussel beds are approximately 900 square feet of direct impact from construction of the emergency egress ramp on the north side of the RSA deck and shading to approximately 1,460 square feet of the northern mussel bed and the small cluster of mussels near the center of the RSA deck. The mussels on the south side of the RSA deck would not be impacted.

As noted above, Massport will work with DMF and USACE to mitigate for these unavoidable impacts.

This Page Intentionally Left Blank.

Figure D.1-4 Coastal Resources Located within the Project Site



This Page Intentionally Left Blank.

The Runway 27 End RSA Improvements Project would also impact upland grassland habitat for upland sandpiper (*Bartramia longicauda*) and Eastern meadowlark (*Sturnella magna*) (**Figure D.1-5**); species that are state-listed as endangered or species of special concern, respectively. Approximately 18,000 square feet of grassland would be lost primarily from the realignment of the perimeter roadway (refer to **Figure D.1-4**). Massport would plan to offset any reductions in this grassland habitat by removing excess pavement on the airfield and reestablishing those areas with a grass mix approved by the U.S. Department of Agriculture (USDA) and the Massachusetts Natural Heritage and Endangered Species Program (NHESP).

The impacts to shellfish beds or upland grassland habitat will not compromise the ability of the coastal area to provide critical wildlife habitat functions, nutrient and sediment attenuation, wave and storm damage protection, or landform movement and processes. There are no anticipated permanent impacts to wildlife as the loss of habitat is minor. Wildlife can use similar habitat on Airport property or elsewhere in Boston Harbor. The proposed RSA improvements would not prevent the coastal resources from providing nutrient and sediment attenuation. The proposed improvements would not create a barrier to nutrient or sediment attenuation. The impacts are a small percentage of the entire resource available in the vicinity to perform the same function. The RSA improvements would not impact the ability of the coastal resources to provide wave and storm damage protection and would actually benefit wave and storm damage protection through the installation of a bulkhead providing the shoreline increased stability and erosion prevention. The existing coastal resources do not contribute to landform movement and processes and therefore would not be impacted by the proposed RSA improvements.

Massport would provide mitigation for the unavoidable impacts that would occur from the Project and the construction of the proposed RSA pile-supported deck is anticipated to enhance habitat used by blue mussels and other bivalves by reducing exposure to sunlight (desiccation) and by providing new hard substrate area (pilings). The shellfish mitigation commitments will be finalized with the DMF.

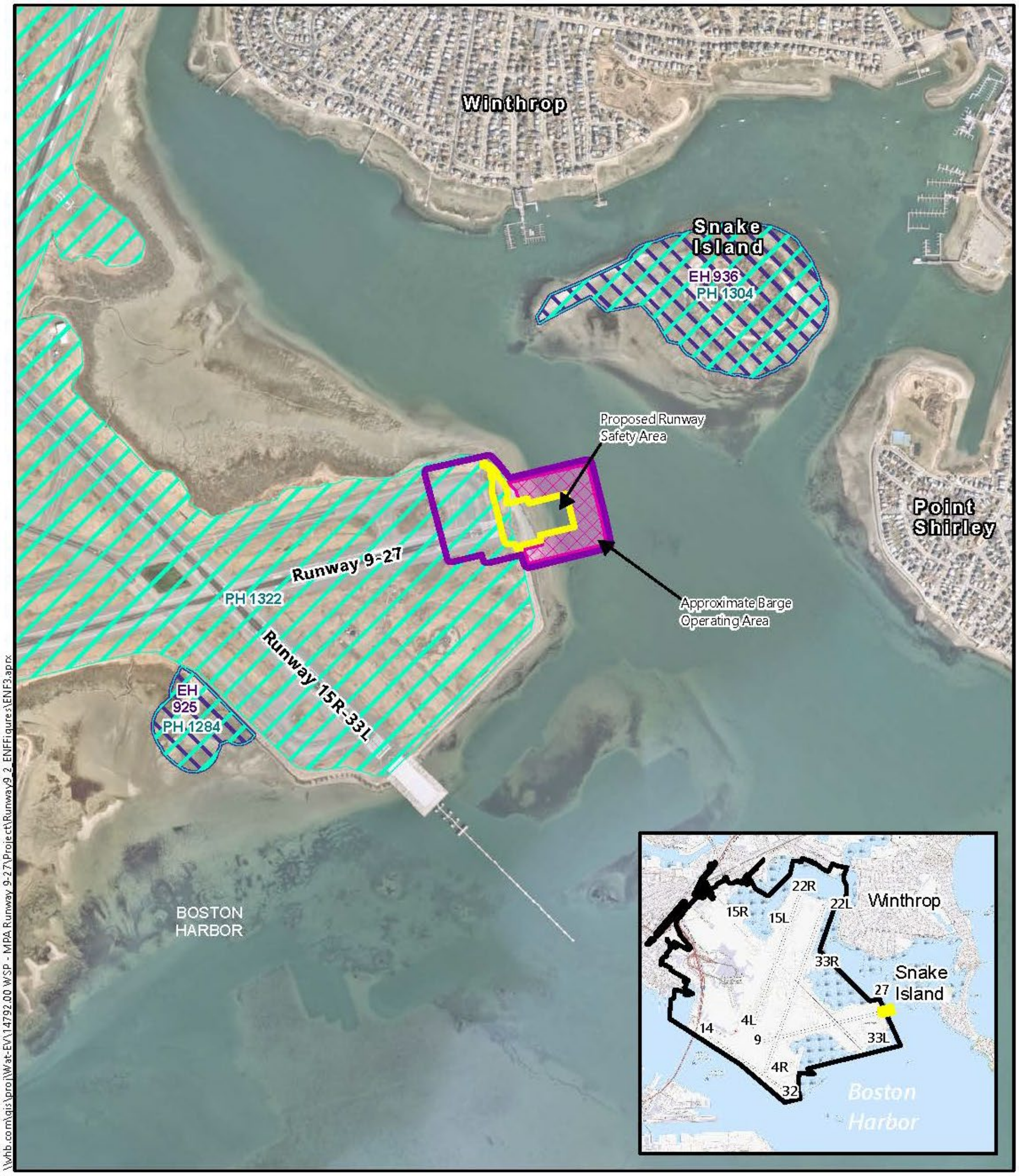


FIGURE D.1-5: NHESP Resource Areas **Runway 27 End RSA Improvements Project**

Proposed Project Site
Study Area
Approximate Barge Operating Area
Natural Heritage & Endangered Species Program Estimated Habitat
Natural Heritage & Endangered Species Program Priority Habitat

0 600 1200 2400 Feet

Sources: VHB 2021, ESRI, Nearmap Imagery March 2022, MassGIS: NHESP 2021

3.5 Habitat Policy 2

Restore degraded or former wetland resources in coastal areas and ensure that activities in coastal areas do not further wetland degradation but instead take advantage of opportunities to engage in wetland restoration.

The CZM implements Habitat Policy 2 through participation in and review of the WPA and CWA 401 Water Quality Certification programs. Survey of the Project Site determined that the nearest area of salt marsh is approximately 800 feet to the north, around the corner of the shoreline and well removed from the in-water construction area. The subtidal portions of the Project Site were investigated for the presence of eelgrass or submerged aquatic vegetation (SAV) using side scan sonar and underwater video (**Figure D.1-6**). No SAV was identified within or near the Project Site. Therefore, with the appropriate construction measures, the Proposed Project would not impact or degrade any vegetated coastal wetlands such as salt marsh or SAV.

3.6 Ports and Harbors Policy 4

For development on tidelands and other coastal waterways, preserve and enhance the immediate waterfront for vessel-related activities that require sufficient space and suitable facilities along the water's edge for operational purposes.

The Project Site is within Logan Airport property on the secured airfield in an area where public access in the coastal zone is restricted and highly regulated. The waterfront adjacent to the Project Site is not available for water dependent or vessel related activities development (**Figure D.1-7**). The Massachusetts Legislature has recognized the paramount importance of maintaining safety and security of Logan Airport and Logan Airport's waterside perimeter, as indicated in M.G.L. Chapter 91, Section 61. By virtue of M.G.L. Chapter 90, Section 61, the public rights that typically exist in flowed and submerged tidelands have been either completely extinguished or greatly curtailed within the Logan Airport Security Zone. The Logan Airport Security Zone extends 500 feet seaward of and parallel to the Mean High Water (MHW) line at Logan Airport.[17] With extremely limited exceptions and subject in all events to Massport's oversight and permission, public access is not permitted within the Logan Airport Security Zone.

Non-airport-related activity is generally prohibited within the inner 250 feet of the Logan Airport Security Zone. Boating is conditionally permitted within the outer 250 feet of the Logan Airport Security Zone. Limited shellfishing authorized by the DMF is the only non-airport-related activity permissible within the Logan Airport Security Zone, which is regulated and authorized by Massport. Badged shellfishers are allowed to access the shellfish beds around Logan Airport for clamming purposes and that will continue after the Project is completed. Currently, with low densities of softshell clams in Boston Harbor, there are only five badged shellfishers. No other public access is permitted within the legislated Logan Airport security zone which is 500 feet seaward of the MHW line (refer to **Figure D.1-7**).

17 Massachusetts General Law, Chapter 90, Section 61(a).

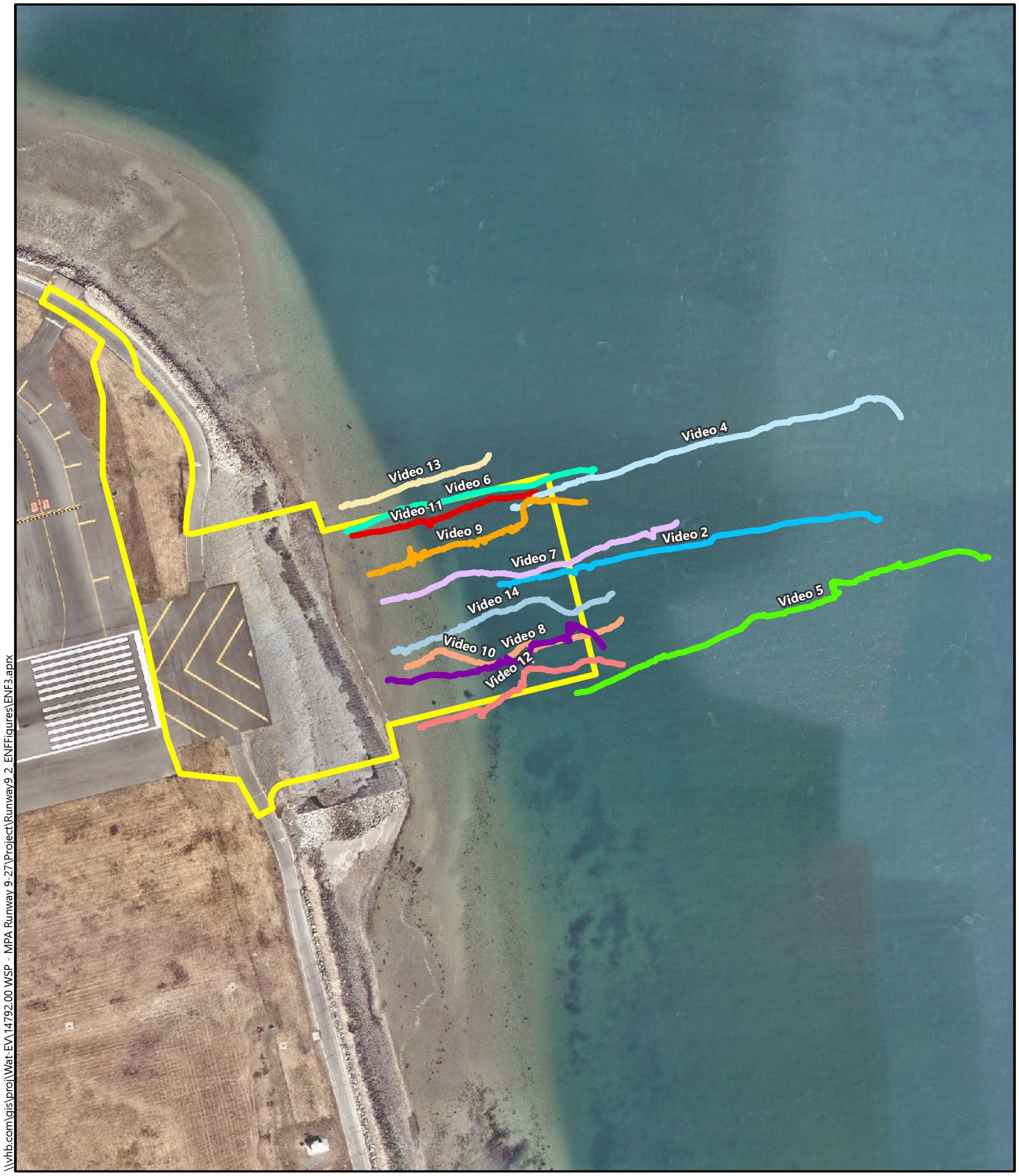


FIGURE D.1-6: Video Tracks for Eelgrass Survey (June 10, 2021)

Runway 27 End RSA Improvements Project

Proposed Project Site

Video Tracks

Video 2, Video 4, Video 5, Video 6, Video 7, Video 8, Video 9, Video 10, Video 11, Video 12, Video 13, Video 14

0 100 200 400 Feet

Sources: CR Environmental June 10, 2021, Nearmap Imagery March 2022

FIGURE D.1-7: Environmental Resource Areas

Runway 27 End RSA Improvements Project

Proposed Project Site
Proposed Emergency Egress Ramps
Proposed Realigned Airport Perimeter Road
Special Flood Hazard Area (100-Year Flood)
Mean High Water Line
Mean Low Water
Mean Lower Low Water Line
Annual High Tide Line
Coastal Bank Line
100-ft Coastal Beach Buffer
Land Subject to Tidal Action
Coastal Beach
Land Subject to Coastal Storm Flowage
Land Under the Ocean
Land Containing Shellfish
Existing Airport Security Buoy (To Be Relocated)
Logan Airport 250-Foot Inner Security Zone
Legislated Logan Airport 500-Foot Security Zone

0 100 200 400 Feet

Sources: WSP, VHB, NOAA 2021, FIRM Panel Number 25025C0101J, Effective Date 3/16/2016, Nearmap Imagery March 2022 Massachusetts Bureau of Geographic Information, MassGIS Data: Shellfish Suitability Areas, May 2011.

3.7 Water Quality Policy 1

Ensure that point-source discharges and withdrawals in or affecting the coastal zone do not compromise water quality standards and protect designated uses and other interests.

There are airfield stormwater outfalls on either side of the Project Site. Stormwater runoff from the Project will either enter one of these existing closed systems and be discharged through the outfall or by overland flow drainage. The stormwater runoff from the proposed RSA deck would enter scuppers along each side of the deck and discharge directly to Boston Harbor. The Project Site consists of the RSA deck that would not receive maintenance during winter months other than blowing snow off the EMAS. The RSA deck would not be treated and would not be used by motor vehicles except during maintenance activities or emergency situations. Therefore, any runoff from the RSA deck would be considered clean water consistent with how roof runoff is considered in the Massachusetts Stormwater Management Standards. Low motor vehicle traffic use of the perimeter road would not change due to the Proposed Project. Maintenance of the perimeter road includes weekly sweeping throughout the year and during the winter, environmentally friendly deicing agents (sodium acetate) are used only as needed. The realigned perimeter road and additional pavement for the proposed RSA deck approach slab would add approximately 3.8 acres of impervious area (refer to **Table D.1-5**). Since the runoff would drain to tidal waters, rate control is not a concern.

Table D.1-5 Proposed Stormwater Management

Element	Existing Cover Type	New Impervious Area	Stormwater Management
RSA Deck[1]	Open Water	3.3 acres	Drains to Boston Harbor through scuppers distributed along edges of deck
RSA Approach Slab and Perimeter Road	Pavement (perimeter road), grass infield, concrete, and riprap slope	0.5 acres	Drain to Boston Harbor via overland flow or existing catch basins to outfalls

1 Runways, taxiways, safety areas, and aprons of the airfield generate negligible amounts of contaminants or suspended solids, because these areas are not typically sanded and convey limited vehicular traffic which consists only of safety and maintenance equipment.

3.8 Water Quality Policy 2

Ensure that nonpoint source (NPS) pollution controls promote the attainment of state surface water quality standards in the coastal zone.

The CZM implements Water Quality Policy 2 through the provisions of the following statutes and regulations that are applicable to the proposed Runway 27 End RSA Improvements Project:

- Clean Water Act 401 Water Quality Certification;
- Massachusetts Surface Water Quality Standards (314 CMR 4.00);
- WPA (M.G.L. c. 131, Section 40) and Regulations (310 CMR 10.00); and
- Massachusetts Stormwater Management Standards (part of WPA regulations).

The Proposed Project is anticipated to require a Water Quality Certificate (WQC). The final design of the Project will establish the extent of impacts and determine if a WQC for both filling and dredging is required.

Rain that falls on the surface of the proposed Runway 27 End RSA deck would not result in an increase of runoff volume to the Harbor and would not be detained. The runoff would be directly discharged to the Harbor, closely matching the existing hydrology of the site and would not increase freshwater inputs to the habitat. Stormwater runoff from the deck is anticipated to be collected by scuppers located along the edges of the deck. It is assumed that these scuppers would convey runoff from the surface through the deck and would direct flows away from the supporting structure. From a construction perspective, the proposed deck and pilings closely resemble a bridge. Stormwater runoff from the deck would not erode sediments adjacent to the deck because discharge would be distributed and would only occur at locations that are inundated throughout the tidal cycle (would not fall onto exposed coastal beach or mud flats during any tide cycle).

Two emergency access ramps are proposed as part of the Project – one on either side of the proposed deck. Because the emergency access ramps would likely consist of concrete mats over a compacted gravel bed, negligible amounts of runoff would be expected to occur, even during rainfall events that coincide with low tide. Other than first responders attending to an airplane accident, the emergency access ramps would not receive any vehicular traffic. No total suspended solid (TSS) or other pollutants would be generated or captured by the emergency access ramps other than through the normal atmospheric deposition.

The National Pollutant Discharge Elimination System (NPDES) permit regulates stormwater discharges from all Logan Airport outfalls. The Proposed Project would be located in the Airfield Outfall Drainage Area. The Airfield Outfall Drainage Area consists of a closed conveyance system that includes catch basins and pipes to convey stormwater from runways, taxiways, and the perimeter roadway (approximately 910 acres) to Airfield Outfalls A-1 through A-44 discharging into Boston Harbor (see **Figure D.1-8**). The open stormwater system uses the airfield's grass swales and open channels to infiltrate stormwater from runway surfaces.

The industrial activities conducted at the airport include, but are not limited to, aircraft and runway deicing, aircraft and vehicle fueling, aircraft and vehicle maintenance, lavatory waste handling, runway rubber removal. Massport and its Co-Permittees are subject to an extensive Stormwater Pollution Prevention Plan (SWPPP) which contains Best Management Practices (BMPs) that are designed to address all activities at the airport and minimize the discharge of pollutants from such activities. The SWPPP is updated every year. The Logan Airport SWPPP addresses stormwater pollutants, including deicing and anti-icing chemicals, bacteria, fuel and oil, and other sources of stormwater pollutants. BMPs specific to aviation activities are included in the SWPPP. In accordance with the other requirements of the NPDES permit, Massport conducts training for personnel responsible for implementing activities identified in the SWPPP.

FIGURE D.1-8: Stormwater Outfalls and Associated Drainage Areas

Runway 27 End RSA Improvements Project

Proposed Project Site
Drainage Area
▲ Fire Training Facility Outfall
• Airfield Stormwater Outfalls

0 900 1800 3600 Feet

Sources: WSP, Nearmap Imagery March 2022

The proposed relocated perimeter roadway is in an upland portion of the Airport. The existing closed drainage system in the upland area consists of a series of catch basins and pipes with limited drainage areas which discharge to separate outfalls. Outfalls A-25, A-26, and A-27 discharge stormwater flows from portions of the end of Runway 27 to the west-southwest, northwest, and east of the Runway 27 End (**Figure D.1-8**). The construction of the upland portion of the proposed Runway 27 End RSA would result in minor changes to stormwater runoff in by adding impervious area (0.5 acres) in upland areas that are currently pervious (refer to **Table D.1-5**). The increase of impervious area will be offset by removal of pavement in other locations on the airfield. Runoff from these portions of the proposed Runway 27 End RSA Improvements Project Study Area would drain via overland flow or by closed drainage system to Boston Harbor. Overland sheet flow from the RSA and adjacent areas do not constitute regulated discharges under the NPDES permit. Because the shoreline is protected from erosion with riprap and the crushed rock inclined safety area and the runoff from these areas contains negligible quantities of pollutants, these changes are not anticipated to impact wetland resources. The perimeter roadway receives comparably little vehicular traffic, is swept frequently, and is de-iced with sodium acetate as necessary during winter. These management practices would continue following the construction of the proposed Runway 27 End RSA Improvements Project. All outfalls will continue to be regulated under the Airport's existing NPDES permit. Stormwater sampling of the airfield outfalls is an ongoing requirement of the NPDES permit and would continue following the construction of the RSA.

The runways, taxiways, safety areas, and aprons of the airfield generate negligible amounts of contaminants or suspended solids, because these areas are not typically sanded and convey limited vehicular traffic which consists only of safety, security, and maintenance equipment. Due to its crushable composition, the proposed EMAS would not be accessed by vehicles other than during an emergency or maintenance activities. There is a negligible contribution of nutrients to the receiving waters because no fertilizers are used on airfield grassed areas. Frequent sweeping of the paved portions of the airfield further reduces the quantity of sediments that are available for transport by stormwater runoff.

Rates of atmospheric deposition of pollutants would not be altered by the construction of the proposed Runway 27 End RSA Improvements. The majority of the increased impervious surfaces would occur as the result of the construction of the EMAS and deck. Under existing conditions, the area is open water and currently receives direct deposition of air-borne pollutants. Following construction of the deck, the same quantity of air-borne pollutants would be deposited and temporarily captured by the deck. These pollutants would be washed off the deck into Boston Harbor by rain events, rather than falling directly into Boston Harbor as it does under existing conditions.

Management of snow and ice within the airfield is a critical component of airport operations. Logan Airport is prohibited from disposing snow into Boston Harbor except under very limited emergency situations and with prior approval. Snow is removed from runways and perimeter roads onto the grassed infield areas as soon as possible after it has fallen. De-icing is performed with potassium acetate (runways and taxiways) and sodium acetate (RSAs and roadways). Sodium acetate is used for traction control and de-icing on the perimeter roadways, which does not generate suspended solids or water pollutants. Because sodium acetate dissolves completely once applied, the practice does not generate sediment and reduces the volume of waste material that must be managed by the stormwater treatment and collection system. Snow management operations result in negligible impacts to water quality and are performed in accordance with the SWPPP and the NPDES discharge permit.

The Runway 27 End RSA, because of the unique safety requirements of the FAA and unique characteristics of Logan Airport (which is located in Boston Harbor, with tidally influenced fill materials), presents challenges to constructing these safety improvements in compliance with the Massachusetts Stormwater Standards 3, 4, and 6. However, because the proposed pile-supported RSA deck would not generate stormwater pollutants other than through atmospheric deposition, the Proposed Project is not anticipated to adversely affect water quality or groundwater supply.

D.2- Runway 27 Benthic Survey Results

This Page Intentionally Left Blank.

RUNWAY 27 END RSA IMPROVEMENTS PROJECT
Boston Logan International Airport
East Boston, Massachusetts

Memorandum

To:	Stewart Dalzell, Massport	Date:	March 15, 2022
		Project No.:	14792.00
From:	Gene Crouch, VHB	Re:	Runway 27 Benthic Survey Results
cc:	Kristen Bergassi, Carol Lurie, VHB		

Introduction

The Massachusetts Port Authority (Massport) is proposing to enhance the Runway Safety Area (RSA) at the end of Runway 27 at Boston Logan International Airport (Logan Airport). The proposed improvements are required to enhance the RSA, to the extent feasible, to be consistent with the current Federal Aviation Administration's (FAA) airport design criteria[1] for RSA and to enhance rescue access in the event of an emergency.

The alternatives being considered for the proposed RSA enhancements include the following:

- Runway 27:
  - No Action Alternative; or
  - RSA with Engineered Material Arresting System (EMAS) on a Pile-Supported Deck (450 feet long by 306 feet wide). Several deck design alternatives with variable pile configurations were considered.

The Proposed Project would necessitate placing a support structure in Boston Harbor. This technical memorandum presents the results of the benthic survey that was conducted in Boston Harbor in the near shore subtidal area off the end of Runway 27.

The benthic survey analyzes the condition of the benthos within the Project area. The benthos consists of the bottom of the ocean and includes the living organisms, plants (algae), invertebrate animals living on and immediately above the sediment surface (epibenthos or epifauna), and organisms living within the sediment (infauna). The evaluation of benthic organisms living in the Project area indicates the relative health of the environment and provides an understanding of the importance of the habitat for other species. For example, an abundance of small crustacea and annelid worms in a particular area may indicate that this is a good feeding area for winter flounder or other fish species while an abundance of pollution tolerant species may indicate impacted sediments.

1 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular (AC) 150/5300-13, Airport Design, Changes 1 through 11, March 28, 2007.

Key Findings

Four stations were sampled for marine benthic organisms, three of the stations were subtidal and one was in the lower intertidal zone, all within the Runway 27 End RSA Improvements Project limits. The intertidal sample was collected during high tide from the same research vessel using the same equipment as the subtidal samples. The study area supports soft bottom habitats (silty sand substrate) and each station exhibited an animal community that is typical for a Massachusetts marine near shore benthic environment such as Boston Harbor. The organisms collected were identified to at least Family. The number of identified taxa collected at each sampling station ranged from 11 to 17, and the number of individual organisms ranged from 97 to 578. Based on the characteristics of the benthic community identified, it appears that the Runway 27 RSA study area currently provides good general habitat for benthic infauna and epifauna invertebrates and supports higher level organisms (such as fish) by offering feeding and rearing opportunities.

Methodology

The benthic sampling program consisted of field work to collect the samples and laboratory analysis to separate the animals from any residual substrate and sort and identify the animals collected.

Field Work

Four sampling stations were established by VHB scientists (**Attachment A - Figure 1**). Three stations; B27-1, B27-2, and B27-3 were established in subtidal waters and Station B 27-4 was established more inshore in the lower intertidal area. All sampling stations were within the footprint of the proposed RSA deck. The location of each sampling station was geo-referenced using Global Positioning System (GPS) equipment and plotted using ArcView Geographic Information System (GIS).

Benthic samples were collected on June 10, 2021, off the survey vessel R/V Cyprinodon, out of Winthrop Harbor, using a Ted Young modified Van Veen grab. The Van Veen grab sediment sampler has a clam shell-type scoop within a frame to keep it vertical (**Attachment A - Figure 2**). It can extract samples up to 20 centimeters deep within a sampling area of 0.1 square meters. Ted-Young modified Van Veen samplers are equipped with mesh screens and rubber flaps to cover the jaws, allowing water to pass through the samplers during descent, reducing disturbance from bow waves at the sediment-water interface. The grab was lowered over the side of the boat and recovered using a davit arm boom and winch. Collected samples were emptied into a bucket and sieved through a 0.5 mm mesh screen to remove the sediment and concentrate the animals. The collected animals, remaining sediment, shells and any plant material was placed in jars and fixed in 70 percent isopropyl alcohol for preservation. After sieving, all samples included deteriorated algae. The algae were not observed on the surface of the collected sediment within the grab, but once sieved, the algae was evident.

The substrate at the four stations was found to be soft-bottom sediments consisting of silty sand (**Attachment A - Figure 3**). Living algae, which requires a hard surface for attachment was not collected at any of the sampling sites. However, clusters of European oysters (*Ostera edulis*) observed during video filming the seabed did provide substrate for kelp *Saccharina latissimi* within the Project limits (**Attachment A - Figure 4**).

Laboratory Analysis

Laboratory analysis consisted of the processing of each sample, to sort the collected animals, and identifying each to specimen to at least the family taxonomic level. Using a binocular microscope, the collected material was sorted into major taxonomic groups and then resorted and identified to at least Family using available scientific keys for invertebrate identification. The sorted animals were recorded, counted, and placed in separate shell vials based on Family identification with labels. The labels in each vial included the sample number and the appropriate Family, Genus or Species name. These vials were then filled with alcohol, plugged with cotton, and placed in an alcohol-filled jar. Species from the same sampling station were kept together in the same container.

Data collection results did not identify any unusual or unique species; all species found were typical of this type of benthic community and/or expected to be present in Boston Harbor. Overall, there were 22 different taxa identified at all four analyzed stations. The animals collected included oligochaete worms, polychaeta worms, crustaceans (mostly amphipods), bivalves, and miscellaneous species that included bryozoans and nematodes. Stations B27-2 and B27-4 included the highest variety of species (16 and 17, respectively). Station B27-4 also had the most individual animals (578), primarily due to *Spionidae polychates*. Although not classified beyond family, a majority of the *Spionidae polychaetes* were of the genus *Polydora*. Station B27-1 exhibited the fewest species (11) and the least number of individuals (97). The high numbers of individuals at Stations B27-2, B27-3 and B27-4 were due to one family of a polychates. At Stations B27-2 and B27-4, *Spionidae polychates* were dominant. At Station B27-3, *Capitellidae polychates* were overwhelmingly dominant. The amphipod *Ampelisca sp*. was the dominant crustacean at all stations. Many of the collected animals were small and young.

The high numbers of individuals would probably lower during the year from competition or be lost as prey. Other interesting animals collected included several Foraminifera, a single cell organism that forms a small hard shell or test and lives on the bottom. A few Copepods and one Mysidacea (a small shrimp-like species) were collected. These species are free swimming and were probably collected while the grab was on the way to the bottom. Both are typically very numerous in the water column. Finally, two Ostracods (commonly called seed shrimp) were collected. These are very small crustaceans that live within a clam-like shell. Two bivalve species were collected, *Tellina agilis* (northern dwarf tellin), a small fragile clam, and several very small individuals of *Mytilus edulis* (blue mussel). The complete list of collected and identified animals from the laboratory analysis are included in **Attachment B**. **Table D.2-1** summarizes the results.

Table D.2-1 Benthic Sampling Results

	Station B27-1	Station B27-2	Station B27-3	Station B27-4
No. of Taxa Identified[1]	11	17	13	16
No. of Individuals	97	432	435	578

Source: VHB, Inc.
1 Identification generally to Family

Conclusion

Benthic analysis of the Logan Airport Runway 27 RSA reveals a relatively diverse community with a variety of benthic organisms that are typical of Boston Harbor communities. The number of species and animals range from a high of 16 species and 578 individual organisms (Station B27-4) to a low of 11 species and 97 individuals (Station B27-1). Species diversity appeared to be good, with many species that would serve as prey species for high level animals such as fish.

Based on the characteristics of the benthic community and the species found in the benthic samples, the Runway 27 RSA Study Area appears to be healthy and productive and also provides good habitat for higher level organisms by offering feeding and rearing opportunities.

Attachment A
Figures: Benthic Sampling Event
June 10, 2021

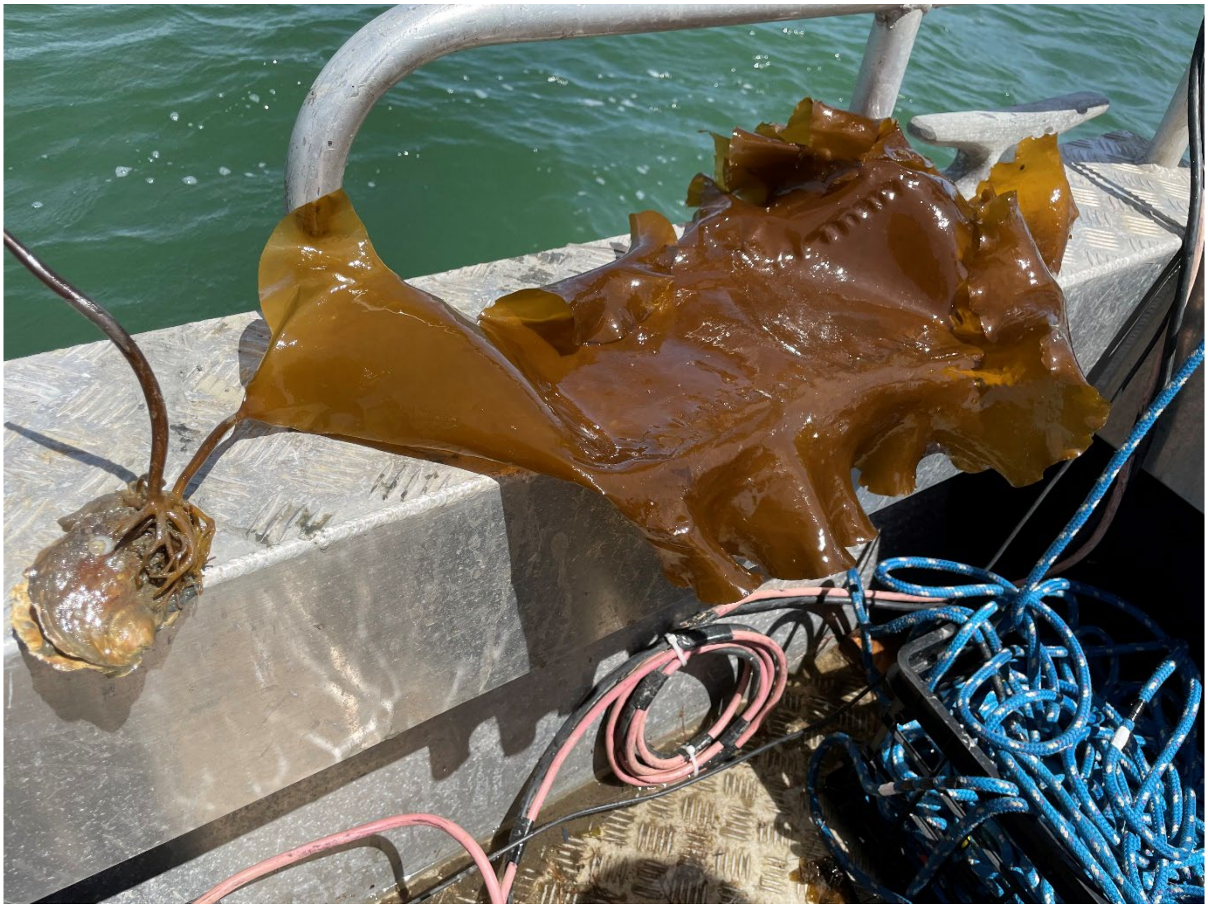
This Page Intentionally Left Blank

Figure D.2-1 Benthic Sampling Locations

Figure D.2-2 Ted Young Modified Van Veen Grab

Figure D.2-3 Benthic Sample in the Van Veen Grab. Note the worm tubes extending above the sediment surface.

Figure D.2-4 Kelp (*Saccharina latissimi*) attached to European Oyster. Collected on the sled during the video survey of the seabed for eelgrass.



Attachment B
Benthic Sampling Data Sheets

This Page Intentionally Left Blank

Table D.2-2 Benthic Sampling Data Sheets

Logan Airport Runway 27 Safety Deck		Sample Date: June 10, 2021			
Benthic Community Analysis		**Station 27-1**	**Station 27-2**	**Station 27-3**	**Station 27-4**
Species Identification		**No. Collected**	**No. Collected**	**No. Collected**	**No. Collected**
Foraminifera		1	1	1	
Nematoda			2	1	3
Annelida					
Oligochaeta		2	81	13	21
Polychaetae					
	Cirratulidae	1	2		
	Spionidae	40	192	68	420
	Phyllodocidae	8	25	23	5
	Syllidae		2		14
	Nephtyidae		3		2
	Maldanidae			1	6
	Paraonidae				1
	Capitellidae	18	7	309	29
	Orbiniidae	2	13	1	15
Crustacea					
	Copepoda		2	1	
	Ostracoda	1	1		
	Mysidacea		1		
	Amphipoda				
	Amphelisca sp.	19	83	12	29
	Corophiidae				3
	Lijeborgiidae				1
	Aoridae		1		1
	Decapoda				
	Pagorus longicarpus		1	1	
Mollusca					
	Bivalves				
	Tellina agilis	3	15	3	27
	Mytilus edulis	2		1	1
	Number of Taxa Collected	11	17	13	16
	Total Individuals Collected	97	432	435	578
	Station Location	Subtidal	Subtidal	Subtidal	Low Intertidal

Source: VHB, Inc.

This Page Intentionally Left Blank.

D.3- Bivalve Field Survey Notes at Runway 27 End

This Page Intentionally Left Blank

Runway 27 End RSA Improvements Project
Boston Logan International Airport
East Boston, Massachusetts

Memorandum

To:	Project File	Date:	April 30, 2021, updated May 18, 2022
		Project #:	14792
From:	Gene Crouch, Kristen Bergassi	Re:	Bivalve Field Surveys at Runway 27 End

On Thursday, April 29, 2021, a field team of VHB scientists, Gene Crouch, Meredith Avery, Daniel Cannata, and Kristen Bergassi, visited the proposed Runway 27 End Runway Safety Area (RSA) Improvements Project Study Area to examine the condition of shellfish in the area of the proposed deck and conduct a bird habitat survey for species of special concern. Gene Crouch and Kristen Bergassi were tasked to conduct the soft-shell cham survey off at Runway 27 End. Meredith Avery and Daniel Cannata conducted a preliminary survey of upland and shore bird habitat in particular upland sandpiper and meadowlark habitat (species protected in Massachusetts as special concern) in the vicinity of the Runway 27 End.

April 29, 2021 was selected for this survey due to an astronomically low tide of -1.82 feet at 7:35 AM. The weather was 50 degrees and overcast, which transitioned to dense fog for the duration of the field visit. The lower water level allowed observation a large extent of the intertidal beach condition and allowed for sufficient time to conduct clam plot surveys.

Sampling bivalves was conducted using a 0.25-meter quadrat of polyvinyl chloride (PVC) pipe (50 centimeters on a side) as the sample boundary. Sediment was skimmed or dug using a shovel and garden rake. The upper inch or so of oxygenated sediment within each plot was first skimmed off and sifted in a small screen material sieve to collect small, young animals that may be present. The remainder of the sediment to 6 inches deep was collected and placed in a large box sieve with 0.25-inch hardware cloth sieve and agitated within a water filled black plastic tub to separate the bivalves from the sediment. All collected material, animals, and sediment was returned to the tidal flat. Bivalves were reinserted in the sediment in a living position. No specimens were collected nor retained.

Four 0.25-meter square plots (#27-1 to 27-4) were sampled and surveyed for evidence of shellfish. The team arrived at the first plot location, Clam Plot #27-1 at 6:35 AM. The last plot, Clam Plot #27-4, was departed at 9:05 AM. Larger siphon holes 0.25 to 0.5 inch or larger were intermittently noted on the sand surface. Very few clams would squirt when approached. Numerous smaller holes noted (0.1 centimeters) likely to be ends of polychaete tubes.

Established beds of Blue Mussels (*Mytilus edulis*) was noted between the shoreline riprap, above the sandy flat. No live adult bivalves were noted within any of the four completed plots. No evidence of growing or washed-up dead eelgrass was noted on the beach.

Sediment at all plot locations was generally a fine muddy sand. The upper few centimeters were oxygenated as evidence by the like brown color. Below the surface layer, the sediment was dark gray or black indicating reduced conditions. Numerous live polycheates and polycheate tubes were collected at all locations. Representatives of the polychaetes were not collected and were not identified.

The following is a summary of survey activities and findings by plot location. **Figure D.3-1** shows the location of benthic and shellfish sample locations.

Clam Plot #27-1

- *Substrate characteristics:* muddy fine sand; approximately 2 to 3 inches of brown aerobic sediment over dark gray anerobic sediment.
- *Bivalves present in Sieve #1* (top 2 inches of aerobic sediment)
  - One juvenile soft-shell clam (M*ya arenaria*) (~0.7 centimeters)
  - One juvenile surf clam (*Spisula solidissima*) (~0.5 centimeters)
  - *Other:* bamboo worm (Maldanidea)
- *Bivalves present in Sieve #2* (6 inches of anerobic sediment)
  - One juvenile Atlantic razor clam (*Ensis directus*) (2 centimeters)
  - One juvenile Atlantic Razor clam (*Ensis directus*) (5 centimeters)

Clam Plot #27-2

- *Substrate characteristics:* muddy fine sand; approximately 1-inch of brown aerobic sediment over dark gray anerobic sediment.
- *Bivalves present in Sieve #1* (top inch of aerobic sediment)
  - None
- *Bivalves present in Sieve #2* (6 inches of anerobic sediment)
  - None
- *Other*:
  - 28 hermit crabs (*Pagurus* sp.)
  - One unknown polychaete (likely Orbiniidea)
  - One shrimp (likely *Crangon septemspinosa*)
  - Other noted in close proximity to plot: One adult surf clam (*Spisula solidissima*)

This plot location was specifically selected due to the abundance of soft-shell clamshells on the surface. Many paired shells were observed partially sitting upright above the sediment surface in a living position, indicating the individuals had died in place.

Clam Plot #27-3

- *Substrate characteristics:* muddy fine sand; approximately 0.5-inch brown aerobic sediment over dark gray anerobic sediment.
- *Bivalves present in Sieve #1* (top inch of aerobic sediment)
  - 1 juvenile soft-shell clam (M*ya arenaria*) (0.8 centimeters)

- *Bivalves present in Sieve #2* (6 inches anerobic sediment)
  - None

Clam Plot #27-4

- *Substrate characteristics:* muddy sand; approximately 2 centimeters brown aerobic sediment over dark gray anerobic sediment.
- *Bivalves present in Sieve #1* (top inch aerobic sediment)
  - None
- *Bivalves present in Sieve #2* (6 inches of anerobic sediment)
  - 1 juvenile soft-shell clam (*Mya arenaria*) (0.5 centimeters)

The RSA improvements would consist of an Engineered Material Arresting System (EMAS) on a pile-supported deck (450 feet long by 306 feet wide). Several deck design alternatives with variable pile configurations were considered. Several deck design alternatives with variable pile configurations were considered.

Blue Mussel Survey (Updated May 17, 2022)

On Tuesday, May 17, 2022, a field team of Gene Crouch (VHB) and Joseph Choi (WSP) visited the proposed Runway 27 End RSA Study Area to review the location and density of blue mussels (*Mytilus edulis*) in the area of the proposed RSA deck. The tidal range on this day was particularly low, providing ample time to survey the shoreline and determine density of individuals in three plots. May 17, 2022 was selected for this survey due to an astronomically low tide of -1.4 feet at 6:35 AM. The air temperature was in the mid 60 degrees and clear. The lowered water level allowed sufficient observation time along the shoreline to conduct mussel survey. The survey focused on the rocky intertidal zone above Mean Low Water (MLW). Below the man-made rocky shoreline, few live mussels were observed and only attached to a hard surface. No mussels were observed on the silty sand mud flat surface.

Methodology

The boundary of mussels was determined by visually identifying the limits of the growing mussels and temporarily placing pin flags at the edges of the observed habitat. Once the entire area had been delineated, the field team returned to each flag location and, using an R1 global positioning (GPS) receiver, recorded each location. This information was later used to create a map of growing mussels along the shoreline. Once the boundary was determined, three random plots were established and all live mussels were counted. The plot consisted of a 0.25 meter (50 centimeters on a side) PVC pipe frame. Within the PVC pipe frame, all live mussels were counted.

Results

Figure D.3-1 illustrates the location of live mussels. There were two areas of concentration on either side of the proposed RSA deck. To the right of the proposed RSA deck, the mussels were largely found nestled down between the large riprap rocks. The mussels were generally growing in a band or narrow strip at the base of the rocks. Mussels were also observed below the edge or within the plastic geogrid shoreline protection. Given the difficult location, these mussels were not counted.

To the left of the RSA deck, the mussels were more widely distributed nestled between cobbles that make up the lower intertidal zone. Mussels were not growing densely. The extent of growing mussels began near the left edge of the proposed RSA deck and extended to the north out of the Study Area. The width of growing mussels along the shoreline within the Study Area varied from 20 feet to 24 feet. In the center of the Study Area, in the area of the proposed RSA deck, mussels were not present or only present sporadically as single individuals. Near the center of the Study Area was a small concentration of mussels growing around what appeared to be a clump of geotextile fabric stuck in the mud (located). Mussels on the right side of the Project Area were outside the work area and were concentrated around the bases of large riprap boulders.

Three plots were established in the left edge of the Study Area to determine mussel density. The results are summarized in **Table D.3-1.**

Table D.3-1 Mussel Plot Results

Plot	Number counted	Number/meter
S27-1	41	164
S27-2	33	132
S27-3	19	76
Average	31	124

Source: VHB, 2021

Other observations

Periwinkle snails (*Littorina littorea*) were present in high numbers throughout the Study Area predominately on the rock and geogrid surfaces. Also barnacles were present on all rocks, with a very high number of very small individuals indicating a recent set.

Figure D.3-1 Shellfish Sampling Locations

This Page Intentionally Left Blank.

D.4- Coastal Analysis

This Page Intentionally Left Blank.

MASSACHUSETTS PORT AUTHORITY

COASTAL ANALYSIS

BOSTON LOGAN INTERNATIONAL AIRPORT RUNWAY 27 END RUNWAY SAFETY AREA IMPROVEMENTS PROJECT

JUNE 2022

COASTAL ANALYSIS

BOSTON LOGAN INTERNATIONAL AIRPORT RUNWAY 27 END RUNWAY SAFETY AREA IMPROVEMENTS PROJECT

MASSACHUSETTS PORT AUTHORITY

WSP PROJECT NO.: 189742WO1.
DATE: JUNE 2022

WSP USA, INC.
100 SUMMER STREET 13TH FLOOR
BOSTON, MA 02110

WSP.COM

TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

1 PROJECT BACKGROUND

The purpose of this hydrodynamic analysis is to support the analysis of potential secondary and cumulative impacts of the proposed Boston Logan International Airport Runway 27 End Runway Safety Area Improvements Project (Proposed Project) in Boston, Massachusetts on the larger Boston Harbor context including Snake Island and the vicinity of the Cottage Park and Winthrop Yacht Clubs. Specifically, it addresses the potential impacts of the alternatives evaluated for supporting the deck that would be constructed as a part of the RSA improvements (the deck support alternatives).

The Study Area, as shown by the dashed yellow line in Figure 1-1, was delineated to include shorelines using National Agriculture Imagery Program (NAIP)'s aerial imagery. Figure 1-2 shows areas of interest that may be affected by flow changes in the channel between the Runway 27 End and Snake Island due to the construction of the proposed deck.

Figure 1-1. Project Location and Study Area

Figure 1-2. Proposed Deck and Areas of Interest

1.1 PROPOSED PILE ARRANGEMENTS

Four deck support alternatives, comprised of different configurations of concrete piles or caissons, were evaluated. Figure 1-3 shows a schematic diagram of a general pile/caisson arrangement highlighting important design parameters.

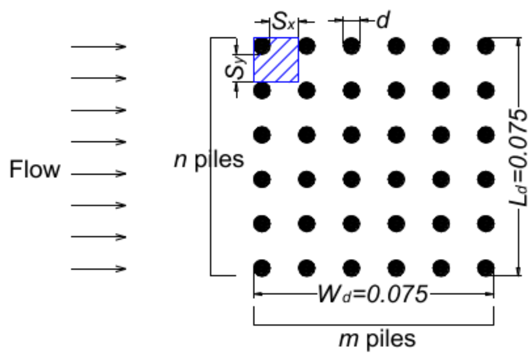


Figure 1-3. Inline arrangement of deck-support structure (Safie and Tominaga, 2019)

The deck support alternatives are different from each other based on their size, number of rows and columns of piles or caissons, and pile spacing, as summarized in Table 1-1.

Table 1-1. Geometric parameters of the pile/caisson groups

DECK SUPPORT ALTERNATIVE	TYPE	SIZE	STRUCTURE ARRANGMENT		APPROX. SPACING	
			ROWS (M)	COLUMNS (N)	S_X (ft)	S_Y (ft)
1	Square pile	1.67’ × 1.67’	16	25	11	12.5
2	Square pile	1.67’ × 1.67’	32	10	8	50
3	Circular caisson	5’ diameter	16	10	15	50
4	Circular caisson	5’ diameter	16	8	20	65

2 METHODOLOGY

This section describes the tasks performed relevant to model data requirements, hydrodynamic model development, and modeling scenarios to evaluate existing and proposed conditions.

2.1 DATA COLLECTION

Hydrodynamic analysis was performed using two-dimensional (2-D) depth-averaged flow module in MIKE 21 (release 2022) considering tidal flows. Required data for flow model development, model calibration, and erosion / deposition trend analysis include: bathymetry, tidal data, bed gradation, and measured flow / wave hydrodynamic data. Each of these data inputs are discussed below.

2.1.1 BATHYMETRY

Bathymetry was collected from the U.S. Army Corps of Engineers (USACE) hydrographic survey data repository. Horizonal and vertical datums were transformed to be compatible with MIKE 21 using Aquaveo Surface-water Modeling System (SMS) version 13.1 to create scatter data (*.XYZ). Transformed scatter data are in horizontal datum of North American Datum (NAD) 1983, reprojected to Universal Transverse Mercator (UTM) 19 N projection and vertical datum of North American Vertical Datum (NAVD) 1988. Both horizonal and vertical units were converted to metrics units.

2.1.2 TIDAL DATA

The National Oceanic and Atmospheric Administration (NOAA) tide station at Boston Light, Massachusetts (Station ID: 8444162) was used to extract tidal data to generate tidal prediction for the period November 20, 2021 – January 31, 2022. Figure 2-1 shows the location of the tide station.

Tidal predictions were calculated using "Tide Prediction of Height" tool in MIKE 21 toolbox. Tidal predictions were generated, including neap and spring tides, for flow simulation in the larger Boston Harbor area, including Snake Island and vicinity of the Cottage Park Yacht Club and the Winthrop Yacht Club. Figure 2-2 shows predicted tide levels from November 20, 2021, to January 19, 2022.

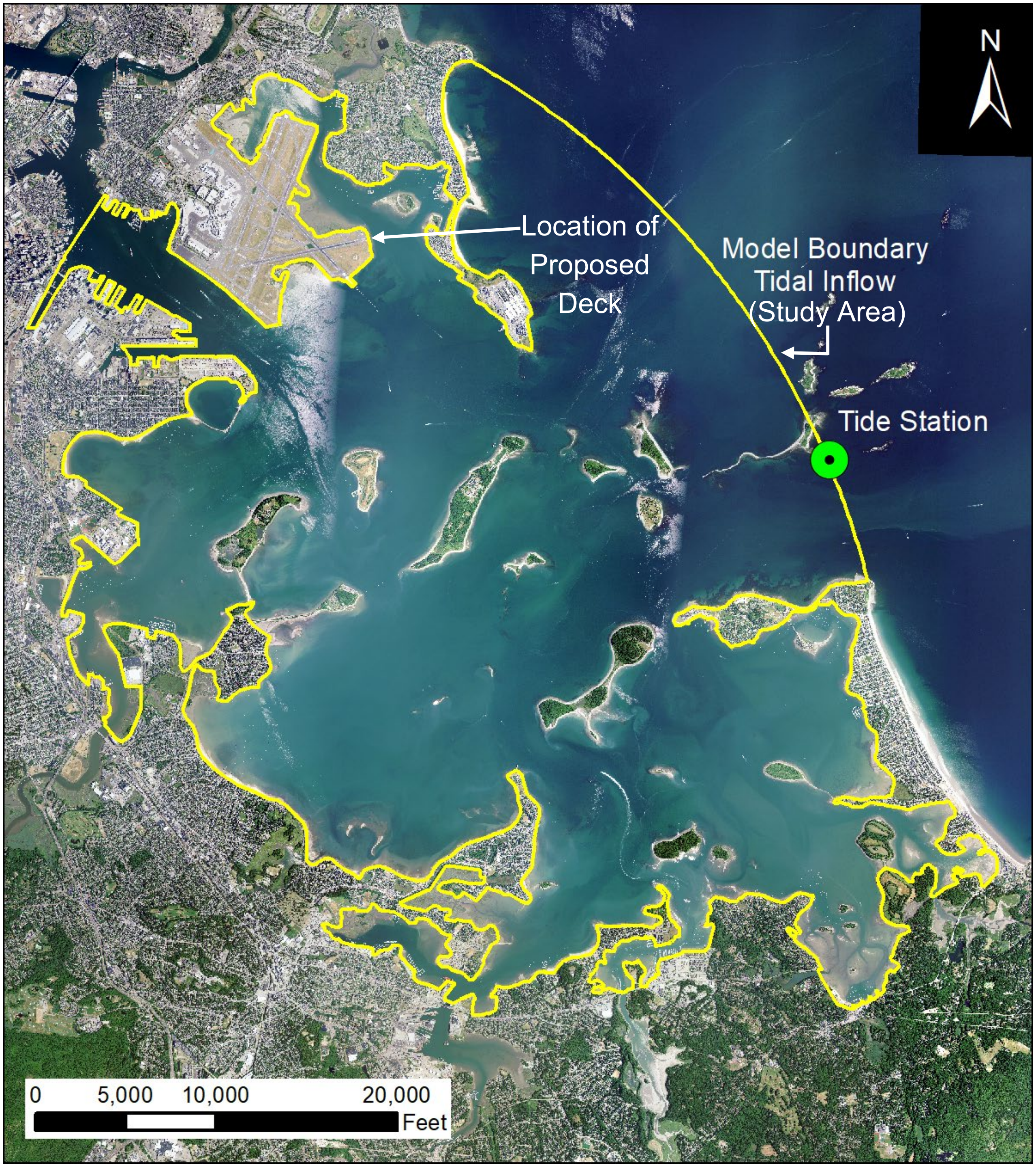


Figure 2-1. NOAA tide station at Boston Light, Massachusetts

Tidal predictions were generated, including neap and spring tides, for flow simulation in the larger Boston Harbor area, including Snake Island and vicinity of the Cottage Park Yacht Club and the Winthrop Yacht Club. Figure 2-2 shows predicted tide levels from November 20, 2021, to January 19, 2022.

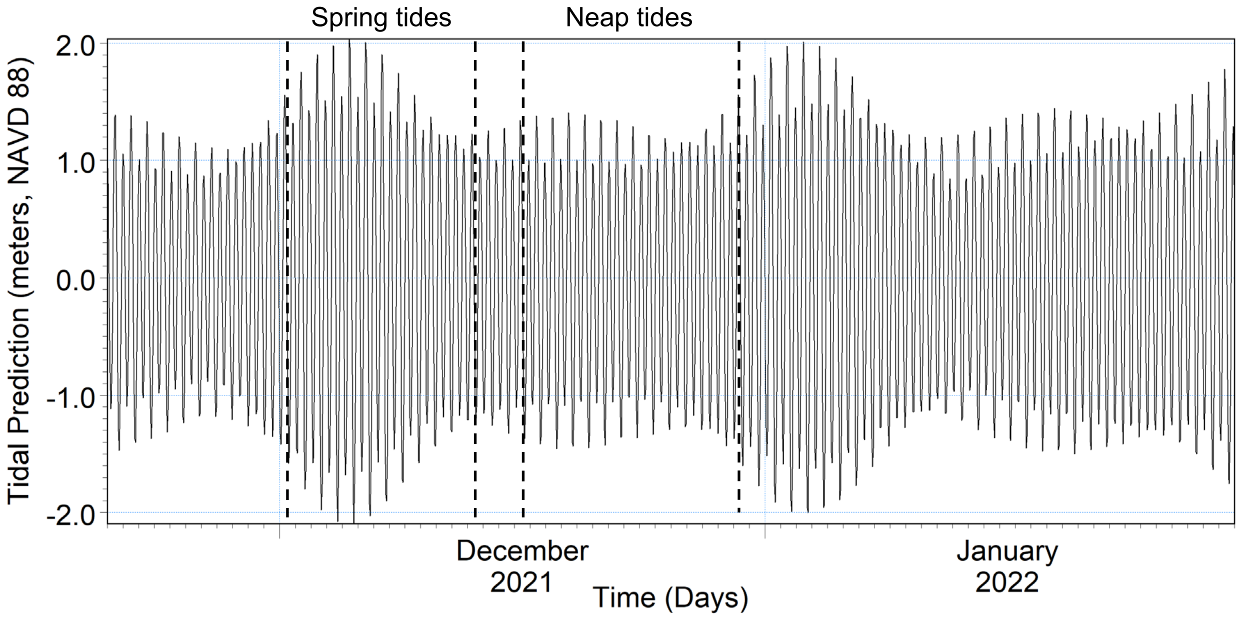


Figure 2-2. Tidal predictions generated using harmonic constituents at Boston Light tide station

2.1.3 BED GRADATION

GEI Consultants, Inc. (2020) performed the bed gradation analysis collecting borings from the nearshore area of the proposed construction. Figure 2-3 shows the boring location plan for nine (9) borings. In addition, surficial sediment data collected in 2004 by the United States Geological Survey (USGS) were used with the boring logs to determine the spatial distribution of sediment gradation in the larger Boston Harbor area.

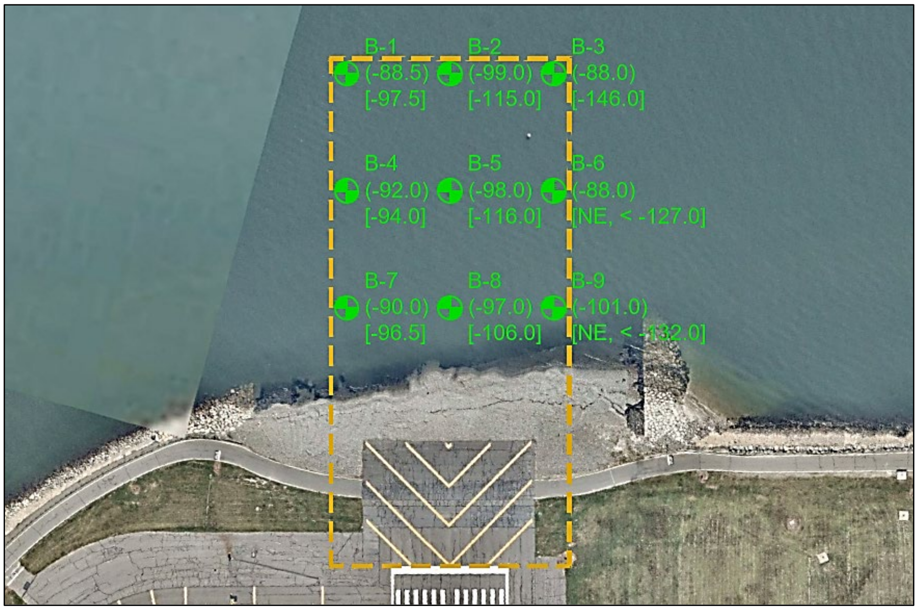


Figure 2-3. Boring locations

Figure 2-4 shows a location map of surficial sediment collection by USGS in 2004 (Manheim, 1992). Data indicated that sediment samples consist of mud, including silt and clay.

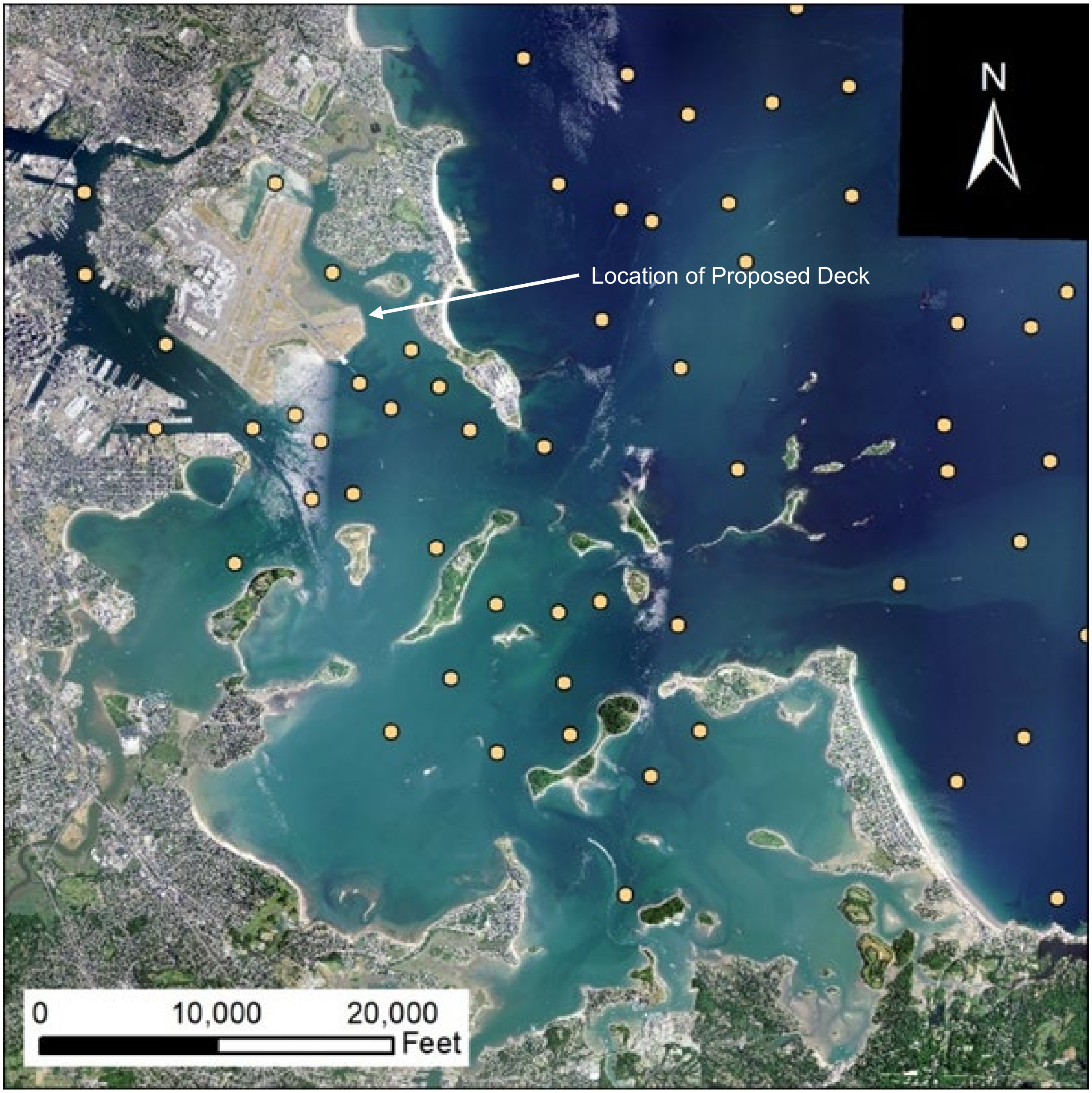


Figure 2-4. Surficial sediment samples collected by USGS in 2004

2.1.4 ADCP DATA COLLECTION

Woods Hole Group collected hydrodynamic data for flow current and wave parameters by using 1 MHz Nortek AWAC Acoustic Doppler Current Profiler (ADCP) near the Winthrop Yacht Club and slightly offshore of the Runway 27 End, as shown in Figure 2-5. ADCP data were collected during the period from November 24, 2021, to January 28, 2022.

Figure 2-5. ADCP deployed locations

2.2 HYDRODYNAMIC ANALYSIS

The hydrodynamic analysis was performed using the flow module in MIKE 21 (release 2022). The following sections describe the mesh generation, assignment of roughness, eddy viscosity coefficients, and boundary conditions associated with hydrodynamic model development, and the model calibration for the existing condition.

2.2.1 MESH GENERATION

An unstructured triangular mesh was generated for the model domain with mesh refinements for the areas in the vicinity of the Proposed Project and Snake Island. The area of the triangular mesh elements varies from 1000 to 30000 m^2, depending on refinement level. The refinement level is varied to capture the terrain geometry in sufficiently high resolution where necessary for the hydrodynamic analysis. The "Natural Neighbor Interpolation Technique" was used when generating elevations for the mesh nodes from bathymetric scatter data . [1, 2] Figure 2-6 shows the triangular computational mesh with the areas of refinement shown as a denser mesh. Standard mesh pre-processing tools in MIKE 21 including smoothing and attribute assignments for boundary conditions and mesh refinements were used during mesh generation.

The MIKE 21 flow model dynamically controls the wetting and drying of cells in the model based on water depths. The standard practice of setting drying depth in coastal models is set to be 0.005 m and wetting depth is set to be 0.1 m. Therefore, the model will automatically compute the wetting and drying dynamics according to the above defined thresholds. Setting appropriate wetting and drying depth is important for model stability and runtimes.

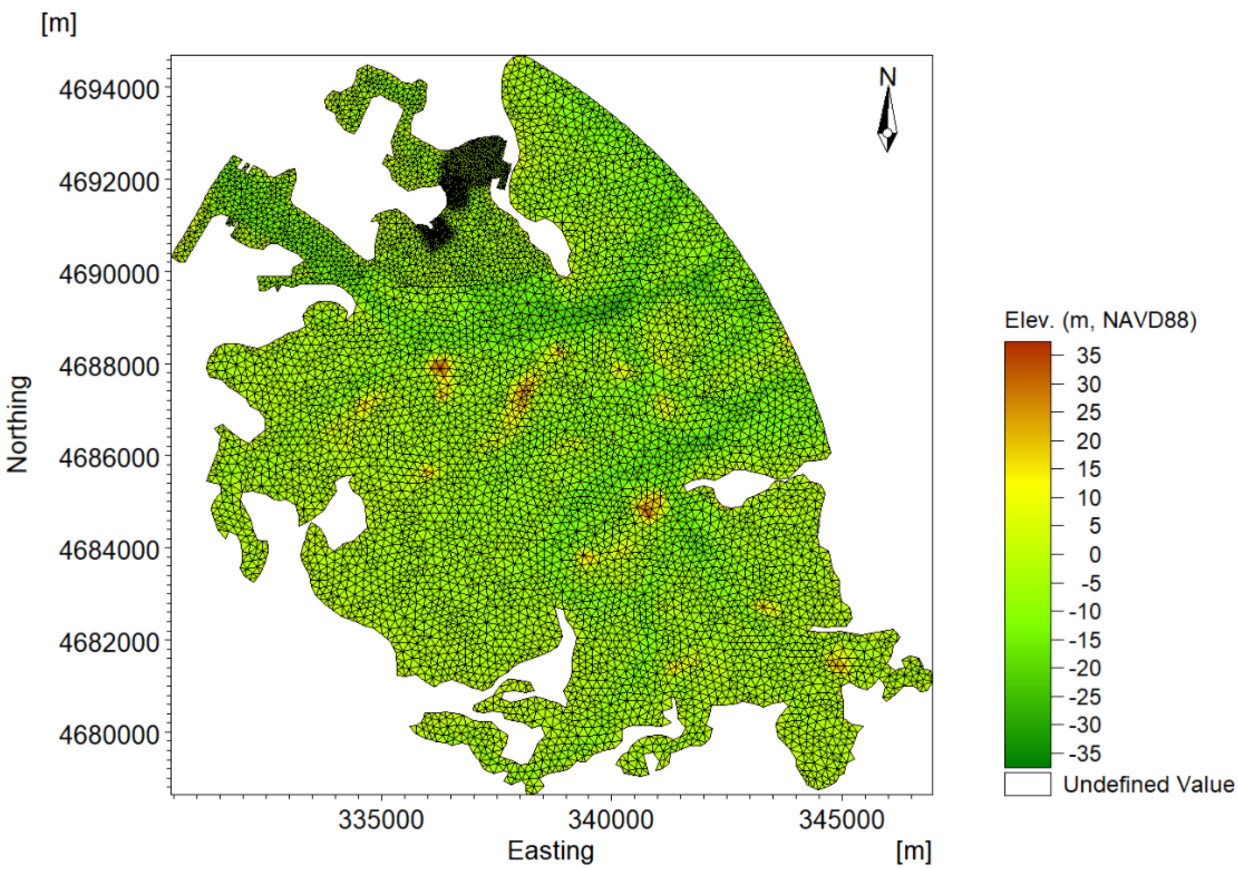


Figure 2-6. Unstructured mesh of the existing condition

---

1 "Natural-neighbor interpolation" is a fast, robust, and reliable technique for reconstructing a surface from irregularly distributed sample points. It is also known as Sibson or "area-stealing" interpolation.

2 Sibson, R. (1981), A Brief Description of Natural Neighbor Interpolation. In *Interpolating multivariate data*, John Wiley & Sons, New York, 1981.

2.2.2 ROUGHNESS COEFFICIENTS

BED ROUGHNESS IN THE MODEL DOMAIN

For the existing condition, a uniform bed roughness coefficient was applied to the entire Study Area, with a Manning's *n* value of 0.0264 s/m$^{1/3}$ adopted from Signell and Butman (1992) that was used in the numerical modeling of tidal exchange and dispersion in Boston Harbor. MIKE 21 defines the bed roughness coefficient as the reciprocal of Manning's *n* value, termed as Manning's *M* number. Therefore, the uniform Manning M number assigned to the domain is 37.9 s/m$^{1/3}$.

ROUGHNESS AT THE PROPOSED RUNWAY 27 END RSA

Proposed pile/shaft arrangements for each of the four deck support alternatives were incorporated to their respective computational meshes as Manning's *n* roughness regions. Flow conveying through piles/shafts experience resistance due to drag with fluid-structure interaction and local turbulence in addition to the roughness of the bed sediments. Therefore, the flow area with piles/shaft has a higher Manning's *n* value than in the existing condition with no piles. Manning's *n* values for each proposed pile arrangement were calculated adopting Wu and He (2009) equations for flow resistance, making the piles/caissons analogous to resistance in highly vegetated channels, with dense vegetation standing in for the piles. Figure 2-7 shows a longitudinal profile of a scenario with emergent vegetation (standing in for the piles), which is applicable to the present study.

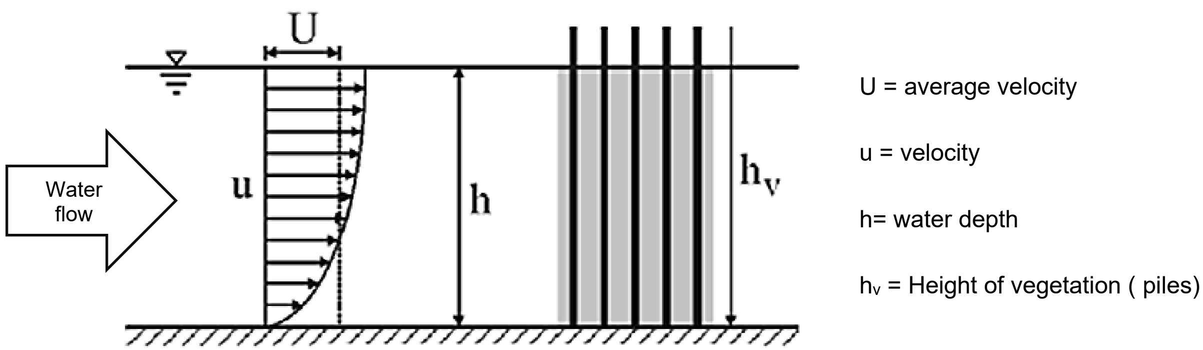


Figure 2-7. Side view of flow through emergent vegetation

Wu and He (2009) derived a formula to determine the Manning's *n* value, considering the combined effects of bed shear stress and drag force of the pile arrangement as shown in Eq. (1).

$$n^2 = n_b^2 + \frac{1}{2g(1-c_v)} C_d N_a A_v \eta_v^2 \frac{h_v}{h} R_s^{\frac{1}{3}} \tag{1}$$

Where n = Manning's coefficient corresponding to the total roughness; n_b = Manning's coefficient corresponding to bed roughness, g = gravitational acceleration, R_s = hydraulic radius of the bed with piles ($=hl_n/(2h+l_n)$), N_aA_v = projected area piles per unit bed area, and η_v = coefficient of about 1.0.

Refer to Attachment A for numerical values of each parameter and detailed calculations for Manning's n values relevant to each deck support alternative. Table 2-1 summarizes the Manning's coefficients computed for each deck support alternative.

Table 2-1. Manning coefficient corresponding to the total roughness

DECK SUPPORT ALTERNATIVE	MANNING'S *n* COEFFICIENT ($s/m^{1/3}$)	MANNING M COEFFICIENT ($m^{1/3}/s$)
1	0.19	5.19
2	0.14	7.39
3	0.25	3.98
4	0.19	5.17

2.2.3 EDDY VISCOSITY COEFFICIENTS

MIKE 21 simulates turbulence using an eddy viscosity concept. In the present flow model, eddy viscosity is modeled using Smagorinsky formulation with a spatially constant horizontal eddy viscosity coefficient of 0.28.

2.2.4 BOUNDARY CONDITIONS

Tidal boundary condition was imposed as a spatially constant and temporally varying water level at the inflow boundary. Figure 2-1 in Section 2.1.2 – Tidal Data shows the boundary conditions used in the flow model. Tidal forcing is defined by 33 astronomical tidal constituents including M2, O1, S2, K2, N2, K1, P1, and Q1, which are most significant. A land boundary with zero normal velocity (i.e., no-slip boundary condition) was assigned for the boundary at the inner bay region.

2.2.5 MODEL CALIBRATION

Model calibration was performed for the existing condition comparing the measured water depths, east velocities, and north velocities shown in Figures 2-8 through 2-10, based on the observed ADCP data.

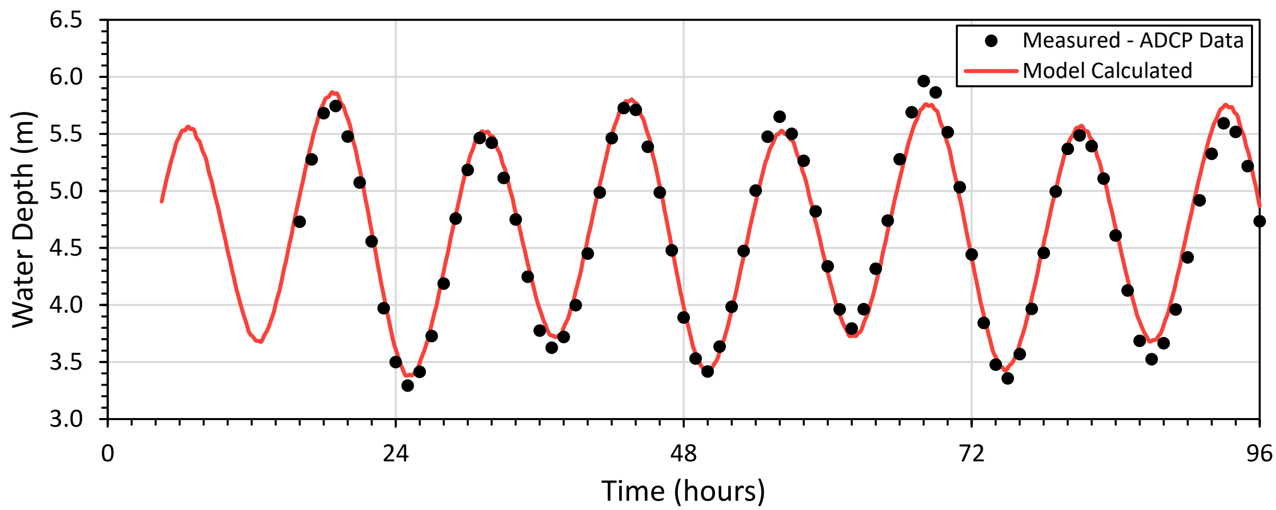


Figure 2-8. Calculated vs. measured water depths for the period 11/24/2021-11/28/2021

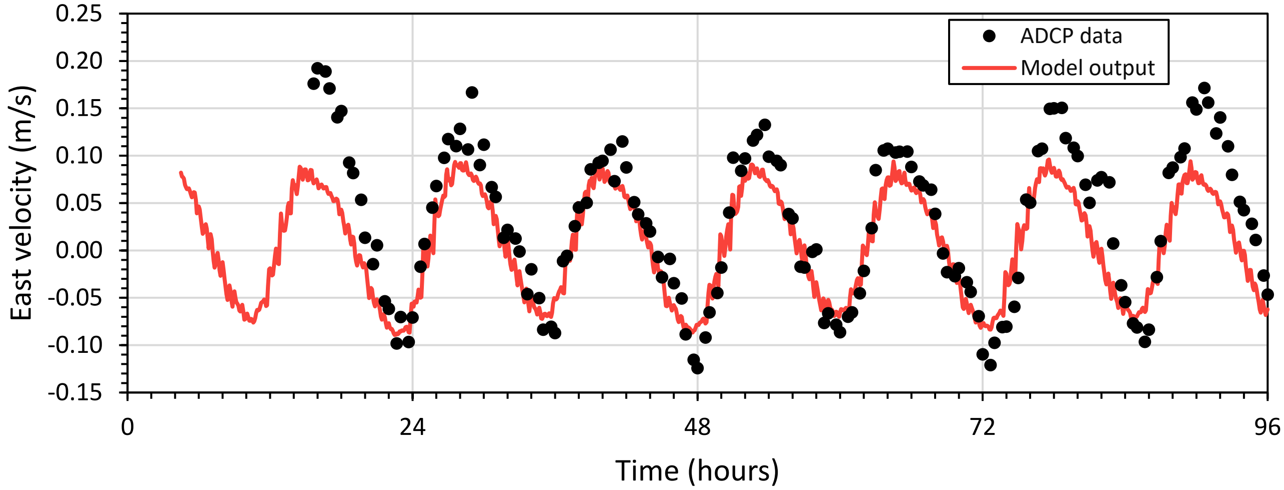


Figure 2-9. Calculated vs. measured U-velocity for the period 11/24/2021-11/28/2021

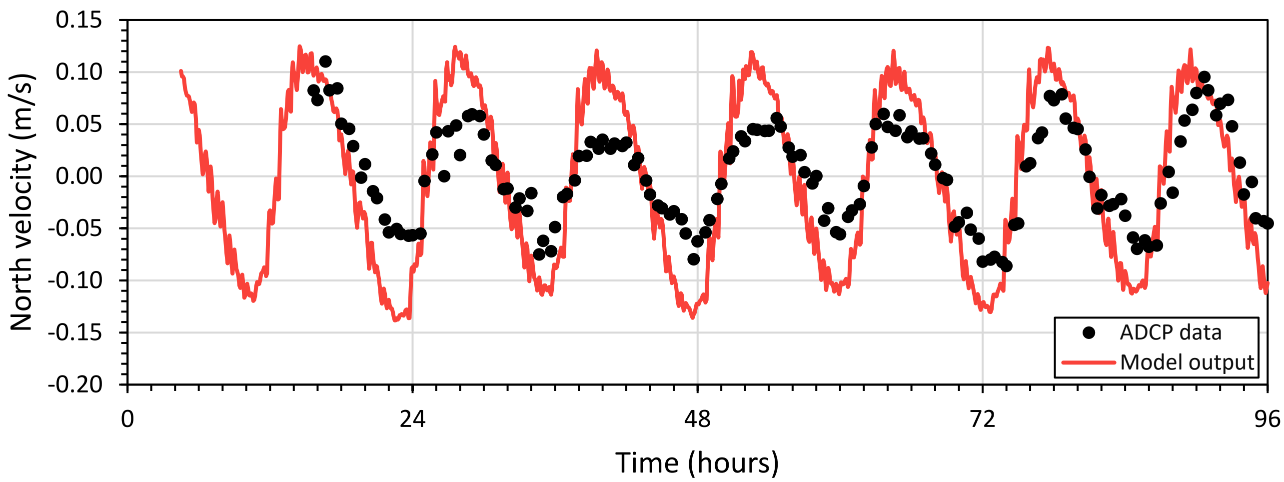


Figure 2-10. Calculated vs. measured V-velocity for the period 11/24/2021-11/28/2021

The model calibration and validation were performed over a period of 96 hours, that covered a period of spring and neap tide conditions. The measured and simulated water depths matched well as shown in Figure 2-8, indicating the simulations predict accurate and realistic water levels.

2.3 MODEL SCENARIOS

Five model scenarios were simulated, including the existing condition and the four deck support alternatives. Model scenarios vary from each other due to the Manning's *n* value assigned at the Project Site. Roughness values assigned for existing condition and proposed conditions for each deck support alternative are described in Section "2.2.2 – Roughness Coefficients." Other model parameters, such as eddy viscosity, boundary conditions, and mesh refinement areas of the mesh remain unchanged between existing condition and the four deck support alternatives. Figure 2-11 shows the variation of Manning's *M* values (shown in Table 2-1) in the vicinity of the proposed deck.

At the early stage of the modeling effort, the deck support was considered impermeable. This approach was considered unrealistic as it demonstrates a 'no-flow' condition through piles/shaft, which would ultimately result in zero scour. Since this approach produced an unrealistically conservative results, the modeling team decided to dismiss the impermeable approach and proceed with a permeable approach with representative roughness for each proposed deck support alternative.

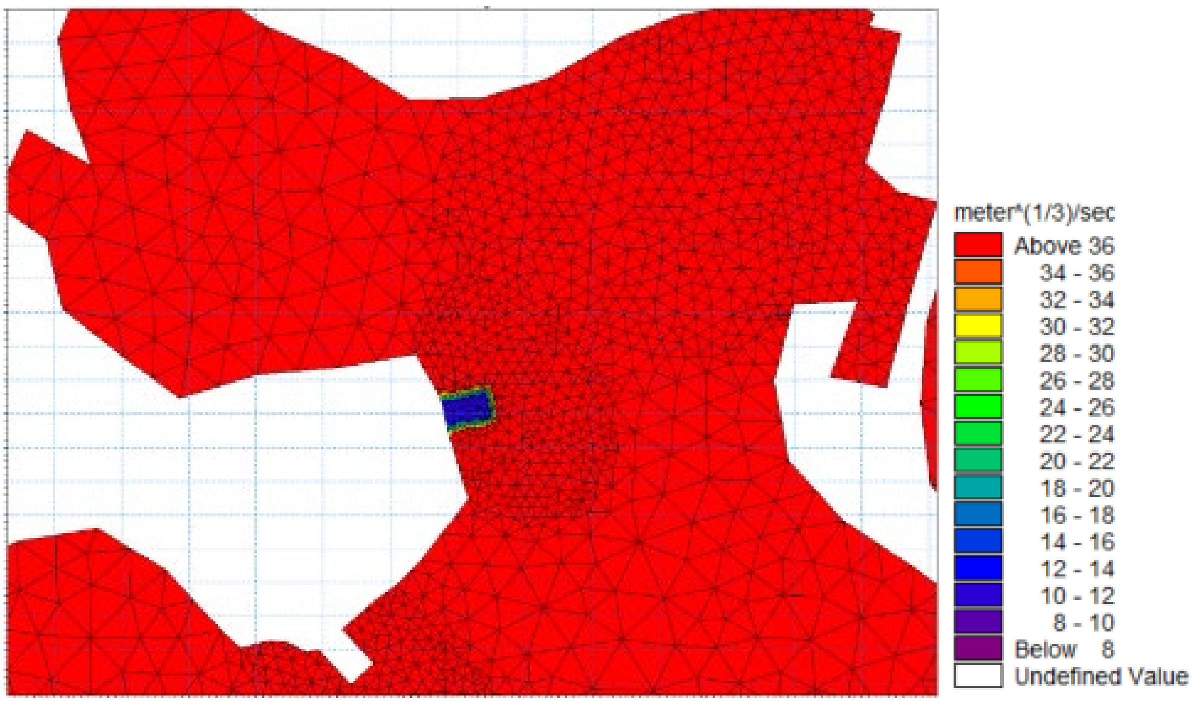


Figure 2-11. Manning's *M* values in the vicinity of the proposed deck

2.4 HYDRODYNAMIC MODEL RESULTS

Attachment B provides detailed result graphics for depth-average velocities and bed shear stresses during low- and high-tide conditions for the existing condition and the four deck support alternatives. There would be very little difference in velocities or bed shear stress among the four deck support alternatives. For all four deck support alternatives, model results indicate there would be slight changes to the flow velocities and bed shear stresses.

Channel flow in the vicinity of the proposed deck would be reduced, resulting in a decrease in flow conveyance in the channel just east of the proposed deck. However, the decrease in flow conveyance is insignificant, as the deck support structure is a permeable structure. Depth-averaged velocities indicate that the flow conveyance in the channel is inversely proportional to total roughness at the deck-supported pile group. This means an increase in roughness at the deck results in a reduction in flow conveyance. The reduction in flow through the proposed deck would increase the main channel velocity slightly just east of the proposed deck, but the increase does not extend to the Cottage Park Yacht Club, Snake Island, or the Winthrop Yacht Club.

Attachment C provides a time-series plots of 16 locations near the proposed deck, and around the Cottage Park Yacht Club, Snake Island, and the Winthrop Yacht Club. The current speed and bed shear stress were examined under the spring- tide condition for the existing condition and the four deck support alternatives. The time series plots were developed to observe the differences between existing and proposed conditions associated with the four deck support alternatives at any given time and regardless of high, mid, or low tide conditions.

Among the 16 total locations modeled, the four deck support alternatives would cause changes in current speed and bed shear stress at the two locations that are nearest to the proposed deck. For the other 14 locations that are farther from the deck and closer to the Cottage Park Yacht Club, Snake Island, and the Winthrop Yacht Club, the difference between existing and proposed conditions are minor.

3 SEDIMENT TRANSPORT/SCOUR ANALYSIS

This section describes the sediment transport and scour analysis performed considering the grain sizes and flow characteristics in the vicinity of the proposed deck.

3.1 SEDIMENT CHARACTERISTICS

GEI Consultants, Inc. performed the bed gradation analysis collecting borings from the nearshore area of the proposed construction. Surficial sediment data collected in 2004 by USGS were used with boring logs to determine the spatial distribution of sediment characteristics in the larger Boston Harbor area.

Spatial distribution of sediment sizes in the model domain was generated using weighted inverse distance interpolation technique in Spatial Analyst extension of ArcMap version 10.8.1. Figure 3-1a shows spatial distribution of fine sediments in the Inner Boston Harbor that include clay and silt (mud). Results indicate bed sediments in the inner harbor area are composed of more than 50-percent of mud. Figure 3-1b shows an enlarged view of the spatial distribution of fine sediments in the vicinity the proposed deck.

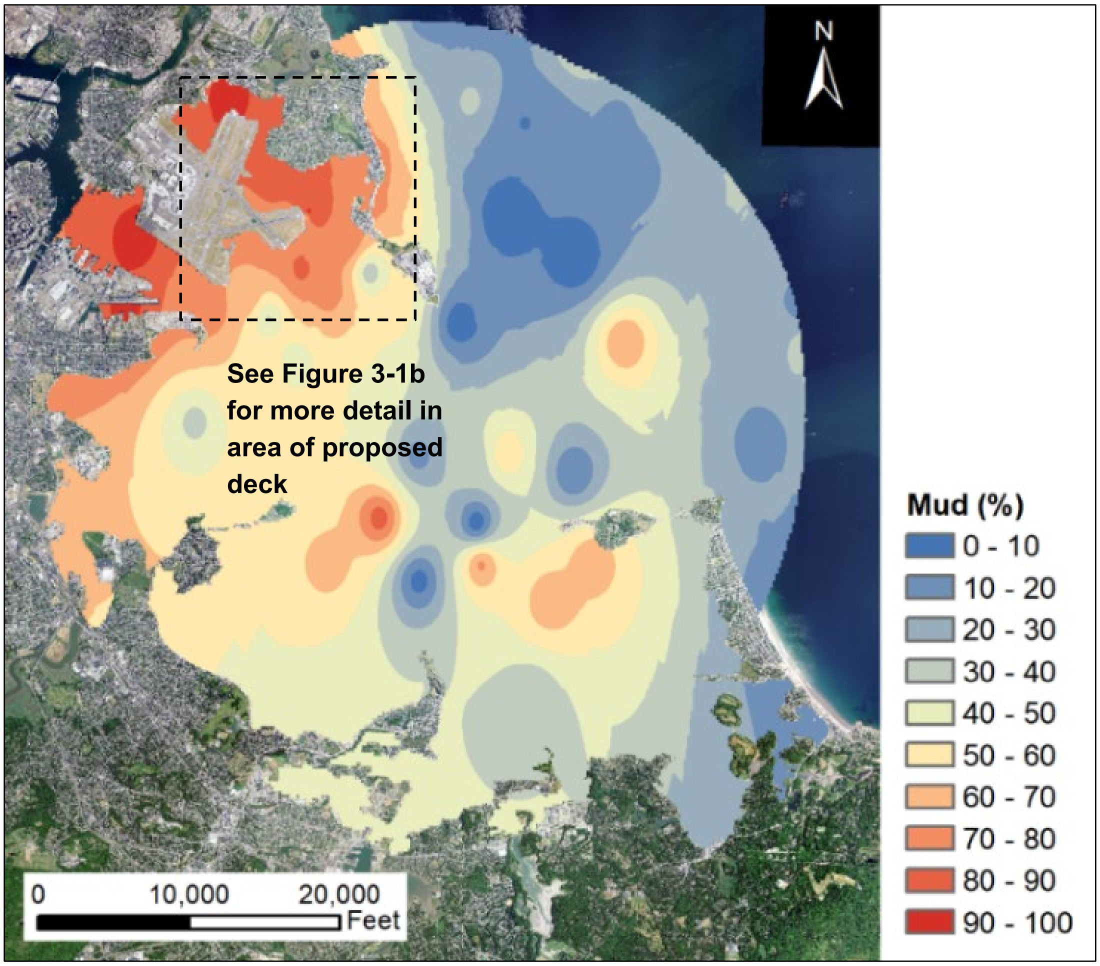


Figure 3-1a. Spatial distribution of fine sediments in the model domain - Boston Harbor area

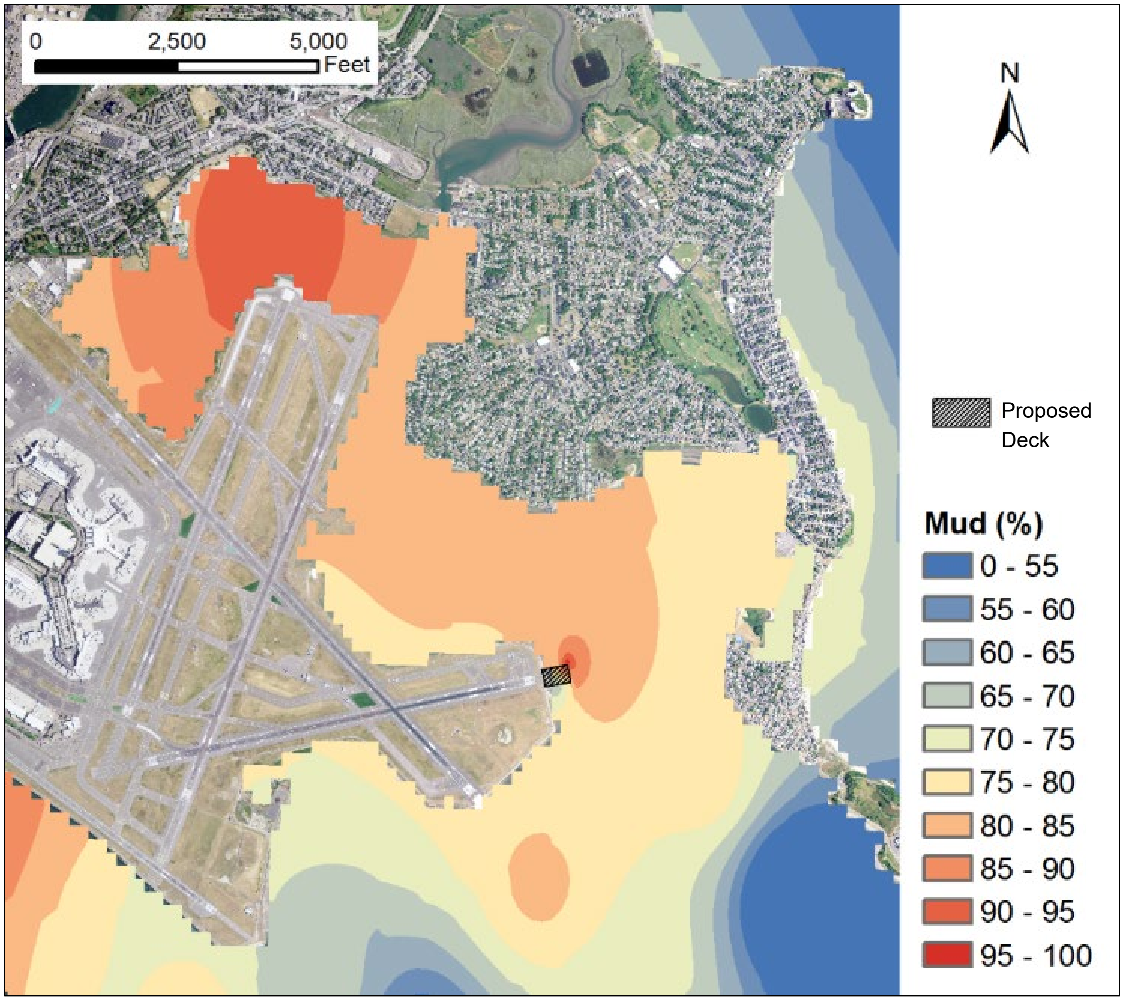


Figure 3-2b. Spatial distribution of fine sediments in area of proposed deck

Critical shear stresses at each sediment mixture were calculated using erosion threshold formulas for mixed cohesive and non-cohesive sediments proposed by Wu et al. (2018). Critical shear stress is defined as the bed shear stress below which sediment movement does not occur. Similarly, spatial distribution of critical shear stresses for the Boston Harbor area was calculated using weighted inverse distance method in ArcMap. Figure 3-2a shows the spatial variation of critical shear stress in the lager Boston Harbor area. Figure 3-2b shows an enlarged view showing the spatial variation of critical shear stress in the vicinity of the proposed deck.

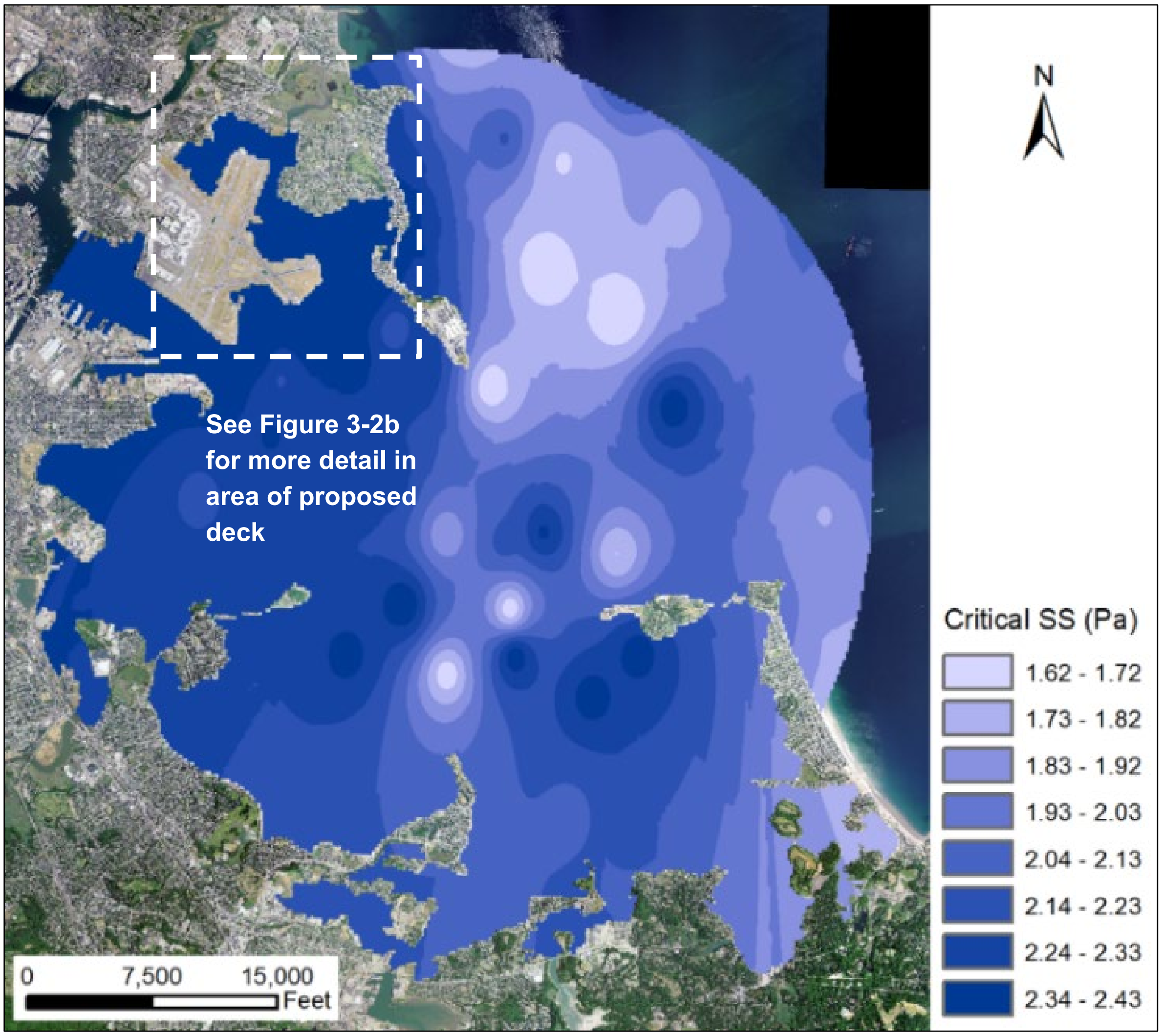


Figure 3-3a. Spatial variation of critical shear stress in the studied area of Boston Harbor

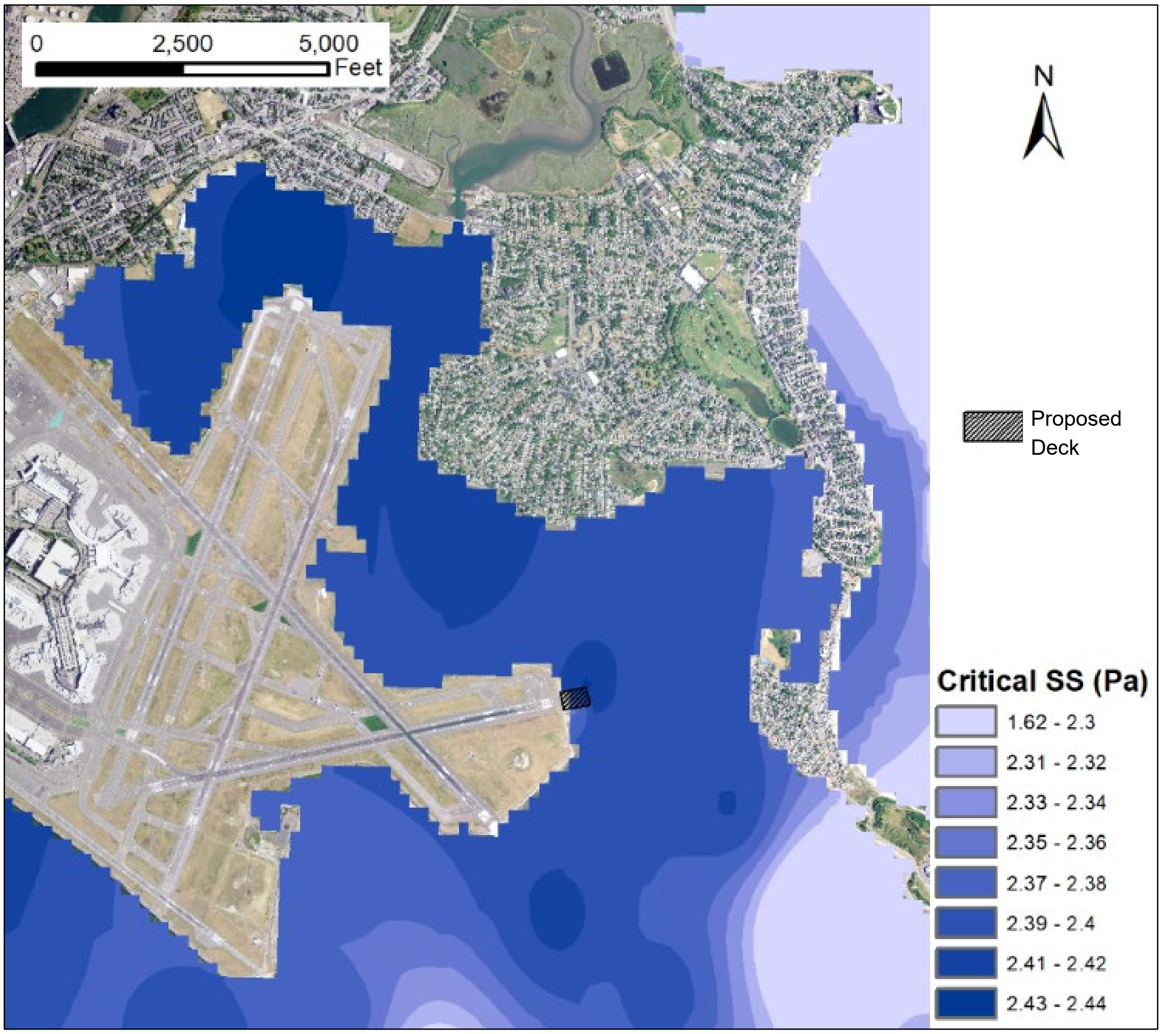


Figure 3-4b. Spatial variation of critical shear stress in the area of the proposed deck

3.2 SCOUR ANALYSIS

3.2.1 ADOPTED HEC-18 GUIDELINES

Scour analysis was performed for each deck support alternative using the Federal Highway Administration (FHWA) Hydraulic Engineering Circulation No. 18 (HEC-18) guidelines for scour at supporting structure groups for cohesive sediments. Equivalent diameter (a_{eq}) for each structure group was calculated with Eq. (2),

$$a_{eq} = a_{prog} \times K_{Gmn} \tag{2}$$

where a_{prog} = sum of non-overlapping projected widths of piles and K_{Gmn} = coefficient for structure spacing, number of aligned rows (m), and number of aligned columns (n). Eq. (3) shows the formula to calculate K_{Gmn}.

$$K_{Gmn} = 1.11 \frac{m^{0.0396}}{n^{0.5225}(G/D)^{0.1153}} \tag{3}$$

Figure 3-3 illustrates the concept of equivalent diameter described in HEC-18.

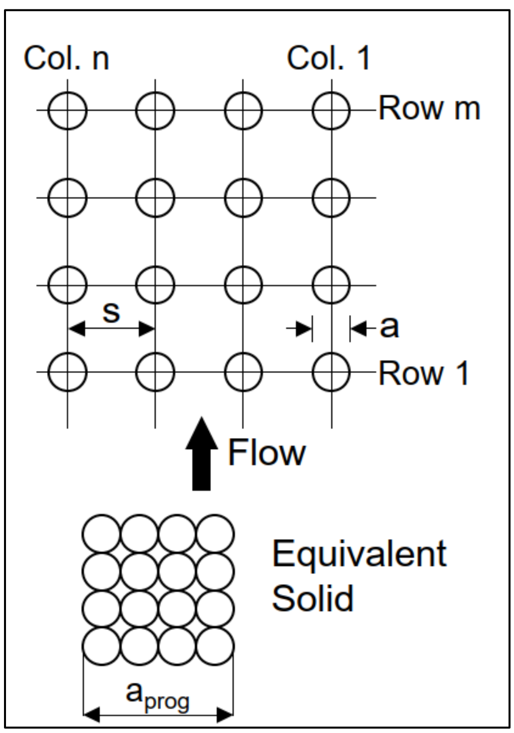


Figure 3-5. Projected width of piles for aligned flow (HEC-18)

Due to the high volume of fine sediments in the area near the proposed deck, scour depth was calculated using the recommended pier scour equation for cohesive materials. Critical shear stress at the location of proposed construction was determined as 2.43 Pascals (Pa, a measure of pressure). Using the relationship for critical shear stress versus critical velocity (V_c), the value of V_c was calculated as 0.69 meters per second (m/s). Eq. (4) provides the formula to calculate pier scour for cohesive materials,

$$y_s = 2.2 K_1 K_2 a_{eq} \left(\frac{2.6 V_1 - V_c}{\sqrt{g}} \right)^{0.7} \tag{4}$$

where y_s = depth of scour, K_1 = correction factor for pier nose shape, K_2 = correction factor for flow angle of attack, a_{eq} = equivalent diameter for pile group, V_1 = mean velocity of flow directly upstream of the pier (approach velocity), V_c = critical velocity for initiation of erosion of the cohesive materials, and g = gravitational acceleration. K_1 for square piles and circular cylindrical piles are 1.1 and 1.0, respectively. For tidal conditions, pile-arrangements are in line with the flow; therefore, the value of K_2 is 1.0.

Value of the approach velocity was selected as the mean flow velocity experienced by the pile located most offshore from the shoreline. Flow velocity at the most offshore pile would be higher than the velocities at rest of the piles, which are nearer to shoreline. Even at peak water level during spring tide, approach velocities with the four deck support alternatives were found to be significantly less than the critical velocity required to mobilize sediments in the vicinity of the proposed deck, which is 0.69 m/s).

The model requires substantially larger approach velocities than the actual conditions calculated by the flow model for each the deck support alternatives to compute non-zero scour depths, because to provide meaningful and useful output, the approach velocity must be greater than the critical velocity. Therefore, in order to conduct a comparative analysis of the scour effects, in the scour calculations of all four deck support alternatives, the approach velocity (V_1) was calculated as 1.5 times the actual approach velocity that was calculated by the flow model at peak water level during the spring tide. This yields a scour result for each alternative that is useful for comparative purposes, but that is overstated in terms of the effects of typical conditions.

3.2.2 SCOUR AT DECK-SUPPORTED STRUCTURE GROUPS

The scour hole around the pile or caisson would resemble a cut cone as a pile/caisson could experience flow velocities from varying directions due to flood / ebb tides and wave conditions. Therefore, the maximum scour volume was calculated as volume of cut cone minus pile volume corresponding to the scour depth. Figure 3-4 shows the conic-shaped scour hole and volume occupied by the pile. Relevant mathematical relationships for scour volume calculations are described in the subsequent paragraphs.

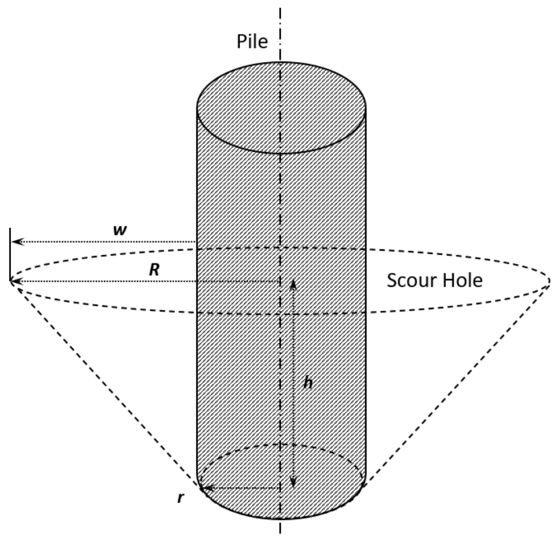


Figure 3-6. Geometric parameters of the conic-shaped local scour hole

Geometric relationship for the volume of cut cone is shown in Eq. (4) as follows,

$$V = \frac{\pi h}{3}[R(R+r)+r^2] \tag{5}$$

Where h = scour depth, w = scour width (= 2h; based on HEC-18 guidelines), R = larger radius of the cut cone (= w+r = 2h+r), and r = radius of the pile. Volume of the scour hole at a single structure will be calculated by Eq. (5) as follows.

$$V_{scour} = \frac{\pi h}{3}[R(R+r)+r^2] - \pi r^2 h \tag{6}$$

The HEC-18 guidelines recommend using 2.0 times the depth of local scour as scour width on each side of the pier. Results of maximum scour depth and maximum total volume of seabed scour for each deck support alternative are summarized in Table 3-1.

Scour estimates provided in Table 3-1 are the maximum pile scour values calculated according to HEC-18 guidelines for spring tide condition, with the increased approach velocities discussed in Section 3.2.1. As noted in Section 3.2.1, these values are useful for comparative purposes, but are overstated in terms of the effects of typical conditions.

The maximum scour would not occur during a single spring tide cycle, but rather over a much longer period. Erosion of cohesive sediments is a time-dependent phenomenon, occurring at a slow rate at a magnitude of millimeters per hour (mm/hr). Cohesive sediments erode particle by particle when bed shear stress exceeds the critical shear stress (i.e., surface erosion). As bed shear stress further increases, cohesive sediment bed fails and starts to erode as a block of sediments (i.e., mass erosion). Under these slow rates of surface and mass erosion, cohesive sediment bed at the proposed deck site would need to undergo long-term spring tides to achieve the maximum predicted scour volume shown in Table 3-1.

For the four deck support alternatives, approach velocities differ from each structure arrangement due to the difference in flow through the structures. For example, the alternatives having a higher number of piles/caissons show higher resistance to flow compared to structure groups with fewer piles/caissons. Therefore, more flow goes through a structure group with fewer piles/caissons resulting in an increase of velocity.

Table 3-1. Maximum scour estimates for the deck support alternatives

DECK SUPPORT ALTERNATIVE	TOTAL NO. AND TYPE	APPROACH VELOCITY (m/s)	SCOUR DEPTH AT EACH PILE (m)	SCOUR WIDTH AT EACH PILE (m)	TOTAL SEABED SCOUR (m^3)
1	416 1.67’ square piles	0.21	0.449	0.898	291.3
2	326 1.67’ square piles	0.23	0.472	0.945	255.2
3	160 60-inch diameter caissons	0.20	0.788	1.577	804.5
4	128 60-inch diameter caissons	0.21	0.887	1.774	855.8

Note: These results are based on the artificially increased approach velocities discussed in Section 3.2.1 and as noted there, the results are useful for comparative purposes, but are overstated in terms of the effects of typical conditions.

The scour analysis approach above from HEC-18 was adopted to perform scour estimates for the square piles or caissons for each deck-supported alternative. For square piles, similar cut-conic shaped scour hole should occur. The radius of the inscribed circle for a square pile was used for scour volume calculations associated with square piles.

3.3 CONCLUSION

As shown in Table 3-1, the scour analysis indicates that both pile alternatives, Deck Support Alternatives 1 and 2, would result in substantially lower volumes of seabed scour than the caisson alternatives, Deck Support Alternatives 3 and 4. The scour analysis indicates that Deck Support Alternative 2 would result in the lowest volume of seabed scour. Even with the artificially increased approach velocities discussed in Section 3.2.1 and the resultant scour effects, under the slow rates of erosion illustrated by this analysis, the scour volumes for all of the alternatives would be modest at the proposed deck site and would need to undergo very long-term spring tides to achieve their maximum predicted scour volumes.

This scour analysis was used in the consideration of the four deck support alternatives in Chapter 3, *Alternatives Considered,* of the Draft Environmental Impact Report (DEIR). Chapter 3 documents that Deck Support Alternative 2 is also superior to the other deck support alternatives with regard to construction impacts to the operation of the airfield, other environmental impacts, and construction impacts to the surrounding community. For these reasons, Massport designated Deck Support Alternative 2 as the Proposed Project. Section 4 of this Report assesses the sediment transport and scour impacts of Deck Support Alternative 2 on the immediate area of the proposed deck, Cottage Park Yacht Club, Snake Island, and the Winthrop Yacht Club.

.

4 IMPACT ASSESSMENT

WSP performed an assessment of the potential impacts of the Proposed Project, Deck Support Alternative 2, with regard to potential changes to sediment transport and scour in the vicinity of the proposed deck and in the surrounding waters around the Cottage Park Yacht Club, Snake Island, and the Winthrop Yacht Club.

4.1 ADOPTED HEC-18 GUIDELINES

As bed sheer stress and velocity are core attributes to the processes of sediment transport and scour (i.e., increased bed sheer stress and velocity indicate increased sediment transport capacity and scour conditions), a MIKE 21 2-D model was developed to evaluate these two parameters under the existing condition as compared to proposed conditions that would result from Deck Support Alternative 2 in the vicinity of the proposed deck, the Cottage Park Yacht Club, Snake Island, and the Winthrop Yacht Club. Following the FHWA HEC-18 procedure, WSP then estimated the potential changes in local scour in the vicinity of the proposed piles.

Figure 4-1 depicts the predicted increase (change) in velocities under proposed conditions during high-, mid-, and low-tide respectively, based on the MIKE 21 2-D model results. The light green areas represent negligible or close to zero increase in velocity with the Proposed Project, as compared to the existing condition, while the red color indicates the largest increase in velocity. It is important to note that the model predicted very little difference in velocity overall during proposed condition as compared to the existing condition. Based on the MIKE 21 2-D coastal modeling results, the maximum velocities in the vicinity of the proposed deck are 0.116 m/s for the existing condition and 0.212 m/s for the proposed condition. Thus, there is only a 0.1 m/s magnitude difference in velocity locally at the project site and negligible change in vicinity of the Cottage Park Yacht Club, Snake Island, and the Winthrop Yacht Club.

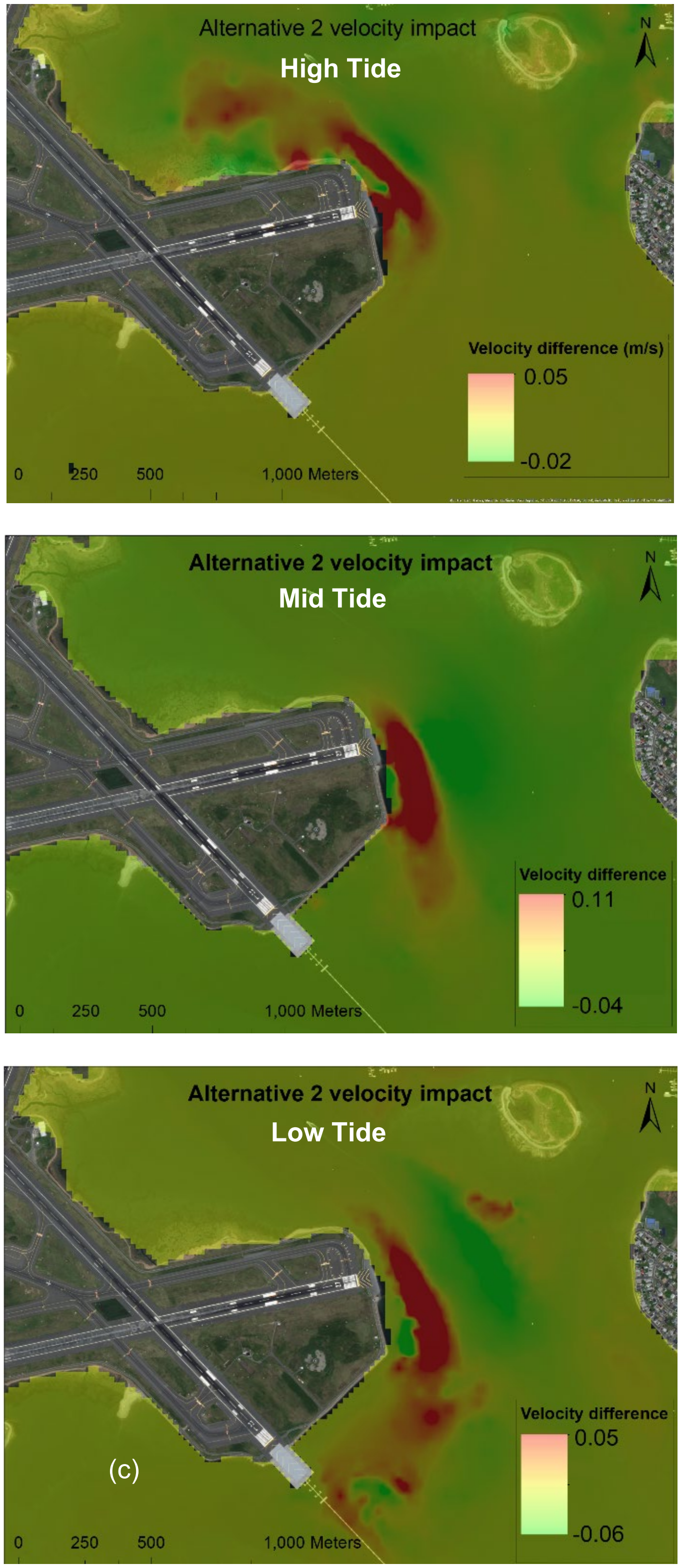


Figure 4-1. Change in velocity magnitude (proposed minus existing)

Figure 4-2 depicts the combined areas where the MIKE 21 model predicted that velocities would increase up to 0.1 m/s during a full tide cycle. Since scour is directly related to velocity, the areas where the model predicted an increase in velocity during proposed conditions represent the areas for potential localized scour and sediment transport. Figure 4-2 is further subdivided depending on how many times out of the three considered conditions (high-, mid- or low-tide) increased velocities were predicted:

- Green: The model predicted increases in velocity during one out of the three conditions (high-, mid- or low-tide).
- Blue: The model predicted increases in velocity during two of the three conditions (high-, mid- or low-tide).
- Red: The model predicted increases in velocity during all three conditions (high-, mid- or low-tide).

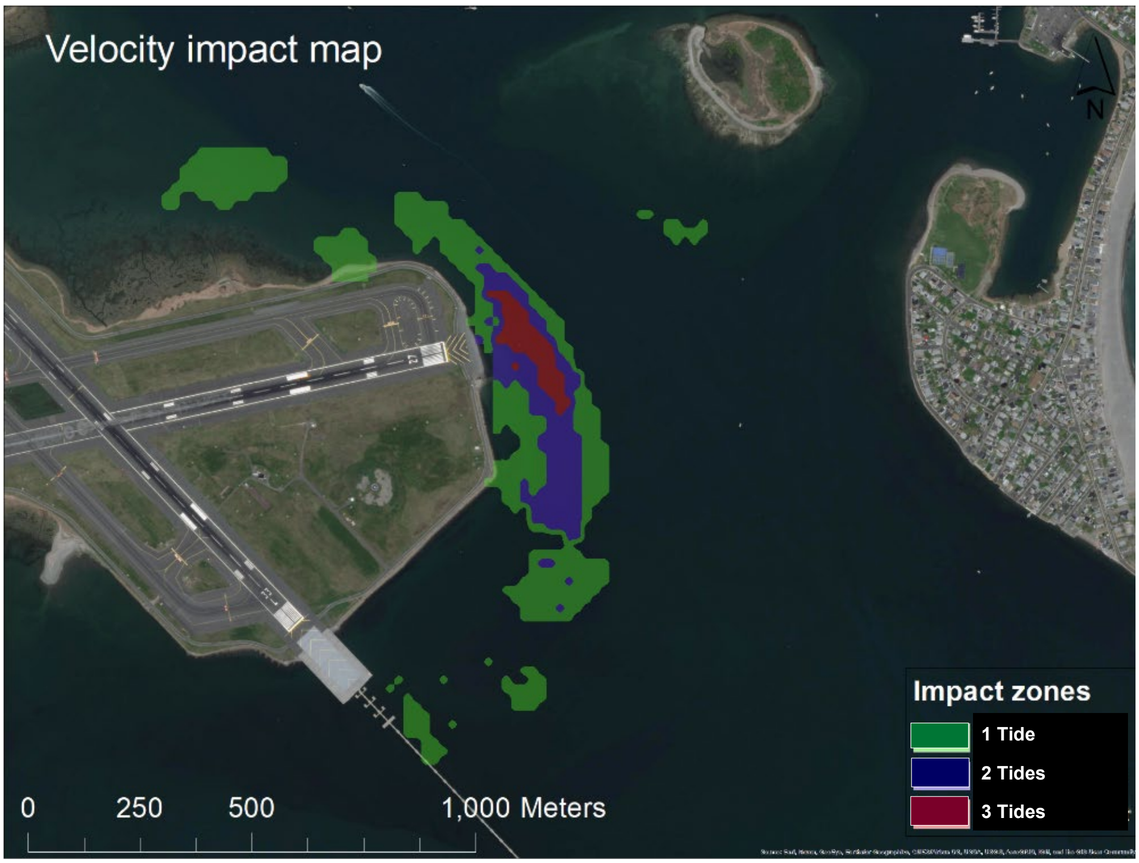
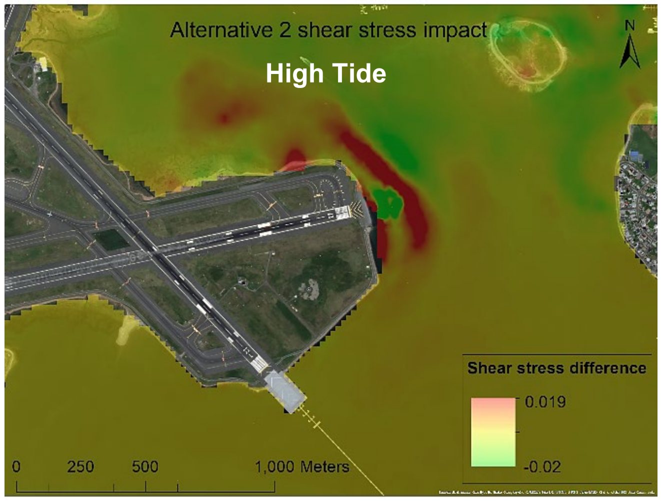
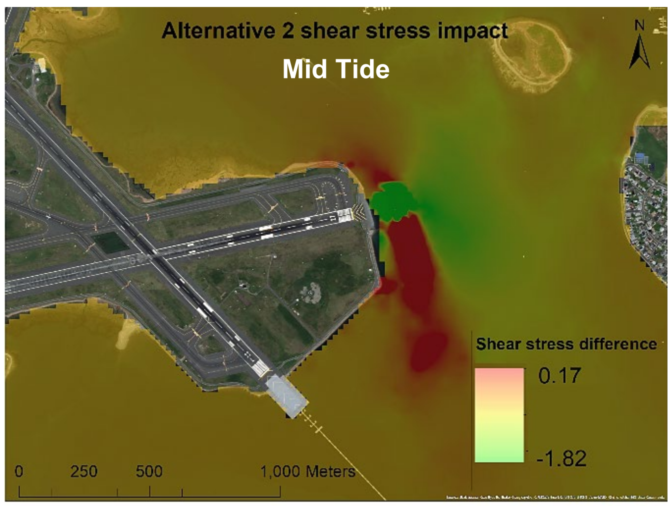


Figure 4-2. Impacted areas due to change in velocity magnitude with the combined effect of high, mid, and low tide conditions

The zone affected by 3 tides is limited to the area directly in the vicinity of the proposed piles, indicating only localized scour during proposed conditions. The analysis using the HEC-18 method corroborated this determination that the Proposed Project would only generate limited scour.

Figure 4-3 and Figure 4-4 show a similar analysis of predicted increases in bed shear stress during existing and proposed conditions. Similar to the analysis of velocity changes, the model predicted an increase in shear stresses under proposed conditions mainly in the vicinity of the Proposed Project on the western side of the channel. The maximum shear stresses in the vicinity of proposed expansion are 0.025 Pa for existing condition and 0.199 Pa with the Proposed Project. A maximum difference in shear stress (0.17 Pa) is only observed during mid-tide conditions.





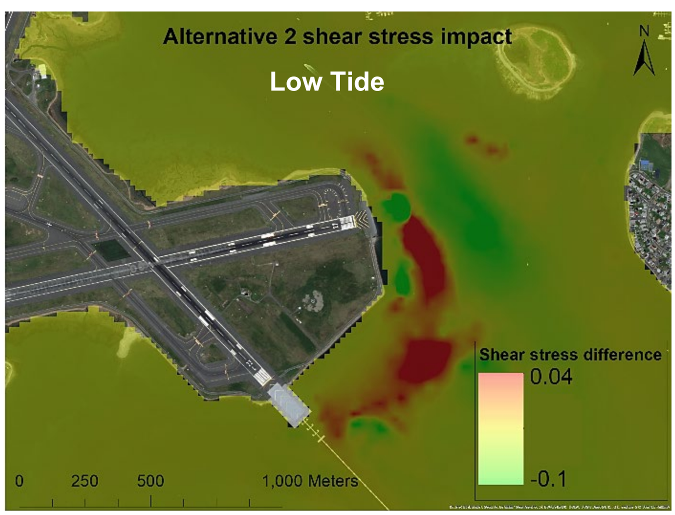


Figure 4-3. Change in bed shear stress (proposed minus existing)

Figure 4-4. Impacted area due to change in shear stress with the combined effect of high, mid, and low tide conditions

4.2 CONCLUSION

The results of the impact analysis indicate that the Proposed Project would result in minor localized increases in velocity and shear stress, resulting in negligible increases in scour potential near the Proposed Project. The impact analysis indicates that there would be no velocity and sediment impact and therefore, no increase in scour due to the Proposed Project near the Cottage Park Yacht Club, Snake Island, or the Winthrop Yacht Club

BIBLIOGRAPHY

- Briaud, J.L., H.C. Chen, K.A. Chang, S.J. Oh, S. Chen, J. Wang, Y. Li, K. Kwak, P. Nartjaho, R. Gudaralli, W. Wei, S. Pergu, Y.W. Cao, and F. Ting, (2011). “The Sricos – EFA Method.” Summary Report, Texas A&M University.
- Federal Highway Administration (2012). “Hydraulic Engineering Circular No. 18 – Evaluating scour at bridges.”
- GEI Consultants, Inc. (2020). “Geotechnical Data Report – Logan RW 9-27 Safety Area Improvements Project, Massachusetts Port Authority.”
- Manheim, F. T. (1992). “The legacy of contaminated sediments in Boston Harbor.” United States Geological Survey.
- Safie, O. and Tominaga, A. (2019). “Effects of pile density and arrangement on flow characteristics around a pile-group dike.” In Proceedings of the 38th IAHR World Congress, Panama City, Panama (pp. 4380-4390).
- Signell, R. P., and Butman, B. (1992). Modeling tidal exchange and dispersion in Boston Harbor. Journal of Geophysical Research: Oceans, 97(C10), 15591-15606.
- Woods Hole Group (2022). “Winthrop ADCP Wave and Current Data Delivery.”
- Wu, W. and Zhiguo, H. E. (2009). “Effects of vegetation on flow conveyance and sediment transport capacity.” *International Journal of Sediment Research*, *24*(3), 247-259.
- Wu, W., Perera, C., Smith, J., and Sanchez, A. (2018). “Critical shear stress for erosion of sand and mud mixtures.” *Journal of Hydraulic Research*, *56*(1), 96-110.

ATTACHMENT A

CALCULATION OF MANNING'S ROUGHNESS COEFFICIENTS

JUNE 17, 2022

This attachment calculates the Manning's roughness coefficients used to calculate the potential sediment transport and scour impacts of the four deck support alternatives. WSP developed a model to evaluate the existing conditions and the potential for increased sediment transport and scour from the four alternatives. The modeling analysis focused on the seabed in the immediate vicinity of the proposed deck, and in the vicinity of Snake Island and the Cottage Park and Winthrop Yacht Clubs (see Figure B-1). The analysis was conducted using available seabed mapping and two months of site-specific tidal and current modeling.

Manning's roughness coefficients are calculated referring to rigid vegetation roughness in open channels based on the method mentioned in Wu and He (2009)[3] as shown in Eq. (1),

$$n^2 = n_b^2 + \frac{1}{2g(1-c_v)} C_d N_a A_v \eta_v^2 \frac{h_v}{h} R_s^{1/3} \tag{1}$$

where n is the Manning coefficient corresponding to the total roughness. For the channel with densely distributed vegetation, the drag of vegetation becomes the major contributor to the total resistance, and the term of n_b is determined as 0.0264 s/m$^{1/3}$ adopted from Signell and Butman (1992)[4]. The coefficient A_v is the projected area of vegetation element, h is the flow depth, and η_v is a coefficient of about 1.0. As an approximation, a vegetation stem is conceptualized as a cylinder with a height, h_v and a representative diameter, D. c_v is the vegetation volumetric concentration, defined as,

$$c_v = N_a \pi D^2 \min(h_v, h) / 4h \tag{2}$$

$N_a A_v$ is the projected area of vegetation stems per unit bed area, determined as,

$$N_a A_v = 4 c_v h / (\pi D) \tag{3}$$

The hydraulic radius R_s defined as,

$$R_s = \frac{h l_n}{2h + l_n} \tag{4}$$

where l_n is the lateral spacing of vegetation elements.

Here, the supporting structures are arranged in a staggered pattern with equal spacing, thus C_d can be determined using,

---

3 Weiming, W. U., & Zhiguo, H. E. (2009). "Effects of vegetation on flow conveyance and sediment transport capacity." International Journal of Sediment Research, 24(3), 247-2.

4 Signell, Richard P., and Bradford Butman. "Modeling tidal exchange and dispersion in Boston Harbor." Journal of Geophysical Research: Oceans 97.C10 (1992):

$$C_d = C_{dm} \Big/ \left(1 - \sqrt{\frac{4c_v h}{\pi \min(h_v, h)}}\right)^2 \qquad (5)$$

Where C_{dm} is the drag coefficient based on the constricted cross-sectional velocity[5].

A list of all parameters related to all four (4) pile / caisson arrangements are presented in Table A-1.

TABLE A-1 LIST OF PARAMETERS

Parameter name	Symbol	Unit	Alt. 1	Alt. 2	Alt. 3	Alt. 4
			Value			
Manning's M (=1/n)	M	$m^{1/3}/s$	5.19	7.39	3.98	5.17
Manning's n	n	$s/m^{1/3}$	0.19	0.13	0.25	0.19
Manning coefficient corresponding to the bed roughness	n_b	$s/m^{1/3}$	0.0264			
Gravitational acceleration	g	m/s^2	9.81			
Structure volumetric concentration	c_v	-	0.004	0.003	0.030	-0.023
Drag coefficient	C_d	-	2.37	2.32	1.80	1.70
Drag coefficient based on the constricted cross-sectional velocity	C_{dm}	-	2.05	2.05	1.17	1.17
Coefficient	η_v	-	1			
Water depth	h	m	2.225			
Hydraulic radius	R_s	m	1.463	1.709	1.680	1.790
Lateral spacing of structure elements	l_n	m	8.54	14.73	13.716	18.288
Structure density	N_a	No. per m	0.015	0.011	0.016	0.013
Dimension (side length/diameter)	D_p	m	0.51	0.51	1.52	1.52
Pile/shaft cross-sectional area	A_p	m^2	0.26	0.26	1.81	1.81
Projected area of structure element	A_s	m^2	18.16	11.35	33.82	27.06
No. of elements facing flow	N_e	-	16.00	10.00	10.00	8.00
No. of piles	N_p	-	400	326	160	128

5 Hoerner, Sighard F. "Fluid Dynamic Drag, published by the author." Midland Park, NJ (1965): 16-35.

Page left intentionally blank

ATTACHMENT B

RESULTS PART I - 2-D CONTOUR MAPS: CURRENT SPEED AND BED SHEAR STRESS

JUNE 17, 2022

1 INTRODUCTION AND OVERVIEW

This report presents the results of studies conducted to determine the potential sediment transport and scour impacts of the four deck support alternatives. WSP developed a model to evaluate the existing conditions and the potential for increased sediment transport and scour from the four alternatives. The modeling analysis focused on the seabed in the immediate vicinity of the proposed deck, and in the vicinity of Snake Island and the Cottage Park and Winthrop Yacht Clubs (see Figure B-1). The analysis was conducted using available seabed mapping and two months of site-specific tidal and current modeling.

Current speed (velocity of the water) and bed shear stress (pressure exerted along the seabed surface) are the major contributors to the processes of sediment transport and scour. To determine the potential for sediment transport and scour, WSP developed a model to evaluate these two parameters under existing conditions and the proposed conditions that would result from the four deck support alternatives. The results of the modeling show that for all four alternatives, there are minor changes in these parameters from the existing condition in the immediate vicinity of the proposed deck and there are no changes in the vicinity of Snake Island, the Winthrop Yacht Club or the Cottage Park Yacht Club.

2 TIDAL CONDITIONS MODELLED

There are two main tide cycles during a lunar month, spring and neap tides. During the spring tide, commonly known as "King Tide," the daily high-tide water levels are slightly higher than the daily high-tide water level during the neap tides. The modeling showed that, with respect to velocities, shear stress, and water depths, the spring tide conditions were slightly higher than the neap tide conditions. Therefore, only the spring tide condition were considered in this analysis. The existing condition reported includes modeled existing current speed and bed shear stress during the period of December 4 to 6, 2021.

For each of the four deck support alternatives, both low tide and high tide condition during the spring tides were modeled and are presented. Low and high tide spring tide conditions used in the modeling are illustrated in figures B-2 and B-3, respectively. The low tide condition modeled occurred at 8:20 PM EST on December 5, 2021 and is shown in Figure B-2 in meters NAVD88. The high tide condition modeled occurred at 11:00 EST on December 5, 2021 and is shown in Figure B-3 in meters NAVD88.

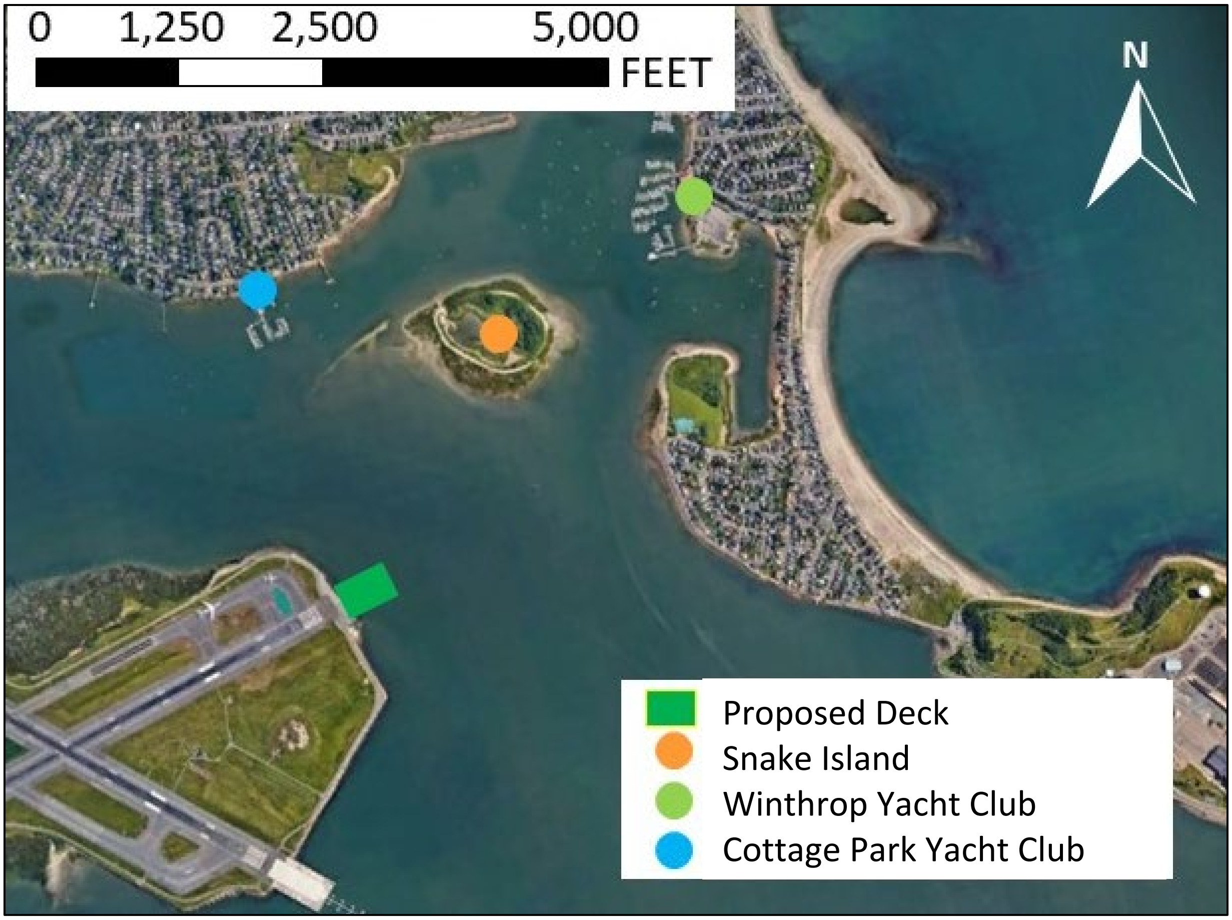


Figure B-1. Proposed Deck Location and Areas of Interest

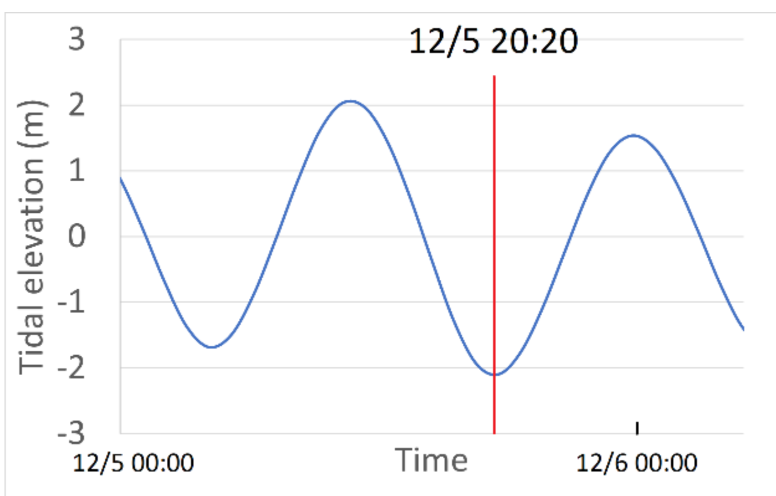


Figure B-2. Tidal Elevation Input of the Low Tide Condition (Red Line)

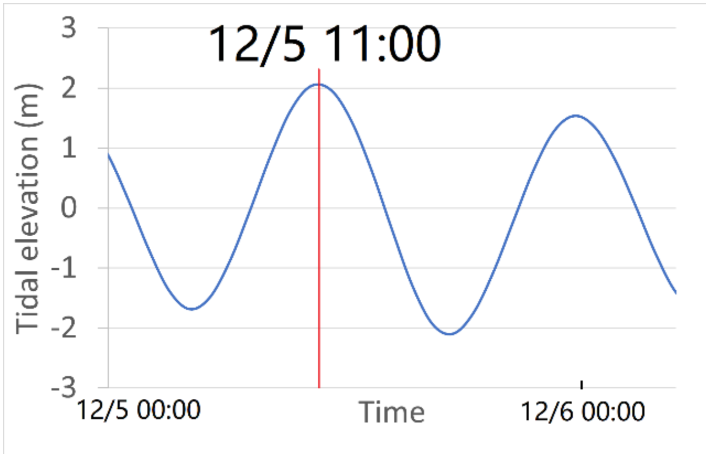


Figure B-3 Tidal Elevation Input of the High Tide Condition (Red Line)

3 RESULTS

This section presents the results of the analysis of each deck support alternative on current speed and bed shear stress.

3.1 CURRENT SPEED

The 2-D contour maps displaying existing conditions and the potential effects of each of the four deck support alternatives on tidal current speed at low tide are presented in Figures B-4 through B-8. The 2-D contour maps displaying existing conditions and the potential effects of each deck support alternative on tidal current speed at high tide are presented in Figures B-9 through B-13.

At low and at high tides, all four deck support alternatives would create a minor increase in tidal current speeds in the vicinity of the proposed deck when compared to the existing condition. Compared to the existing condition, each deck support alternative would slightly alter the flow pattern in the areas around Snake Island, but there would be no change in the overall velocity around Snake Island or around the Cottage Park and Winthrop Yacht Clubs from any of the deck support alternatives. Therefore, there would be no impact from changes in the current speed to Snake Island or the areas around the yacht clubs from any of the deck support alternatives.

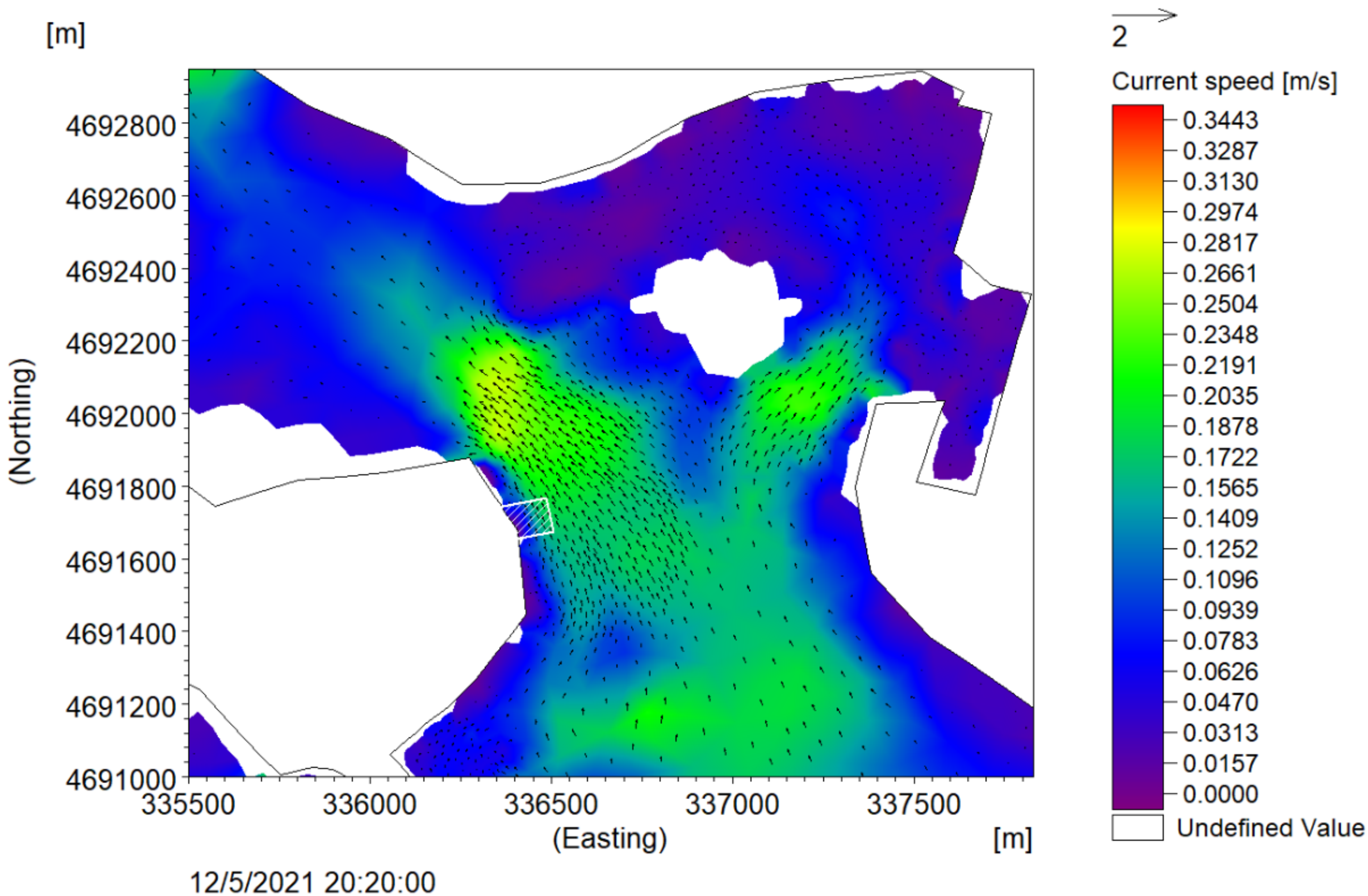


Figure B-4. Current Speed Under Low Tide for Existing Condition

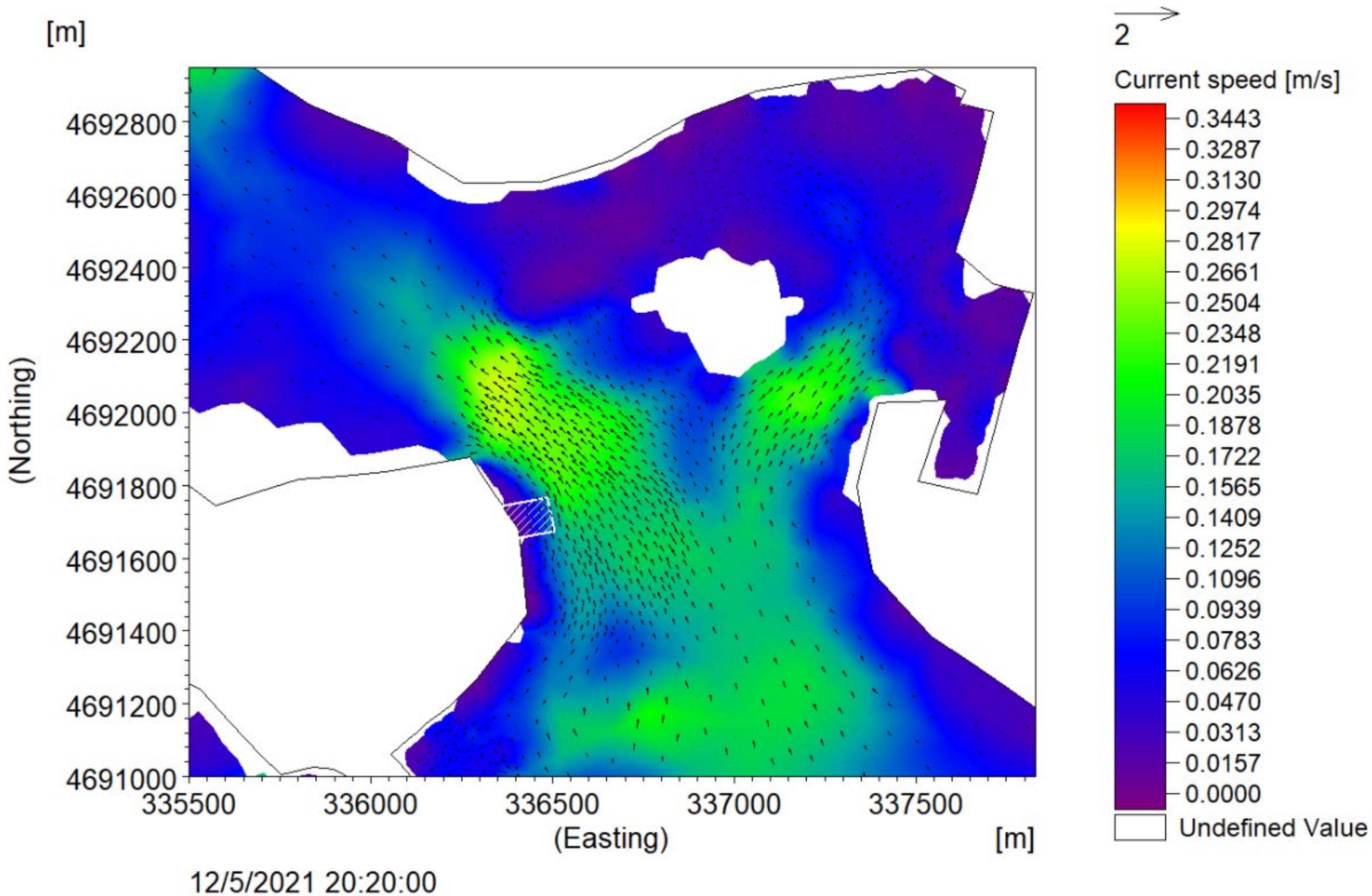


Figure B-5. Current Speed under Low Tide Condition with Deck Support Alternative 1 (Manning's M=5.19)

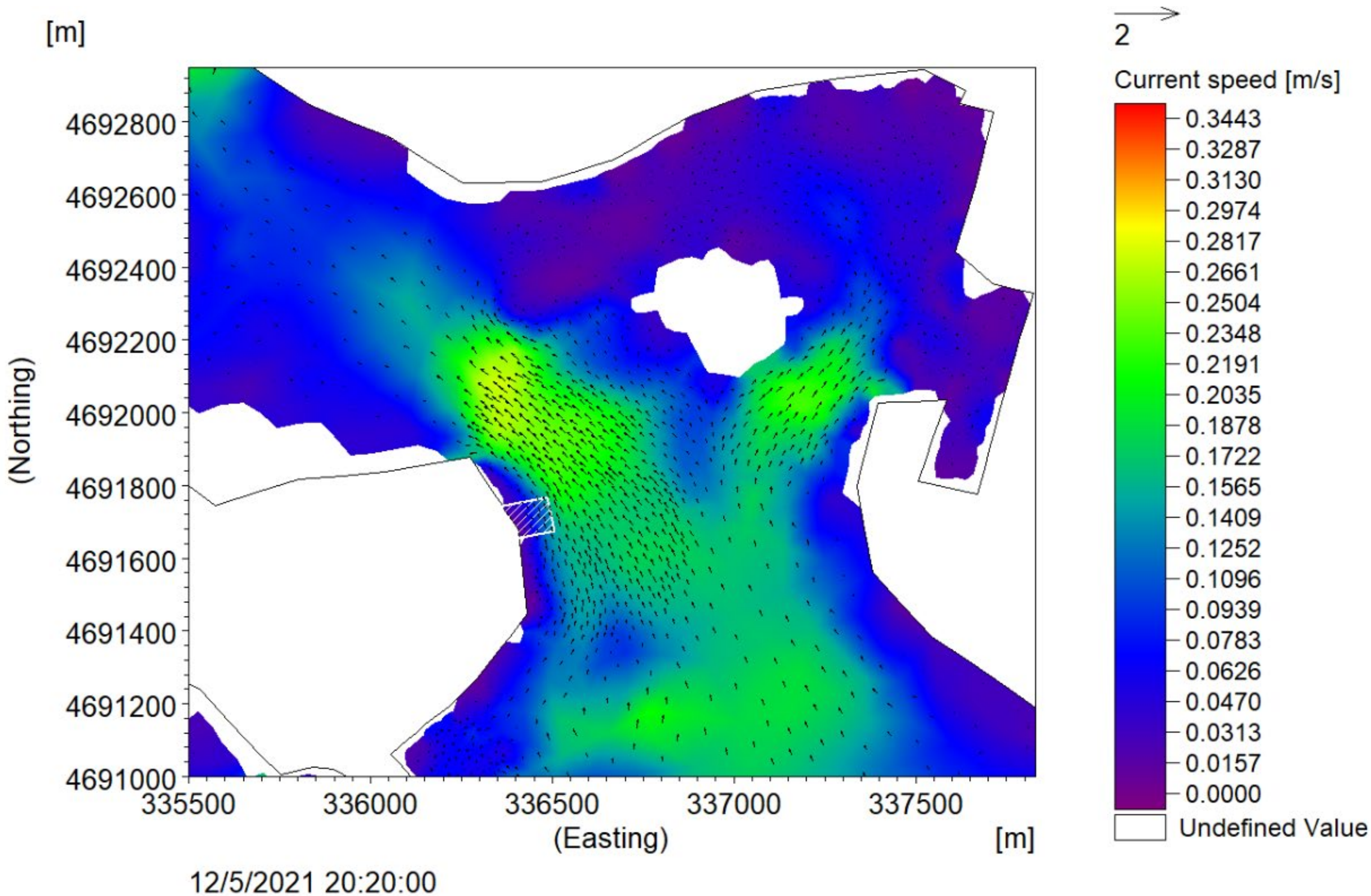


Figure B-6. Current Speed under Low Tide Condition with Deck Support Alternative 2 (Manning's M=7.39)

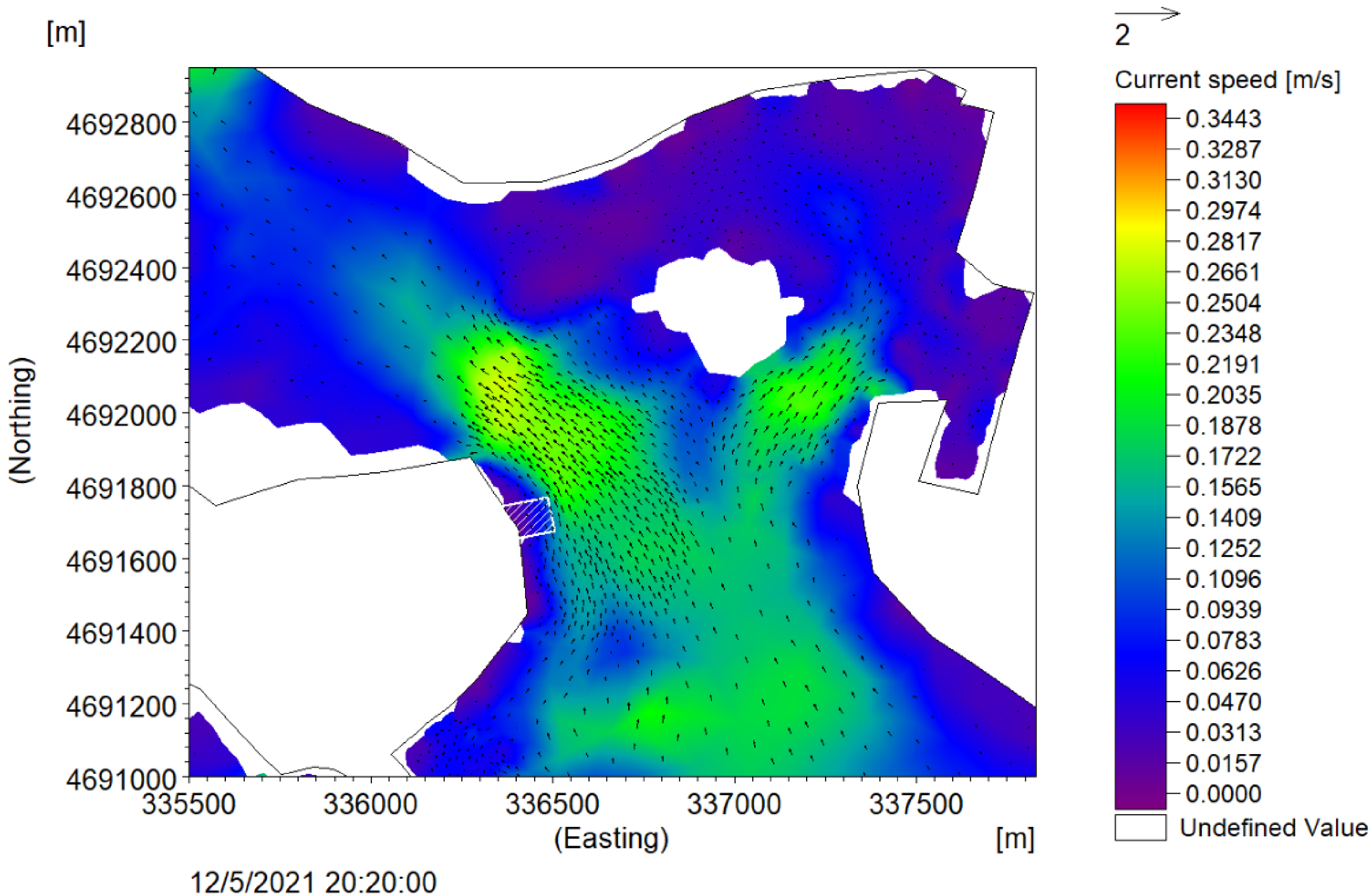


Figure B-7. Current Speed under Low Tide Condition with Deck Support Alternative 3 (Manning's M=3.98)

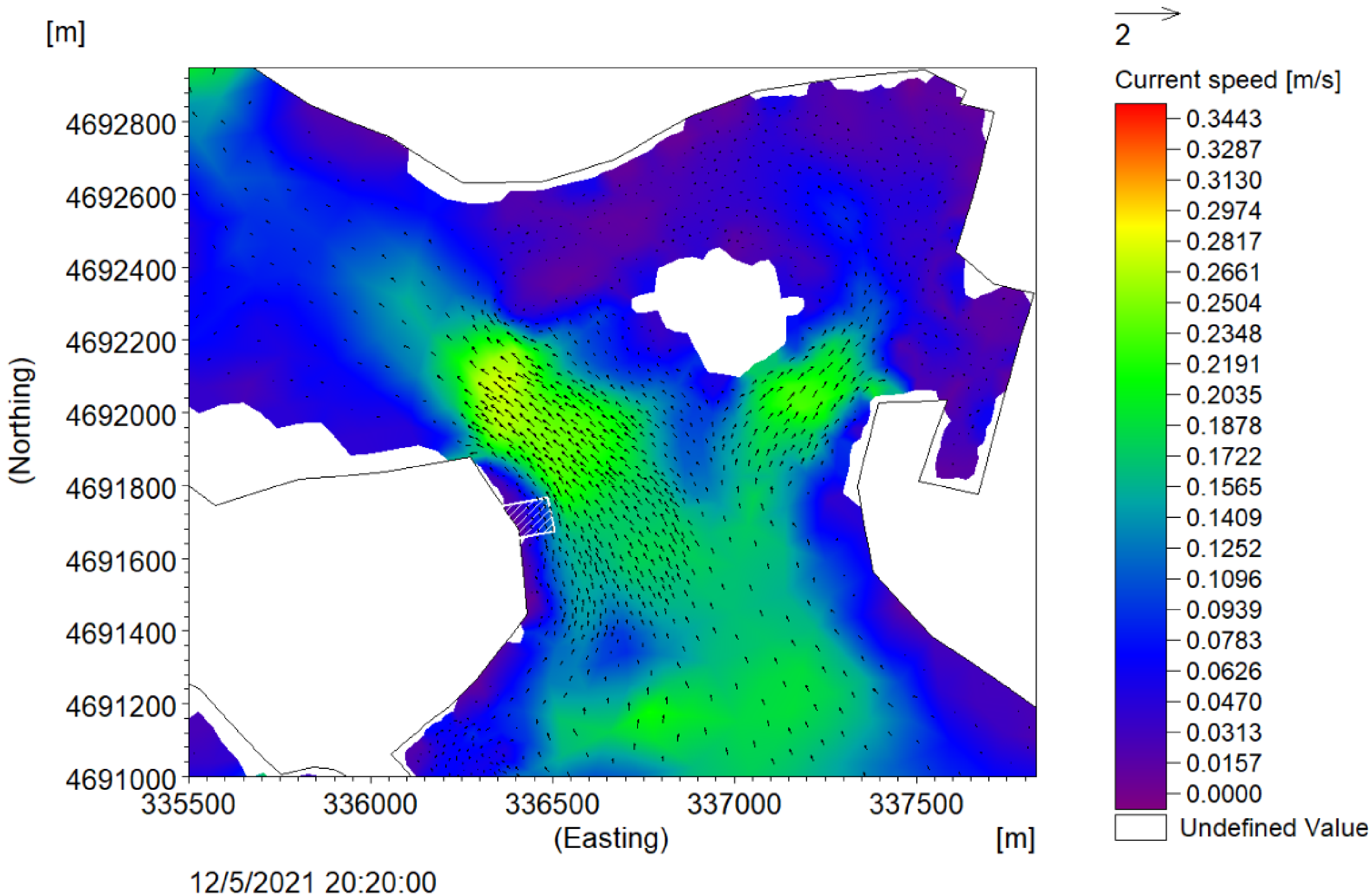


Figure B.8. Current Speed under Low Tide Condition with Deck Support Alternative 4 (Manning's M=5.17)

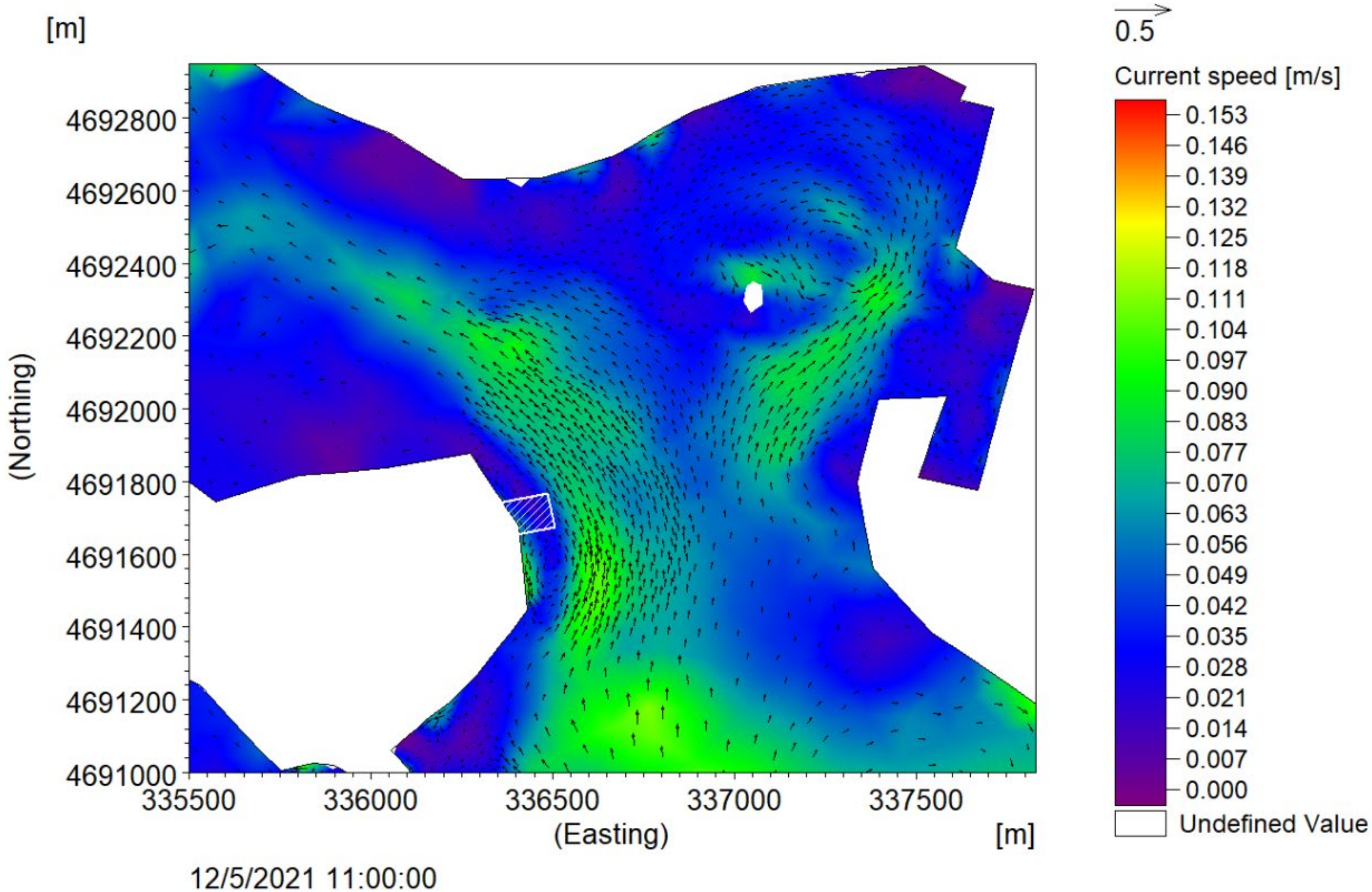


Figure B-9. Current Speed under High Tide and Existing Condition

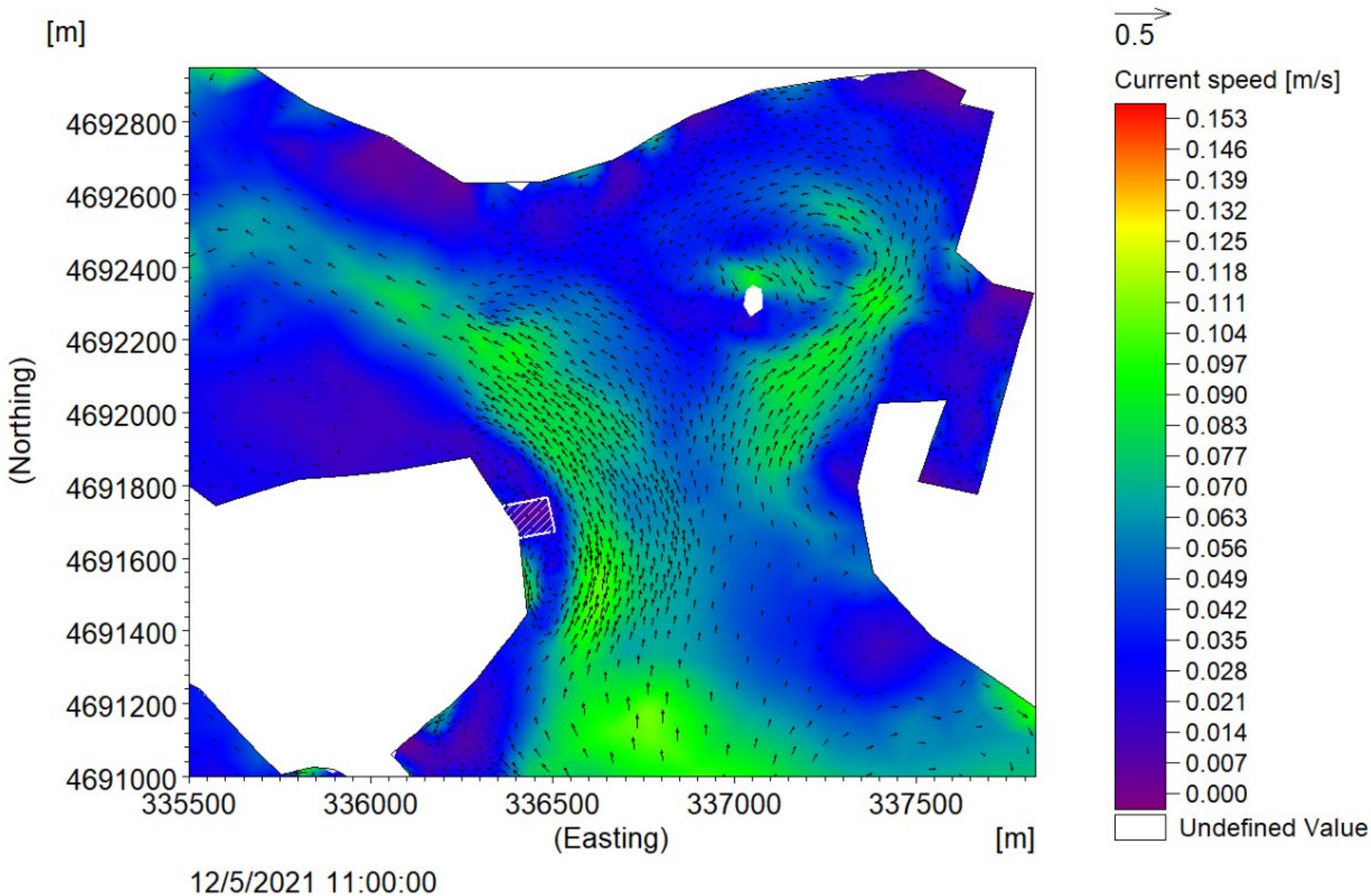


Figure B-10. Current Speed under High Tide Condition with Deck Support Alternative 1 (Manning's M=5.19)

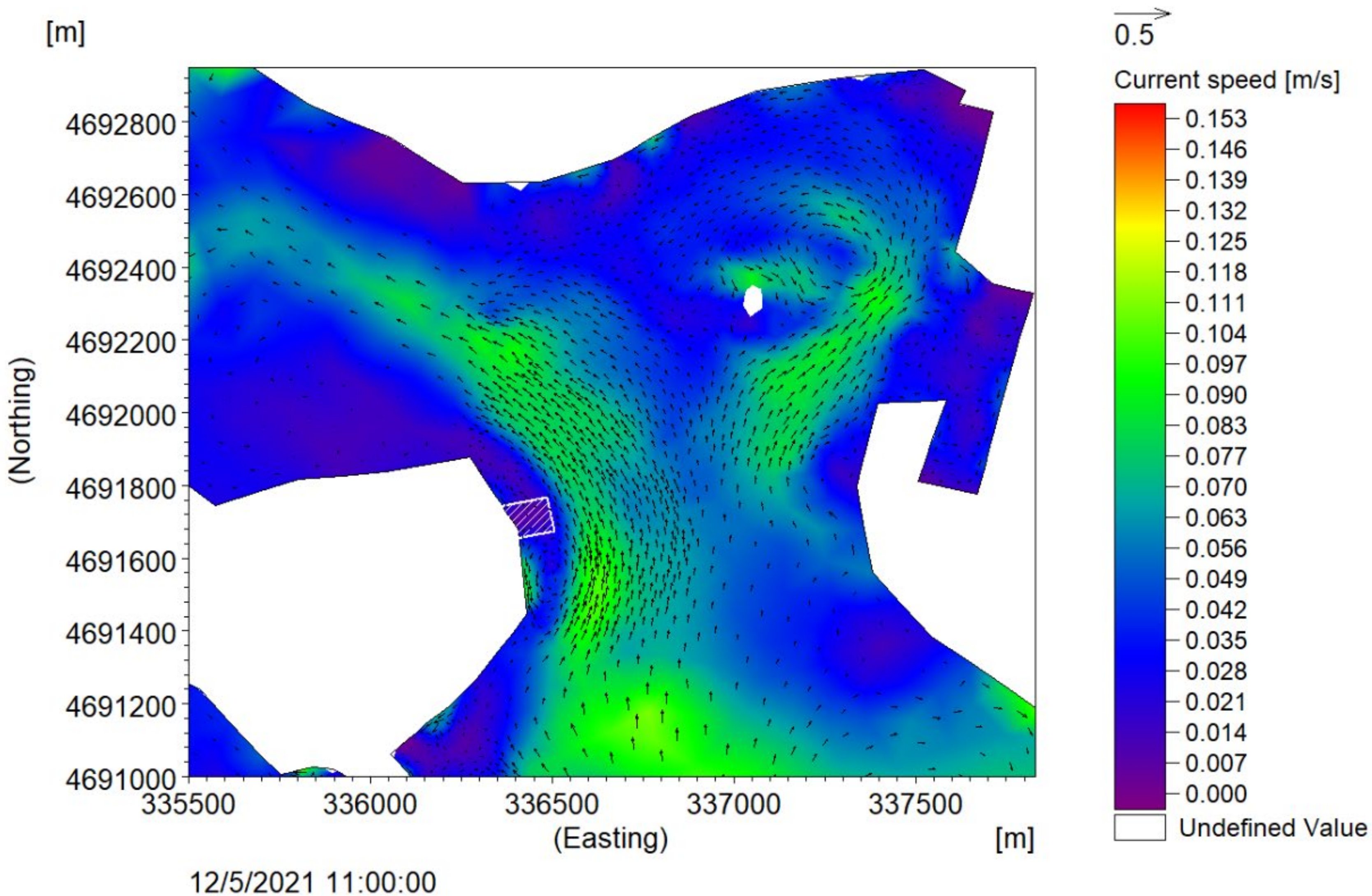


Figure B-11. Current Speed under High Tide Condition with Deck Support Alternative 2 (Manning's M=7.39)

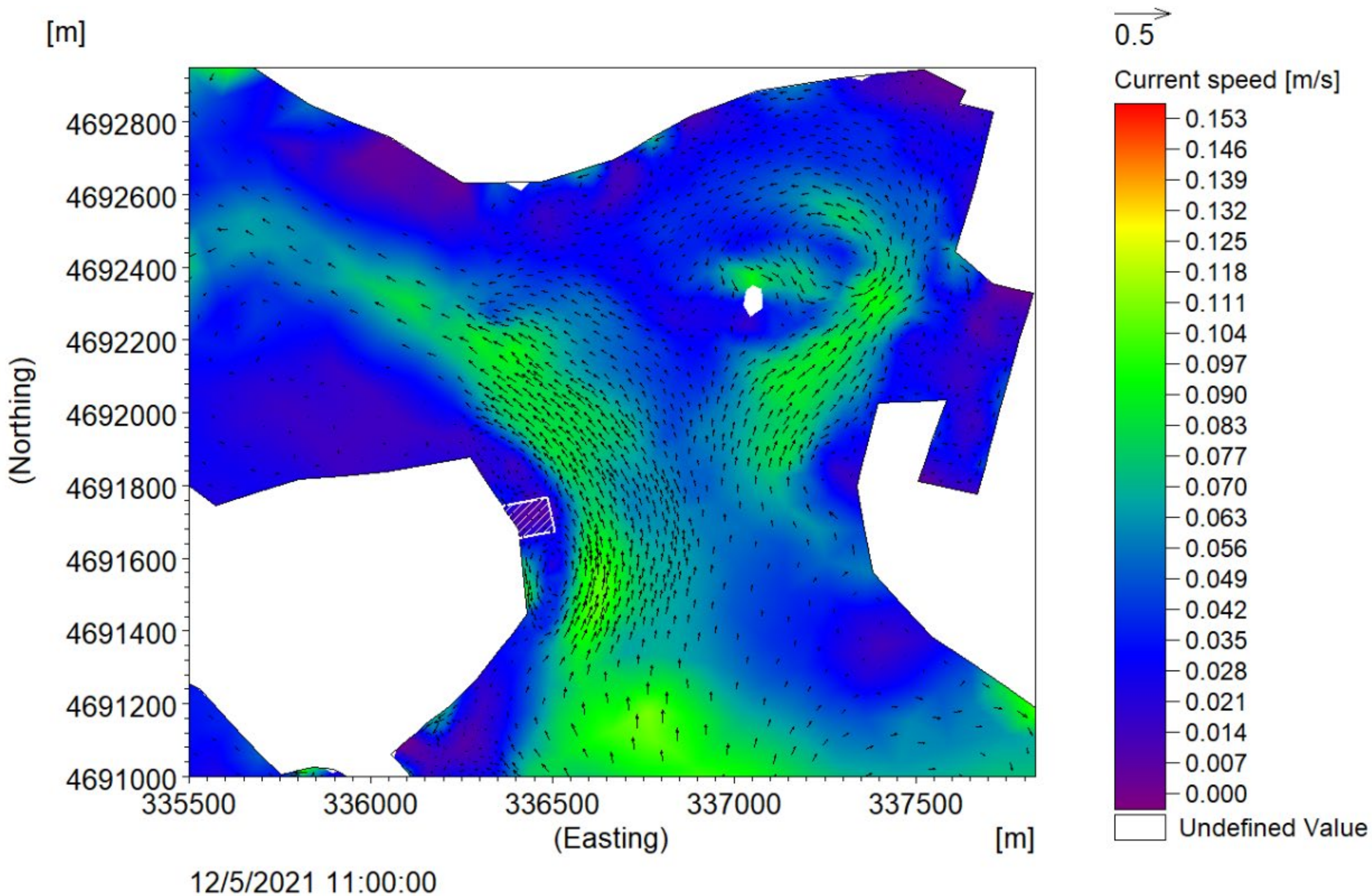


Figure B-12. Current Speed under High Tide Condition with Deck Support Alternative 3 (Manning's M=3.98)

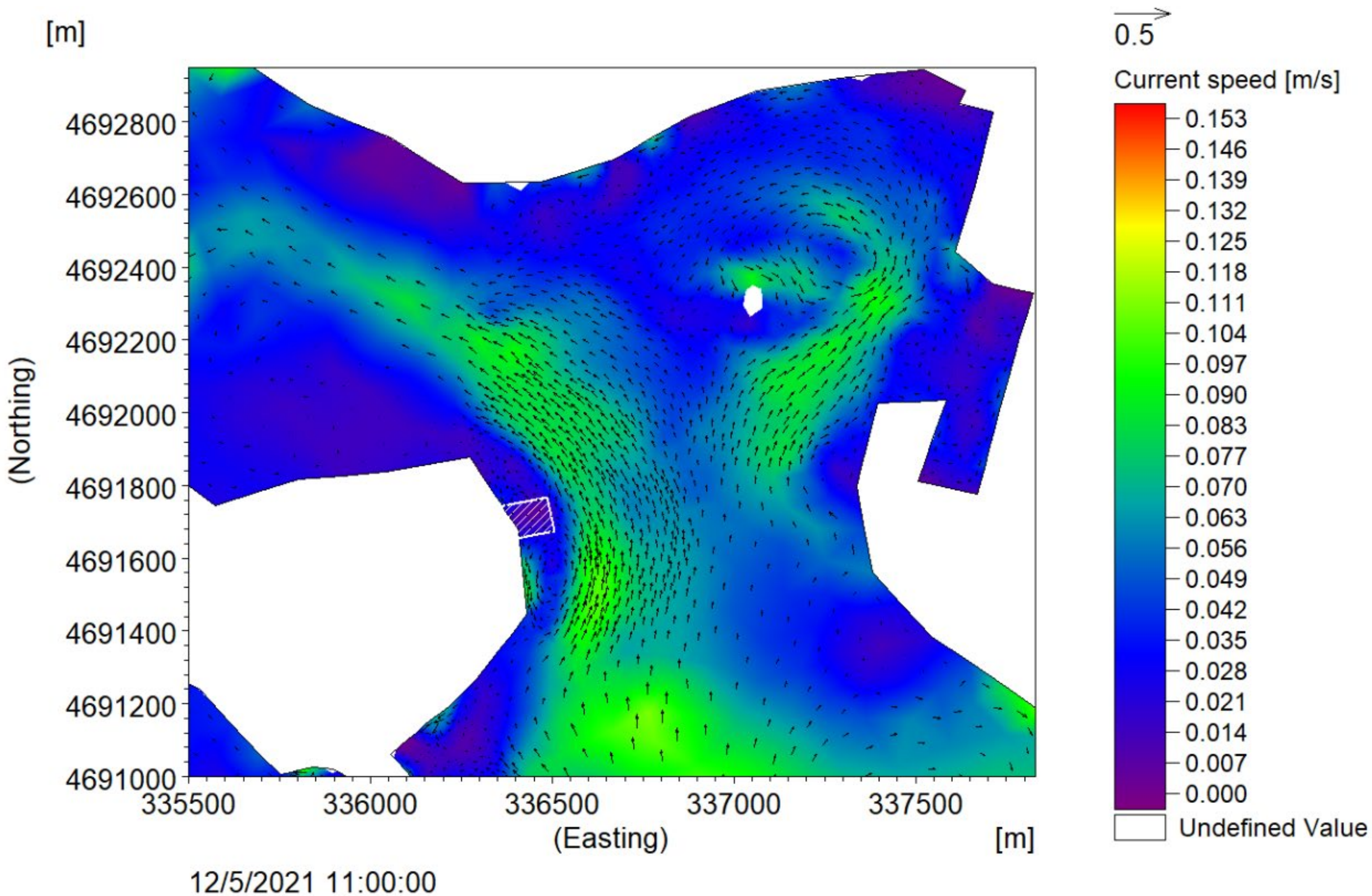


Figure B-13. Current Speed under High Tide Condition with Deck Support Alternative 4 (Manning's M=5.17)

3.2 SHEAR STRESS

The 2-D contour maps displaying existing conditions and the potential effects of each of the four deck support alternatives on bed shear stress at low tide are presented in B-14 through B-18. The 2-D contour maps displaying existing conditions and the potential effects of each of the deck support alternatives on bed shear stress at high tide are presented in B-19 through B-23.

At low tides, all four deck support alternatives would result in an increase in bed shear stress over the existing condition in the vicinity of the proposed deck. The higher stresses are indicated in Figures B15 through B-18 by the red spots. This is due to the increased effect of bed roughness at low tide conditions. The effects of the bed roughness diminish as the water depths increase. Hence, the red spots seen in the low-tide shear stress plots are not seen in the high-tide conditions, as illustrated in Figures B-19 through B-23.

Manning's M value, shown in Figures B-15 through B-18 and Figures B-20 through B-24 is a parameter used in the MIKE 21 model to represent the bed roughness. Manning's M is defined as the bed roughness coefficient as the reciprocal of Manning's n value and explained in the report in section 2.2.2. The calculation of Manning's M is presented in Attachment A. Water speed reduces suddenly when reaching the high roughness area, leading to high bed shear stress. However, as shown in the figures, none of the deck support alternatives would change the overall shear stress patterns in the vicinity of the Proposed Project or around Snake Island and the Cottage Park and Winthrop Yacht Clubs.

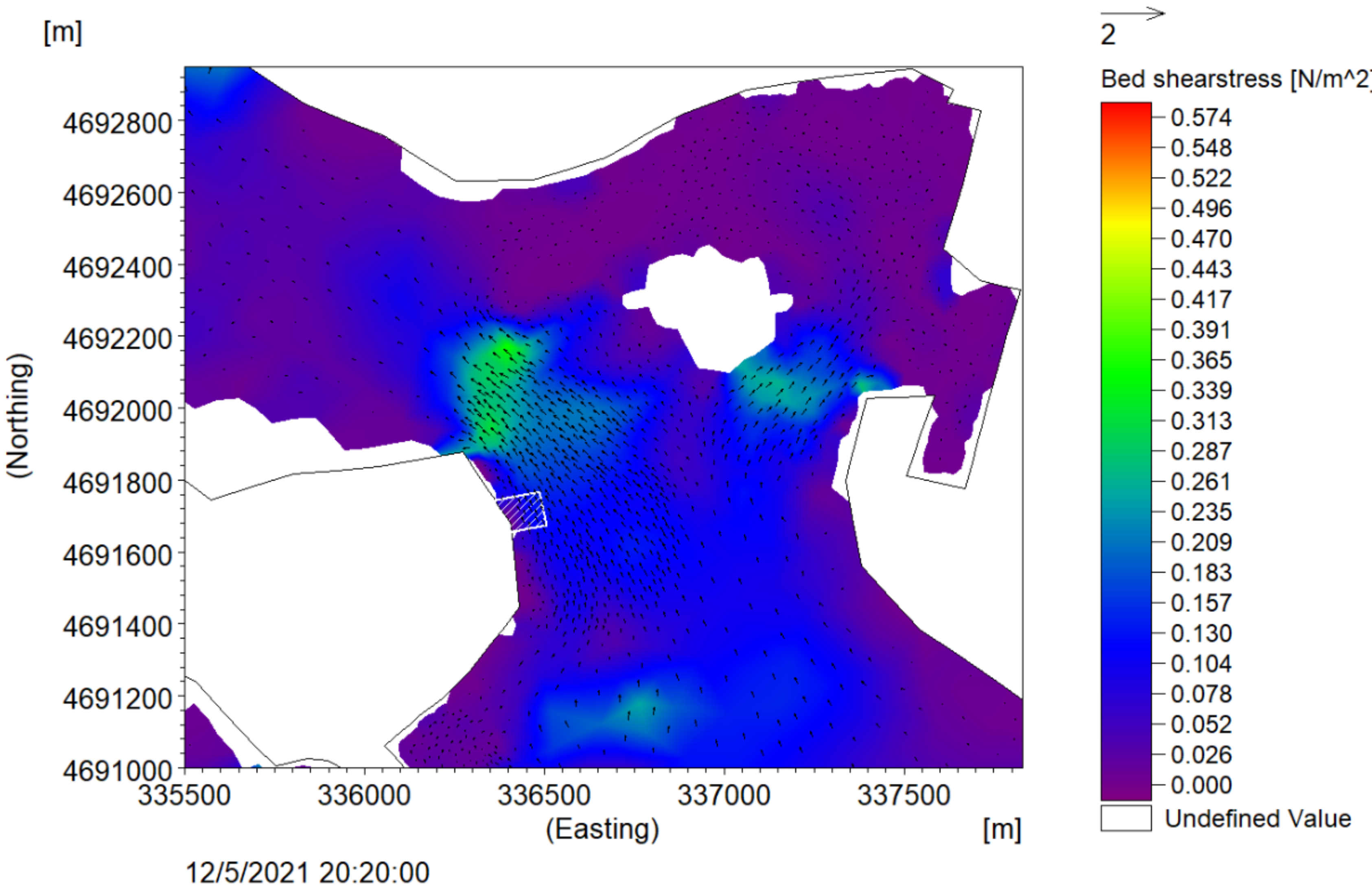


Figure B-14. Bed Shear Stress under Low Tide and Existing Condition

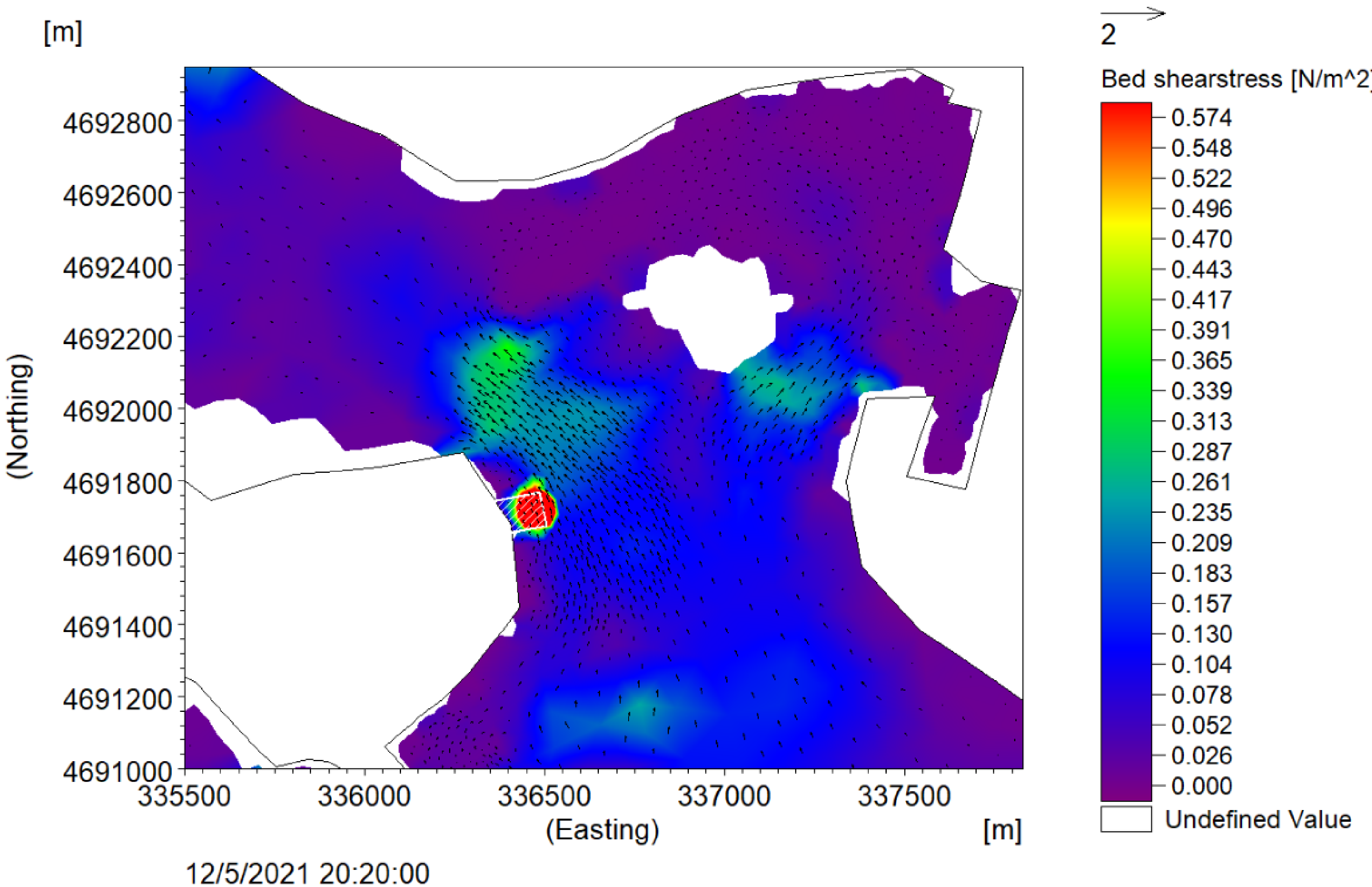


Figure B-15. Bed Shear Stress under Low Tide Condition with Deck Support Alternative 1 (Manning's M=5.19)

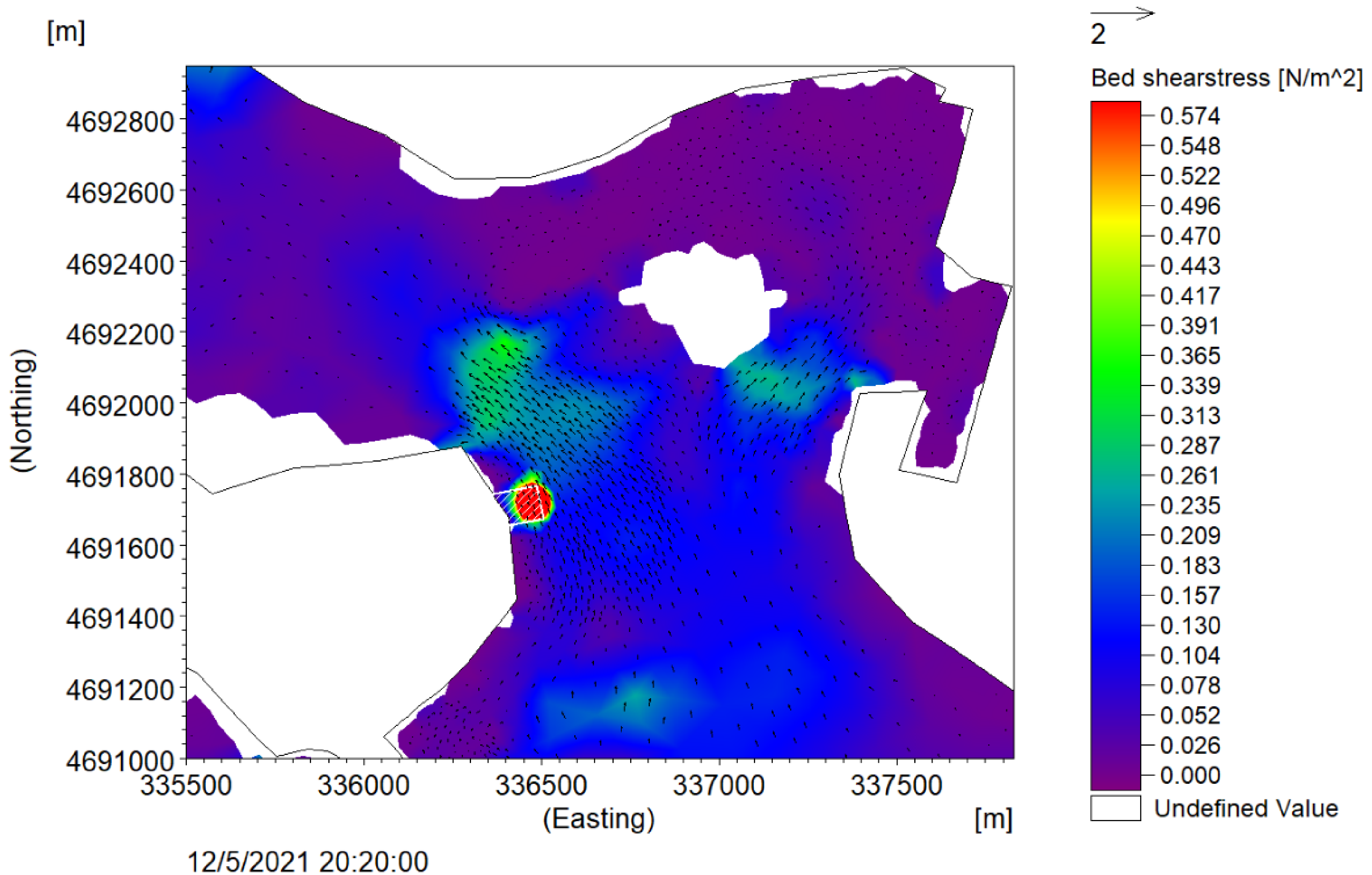


Figure B-16. Bed Shear Stress under Low Tide Condition with Deck Support Alternative 2 (Manning's M=7.39)

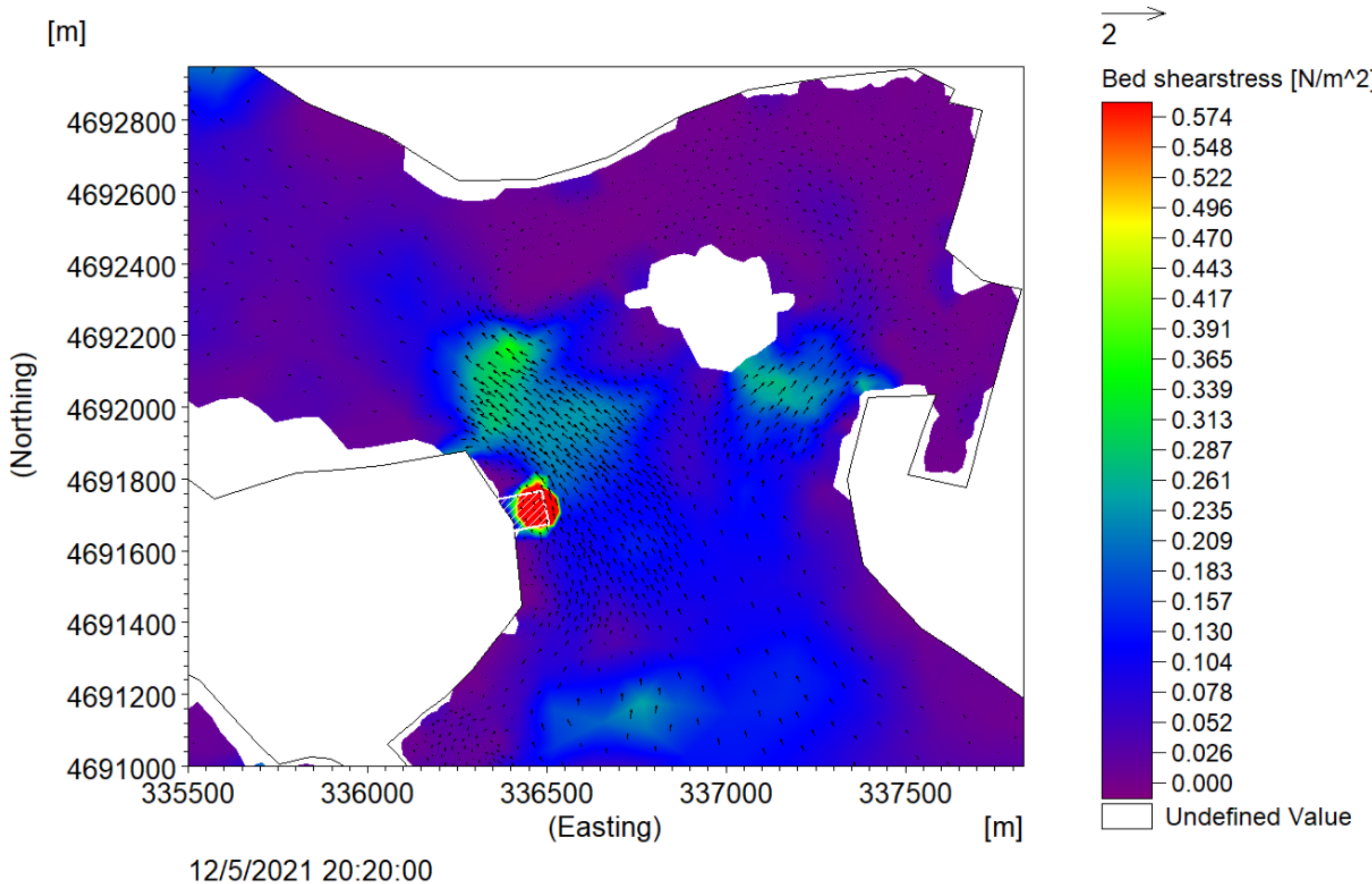


Figure B-17. Bed Shear Stress under Low Tide Condition with Deck Support Alternative 3 (Manning's M=3.98)

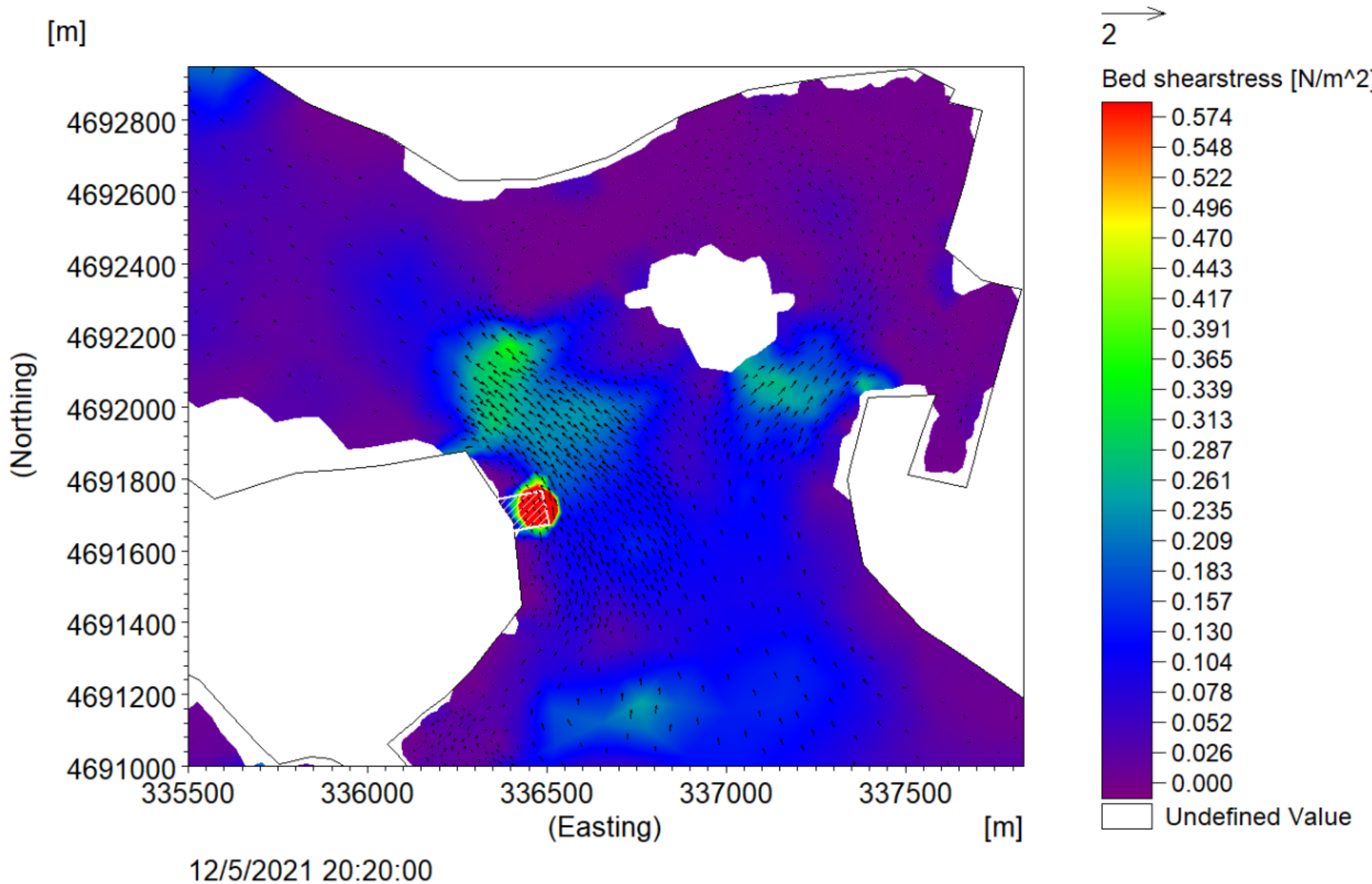


Figure B-18. Bed Shear Stress under Low Tide Condition with Deck Support Alternative 4 (Manning's M=5.17)

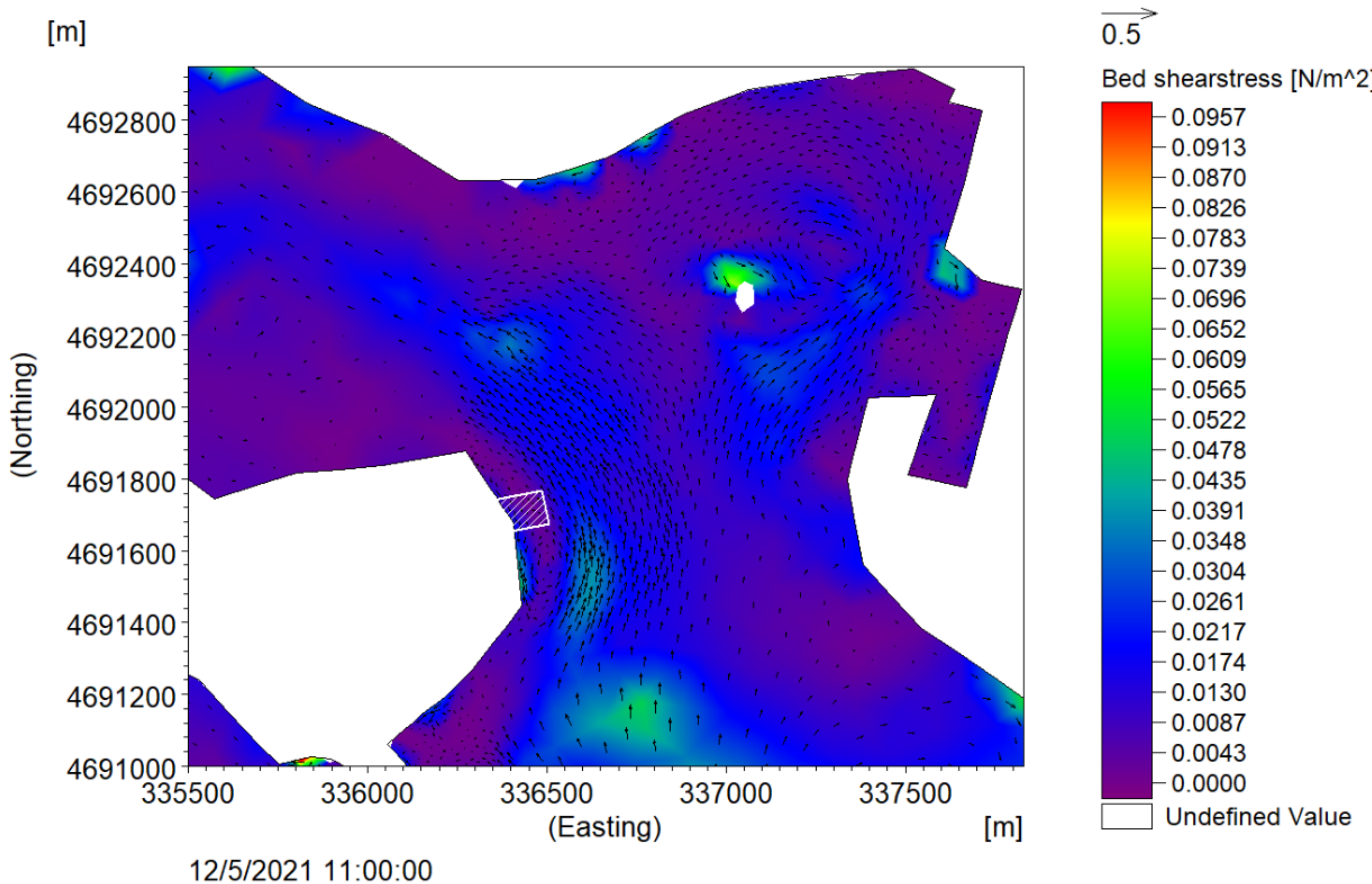


Figure B-19. Bed Shear Stress under High Tide and Existing Condition

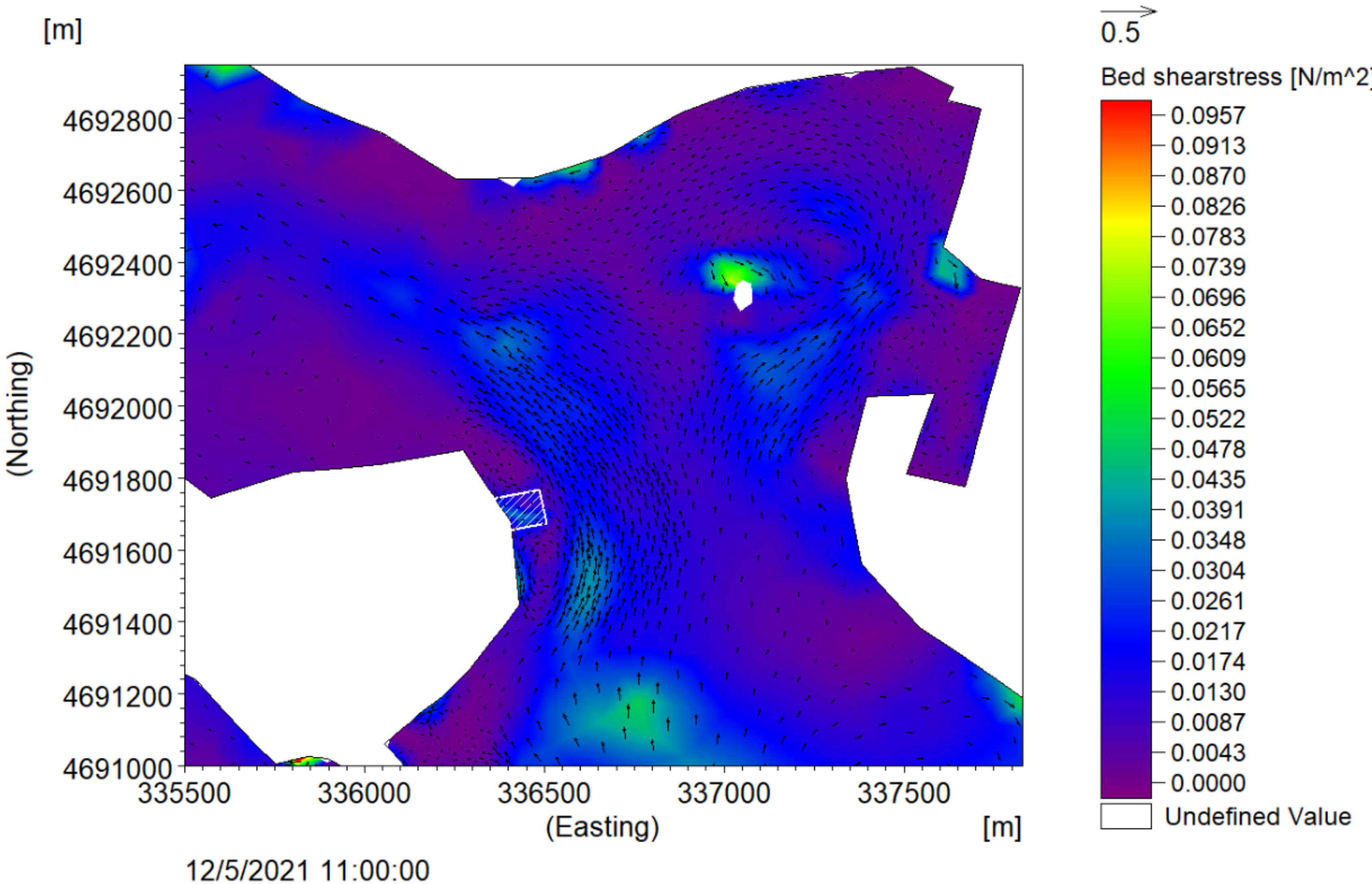


Figure B-20. Bed Shear Stress under High Tide Condition with Deck Support Alternative 1 (Manning's M=5.19)

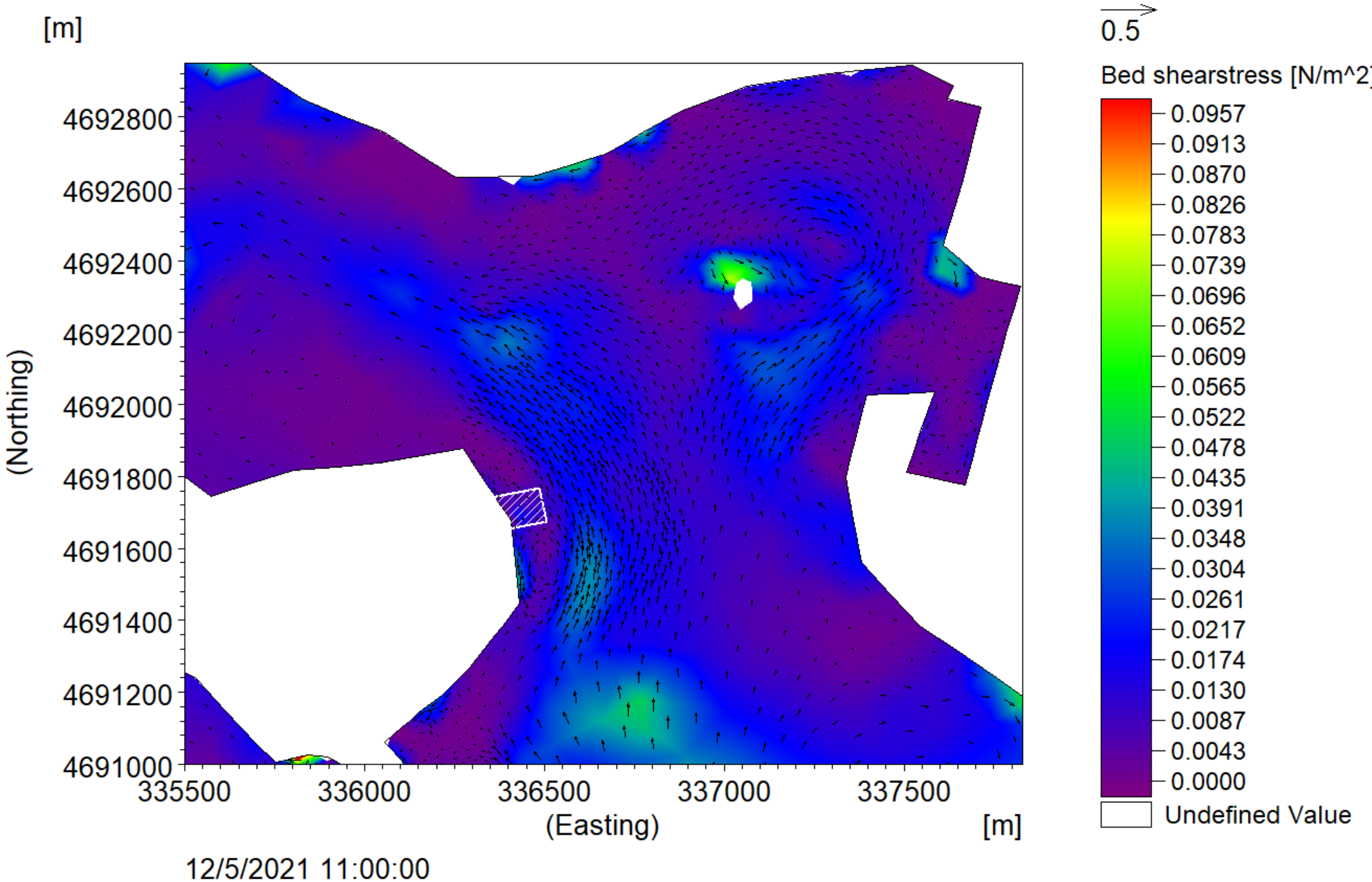


Figure 21. Bed Shear Stress under High Tide Condition with Deck Support Alternative 2 (Manning's M=7.39)

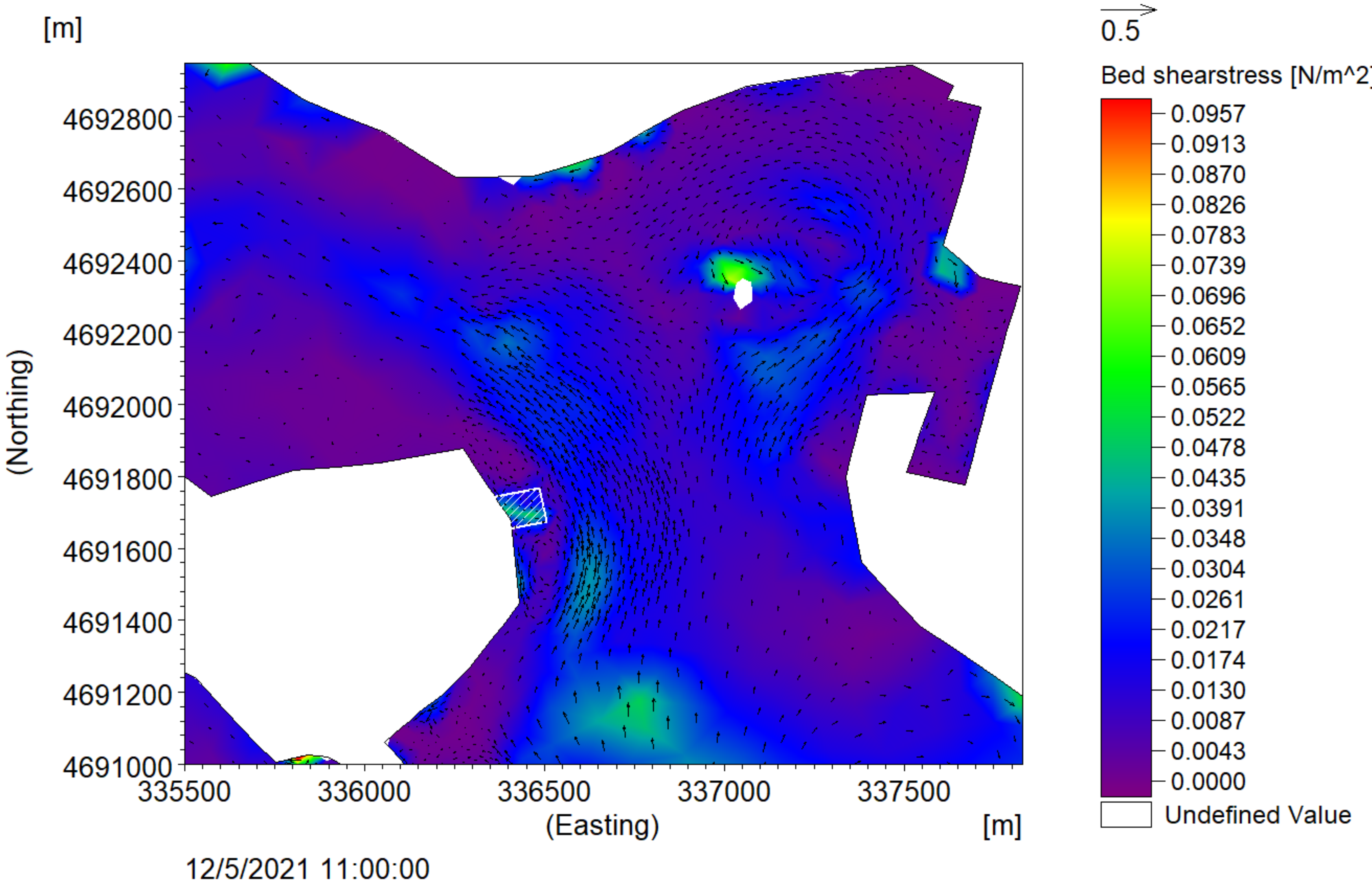


Figure B-22. Bed Shear Stress under High Tide Condition with P Deck Support Alternative 3 (Manning's M=3.98)

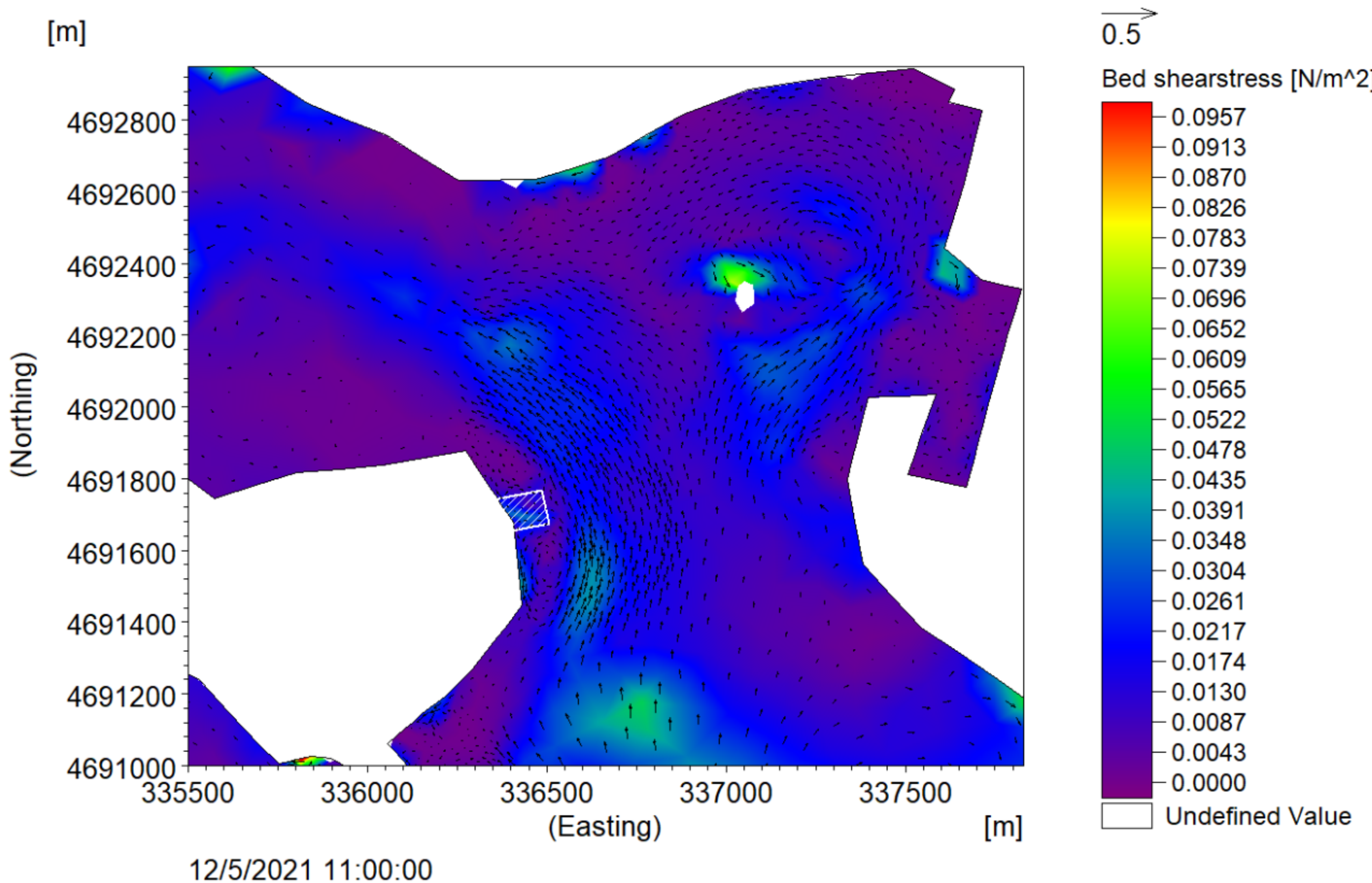


Figure B-23. Bed Shear Stress under High Tide Condition with Deck Support Alternative 4 (Manning's M=5.17

Page left intentionally blank

ATTACHMENT C

RESULTS PART II – TIME SERIES PLOTS OF CURRENT SPEED AND BED SHEAR STRESS

JUNE 17, 2022

This Attachment C presents the time series of current speed (velocity of the water) and bed shear stress (pressure exerted along the seabed surface) for the existing condition and for the pile configurations associated with the four Runway 27 End Runway Safety Area (RSA) deck support alternatives during the spring-tide condition. The spring tide condition is discussed in Attachment B.

The results of the MIKE 21 2-D model are presented in this attachment. The MIKE-21 2-D model was used to simulate hydrodynamics and time series variation of outputs between existing condition and the conditions with each of the four deck support alternatives at selected locations. The modeling used a permeable approach, where the water is allowed to pass through the proposed site with the calculated Manning's roughness representative for each of the four deck support alternatives. Calculation of the Manning's roughness representatives is presented in Attachment A.

Time series plots of 16 locations of interest in the vicinity of the proposed deck, and around Snake Island and the Cottage Park and Winthrop Yacht Clubs were considered. The locations are shown in Figure C-1.

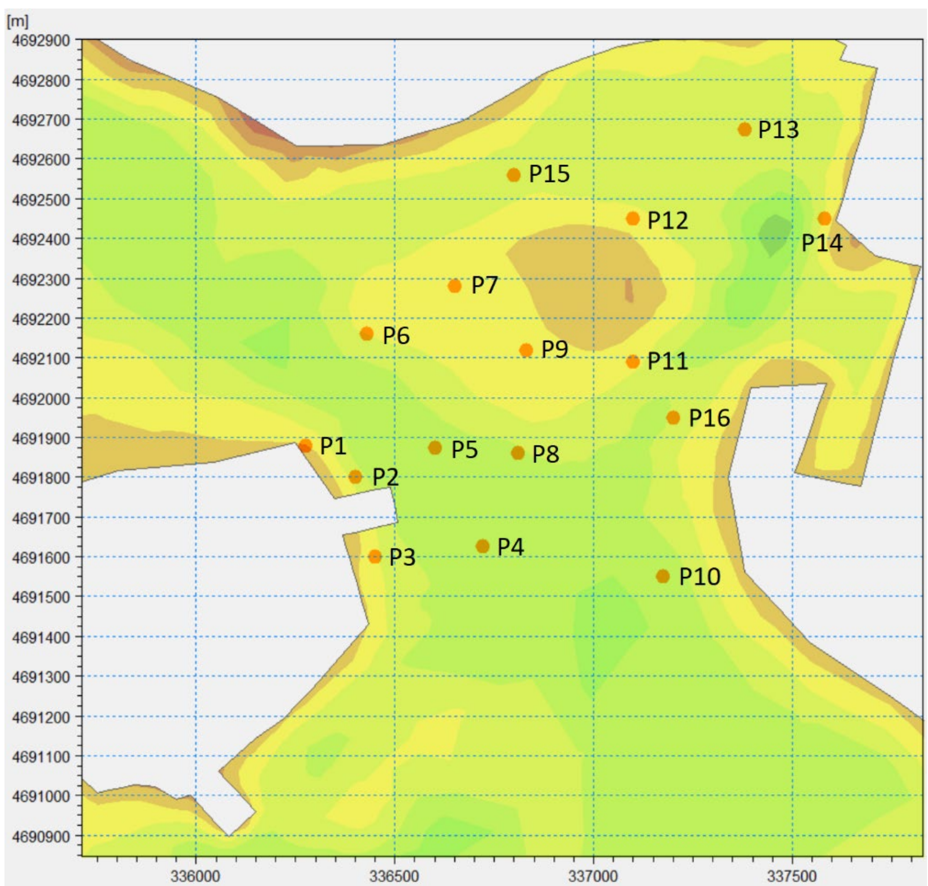
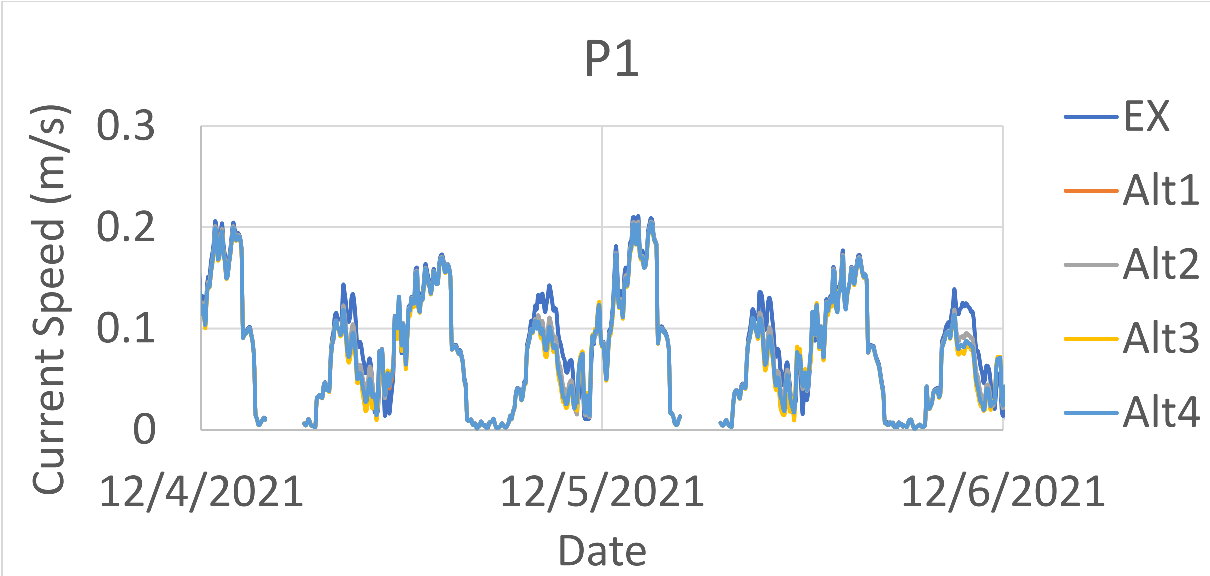


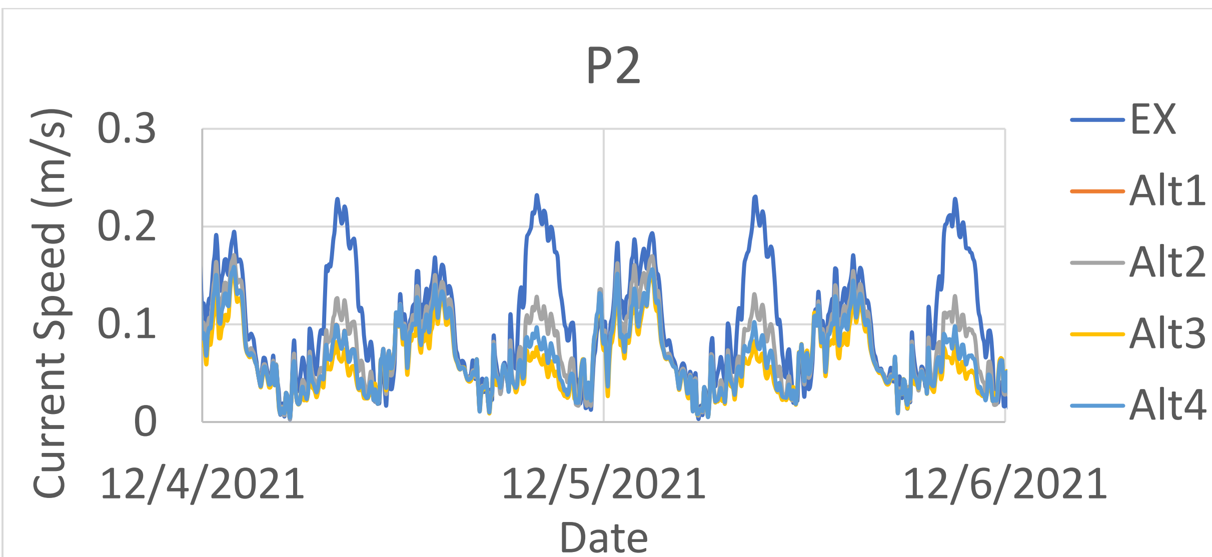
Figure C-5. Locations Modeled to simulate hydrodynamics and time series variation

Each of the figures below presents the current speed (m/s) or bed shear stress (N/m^2) for the existing condition and the four deck support alternatives at one of the 16 points shown in Figure C-1 (under spring tide conditions, which are discussed in Attachment B). Current speed at Locations P1 through P16 is shown in the first set of figures. Bed sheer stress at Locations P1 through P16 is shown in the second set of figures. Each figure shows the existing condition and the results of the modelling for all four deck support alternatives.

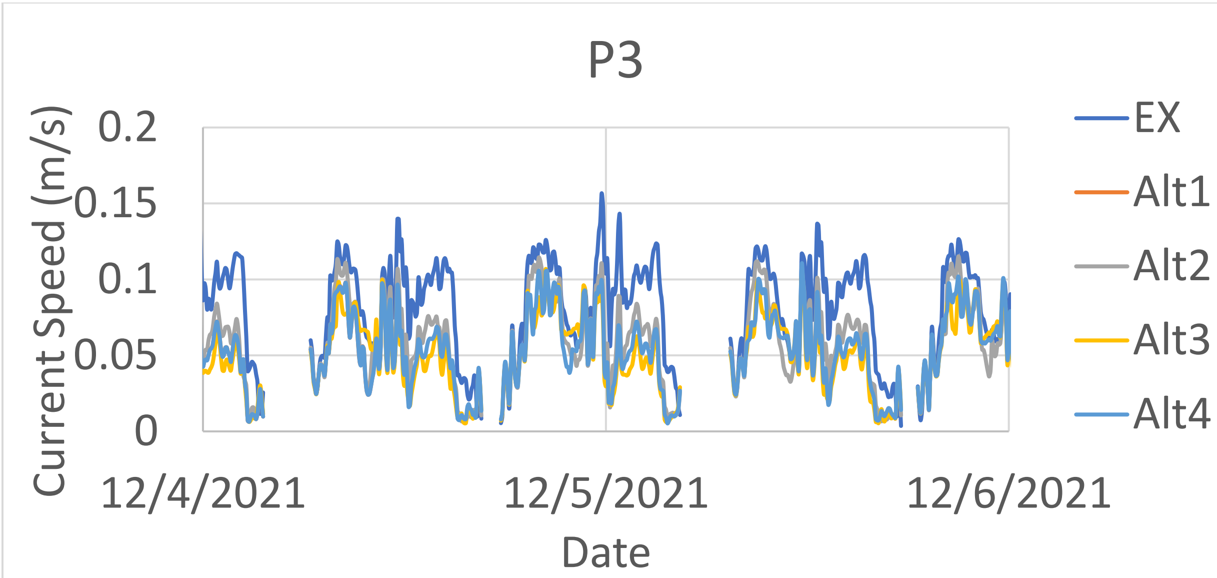
As show below in the charts for Locations P2 and P3, which are upstream and downstream of the proposed deck location, respectively, current speed and bed shear stress would decrease (compared to the existing condition) as a result of each of the deck support alternatives. At other locations (P1 and P-5 through P-16), the figures below show that all four of the deck support alternatives, would result in negligible to no change in current speed or bed shear stress.



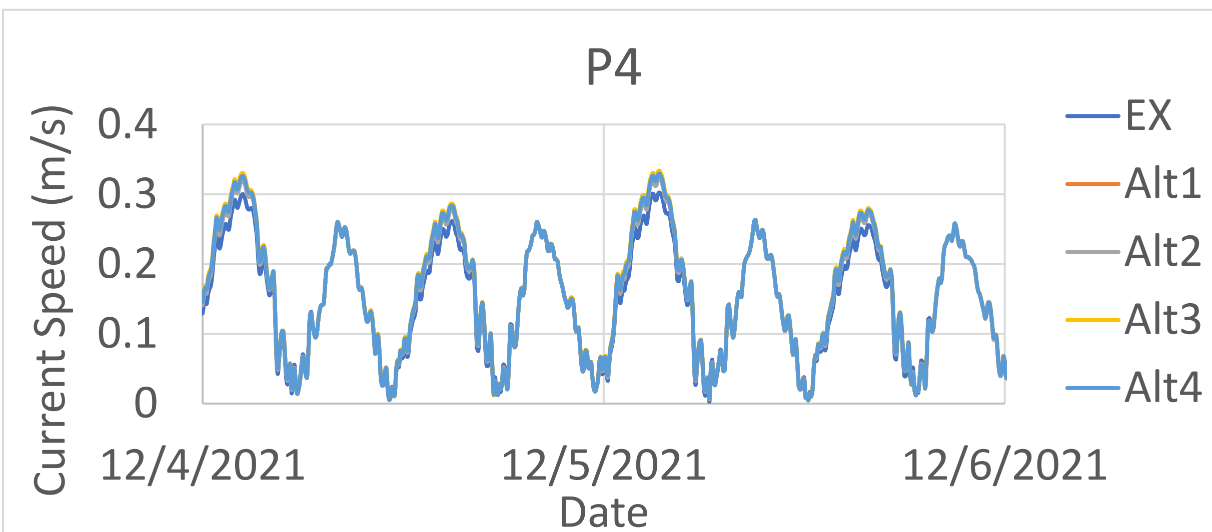
Location P-1: Time-Series Plots of Current Speed (m/s) under Spring Tides



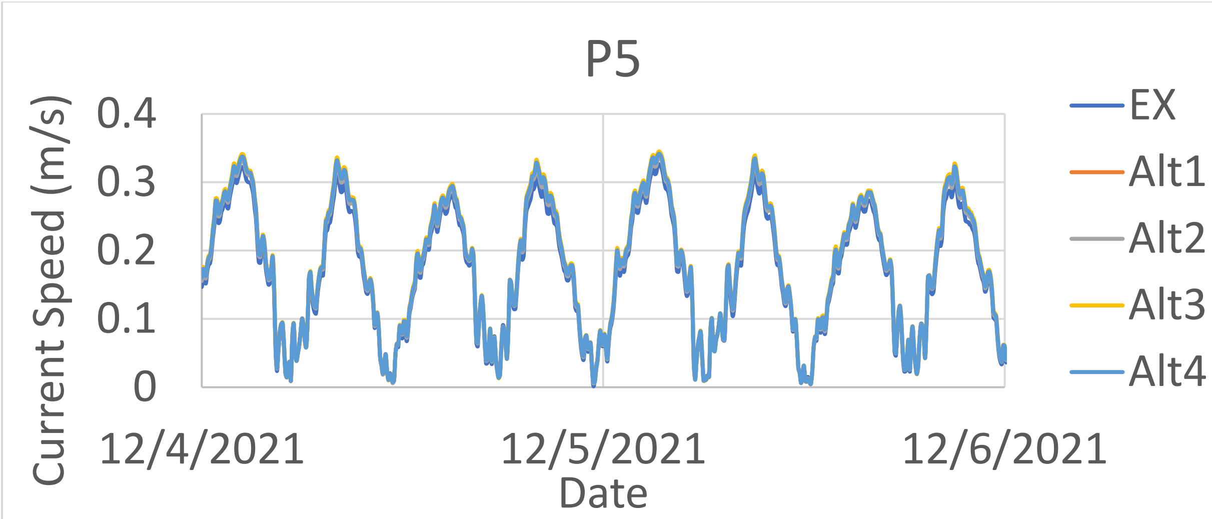
Location P-2 Time-Series Plots of Current Speed (m/s) under Spring Tides



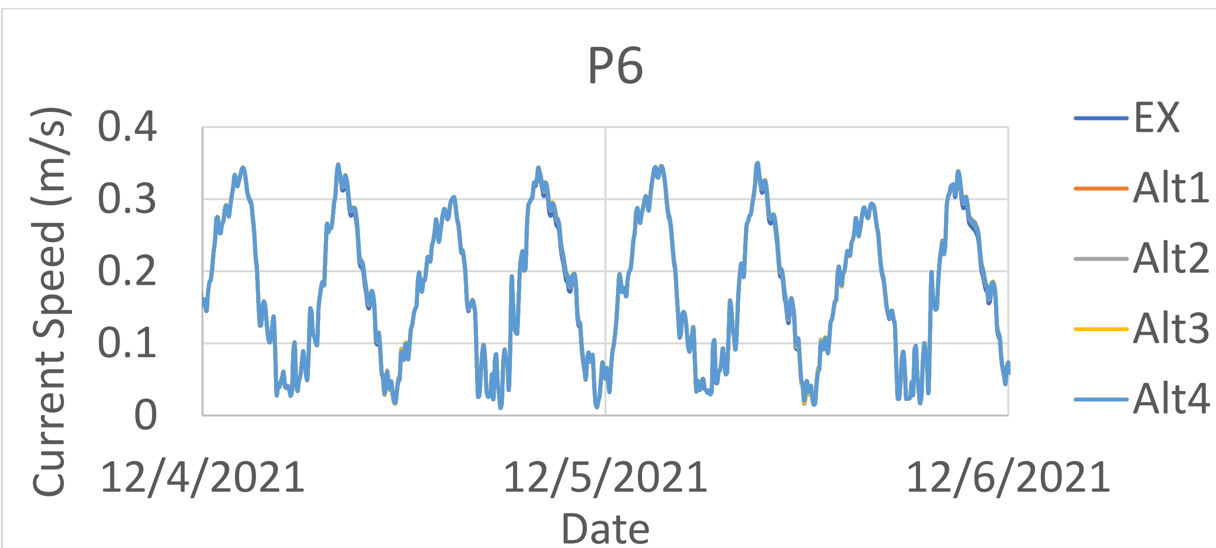
Location P-3: Time-Series Plots of Current Speed (m/s) under Spring Tides



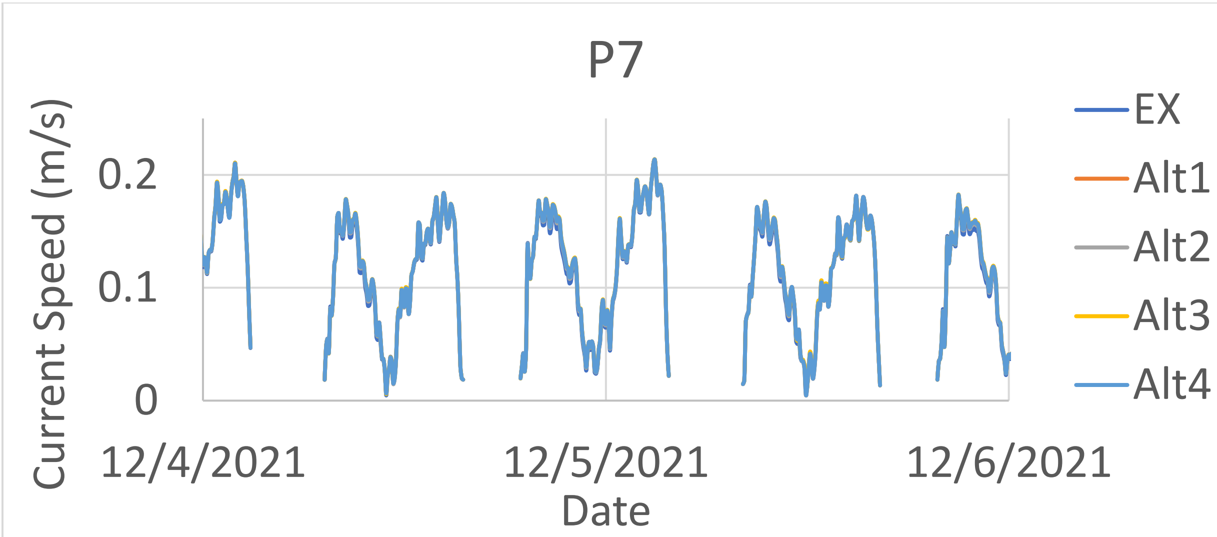
Location P-4: Time-Series Plots of Current Speed (m/s) under Spring Tides



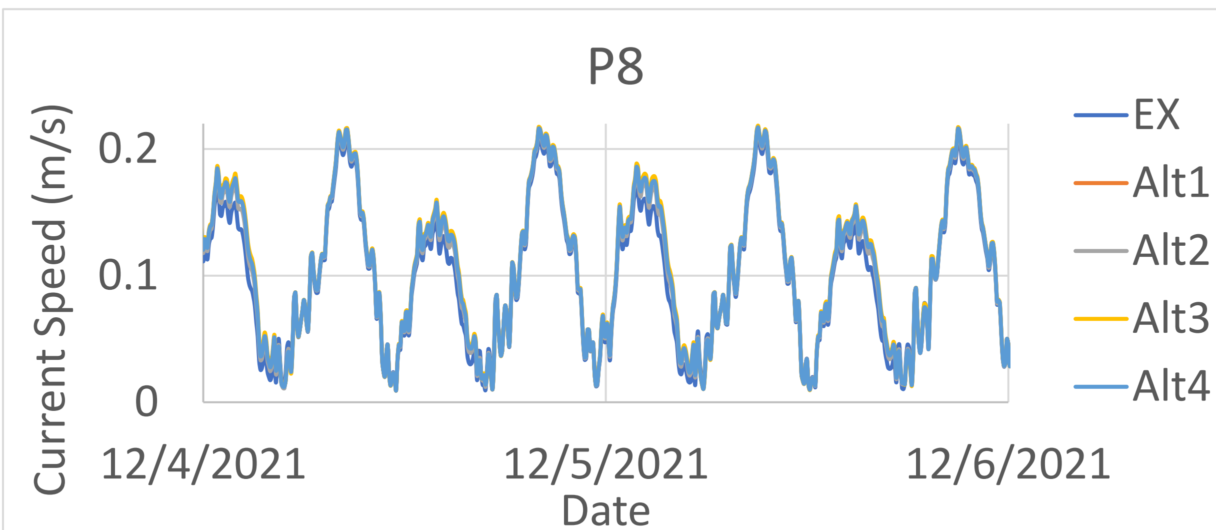
Location P-5: Time-Series Plots of Current Speed (m/s) under Spring Tides



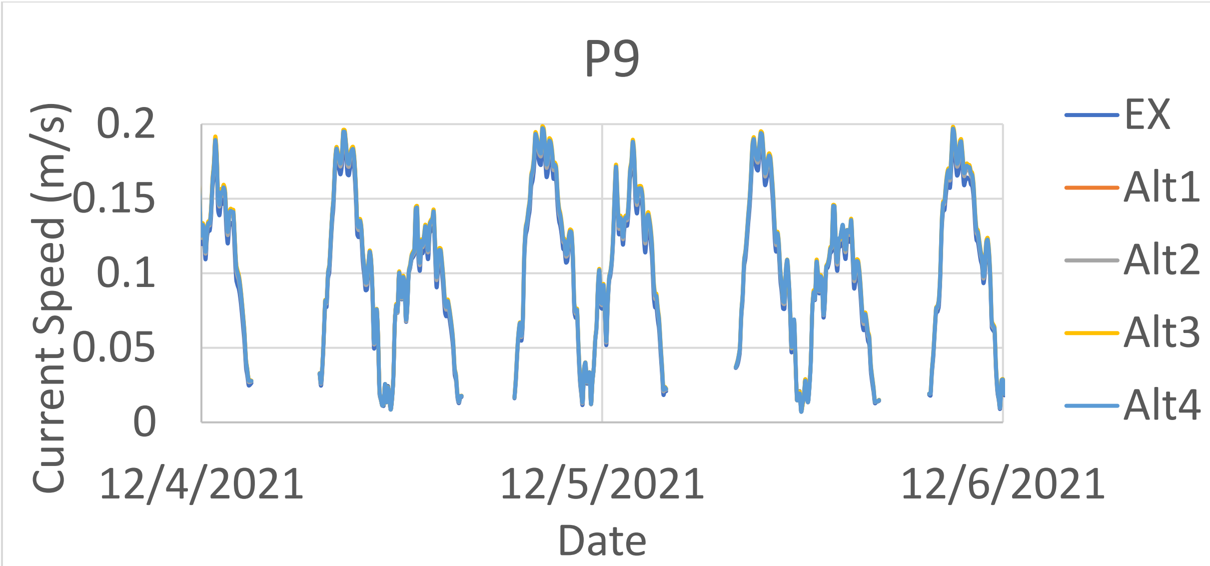
Location P-6: Time-Series Plots of Current Speed (m/s) under Spring Tides



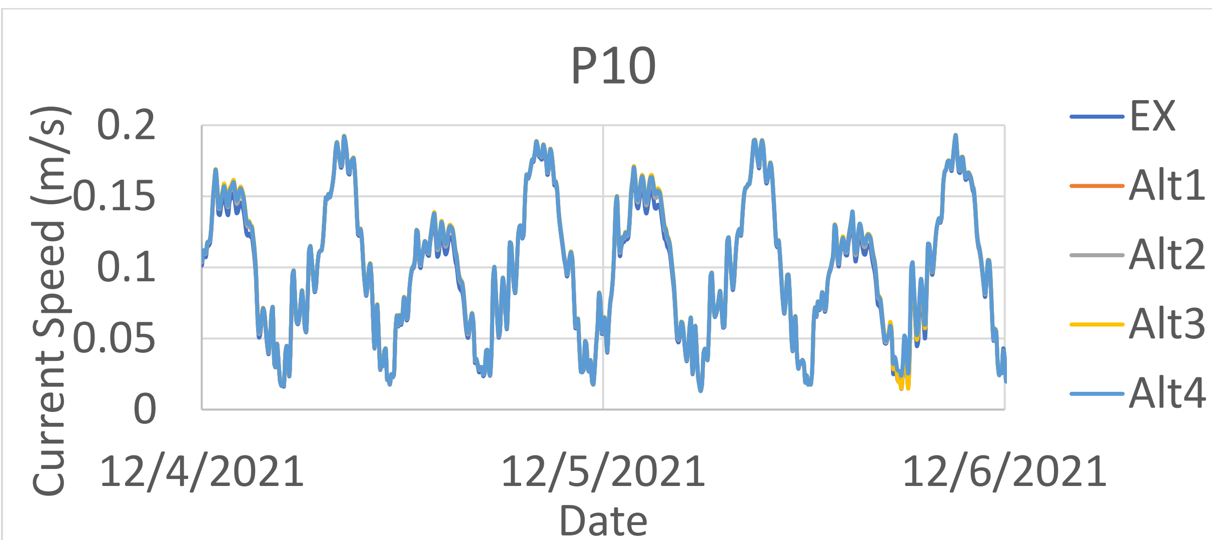
Location P-7: Time-Series Plots of Current Speed (m/s) under Spring Tides



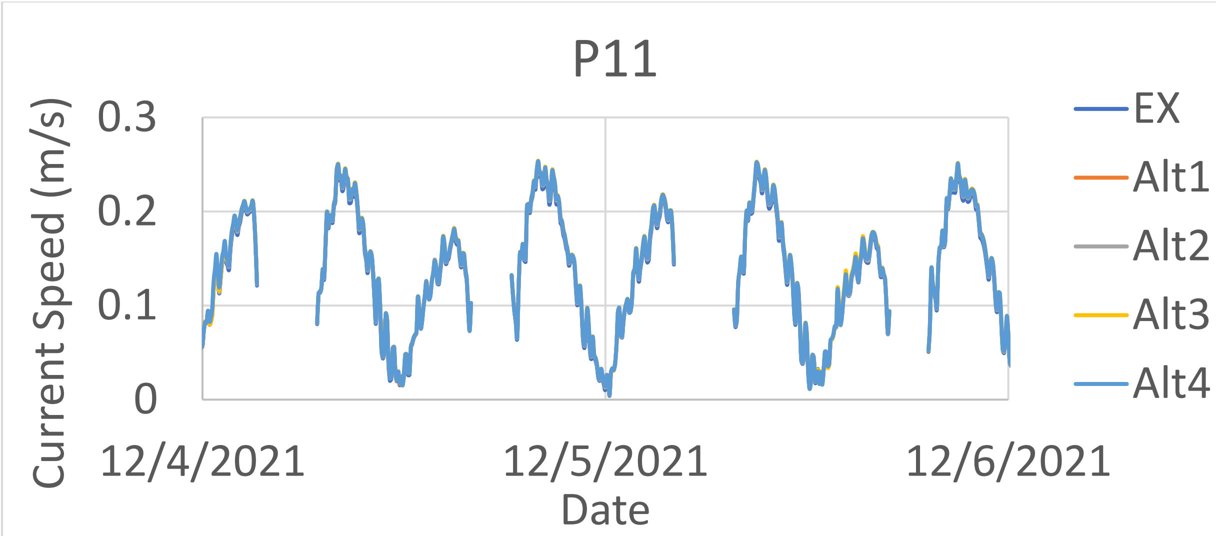
Location P-8: Time-Series Plots of Current Speed (m/s) under Spring Tides



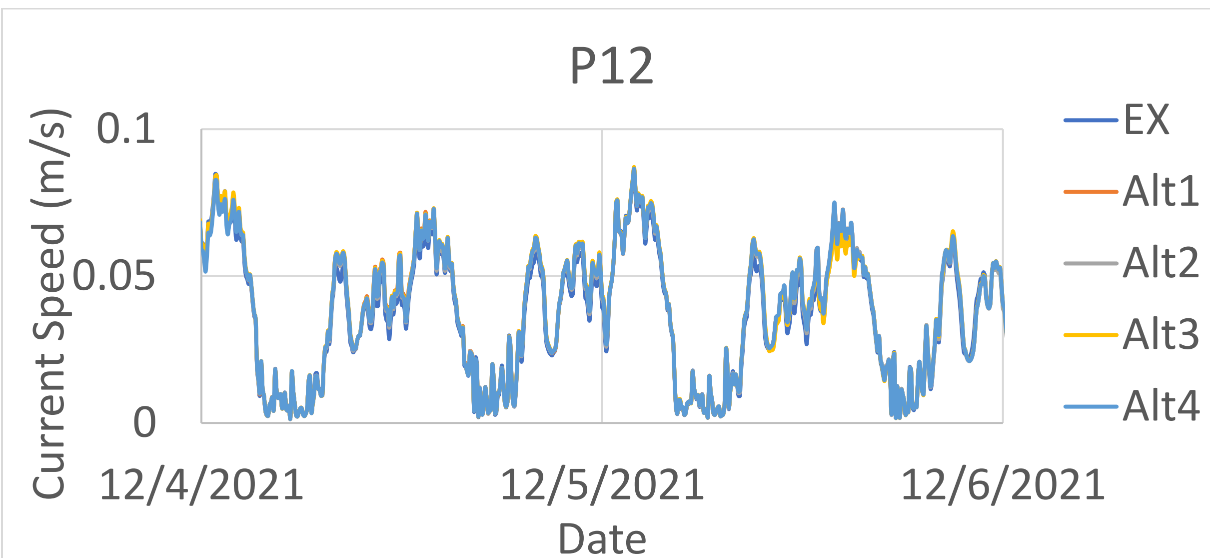
Location P-9: Time-Series Plots of Current Speed (m/s) under Spring Tides



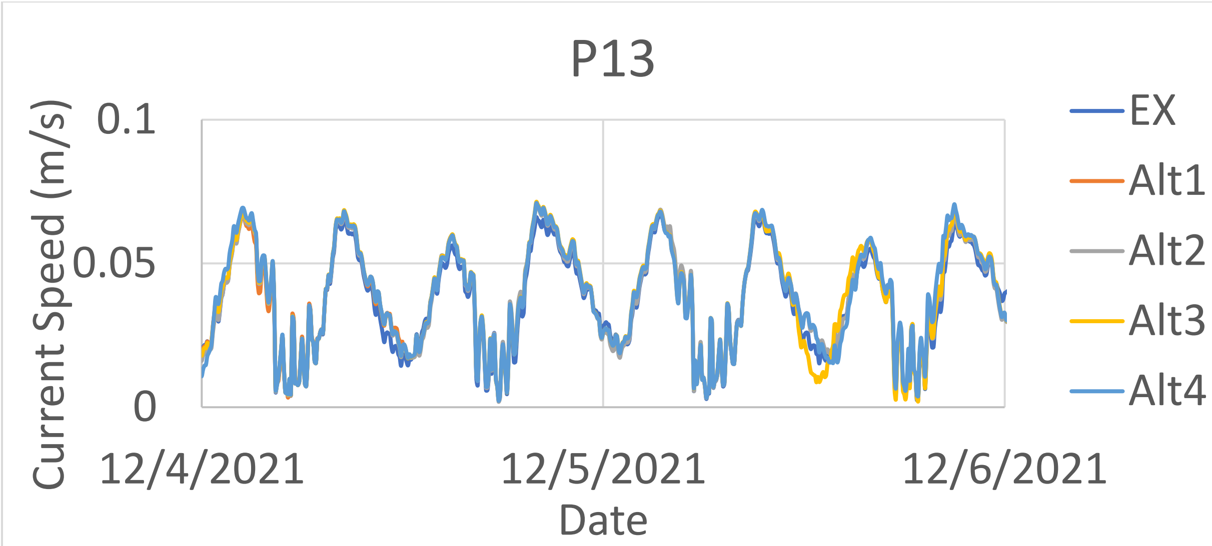
Location P-10: Time-Series Plots of Current Speed (m/s) under Spring Tides



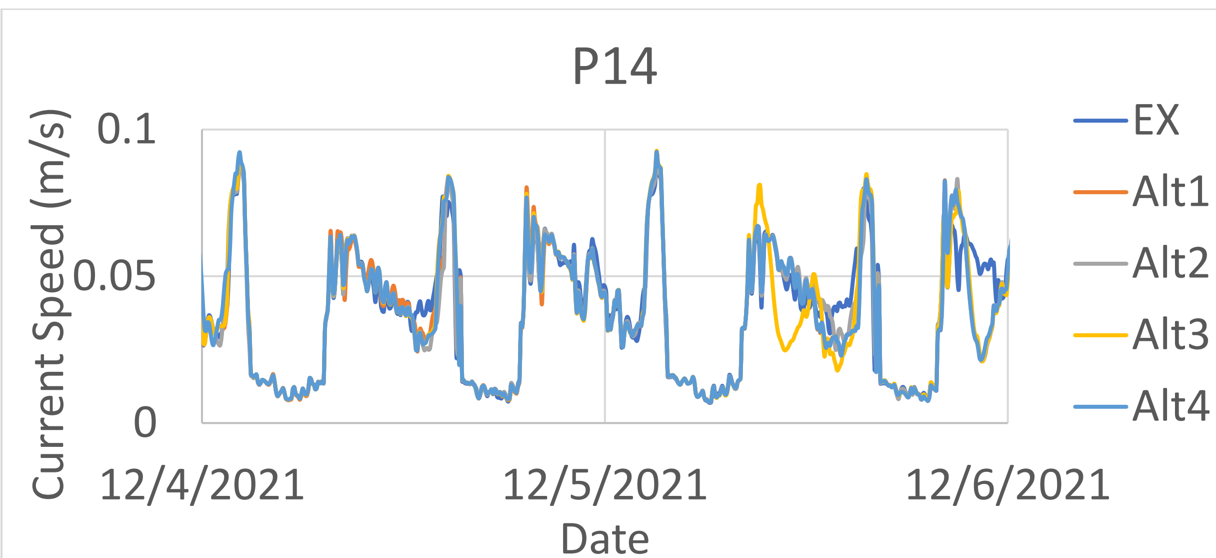
Location P-11: Time-Series Plots of Current Speed (m/s) under Spring Tides



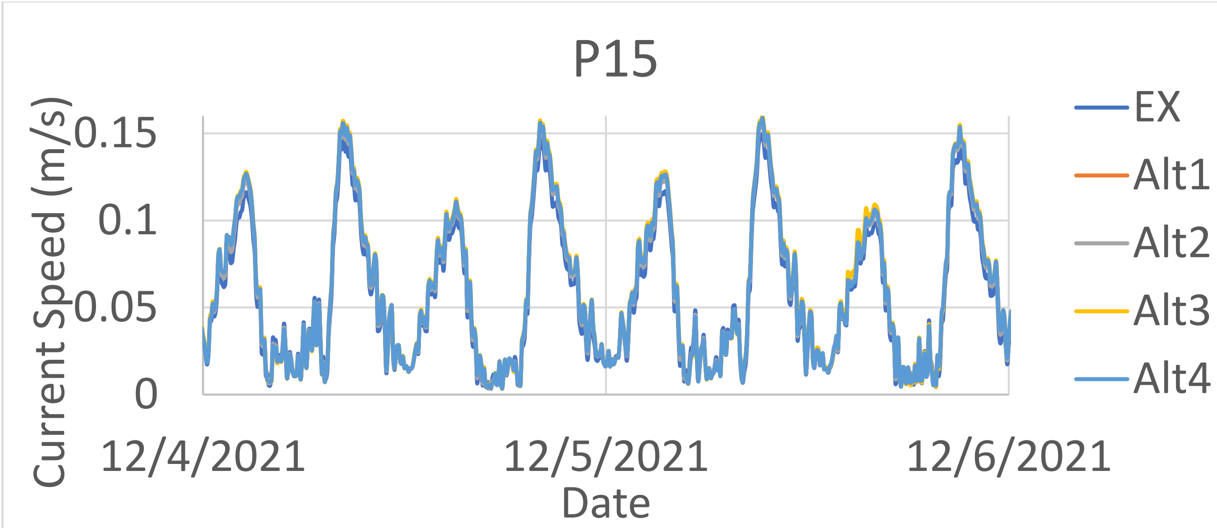
Location P-12: Time-Series Plots of Current Speed (m/s) under Spring Tides



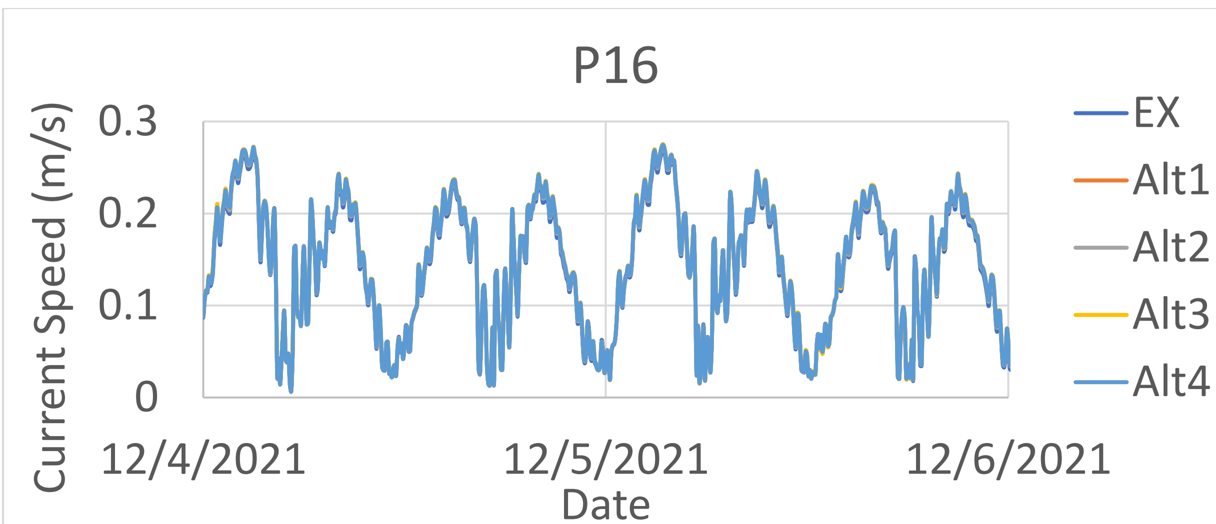
Location P-13: Time-Series Plots of Current Speed (m/s) under Spring Tides



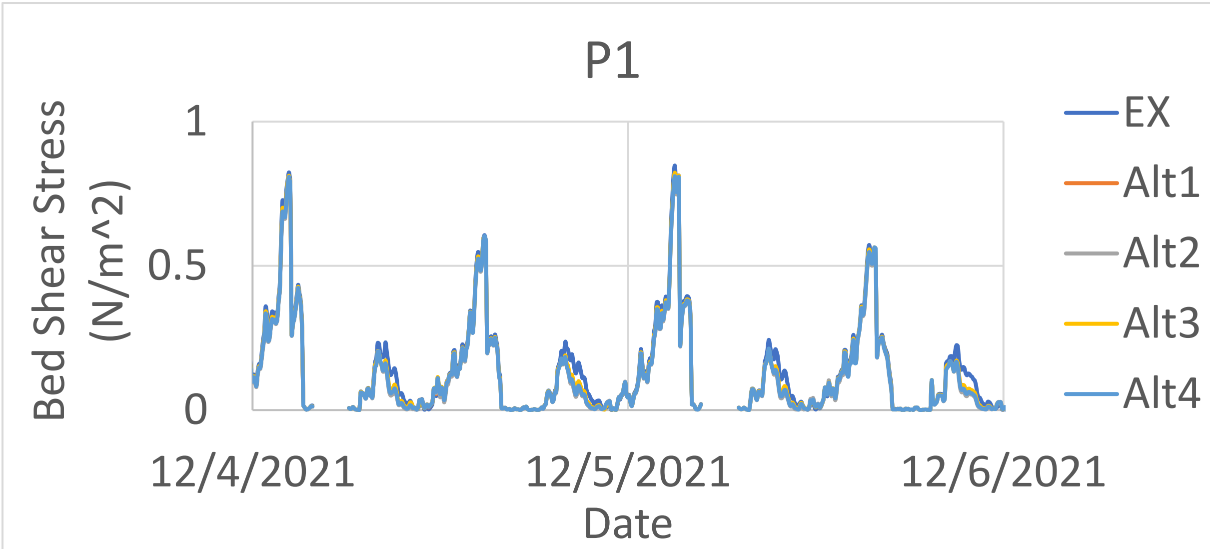
Location P-14: Time-Series Plots of Current Speed (m/s) under Spring Tides



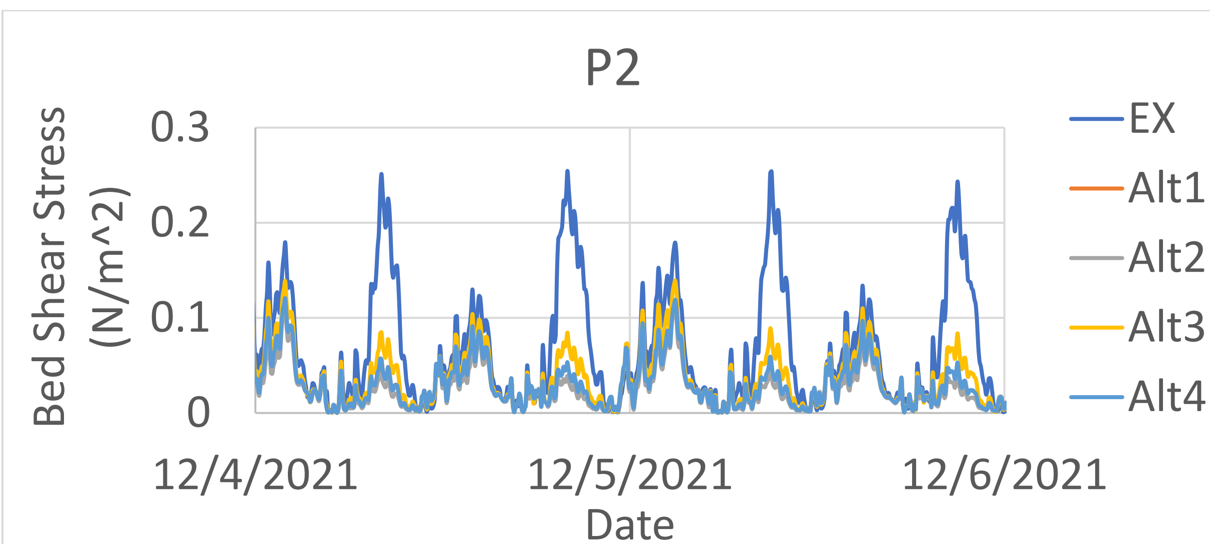
Location P-15: Time-Series Plots of Current Speed (m/s) under Spring Tides



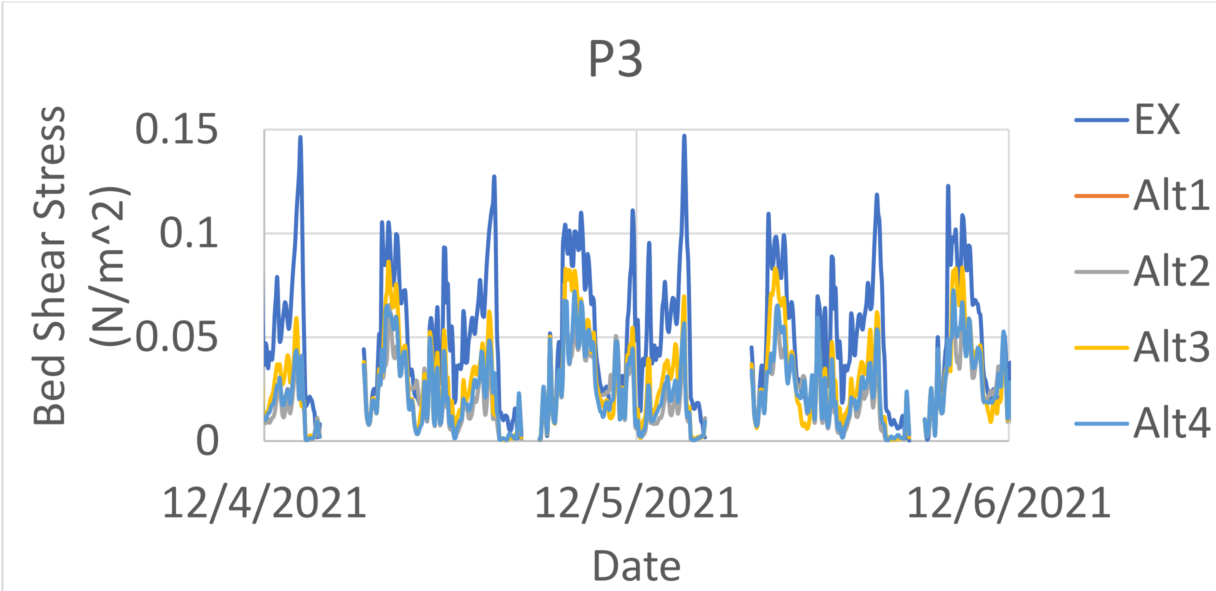
Location P-16: Time-Series Plots of Current Speed (m/s) under Spring Tides



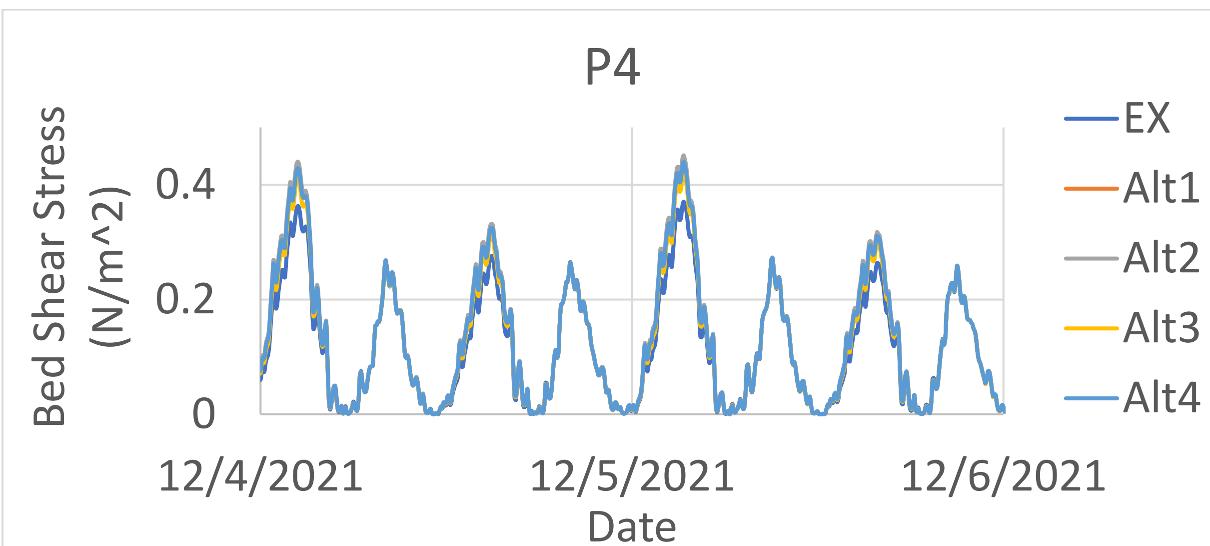
Location 1: Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



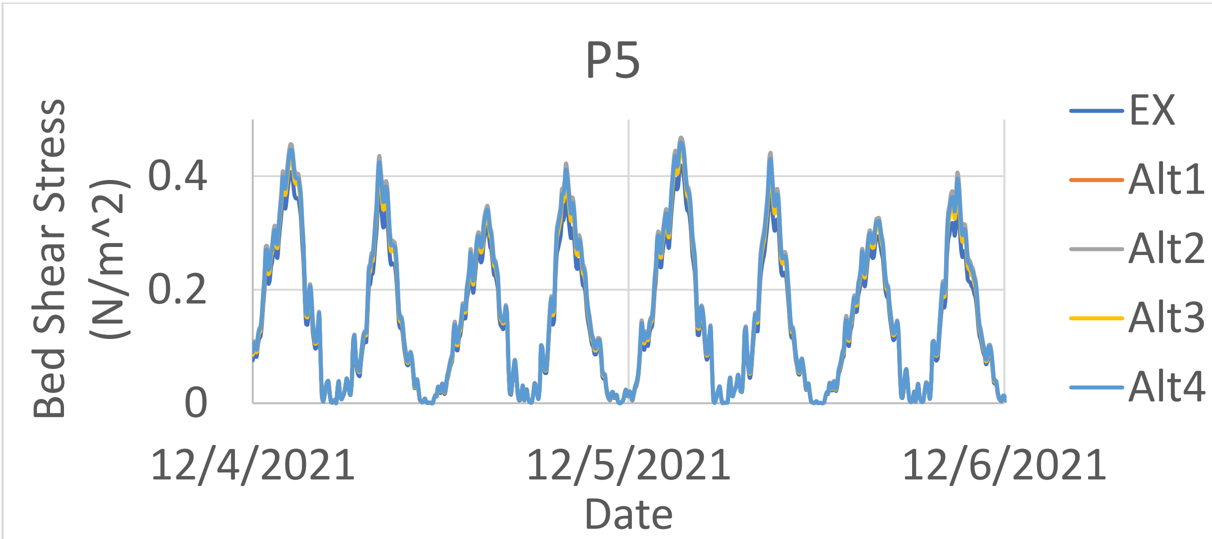
Location 2: Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



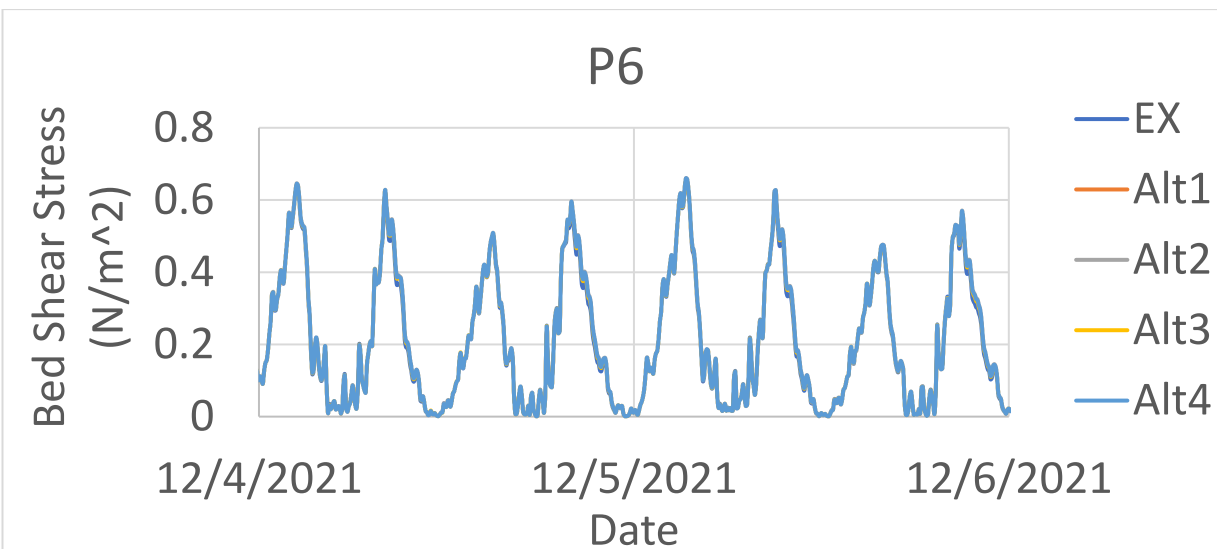
Location 3: Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



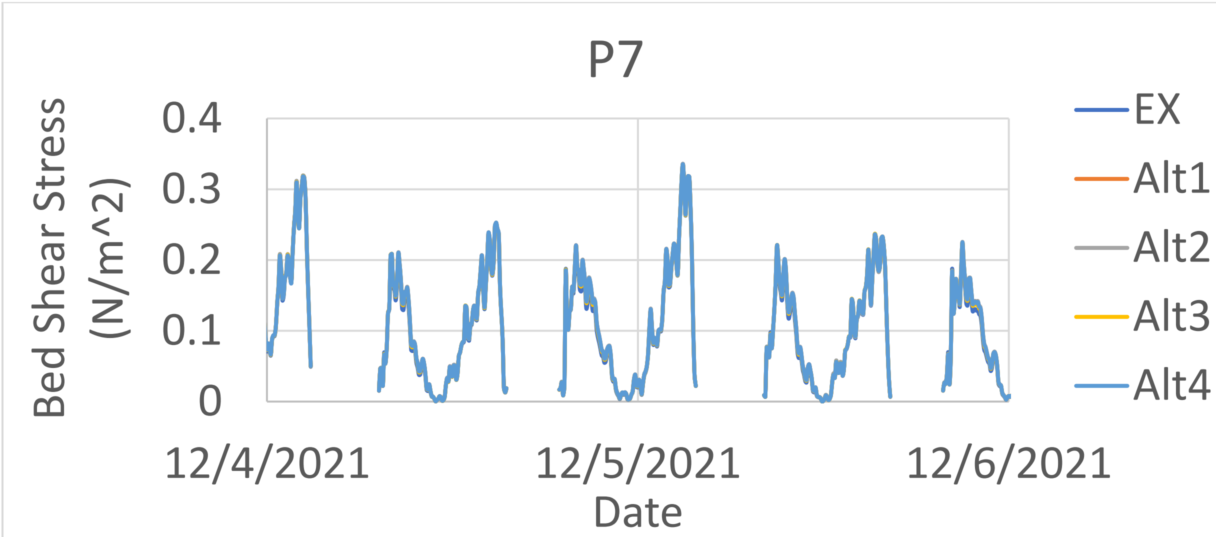
Location 4: Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



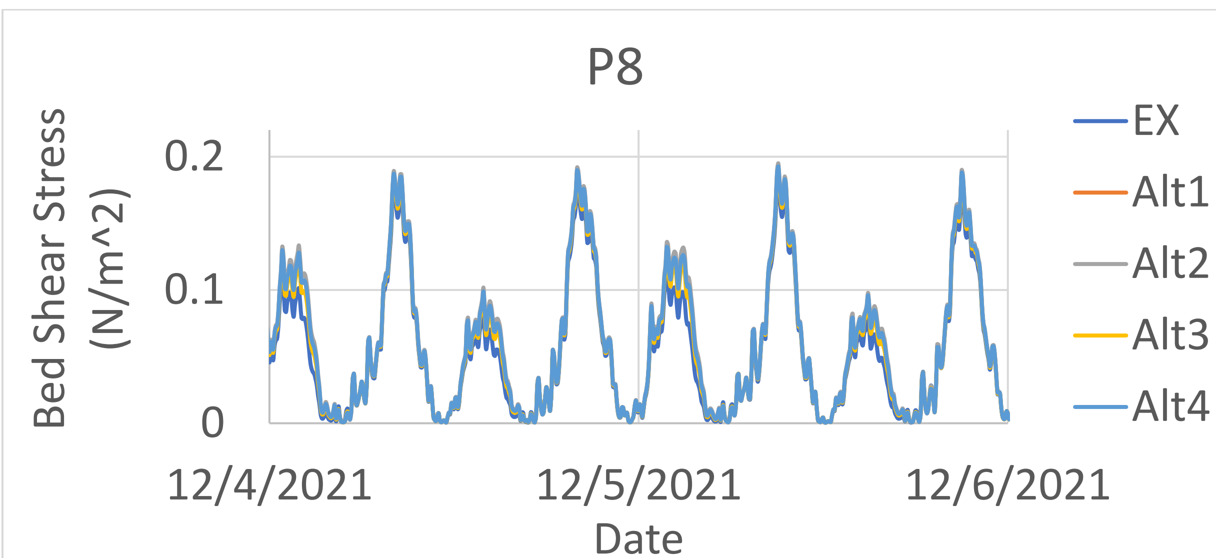
Location 5: Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



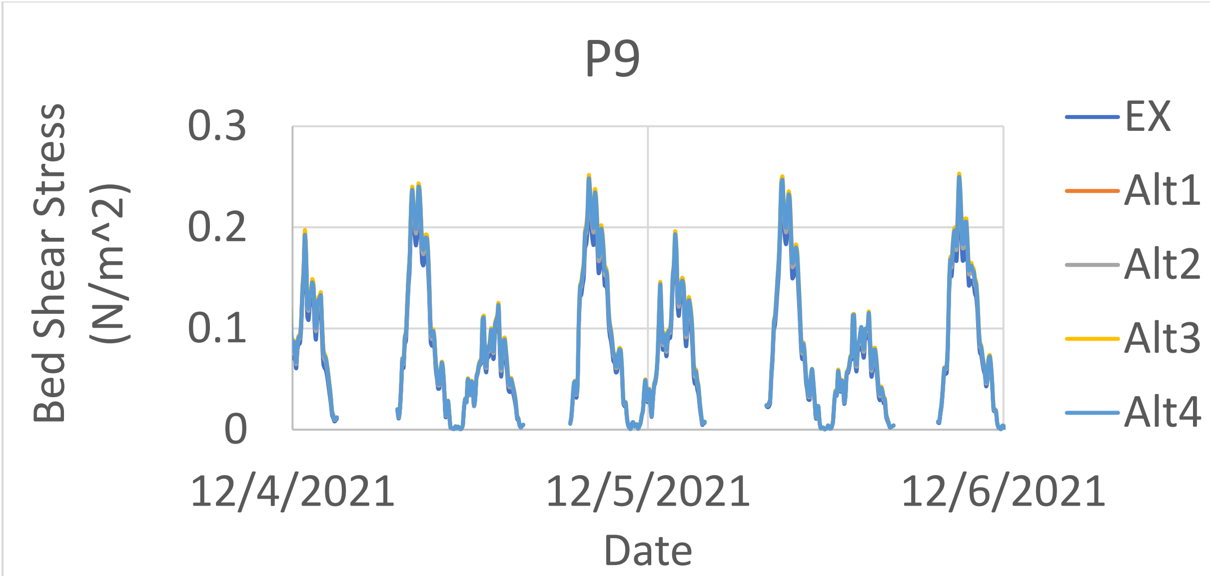
Location 6 Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



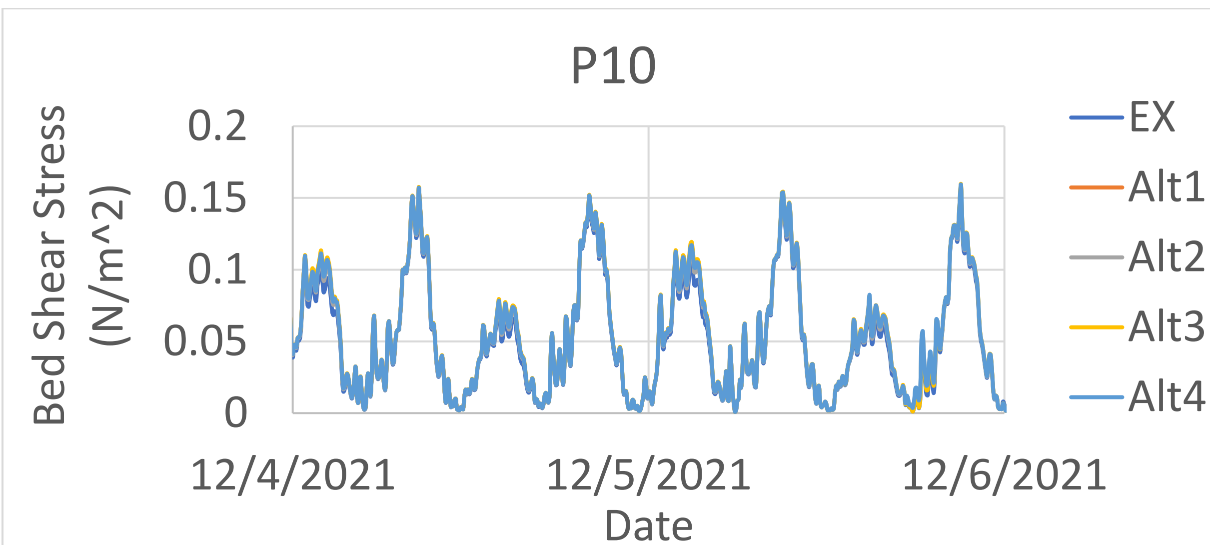
Location 7: Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



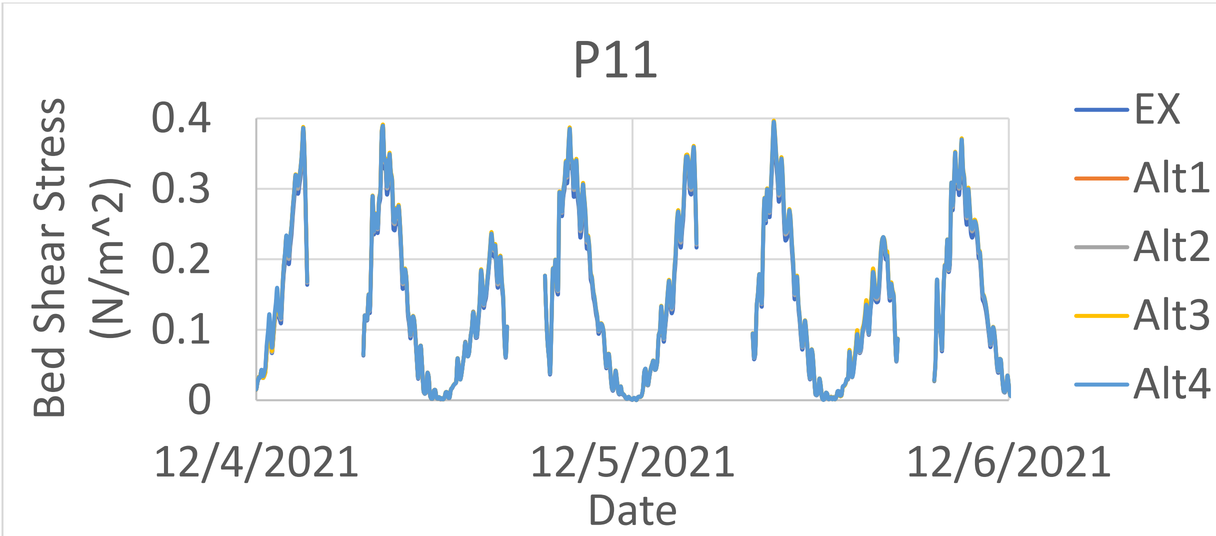
Location 8: Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



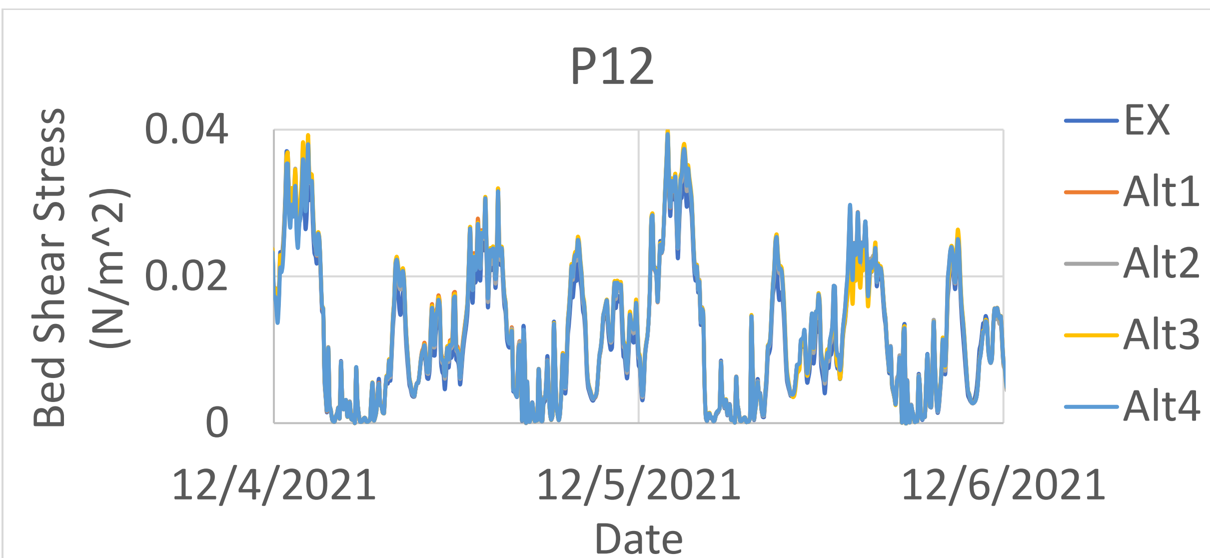
Location 9Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



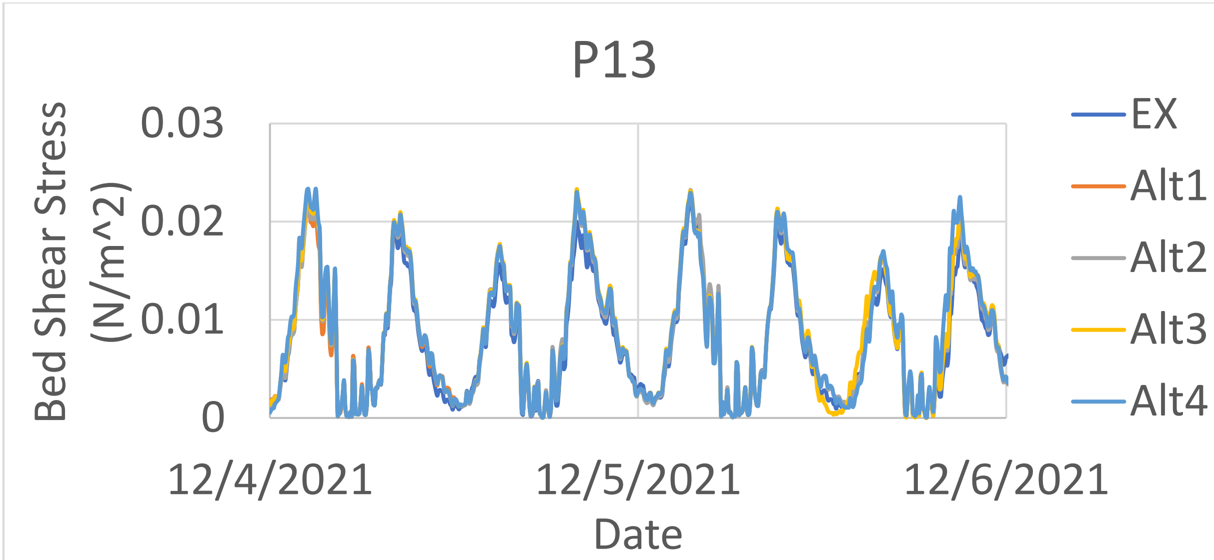
Location 10: Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



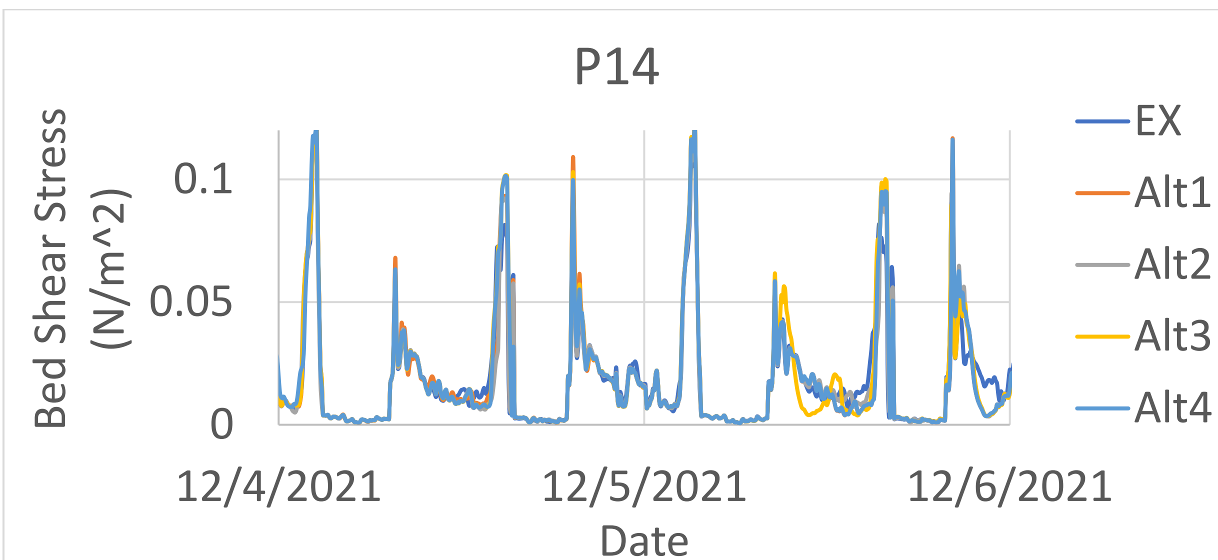
Location 11: Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



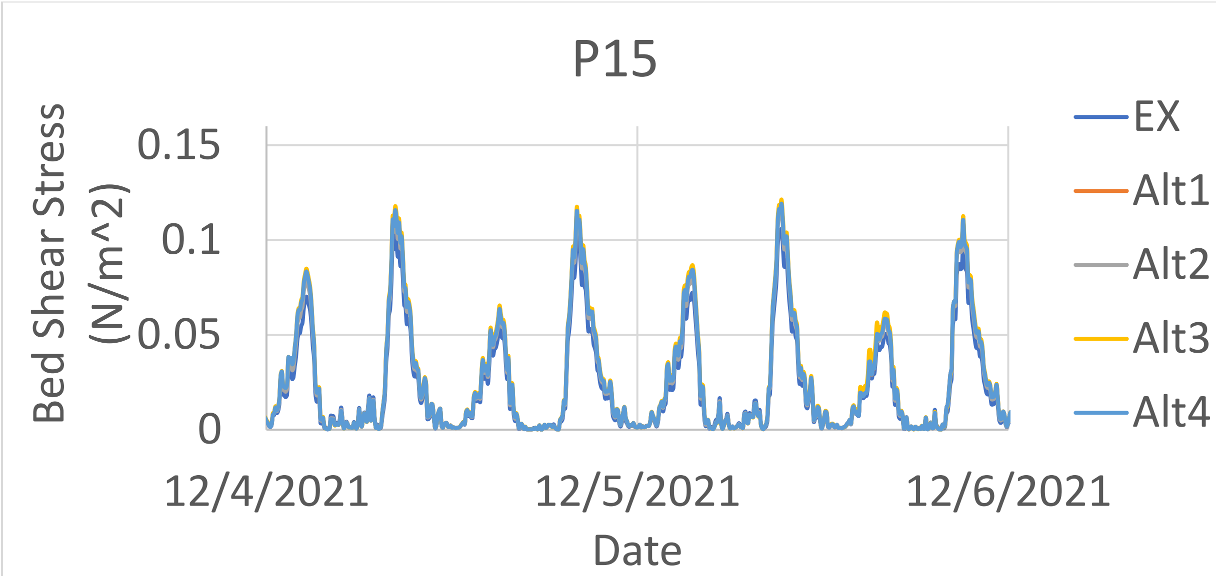
Location 12: Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



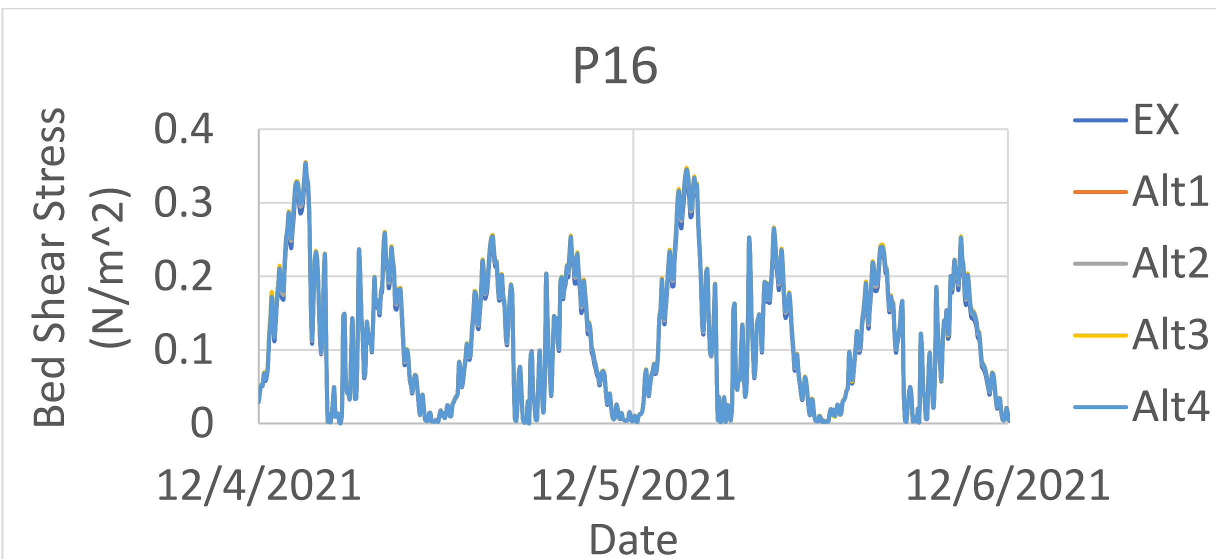
Location 13: Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



Location 1:4 Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



Location 15: Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides



Location 16: Time-Series Plots Showing Bed Shear Stress (N/m2) under Spring Tides

Page left intentionally blank

D.5- Snake Island Habitat Evaluation

This Page Intentionally Left Blank

Memorandum

To: File

Date: May 16, 2022

Project #: 14792.02

From: Dan Cannata, Chris Wagner

Re: Snake Island Habitat Evaluation, Winthrop, MA

On Friday, May 13, 2022, VHB Environmental Scientists (Dan Cannata and Chris Wagner) visited Snake Island in Winthrop, Massachusetts to document existing conditions and conduct a bird habitat survey for potential species of concern. According to the Massachusetts Natural Heritage and Endangered Species Program (NHESP), the entirety of Snake Island and its immediate surroundings are located within Priority Habitat of Rare Species (PH 1304) and Estimated Habitat of Rare Wildlife (EH 936) mapped for the Common Tern (*Sterna hirundo*) and Least Tern (*Sternula antillarum*). Both of these species are listed as species of Special Concern under the Massachusetts Endangered Species Act (MESA). During the site visit, the Environmental Scientists examined the island by non-motorized boats and on foot to document habitat conditions to determine the likelihood that either Common Terns or Least Terns may be present. Additionally, visual and auditory observations of bird species were documented on the Island and adjacent areas.

Results

Snake Island is an approximately 3.0-acre uninhabited island located in Boston Harbor 2,300 feet east of Boston Logan International Airport and 1,500 feet west of the mainland portion of the Town of Winthrop. The southern portion of the island consists primarily of a rocky shoreline with sandy areas vegetated with common reed (*Phragmites australis*), American beach grass (*Ammophila breviligulata*) and seaside goldenrod (*Solidago sempervirens*). Immediately north of the beach, vegetation consists of a dense wooded thicket dominated by cottonwood (*Populus deltoides*) and big-toothed aspen (*Populus grandidentata*) with an understory consisting of staghorn sumac (*Rhus typhina*), Asiatic bittersweet (*Celastrus orbiculatus*), Tartarian honeysuckle (*Lonicera tatarica*), crabapple (*Malus sp.*), beach rose (*Rosa rugosa*), and black swallowwort (*Cynanchum louiseae*). The central portion of the island consists primarily of a tidal lagoon that is bounded by rocky terrain, and marsh dominated by common reed and saltmeadow cordgrass (*Spartina patens*). The island is bordered by mudflats and salt marsh dominated by smooth cordgrass (*Spartina alterniflora*).

During visual and auditory surveys, both Common Tern and Least Tern were observed on the island and in surrounding waters. Species observed consisted of:

- Common Tern (*Sterna hirundo*)
- Least Tern (*Sternula antillarum*)
- Double-crested cormorant (*Phalacrocorax auritus*)
- Willet (*Tringa semipalmata*)
- Barn Swallow (*Hirundo rustica*)
- Common Eider (*Somateria mollissima*)

- Red-winged blackbird (*Agelaius phoeniceus*)
- Song Sparrow (*Melospiza melodia*)
- American oystercatcher (*Haematopus palliatus*)
- Black-bellied Plover (*Pluvialis squatarola*)
- Ruddy turnstone (*Arenaria interpres*)
- Surf scoter (*Melanitta perspicillata*)
- American Black Duck (*Anas rubripes*)
- Killdeer (*Charadrius vociferus*)
- Spotted Sandpiper (*Actitis macularius*)
- Herring gull (*Larus argentatus*)
- European starling (*Sturnus vulgaris*)
- Northern Cardinal (*Cardinalis cardinalis*)
- Mourning Dove (*Zenaida macroura*)
- Common Grackle (*Quiscalus quiscula*)
- Great Egret (*Ardea alba*)
- Great Black-backed gull (*Larus marinus*)

Suitability as Habitat

According to information from MassWildlife's NHESP:

In Massachusetts, the Least Tern nests on sandy or gravelly beaches periodically scoured by the storm tides, resulting in sparse or no vegetated areas.[1] *In Massachusetts, the Common Tern generally nests on sandy or gravelly islands and barrier beaches, but also occurs on rocky or cobbly beaches and salt marshes. It prefers areas with scattered vegetation which is used for cover by chicks.*[2]

Conclusion

Based on the findings from the site visit, it appears that Snake Island contains areas both vegetated and non-vegetated surface that can provide suitable nesting habitat for each species. Based on the existing habitat conditions and presence of individual birds, favorable habitat conditions appear to exist for both common terns and least terns on

1 https://www.mass.gov/doc/least-tern/download
2 https://www.mass.gov/doc/common-tern/download

Snake Island. The island also appears to serve as nesting habitat for American Oystercatchers as several pairs were noted during the site visit.

Environmental Scientists also noted that Snake Island is directly below the flight path of aircraft departing Logan Airport. During the site visit, birds of all species on the island did not scatter or flee from the island at any point that aircraft were flying overhead.

This Page Intentionally Left Blank.

D.6- Noise Analysis

This Page Intentionally Left Blank.

Noise Analysis Support Information

D.6.1 Introduction

A noise analysis was undertaken to assess the potential noise impacts associated with construction of the proposed Runway 27 End Runway Safety Area (RSA) Improvements Project (the Proposed Project). Because the Proposed Project would not extend runways nor have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway, once construction is complete, the presence of the RSA would have no impact on noise from aircraft operations. Accordingly, this analysis evaluates the temporary impacts associated with construction of the safety improvements.

D.6.2 Overview of Noise Assessment Methodology

Noise is a complex physical quantity. The properties, measurement, and presentation of noise involve specialized terminology. To assist reviewers in interpreting the complex noise metrics used in evaluating airport noise, this appendix introduces five acoustical descriptors of noise, roughly in increasing degree of complexity:

- Decibel (dB)
- A-Weighted Decibel (dBA)
- Maximum A-Weighted Sound Level (L_{max})
- Equivalent A-Weighted Sound Level (L_{eq})
- Day-Night Average Sound Level (DNL or L_{dn})
- Statistical Sound Level Descriptors

D.6.2.1 Decibel, dB

All sounds come from a sound source - a musical instrument, a voice speaking, an airplane passing overhead. It takes energy to produce sound. The sound energy produced by any sound source is transmitted through the air in sound waves - tiny, quick oscillations of pressure just above and just below atmospheric pressure. The ear detects these oscillating pressures interpreting it as “sound.”

Human ears are sensitive to a wide range of sound pressures. Although the loudest sounds heard by people without pain have about one million times more energy than the quietest sounds heard, ears are incapable of detecting small differences in these pressures. Thus, to better match how humans hear sound energy, the ears compress the total range of sound pressures to a more meaningful range by introducing the concept of sound pressure level.

Sound pressure level (SPL) is measured in decibels. Decibels are logarithms of a ratio, the numerator being the pressure of the sound source of interest, and the denominator being the reference pressure (equivalent to the quietest sound that an average healthy young adult can hear):

$$\textit{Sound Pressure Level (SPL)} = 20 * Log\left(\frac{P_{source}}{P_{reference}}\right)dB$$

The logarithmic conversion of sound pressure to sound pressure level means that the quietest sound that we can hear (the reference pressure) has a sound pressure level of about 0 dB, while the loudest sounds that we hear without pain have sound pressure levels of about 120 dB. Most sounds in our day-to-day environment have sound pressure levels on the order of 30 dB to 100 dB.

Because decibels are logarithmic, combining decibels is unlike common arithmetic. For example, if two sound sources each produce 100 dB and they are then operated together, they produce 103 dB - not the 200 decibels we might expect. Four equal sources operating simultaneously produce another three decibels of noise, resulting in a total sound pressure level of 106 dB. For every doubling of the number of equal sources, the sound pressure level goes up another three decibels.

A tenfold increase in the number of sources makes the sound pressure level go up 10 dB. A hundredfold increase makes the level go up 20 dB, and it takes a thousand equal sources to increase the level 30 dB.

If one noise source is much louder than another, the two sources together will produce virtually the same sound pressure level (and sound to our ears) as the louder source alone. For example, a 100 dB source plus an 80 dB source produce approximately 100.04 dB when operating together. The louder source "masks" the quieter one. But if the quieter source gets louder, it will have an increasing effect on the total sound pressure level such that, when the two sources are equal, as described above, they produce a level three decibels above the sound of either one by itself.

Conveniently, people also hear or interpret sound pressure in a logarithmic fashion. Two useful rules of thumb to remember when comparing sound pressure levels are: (1) a 6 dB to 10 dB increase is generally perceived to be about a doubling of loudness, and (2) changes in sound pressure level of less than about 3 dB are not readily detectable outside of a laboratory environment.

D.6.2.2 A-Weighted Decibel, sometimes denoted dBA

An important characteristic of sound is its frequency, or "pitch." The per-second rate of repetition of the sound pressure oscillations as they reach the ear, expressed in units known as hertz, formerly called cycles per second.

When analyzing the total noise of any source, acousticians often break the noise into frequency bands to determine how much is low-frequency noise, how much is middle-frequency noise, and how much is high-frequency noise. This breakdown is important for two reasons:

- The human ear is better equipped to hear mid and high frequencies and are less sensitive to lower frequencies. Thus, humans find mid- and high-frequency noise more annoying.
- Engineering solutions to a noise problem are different for different frequency ranges. Low-frequency noise is generally harder to control.

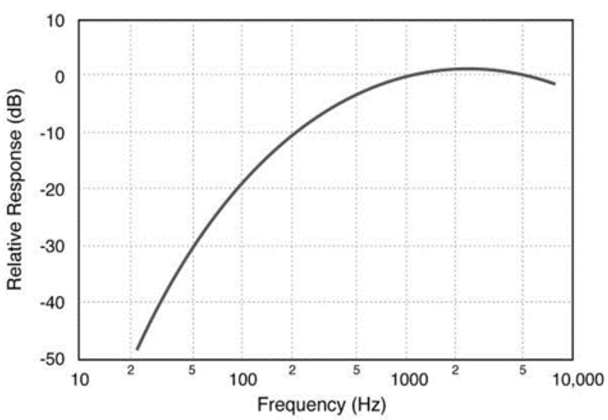
The normal frequency range of hearing for most people extends from a low of about 20 hertz to a high of about 10,000 hertz to 15,000 hertz. People respond to sound most readily when the predominant frequency is in the range of normal conversation, typically around 1,000 hertz to 2,000 hertz. The acoustical community has defined several "filters," which approximate this sensitivity of our ears and thus, help us to judge the relative loudness of various sounds made up of many different frequencies.

The "A" filter (or "A-weighting") does this best for most environmental noise sources. A-weighted sound levels are measured in decibels, just like unweighted. To avoid ambiguity, A-weighted sound levels should be identified as such (e.g., "an A-weighted sound level of 85 dB") or in an abbreviated form (e.g., "a sound level of 85 dBA") where the "A" indicates the sound level has been A-weighted.

Government agencies in the U.S. (and most governments worldwide) recommend or require the use of A-weighted sound levels for measuring, modeling, describing, and assessing aircraft sound levels (and sound levels from most other transportation and environmental sources).

Figure D.6-1 depicts A-weighting adjustments to sound from approximately 20 hertz to 10,000 hertz. If two sounds have a level of 90 dB (unweighted), but the first sound occurs at 1,000 hertz and the second at 100 hertz, the first sound would have an A-weighted level of 90 dBA and the second sound would have an A-weighted level of 70.9 dBA.

Figure D.6-1 Frequency-Response Characteristics of the A-Weighting Filter

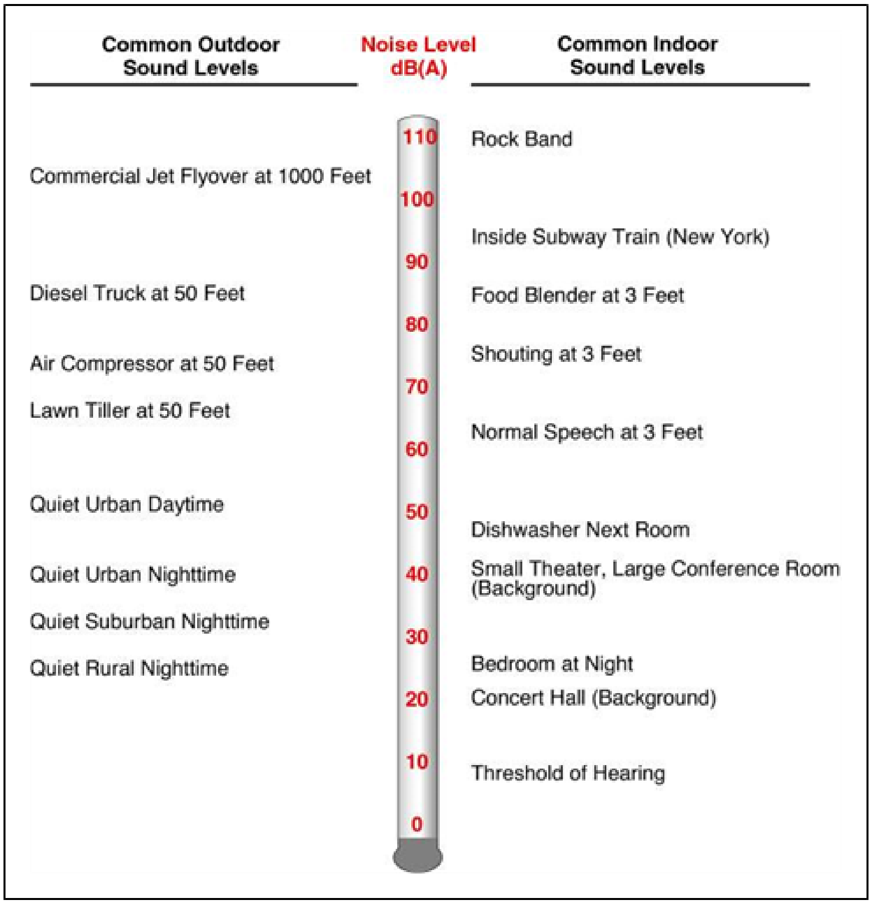


Source: HMMH, 2011

The A-weighted filter significantly de-emphasizes those parts of the total noise at lower and higher frequencies (below about 500 hertz and above about 10,000 hertz) where humans do not hear as well. The filter has very little effect, or is nearly "flat," in the middle range of frequencies between 500 hertz and 10,000 hertz where we hear quite easily. Because this filter generally matches our ears' sensitivity, sounds having higher A-weighted sound levels are usually judged to be louder than those with lower A-weighted sound levels, a relationship which otherwise might not be true. It is for this reason that acousticians typically use A-weighted sound levels to evaluate environmental noise sources.

Figure D.6-2 depicts representative A-weighted sound levels for a variety of common sounds.

Figure D.6-2 Representative A-Weighted Sound Levels

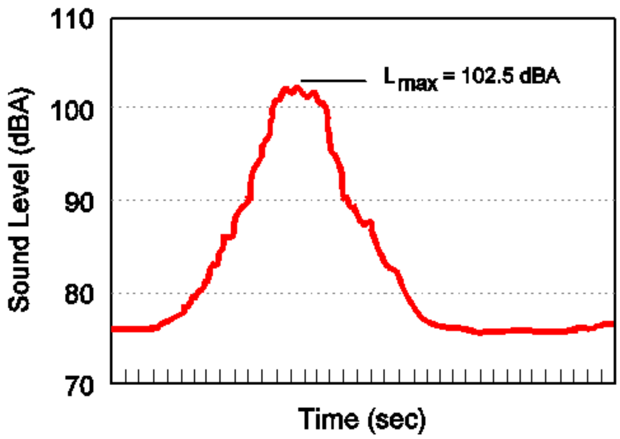


Source: HMMH, 2011

D.6.2.3 Maximum A-Weighted Sound Level, L_{max}

An additional dimension to environmental noise is that A-weighted levels vary with time. For example, the sound level increases as a dump truck passes by, then falls and blends into the background as the dump truck recedes into the distance (though even the background varies as birds chirp, the wind blows, or a car passes by). This is illustrated in **Figure D.6-3**.

Figure D.6-3 Variation in the A-Weighted Sound Level over Time



Source: HMMH, 2011

Because of this variation, it is often convenient to describe a particular noise "event" by its maximum sound level, abbreviated as L_{max}. In **Figure D.6-3**, the L_{max} is approximately 102.5 dB.

While the maximum level is easy to understand, it suffers from a serious drawback when used to describe the relative “noisiness” of noise over time; i.e., it describes only one dimension of the event and provides no information on the event’s overall, or cumulative, noise exposure. The next sections introduce two closely related measures that account for this concept of a noise "dose," or the cumulative exposure associated with individual “noise events” such as during the construction of the Proposed Project.

D.6.2.4 Equivalent A-Weighted Sound Level, Leq

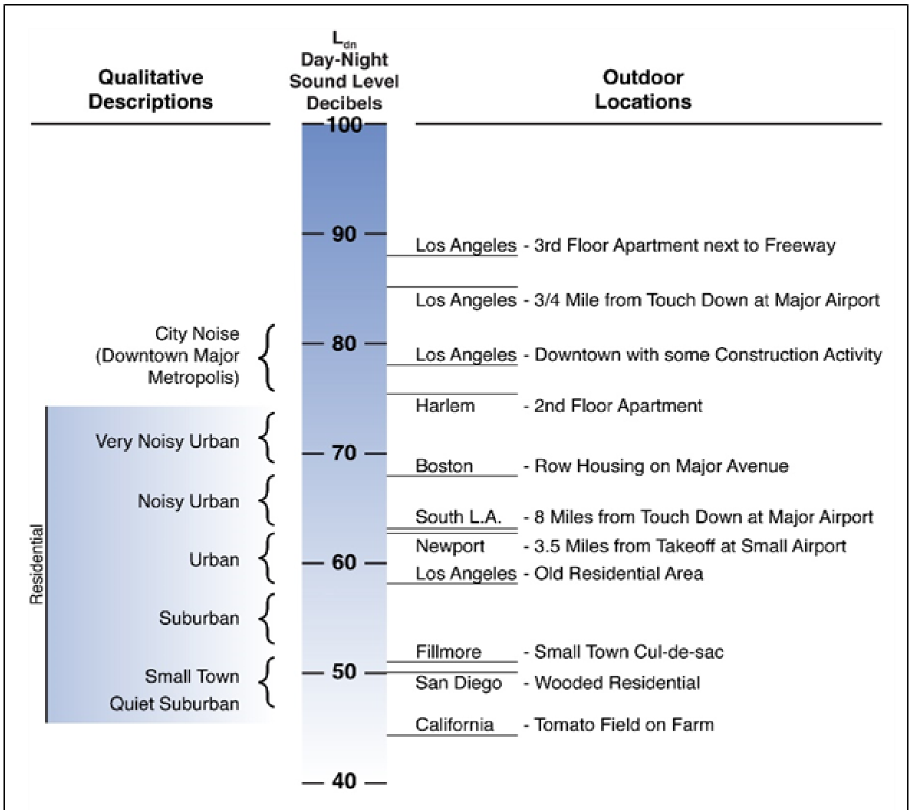
Leq is the sound level, expressed in dBA, of a steady sound that has the same A-weighted sound energy as the time-varying sound over the averaging period. Leq is the average sound level for a specified time period, such as 24 hours, 8 hours, or 1 hour. Leq is calculated by integrating the sound energy from all noise events over a given time period and applying a factor for the number of events. Leq can be expressed for any time interval; for example, the Leq representing an averaged level over an 8-hour period would be expressed as $L_{eq}(8)$.

D.6.2.5 Day-Night Average Sound Level, DNL or L_{dn}

Day-Night Sound Levels (DNL), formerly referred to as L_{dn}, is expressed in dBA and represents the noise level over a 24-hour period. Because environmental noise fluctuates over time, DNL was devised to relate noise exposure over time to human response. DNL is a 24-hour average of the hourly L_{eq}, but with penalties to account for the increased sensitivity to noise events that occur during the more sensitive nighttime periods. Specifically, DNL penalizes noise by 10 dB during the nighttime time period (10:00 PM to 7:00 AM). The U.S. Environmental Protection Agency (USEPA) introduced the metric in 1976 as a single-number measurement of community noise exposure. The Federal Aviation Administration (FAA) adopted DNL as the noise metric for measuring cumulative aircraft noise under 14 Code of Federal Regulations (CFR) Part 150, Airport Noise Compatibility Planning. The Department of Housing and Urban Development, the Veterans Administration, the Department of Defense, the United States Coast Guard (USCG), and the Federal Transit Administration (FTA) have also adopted DNL for measuring cumulative noise exposure. DNL is used to describe measured and predicted noise exposure in communities in airport environs.

Representative values of DNL in our environment range from a low of 40 dB to 45 dB in extremely quiet, isolated locations, to highs of 80 dB or 85 dB immediately adjacent to a busy truck route. The DNL would typically be in the range of 50 dB to 55 dB in a quiet residential community and 60 dB to 65 dB in an urban residential neighborhood. **Figure D.6-4** presents representative outdoor DNL values measured at various U.S. locations.

Figure D.6-4: Examples of Measured Day-Night Average Sound Levels



Source: HMMH, 2011

D.6.2.6 Statistical Sound Level Descriptors

Statistical descriptors of the time-varying sound level are often used to provide more information about how the sound level varies during the time period of interest. The descriptor includes a subscript that indicates the percentage of time the sound level is exceeded during the period. The L_{50} is an example, which represents the sound level exceeded 50 percent of the time, and equals the median sound level. Another commonly used descriptor is the L_{10}, which represents the sound level exceeded 10 percent of the measurement period and describes the sound level during the loudest portions of the period. The L_{90} is often used to describe the quieter background sound levels that occurred, since it represents the level exceeded 90 percent of the period. The L_{90} metric is often used to describe the "ambient" sound level for a given location.

D.6.3 Neighborhood Sound Levels

Massport maintains 30 noise monitoring stations that gather noise data 24 hours a day at various locations across the City of Boston. Massport uses these data to monitor and minimize the noise impacts to the community, associated with activities at Logan Airport. Daily readings are taken from the noise monitors throughout the year. The noise monitoring system can separate and distinguish the sound levels of passing aircraft thousands of feet overhead from sound levels due to traffic and other activities in the neighborhood that occur at ground level.

Table D.6-1 provides a summary of measured noise levels for 2019 at the noise monitoring stations in the neighborhood near the proposed project location. The year 2019 is the most recent timeframe available for where a representative full year of data are available, showing pre-COVID-19 conditions. The "Total measured" sound levels include the contributions from all sources including aircraft operations to and from Logan airport, as well as contributions from sources in the community, such as traffic on local roads.

Table D.6-1 Measured Noise Levels in Surrounding Neighborhoods in 2019

Noise Monitoring Station	Monitoring Location[1]	Total Measured	
		DNL	Daytime L_{10} (7 AM to 7 PM)[2]
NMT04	Bay View Ave and Grand View Avenue – Winthrop	74.9	79.9
NMT05	Harborview and Faun Bar– Winthrop	62.1	67.1
NMT06	Somerset Ave near Johnson Avenue – Winthrop	68.6	73.6

Source: Logan International Airport 2019 Annual DNL Report. The daytime background sound levels represent both community and aircraft noise sources. Total DNL reported at the monitor was used because it includes both community and aircraft noise sources.
See Figure D.6-5.
Noise Monitoring Terminals measure DNL. L10 was derived from DNL. These sound level metrics are used to describe the effects of noise on humans.

Figure D.6.-5 Massport Noise Monitoring Station Locations

D.6.4 Construction Noise Analysis

D.6.4.1 Existing Conditions

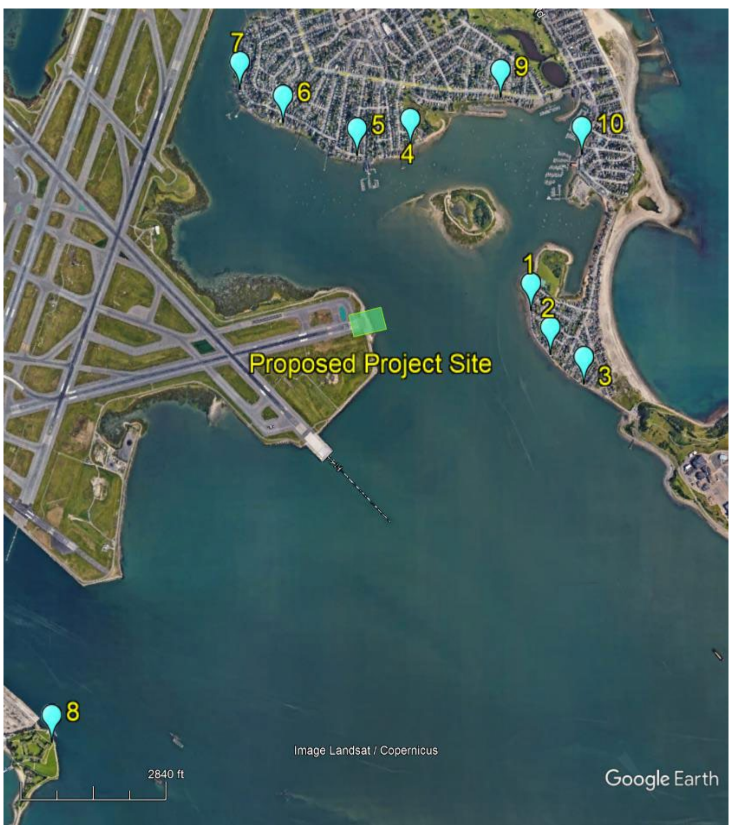
The noise environment in the vicinity of the proposed Runway 27 End RSA Improvements Project was evaluated to identify areas that could be potentially sensitive to noise from project construction activities. The noise analysis identified ten sensitive receptor locations in the vicinity of the Proposed Project, ranging in distance from the Runway 27 End RSA location from approximately 3,000 feet to approximately 10,000, as shown in **Table D.6-2** and in **Figure D.6-6**. The receptor locations are predominately residential. These receptor locations were selected based on land use considerations and represent the most sensitive locations that would be likely to experience temporary changes in sound levels due to the proposed construction activities.

Table D.6-2 Noise Modeling Receptor Locations

Receptor #	Location	Approximate Distance (feet)
1	Grand View Avenue between Undine Avenue and Foam Street	3,300
2	Grand View Avenue between Shirley Street and Billows Street	3,700
3	Townsend Street and Maryland Avenue	4,400
4	Frances Street and Plummer Avenue	3,100
5	Woodside Park, Baker Road, and Bartlett Parkway	3,100
6	Johnson Avenue between Bellevue Avenue and Sargent Street	4,200
7	Court Road between Sargent Street and Albert Avenue	4,900
8	Fort Independence Park (South Boston)	10,000
9	Washington Avenue between Bates Avenue and Lewis Avenue	5,000
10	Shirley Street between Crystal Cove Avenue and Park Avenue.	5,400

Source: HMMH, 2022.

Figure D.6-6 Proposed Project Site and Noise-Sensitive Receptor Locations



Note: See Table D.6-2 for distances to each receptor location.

D.6.4.2 Construction Noise Assessment

A noise analysis was undertaken to assess the potential noise impacts from construction of the proposed Runway 27 End Runway Safety Improvement Project. Because the Proposed Project would not extend runways nor have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway, it would not permanently affect noise from aircraft operations. Therefore, changes in aircraft noise were not assessed due to the Proposed Project.

Based on a schedule of equipment to be used, the noise analysis evaluated sound levels of construction activities for the proposed Runway 27 End RSA Improvements Project during the periods for which construction is planned to occur: the third quarter of 2025 and the third quarter of 2026. **Table D.6-3** provides equipment usage for each of these periods and typical maximum sound levels associated with each type of construction equipment expected to be used during construction of the Proposed Project.

Table D.6-3 Predicted Maximum Construction Equipment Use and Sound Levels

		Number of Pieces of Equipment	
Equipment	L_{max} at 50 Feet (dBA)	2025 Quarter 3	2026 Quarter 3
250 Ton Crane	76	3	3
2500 Gallon Water Truck	72	1	1
300 Ton Crane	76	2	2
Bulldozer	86	1	2
Cold Planer, Tandem Roller & Paver	84	-	2
Compressor	67	7	9
Concrete Pump	88	5	4
Crew Boat	67	1	1
Delivery Truck	74	3	3
Dozer	86	1	2
Dump Truck	92	3	6
Engineered Materials Arresting System (EMAS) Tractor Trailer	74	-	8
Escort Vehicle	74	3	3
Excavator	87	1	3
Forklift	88	-	6
Heavy Duty Concrete Power Screed	80	4	4
Hydraulic Hammers with Powerpak	95	3	-
Hydraulic Pile Cutting Machine	95	2	-
Loader	81	1	3
Man Boat	67	1	1
Material Barge	67	6	6
Mechanic Truck	74	2	2

Table D.6-3 Predicted Maximum Construction Equipment Use and Sound Levels

		Number of Pieces of Equipment	
Equipment	**L_{max} at 50 Feet (dBA)**	**2025 Quarter 3**	**2026 Quarter 3**
Mortar Concrete Mixer	71	4	4
Pickup Truck	74	3	7
Portable Generator	68	7	7
Ready Mix Concrete Truck	82	20	16
Ride On Power Trowel	88	4	4
Survey Van	74	1	1
Tack Coat Truck	72	-	2
Truck Mounted Concrete Pump	88	4	4
Tugboat	67	2	2
Vacuum Sweeper Truck	81	1	1
Vibratory Roller	82	1	2
Vibro Hammer with Powerpak	95	4	2
Welder Machine	72	6	4
Work Boat	67	5	5
Worker Van	74	1	1

Source: Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM).

Table D.6-4 shows a summary and **Tables D.6-5** and **D.6-6** show the results from the construction noise model for each of the two 60-day construction periods in 2025 and 2026. Each piece of construction equipment was assigned reference noise emission levels contained in the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) consisting of the reference L_{max} at 50 feet (as shown in **Table D.6-3**), the usage factor, and whether the piece of equipment is an impact device (e.g., pile driver or jack hammer). **Tables D.6-5** and **D.6-6** show the contribution from each type of construction equipment, as well as the cumulative noise exposure and overall L_{max}, at each of the 10 receptors identified in the preceding table.

The L_{10} sound levels at all receptors during all construction quarters would be below the City of Boston's criteria on noise emitted from construction sites, which is L_{10} = 75 dBA for residential land uses and L_{10} = 80 dBA for recreational land uses. L_{10} sound levels from construction would range from a low of 57 dBA at Fort Independence Park in South Boston, which is located farther from the Proposed Project, to 68 dBA at the closest locations to the Proposed Project at Frances Street and Pico Avenue (Receptor 4), and in the vicinity of Woodside Park, Baker Road, and Bartlett Parkway in Winthrop (Receptor 5).

The Lmax sound levels at all receptors would be below the City of Boston's criteria for noise emitted from construction sites of Lmax = 86 dBA for residential uses. The predicted construction sound levels would range from 42 dBA at Fort Independence Park to 69 dBA at Frances Street and Pico Avenue and Woodside Park, Baker Road, and Bartlett Parkway. These sound levels would not result in significant noise impacts at any off-airport location. The Lmax is based on the loudest piece of equipment used in each construction period and is experienced only during the period when the equipment is in use. For the RSA Project, the loudest piece of equipment is a vibratory pile driver. Pile driving is expected to occur for a limited period of approximately 30 days in 2025.

Table D.6-4 Predicted Construction Sound Levels (dBA)

Receptor	Location[1]	L_{10}[2]		Lmax[3]	
		2025	2026	2025	2026
1	Grand View Avenue between Undine Avenue and Foam Street	72	70	68	68
2	Grand View Avenue between Shirley Street and Billows Street	71	69	67	67
3	Townsend Street and Maryland Avenue	70	68	66	66
4	Frances Street and Pico Avenue	73	71	69	69
5	Woodside Park, Baker Road, and Bartlett Parkway	73	71	69	69
6	Johnson Avenue between Bellevue Avenue/Sargent Street	70	68	66	66
7	Court Road between Sargent Street/Albert Avenue	69	67	65	65
8	Fort Independence Park	63	60	58	58
9	Washington Avenue between Bates Avenue and Lewis Avenue	69	66	64	64
10	Shirley Street between Crystal Cove Avenue and Park Avenue	68	66	64	64

NOTE: City of Boston noise criteria from construction sites is limited to L_{10} = 75 dBA at a residential or institutional land use and L10 = 80 dBA at recreational land use and

1 See Figure D.6-6.
2 L10 represents total sound level of all equipment.
3 Lmax represents the sound level of the noisiest piece of equipment.

Lmax = 86 dBA at residential or institutional land uses.

Table D.6-5 Third Quarter of 2025 Modeling Results

	Q3 2025									
Receptor	R-1	R-2	R-3	R-4	R-5	R-6	R-7	R-8	R-9	R-10
Address	60 Grand View Ave	148 Grand View Ave	59 Townsend St	15 Frances St	12 Bartlett Pkwy	114 Johnson Ave	219 Court Rd	Fort Independence	97 Washington Ave	622 Shirley St
Distance (ft)	3,289	3,693	4,386	3,061	3,138	4,189	4,865	10,024	5,021	5,362
Overall Lmax (Non-Impact Device)	55.3	54.3	52.8	55.9	55.7	53.2	51.9	45.6	51.6	51.0
Overall Lmax (Impact Device)	68.1	67.1	65.6	68.8	68.5	66.0	64.7	58.5	64.5	63.9
Range of Leq (Equipment)	26 - 67	25 - 66	24 - 65	27 - 68	27 - 68	24 - 65	23 - 64	17 - 57	23 - 63	22 - 63
Cumulative Leq (All Equipment)	69.4	68.4	67.0	70.1	69.9	67.3	66.0	59.8	65.8	65.2
Cumulative L10 (All Equipment)	72.4	71.4	70.0	73.1	72.9	70.3	69.0	62.8	68.8	68.2

RCNM Equipment	Ref Avg Lmax at 50 feet	Usage Factor (%)	Impact Device?	Predicted Noise Levels by Equipment at Each Receptor, dBA																			
				R-1		R-2		R-3		R-4		R-5		R-6		R-7		R-8		R-9		R-10	
				Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	76.0	16	No	39.6	36.4	38.6	35.4	37.1	33.9	40.2	37.1	40.0	36.8	37.5	34.3	36.2	33.0	29.9	26.8	35.9	32.8	35.4	32.2
Water Spray Truck	72.0	40	No	35.6	31.6	34.6	30.6	33.1	29.1	36.2	32.3	36.0	32.0	33.5	29.5	32.2	28.2	25.9	22.0	31.9	28.0	31.4	27.4
Crane	76.0	16	No	39.6	34.7	38.6	33.7	37.1	32.2	40.2	35.3	40.0	35.1	37.5	32.6	36.2	31.3	29.9	25.0	35.9	31.0	35.4	30.4
Dozer	86.1	40	No	49.7	45.7	48.7	44.7	47.2	43.2	50.3	46.4	50.1	46.1	47.6	43.6	46.3	42.3	40.0	36.1	46.0	42.1	45.5	41.5
Paving - Asphalt (Paver + MTV + Dump Truck)	82.8	50	No																				
Compressor	66.8	40	No	30.4	34.9	29.4	33.9	27.9	32.4	31.0	35.5	30.8	35.3	28.3	32.8	27.0	31.5	20.7	25.2	26.7	31.2	26.2	30.6
Concrete Pump Truck	87.5	20	No	51.2	51.2	50.2	50.2	48.7	48.7	51.8	51.8	51.6	51.6	49.1	49.1	47.8	47.8	41.5	41.5	47.5	47.5	46.9	46.9
Compressor	66.8	40	No	30.4	26.4	29.4	25.4	27.9	23.9	31.0	27.0	30.8	26.8	28.3	24.3	27.0	23.0	20.7	16.7	26.7	22.7	26.2	22.2
Flatbed Truck	74.2	40	No	37.8	38.6	36.8	37.6	35.3	36.1	38.4	39.2	38.2	39.0	35.7	36.5	34.4	35.2	28.1	28.9	34.1	34.9	33.6	34.4
Dozer	86.1	40	No	49.7	45.7	48.7	44.7	47.2	43.2	50.3	46.4	50.1	46.1	47.6	43.6	46.3	42.3	40.0	36.1	46.0	42.1	45.5	41.5
Dump Truck (Cyclical)	91.6	40	No	55.3	56.1	54.3	55.1	52.8	53.6	55.9	56.7	55.7	56.5	53.2	54.0	51.9	52.7	45.6	46.4	51.6	52.4	51.0	51.8
Flatbed Truck	74.2	40	No																				

Table D.6-5 Third Quarter of 2025 Modeling Results

				Q3 2025																			
Receptor				R-1		R-2		R-3		R-4		R-5		R-6		R-7		R-8		R-9		R-10	
Flatbed Truck	74.2	40	No	37.8	38.6	36.8	37.6	35.3	36.1	38.4	39.2	38.2	39.0	35.7	36.5	34.4	35.2	28.1	28.9	34.1	34.9	33.6	34.4
Excavator	86.7	40	No	50.4	46.4	49.4	45.4	47.9	43.9	51.0	47.0	50.8	46.8	48.3	44.3	47.0	43.0	40.7	36.7	46.7	42.7	46.1	42.1
Telescopic Handler (Forklift)	88.3	40	No																				
Vibratory Concrete Consolidator	80.2	20	No	43.9	42.9	42.9	41.9	41.4	40.4	44.5	43.5	44.3	43.3	41.8	40.8	40.5	39.5	34.2	33.2	40.2	39.2	39.6	38.7
Power Tools - Jackhammer	95.4	50	Yes	59.0	60.8	58.0	59.8	56.5	58.3	59.6	61.4	59.4	61.2	56.9	58.7	55.6	57.4	49.3	51.1	55.4	57.1	54.8	56.5
Power Tools - Jackhammer	95.4	50	Yes	59.0	59.0	58.0	58.0	56.5	56.5	59.6	59.6	59.4	59.4	56.9	56.9	55.6	55.6	49.3	49.3	55.4	55.4	54.8	54.8
Front End Loader (Cyclical)	81.4	40	No	45.0	41.0	44.0	40.0	42.5	38.5	45.6	41.7	45.4	41.4	42.9	38.9	41.6	37.6	35.3	31.4	41.3	37.4	40.8	36.8
Compressor	66.8	40	No	30.4	26.4	29.4	25.4	27.9	23.9	31.0	27.0	30.8	26.8	28.3	24.3	27.0	23.0	20.7	16.7	26.7	22.7	26.2	22.2
N/A																							
Flatbed Truck	74.2	40	No	37.8	36.8	36.8	35.8	35.3	34.3	38.4	37.5	38.2	37.3	35.7	34.7	34.4	33.4	28.1	27.2	34.1	33.2	33.6	32.6
Drum Mixer	70.6	50	No	34.3	37.3	33.3	36.3	31.8	34.8	34.9	37.9	34.7	37.7	32.2	35.2	30.9	33.9	24.6	27.6	30.6	33.6	30.0	33.0
Flatbed Truck	74.2	40	No	37.8	38.6	36.8	37.6	35.3	36.1	38.4	39.2	38.2	39.0	35.7	36.5	34.4	35.2	28.1	28.9	34.1	34.9	33.6	34.4
Generator	67.8	50	No	31.5	36.9	30.5	35.9	29.0	34.4	32.1	37.5	31.9	37.3	29.4	34.8	28.1	33.5	21.8	27.2	27.8	33.2	27.2	32.7
Concrete Mixer Truck	82.4	50	No	46.1	56.1	45.1	55.1	43.6	53.6	46.7	56.7	46.5	56.5	44.0	54.0	42.7	52.7	36.4	46.4	42.4	52.4	41.8	51.8
Paving - Concrete (Triple Roller Tube Paver)	88.4	50	No	52.1	55.1	51.0	54.1	49.6	52.6	52.7	55.7	52.5	55.5	50.0	53.0	48.7	51.7	42.4	45.4	48.4	51.4	47.8	50.8
Flatbed Truck	74.2	40	No	37.8	33.8	36.8	32.8	35.3	31.3	38.4	34.5	38.2	34.2	35.7	31.7	34.4	30.4	28.1	24.2	34.1	30.2	33.6	29.6
Water Spray Truck	72.0	40	No																				
Concrete Pump Truck	87.5	20	No	51.2	50.2	50.2	49.2	48.7	47.7	51.8	50.8	51.6	50.6	49.1	48.1	47.8	46.8	41.5	40.5	47.5	46.5	46.9	46.0
Compressor	66.8	40	No	30.4	29.4	29.4	28.4	27.9	26.9	31.0	30.1	30.8	29.8	28.3	27.3	27.0	26.0	20.7	19.7	26.7	25.8	26.2	25.2
Street Sweeper	81.3	40	No	44.9	41.0	43.9	39.9	42.4	38.5	45.6	41.6	45.3	41.4	42.8	38.9	41.5	37.6	35.3	31.3	41.3	37.3	40.7	36.7
Compactor (Roller)	82.4	20	No	46.0	39.0	45.0	38.0	43.5	36.5	46.6	39.6	46.4	39.4	43.9	36.9	42.6	35.6	36.3	29.3	42.3	35.3	41.8	34.8

Table D.6-5 Third Quarter of 2025 Modeling Results

				Q3 2025																			
Receptor				R-1		R-2		R-3		R-4		R-5		R-6		R-7		R-8		R-9		R-10	
Vibratory Pile Driver	104.5	20	Yes	68.1	67.2	67.1	66.2	65.6	64.7	68.8	67.8	68.5	67.6	66.0	65.1	64.7	63.8	58.5	57.5	64.5	63.5	63.9	62.9
Welding Machine	72.1	40	No	35.8	39.6	34.7	38.5	33.3	37.1	36.4	40.2	36.2	40.0	33.7	37.5	32.4	36.2	26.1	29.9	32.1	35.9	31.5	35.3
Compressor	66.8	40	No	30.4	33.4	29.4	32.4	27.9	30.9	31.0	34.0	30.8	33.8	28.3	31.3	27.0	30.0	20.7	23.7	26.7	29.7	26.2	29.2
Flatbed Truck	74.2	40	No	37.8	33.8	36.8	32.8	35.3	31.3	38.4	34.5	38.2	34.2	35.7	31.7	34.4	30.4	28.1	24.2	34.1	30.2	33.6	29.6

Table D.6-6 Third Quarter 2026 Modeling Results

Q3 2026 - Alternative 2										
Receptor	R-1	R-2	R-3	R-4	R-5	R-6	R-7	R-8	R-9	R-10
Address	60 Grand View Ave	148 Grand View Ave	59 Townsend St	15 Frances St	12 Bartlett Pkwy	114 Johnson Ave	219 Court Rd	Fort Independence	97 Washington Ave	622 Shirley St
Distance (ft)	3289	3693	4386	3061	3138	4189	4865	10024	5021	5362
Overall Lmax (Non-Impact Device)	55.3	54.3	52.8	55.9	55.7	53.2	51.9	45.6	51.6	51.0
Overall Lmax (Impact Device)	68.1	67.1	65.6	68.8	68.5	66.0	64.7	58.5	64.5	63.9
Range of Leq (Equipment)	26 - 64	25 - 63	24 - 62	27 - 65	27 - 65	24 - 62	23 - 61	17 - 54	23 - 60	22 - 60
Cumulative Leq (All Equipment)	67.1	66.1	64.6	67.7	67.5	65.0	63.7	57.4	63.4	62.9
Cumulative L10 (All Equipment)	70.1	69.1	67.6	70.7	70.5	68.0	66.7	60.4	66.4	65.9

				Predicted Noise Levels by Equipment at Each Receptor, dBA																			
				R-1		R-2		R-3		R-4		R-5		R-6		R-7		R-8		R-9		R-10	
RCNM Equipment	Ref Avg Lmax at 50 feet	Usage Factor (%)	Impact Device?	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Crane	76.0	16	No	39.6	36.4	38.6	35.4	37.1	33.9	40.2	37.1	40.0	36.8	37.5	34.3	36.2	33.0	29.9	26.8	35.9	32.8	35.4	32.2
Water Spray Truck	72.0	40	No	35.6	31.6	34.6	30.6	33.1	29.1	36.2	32.3	36.0	32.0	33.5	29.5	32.2	28.2	25.9	22.0	31.9	28.0	31.4	27.4
Crane	76.0	16	No	39.6	34.7	38.6	33.7	37.1	32.2	40.2	35.3	40.0	35.1	37.5	32.6	36.2	31.3	29.9	25.0	35.9	31.0	35.4	30.4
Dozer	86.1	40	No	49.7	48.7	48.7	47.7	47.2	46.2	50.3	49.4	50.1	49.2	47.6	46.6	46.3	45.3	40.0	39.1	46.0	45.1	45.5	44.5
Paving - Asphalt (Paver + MTV + Dump Truck)	82.8	50	No	46.5	46.5	45.5	45.5	44.0	44.0	47.1	47.1	46.9	46.9	44.4	44.4	43.1	43.1	36.8	36.8	42.8	42.8	42.2	42.2
Compressor	66.8	40	No	30.4	36.0	29.4	35.0	27.9	33.5	31.0	36.6	30.8	36.4	28.3	33.9	27.0	32.6	20.7	26.3	26.7	32.3	26.2	31.7
Concrete Pump Truck	87.5	20	No	51.2	50.2	50.2	49.2	48.7	47.7	51.8	50.8	51.6	50.6	49.1	48.1	47.8	46.8	41.5	40.5	47.5	46.5	46.9	46.0
Compressor	66.8	40	No	30.4	26.4	29.4	25.4	27.9	23.9	31.0	27.0	30.8	26.8	28.3	24.3	27.0	23.0	20.7	16.7	26.7	22.7	26.2	22.2
Flatbed Truck	74.2	40	No	37.8	38.6	36.8	37.6	35.3	36.1	38.4	39.2	38.2	39.0	35.7	36.5	34.4	35.2	28.1	28.9	34.1	34.9	33.6	34.4
Dozer	86.1	40	No	49.7	48.7	48.7	47.7	47.2	46.2	50.3	49.4	50.1	49.2	47.6	46.6	46.3	45.3	40.0	39.1	46.0	45.1	45.5	44.5
Dump Truck (Cyclical)	91.6	40	No	55.3	59.1	54.3	58.1	52.8	56.6	55.9	59.7	55.7	59.5	53.2	57.0	51.9	55.7	45.6	49.4	51.6	55.4	51.0	54.8
Flatbed Truck	74.2	40	No	37.8	42.9	36.8	41.9	35.3	40.4	38.4	43.5	38.2	43.3	35.7	40.8	34.4	39.5	28.1	33.2	34.1	39.2	33.6	38.6
Flatbed Truck	74.2	40	No	37.8	38.6	36.8	37.6	35.3	36.1	38.4	39.2	38.2	39.0	35.7	36.5	34.4	35.2	28.1	28.9	34.1	34.9	33.6	34.4
Excavator	86.7	40	No	50.4	51.2	49.4	50.2	47.9	48.7	51.0	51.8	50.8	51.6	48.3	49.1	47.0	47.8	40.7	41.5	46.7	47.5	46.1	46.9
Telescopic Handler (Forklift)	88.3	40	No	51.9	55.7	50.9	54.7	49.4	53.2	52.5	56.3	52.3	56.1	49.8	53.6	48.5	52.3	42.2	46.0	48.2	52.0	47.7	51.5
Vibratory Concrete Consolidator	80.2	20	No	43.9	42.9	42.9	41.9	41.4	40.4	44.5	43.5	44.3	43.3	41.8	40.8	40.5	39.5	34.2	33.2	40.2	39.2	39.6	38.7
Power Tools - Jackhammer	95.4	50	Yes																				
Power Tools - Jackhammer	95.4	50	Yes																				
Front End Loader (Cyclical)	81.4	40	No	45.0	45.8	44.0	44.8	42.5	43.3	45.6	46.4	45.4	46.2	42.9	43.7	41.6	42.4	35.3	36.1	41.3	42.1	40.8	41.6
Compressor	66.8	40	No	30.4	26.4	29.4	25.4	27.9	23.9	31.0	27.0	30.8	26.8	28.3	24.3	27.0	23.0	20.7	16.7	26.7	22.7	26.2	22.2
N/A																							
Flatbed Truck	74.2	40	No	37.8	36.8	36.8	35.8	35.3	34.3	38.4	37.5	38.2	37.3	35.7	34.7	34.4	33.4	28.1	27.2	34.1	33.2	33.6	32.6

Table D.6-6 Third Quarter 2026 Modeling Results

Q3 2026 - Alternative 2										
Receptor	R-1	R-2	R-3	R-4	R-5	R-6	R-7	R-8	R-9	R-10
Address	60 Grand View Ave	148 Grand View Ave	59 Townsend St	15 Frances St	12 Bartlett Pkwy	114 Johnson Ave	219 Court Rd	Fort Independence	97 Washington Ave	622 Shirley St
Distance (ft)	3289	3693	4386	3061	3138	4189	4865	10024	5021	5362
Overall Lmax (Non-Impact Device)	55.3	54.3	52.8	55.9	55.7	53.2	51.9	45.6	51.6	51.0
Overall Lmax (Impact Device)	68.1	67.1	65.6	68.8	68.5	66.0	64.7	58.5	64.5	63.9
Range of Leq (Equipment)	26 - 64	25 - 63	24 - 62	27 - 65	27 - 65	24 - 62	23 - 61	17 - 54	23 - 60	22 - 60
Cumulative Leq (All Equipment)	67.1	66.1	64.6	67.7	67.5	65.0	63.7	57.4	63.4	62.9
Cumulative L10 (All Equipment)	70.1	69.1	67.6	70.7	70.5	68.0	66.7	60.4	66.4	65.9

				Predicted Noise Levels by Equipment at Each Receptor, dBA																			
				R-1		R-2		R-3		R-4		R-5		R-6		R-7		R-8		R-9		R-10	
RCNM Equipment	Ref Avg Lmax at 50 feet	Usage Factor (%)	Impact Device?	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Drum Mixer	70.6	50	No	34.3	37.3	33.3	36.3	31.8	34.8	34.9	37.9	34.7	37.7	32.2	35.2	30.9	33.9	24.6	27.6	30.6	33.6	30.0	33.0
Flatbed Truck	74.2	40	No	37.8	42.3	36.8	41.3	35.3	39.8	38.4	42.9	38.2	42.7	35.7	40.2	34.4	38.9	28.1	32.6	34.1	38.6	33.6	38.0
Generator	67.8	50	No	31.5	36.9	30.5	35.9	29.0	34.4	32.1	37.5	31.9	37.3	29.4	34.8	28.1	33.5	21.8	27.2	27.8	33.2	27.2	32.7
Concrete Mixer Truck	82.4	50	No	46.1	55.1	45.1	54.1	43.6	52.6	46.7	55.7	46.5	55.5	44.0	53.0	42.7	51.7	36.4	45.4	42.4	51.4	41.8	50.8
Paving - Concrete (Triple Roller Tube Paver)	88.4	50	No	52.1	55.1	51.0	54.1	49.6	52.6	52.7	55.7	52.5	55.5	50.0	53.0	48.7	51.7	42.4	45.4	48.4	51.4	47.8	50.8
Flatbed Truck	74.2	40	No	37.8	33.8	36.8	32.8	35.3	31.3	38.4	34.5	38.2	34.2	35.7	31.7	34.4	30.4	28.1	24.2	34.1	30.2	33.6	29.6
Water Spray Truck	72.0	40	No	35.6	34.7	34.6	33.6	33.1	32.2	36.2	35.3	36.0	35.1	33.5	32.6	32.2	31.3	25.9	25.0	31.9	31.0	31.4	30.4
Concrete Pump Truck	87.5	20	No	51.2	50.2	50.2	49.2	48.7	47.7	51.8	50.8	51.6	50.6	49.1	48.1	47.8	46.8	41.5	40.5	47.5	46.5	46.9	46.0
Compressor	66.8	40	No	30.4	29.4	29.4	28.4	27.9	26.9	31.0	30.1	30.8	29.8	28.3	27.3	27.0	26.0	20.7	19.7	26.7	25.8	26.2	25.2
Street Sweeper	81.3	40	No	44.9	41.0	43.9	39.9	42.4	38.5	45.6	41.6	45.3	41.4	42.8	38.9	41.5	37.6	35.3	31.3	41.3	37.3	40.7	36.7
Compactor (Roller)	82.4	20	No	46.0	42.0	45.0	41.0	43.5	39.5	46.6	42.7	46.4	42.4	43.9	39.9	42.6	38.6	36.3	32.4	42.3	38.4	41.8	37.8
Vibratory Pile Driver	104.5	20	Yes	68.1	64.2	67.1	63.2	65.6	61.7	68.8	64.8	68.5	64.6	66.0	62.1	64.7	60.8	58.5	54.5	64.5	60.5	63.9	59.9
Welding Machine	72.1	40	No	35.8	37.8	34.7	36.8	33.3	35.3	36.4	38.4	36.2	38.2	33.7	35.7	32.4	34.4	26.1	28.1	32.1	34.1	31.5	33.6
Compressor	66.8	40	No	30.4	33.4	29.4	32.4	27.9	30.9	31.0	34.0	30.8	33.8	28.3	31.3	27.0	30.0	20.7	23.7	26.7	29.7	26.2	29.2
Flatbed Truck	74.2	40	No	37.8	33.8	36.8	32.8	35.3	31.3	38.4	34.5	38.2	34.2	35.7	31.7	34.4	30.4	28.1	24.2	34.1	30.2	33.6	29.6

This Page Intentionally Left Blank.

D.7- Air Quality Analysis

This Page Intentionally Left Blank.

D.7.1 Introduction

This Appendix contains the methodology, technical data, and background data used to prepare the air quality analysis for the construction of the proposed Runway 27 End Runway Safety Area (RSA) Improvements Project (the Project or the Proposed Project) at Boston Logan International Airport (Logan Airport or the Airport). Because the Proposed Project would not extend runways nor have any effect on normal runway operations, runway capacity, or types of aircraft that could use the runway, once construction is complete, the presence of the RSA would have no impact on airfield or aircraft emissions. Accordingly, the air quality analysis evaluates the temporary impacts associated with construction of the safety improvements.

D.7.2 Construction Activities

For this Project, construction-related emissions are primarily associated with the exhaust from heavy equipment (i.e., excavators, bulldozers, graders, etc.); delivery trucks and marine vessels traveling to and from the site; dust from site preparation, land clearing, material handling, equipment movement on unpaved areas, and demolition activities; and fugitive emissions from the storage/transfer of raw materials. These emissions are temporary in nature and generally confined to the construction area and the access/egress roadways.

Emissions from construction activities were estimated based on the number of vehicles/pieces of equipment, the types of equipment/type of fuel used, vehicle/equipment utilization rates, and the projected duration and schedule of construction activity (construction of the Project is anticipated to occur for 120 days total during two separate 60-day periods, one each in the third quarter of 2025 and 2026).

The emission inventories for off-road (non-highway) equipment were calculated using emission factors obtained from the U.S. Environmental Protection Agency's (USEPA) NONROAD module contained within the USEPA's Motor Vehicle Emissions Simulator (MOVES3) mobile source model.[1] Emission factors for on-road (highway) pickups, delivery trucks, escort vehicles, and other on-road regulated vehicles were obtained from the on-road module in MOVES3. Emissions model input parameters were developed to be as consistent with regional meteorological conditions and vehicle data as possible. Emissions model default parameters were assumed where data were unavailable. Finally, marine vessel emissions factors were derived from the EPA's *Port Emissions Inventory Guidance: Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emissions*, published in April 2022.[2]

Emission factors for each off-road equipment type were applied to the anticipated equipment work output (horsepower-hours of expected equipment use). Operating times for the equipment were

1 U.S. Environmental Protection Agency, Motor Vehicle Emissions Simulator (MOVES3), January 2021.
2 U.S. Environmental Protection Agency, Office of Transportation and Air Quality, Transportation and Climate Division, *Ports Emissions Inventory Guidance: Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emissions*, EPA-420-B-22-011, April 2022.

conservatively based on a 12-hour workday which represents the maximum amount of time equipment may be operating. A load factor accounting for the average throttle setting relative to capacity were used. That is, a load factor of 0.62 equates to 62 percent of capacity during operation. For the off-road equipment, sulfur dioxide (SO_2), and particulate matter emission factors, diesel sulfur content was consistent with the assumptions and data used in other local and regional air quality analyses.

For on-road vehicles, the anticipated vehicle miles traveled (VMT) were estimated to determine annual emissions. Emissions from marine tugs, work boats, man boats, and crew boats were estimated using updated USEPA emission factors and engine load factors for Harbor Craft. The following equations were used to obtain annual emission rates for off-road equipment, on-road vehicles, materials barge tugs, work boats and personnel boats:

- Off-Road Emission Rate (tons per year) = Emission Factor (grams per horsepower-hour) * size (horsepower) * 12 hours per day * shifts/quarter * quarters/year * Load Factor * (453.59/2,000 tons/gram)
- On-Road Emission Rate (tons per year) = Emission Factor (grams per mile) * average trip VMT * shifts per quarter * quarters per year * (453.59/2,000 tons/gram)
- Material Barge, Work Boat, and Personnel Vessel Emission Rate (tons/year) = Emission Factor (grams per kilowatt hour) * size (kilowatts) * Load Factor * 12 hours/day * shifts/quarter * quarters per year * (453.59/2,000 tons/gram)

To estimate emissions associated with on-road motor vehicles, including vehicles utilized for the purposes of materials delivery, security, escorting and project management, the following assumptions were applied. For a conservative estimate of air emissions, all vehicles were assumed to travel round trip distance of 5 miles to the off-site materials source at an average speed of 20 miles per hour. Where applicable, 12 hours per day of work was conservatively applied to calculations (as noted above). Marine vessels were assumed to travel round trip to a staging area located in Quincy, Massachusetts (where applicable).

Additionally, the construction emissions inventories for fugitive dust sources were calculated using emission factors within USEPA's *Compilation of Air Emissions Factors* (AP-42)[3] and the Western Regional Air Partnership (WRAP) Fugitive Dust Handbook.[4]

3 U.S. Environmental Protection Agency, AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition, January 1995, as amended.
4 Western Regional Air Partnership, *WRAP Fugitive Dust Handbook*, prepared for the Western Governors' Association by Countless Environmental, September 7, 2006.

Fugitive dust emissions can result from the following activities: grading, moving soil, and digging, loading/unloading of trucks, movement of trucks on unpaved surfaces, and wind erosion of stockpiles. A fugitive dust emission factor of 0.011 tons per month per acre disturbed and 0.059 tons per 1,000 cubic yards of soil disturbed was used. For a conservative estimate, twice the project area was assumed to be disturbed on a typical construction day. Additionally, fine particulate matter (particulate matter smaller than or equal to 2.5 microns in diameter [$PM_{2.5}$]) was assumed to be 10 percent of particulate matter (PM_{10}) based on AP-42. Dust control measures and best management practices would be implemented to minimize fugitive dust and particulate emissions. A dust control efficiency of 75 percent due to daily watering and other measures was estimated based on AP-42.

Evaporative volatile organic compounds (VOC) emissions associated with the application of hot mix asphalt on areas requiring paving were not directly included in the construction emission estimate. The quantity of raw material used for asphalt paving are not available in the projected construction schedule. However, similar to construction for the adjacent Runway 33L RSA deck, which is a similar scope construction project, determined VOC emissions from asphalt paving were 0.11 tons per year. A similar quantity of VOC emissions would be expected for the Proposed Project and would add a minimal amount of VOC to the Project construction total.

The following tables document the emissions factors used in the analysis and the resulting emissions estimates for the Proposed Project (RSA Deck Support Alternative 2).

Table D.7-1 Off-Road Emission Factors (from MOVES3 – Nonroad)

			Emission Factor (grams per horsepower hour)					
Equipment Type	**Horsepower**	**Load Factor**	**VOC**	**CO**	**NO_x**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
250 Ton Crane	400	0.47	0.229	0.046	1.057	0.002	0.036	0.035
300 Ton Crane	500	0.47	0.229	0.046	1.057	0.002	0.036	0.035
Bulldozer	170	0.59	0.092	0.013	0.274	0.001	0.023	0.022
Cold Planer	630	0.59	0.570	0.074	1.556	0.002	0.075	0.073
Tandem Roller	134	0.62	0.181	0.025	0.423	0.001	0.047	0.045
Tandem Paver	173	0.66	0.129	0.018	0.355	0.001	0.033	0.032
Compressor	265	0.43	0.133	0.035	0.549	0.001	0.027	0.026
Concrete Pump	66	0.59	2.484	0.507	5.452	0.002	0.460	0.446
Dozer	130	0.59	0.092	0.013	0.274	0.001	0.023	0.022
Excavator	272	0.59	0.031	0.011	0.139	0.001	0.009	0.008
Fork Lift	100	0.59	0.052	0.007	0.857	0.002	0.012	0.012
Heavy Duty Concrete Power Screed	13	0.59	245.863	4.874	2.729	0.006	0.112	0.103
Hydraulic Hammers with Powerpak	350	0.48	0.631	0.082	1.702	0.002	0.083	0.081
Hydraulic Pile Cutting Machine	142	0.48	0.184	0.038	0.546	0.001	0.042	0.041
Loader	140	0.48	1.034	0.306	2.090	0.002	0.220	0.213
Mortar Concrete Mixer	8	0.59	245.864	4.874	2.729	0.006	0.112	0.103
Portable Generator	5.6	0.68	182.970	6.451	3.293	0.007	0.313	0.288
Ready Mix Concrete Truck	425	0.59	0.033	0.011	0.139	0.001	0.009	0.008
Ride On Power Trowel	31	0.49	10.405	0.349	1.631	0.004	0.069	0.064
Tack Coat Truck	210	0.59	0.020	0.009	0.114	0.001	0.007	0.006
Truck Mounted Concrete Pump	400	0.59	1.066	0.206	4.614	0.002	0.137	0.133
Vacuum Sweeper Truck	205	0.59	0.020	0.009	0.114	0.001	0.007	0.006
Vibratory Roller	157	0.62	0.181	0.025	0.423	0.001	0.047	0.045
Vibro Hammer with Powerpak	350	0.48	0.631	0.082	1.702	0.002	0.083	0.081
Welder Machine	23.5	0.21	2.555	0.541	4.116	0.003	0.308	0.299

Source: U.S. Environmental Protection Agency, Motor Vehicle Emissions Simulator, Version 3.
VOC = volatile organic compounds; CO = carbon monoxide; NO_x = nitrogen oxides; SO_2 = sulfur dioxide; PM_{10} = particulate matter; $PM_{2.5}$ = fine particulate matter.

Table D.7-2 On-Road Emission Factors (from MOVES3 - On-Road)

	Emission Factor (grams per mile)					
Emission Source	**VOC**	**CO**	**NO_x**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
2,500 Gallon Water Truck	1.252	0.098	1.956	0.003	0.035	0.032
Delivery Truck	1.015	0.085	0.801	0.002	0.028	0.025
Dump Truck	2.189	0.129	4.084	0.005	0.065	0.060
EMAS Tractor Trailer	2.189	0.129	4.084	0.005	0.065	0.060
Escort Vehicle	1.413	0.017	0.025	0.002	0.001	0.001
Mechanic Truck	1.015	0.085	0.801	0.002	0.028	0.025
Pickup Truck	1.413	0.017	0.025	0.002	0.001	0.001
Survey Van	1.413	0.017	0.025	0.002	0.001	0.001
Worker Van	1.413	0.017	0.025	0.002	0.001	0.001

Source: U.S. Environmental Protection Agency, Motor Vehicle Emissions Simulator, Version 3.
VOC = volatile organic compounds; CO = carbon monoxide; NO_x = nitrogen oxides; SO_2 = sulfur dioxide; PM_{10} = particulate matter; $PM_{2.5}$ = fine particulate matter.

Table D.7-3 Estimated Proposed Project Construction Emissions (tons/year)

	VOC		CO		NO_x		SO_2		PM_{10}		$PM_{2.5}$	
Emission Source	**2025**	**2026**	**2025**	**2026**	**2025**	**2026**	**2025**	**2026**	**2025**	**2026**	**2025**	**2026**
Off-Road	7.96	2.65	0.49	0.17	5.19	1.65	0.01	0.00	0.29	0.10	0.28	0.10
On-Road	0.079	0.062	0.004	0.003	0.101	0.076	0.0002	0.0001	0.002	0.001	0.002	0.001
Marine Vessels	0.23	0.21	1.46	1.32	8.60	7.77	0.01	0.01	0.18	0.16	0.17	0.15
Fugitive Dust	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.87	0.13	0.12
Total	**8.27**	**2.93**	**1.95**	**1.49**	**13.89**	**9.50**	**0.02**	**0.01**	**1.38**	**1.13**	**0.58**	**0.37**
General Conformity *de minimis* Threshold	*50*	*50*	*100*	*100*	*100*	*100*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*
Proposed Project *de minimis* Applicability Result (Pass/Fail)[1]	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*	*N/A*

Source: WSP 2022.

VOC = volatile organic compounds; CO = carbon monoxide; NO_x = nitrogen oxides; SO_2 = sulfur dioxide; PM_{10} = particulate matter; $PM_{2.5}$ = fine particulate matter.

1 Determined by comparing the estimated total emissions for each pollutant in each year to the applicable *de minimis* value.

Appendix E- RIM Study

E.1 FAA RSA Determination Form

E.2 Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study

This Page Intentionally Left Blank.

E.1- FAA RSA Determination Form

This Page Intentionally Left Blank.

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

Planning & Engineering Branch Manager

1/18/2019

Date

Gail B. Lattrell

Acting, New England Region Airports Division Director

1-23-2019

Date

E.2- Runway Incursion Mitigation Study/Runway 9-27 Runway Safety Area (RSA) Alternatives Study

This Page Intentionally Left Blank.

Boston Logan Airport

Runway Incursion Mitigation Study

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

January 8, 2019

Final for FAA Review

This Page Intentionally Left Blank.

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.

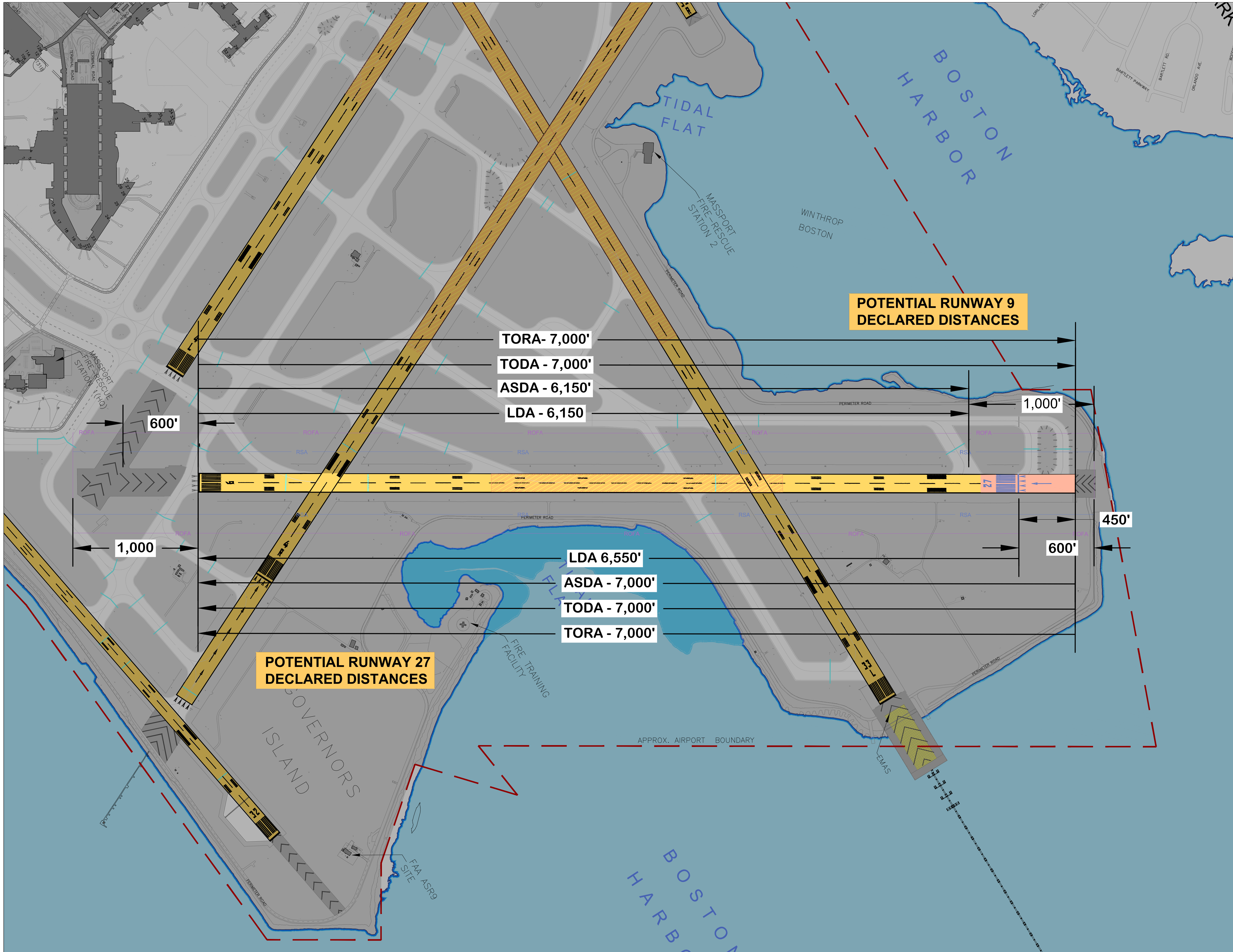
The ASDA and LDA values listed in Table 1.1 also indicate the full runway length being available for accelerate stop distance and landing distance despite the deficient length for full dimension overrun and undershoot RSA's on this runway end. The 2004 FAA RSA determination for this considered declared 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)

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

This Page Intentionally Left Blank.

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.

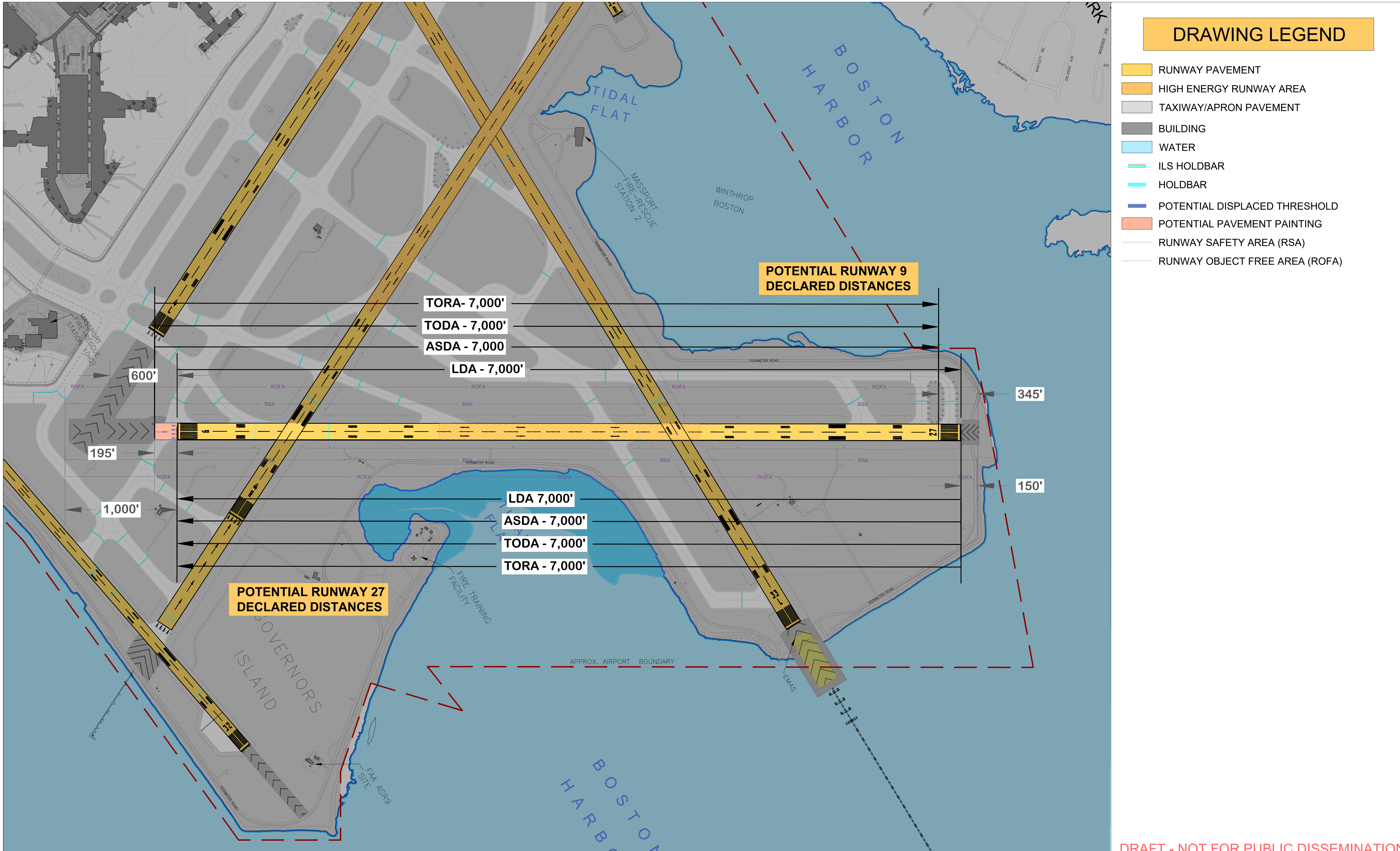
1.3.2 Alternative 2 - Runway Threshold Markings at Runway 9 Departure End

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.



bostonlogan

EXHIBIT 1.2

RUNWAY 9-27 RSA ALTERNATIVE 2 - DISPLACED THRESHOLD

DIMENSIONAL GAP ALTERNATIVES

This Page Intentionally Left Blank.

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.

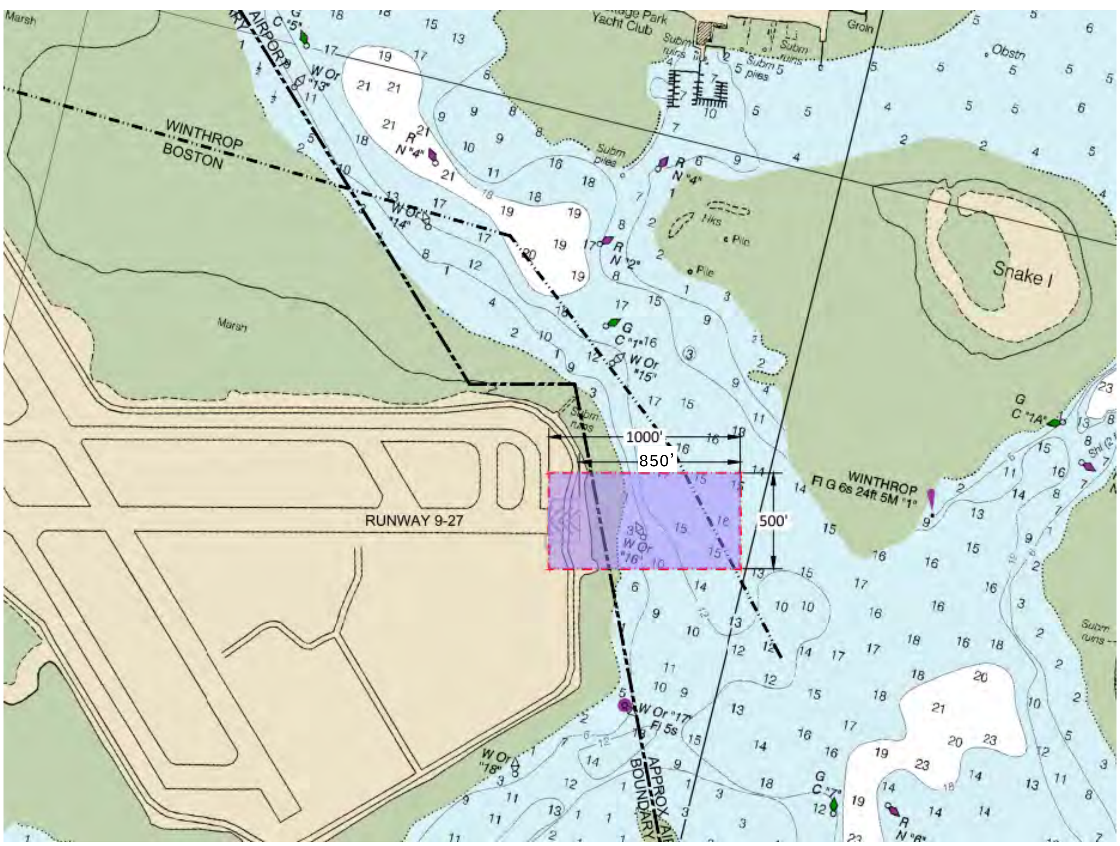
Attributes of Runway 9-27 RSA Alternatives 3A and 3B

- 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.

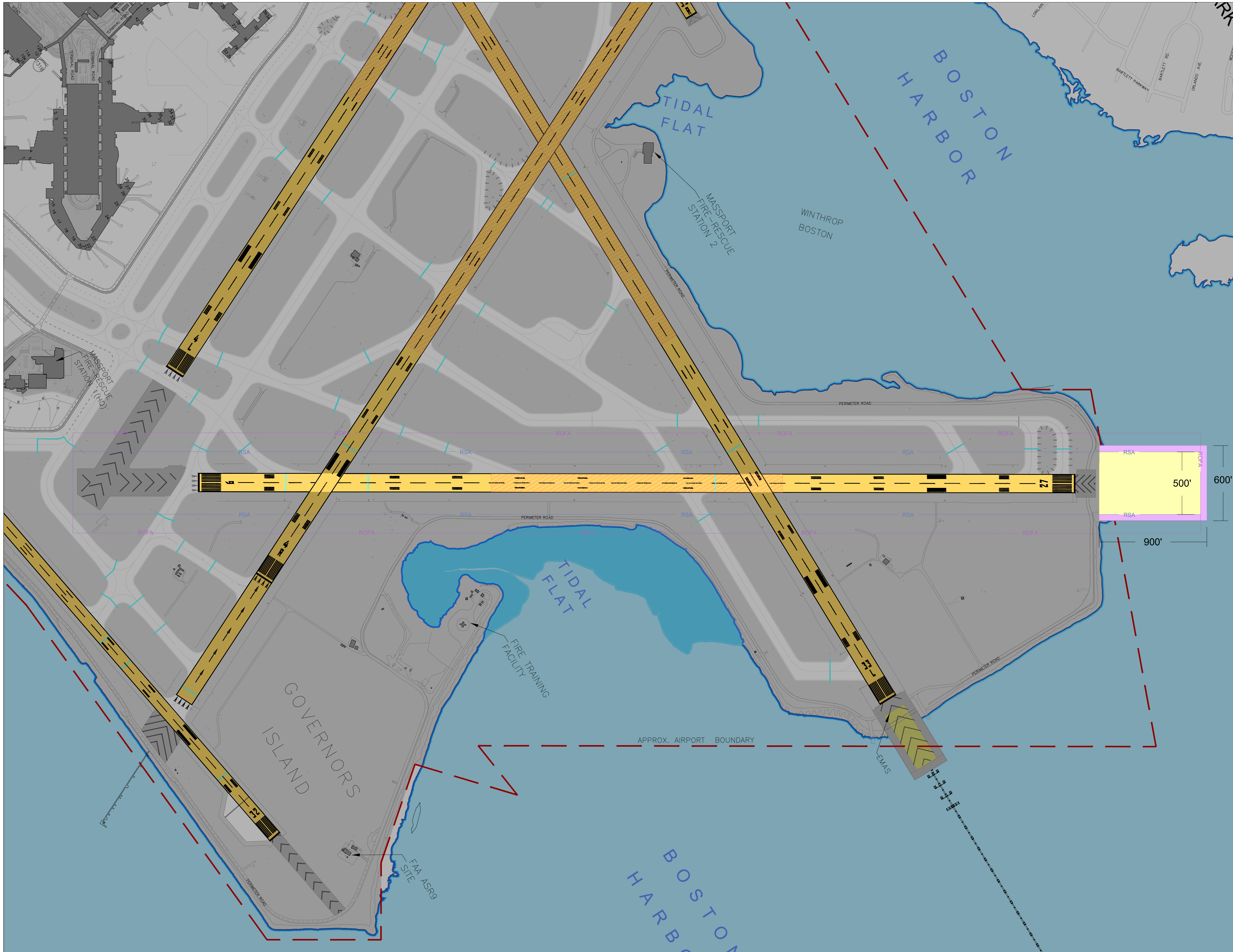
Constraints of Runway 9-27 Alternative 3A and 3B

- 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)

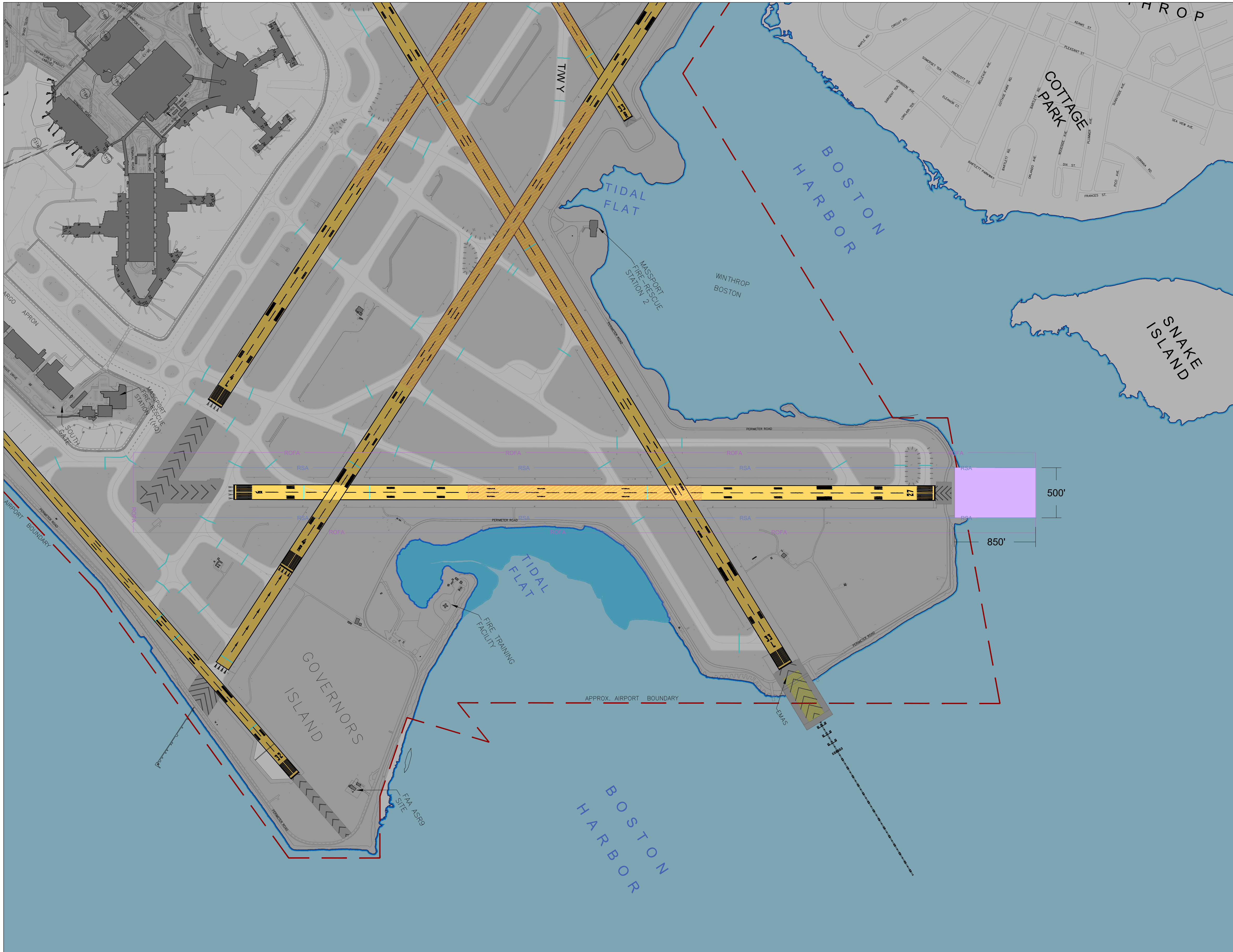
DRAFT - NOT FOR PUBLIC DISSEMINATION

bostonlogan

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)

DRAFT - NOT FOR PUBLIC DISSEMINATION

bostonlogan

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.

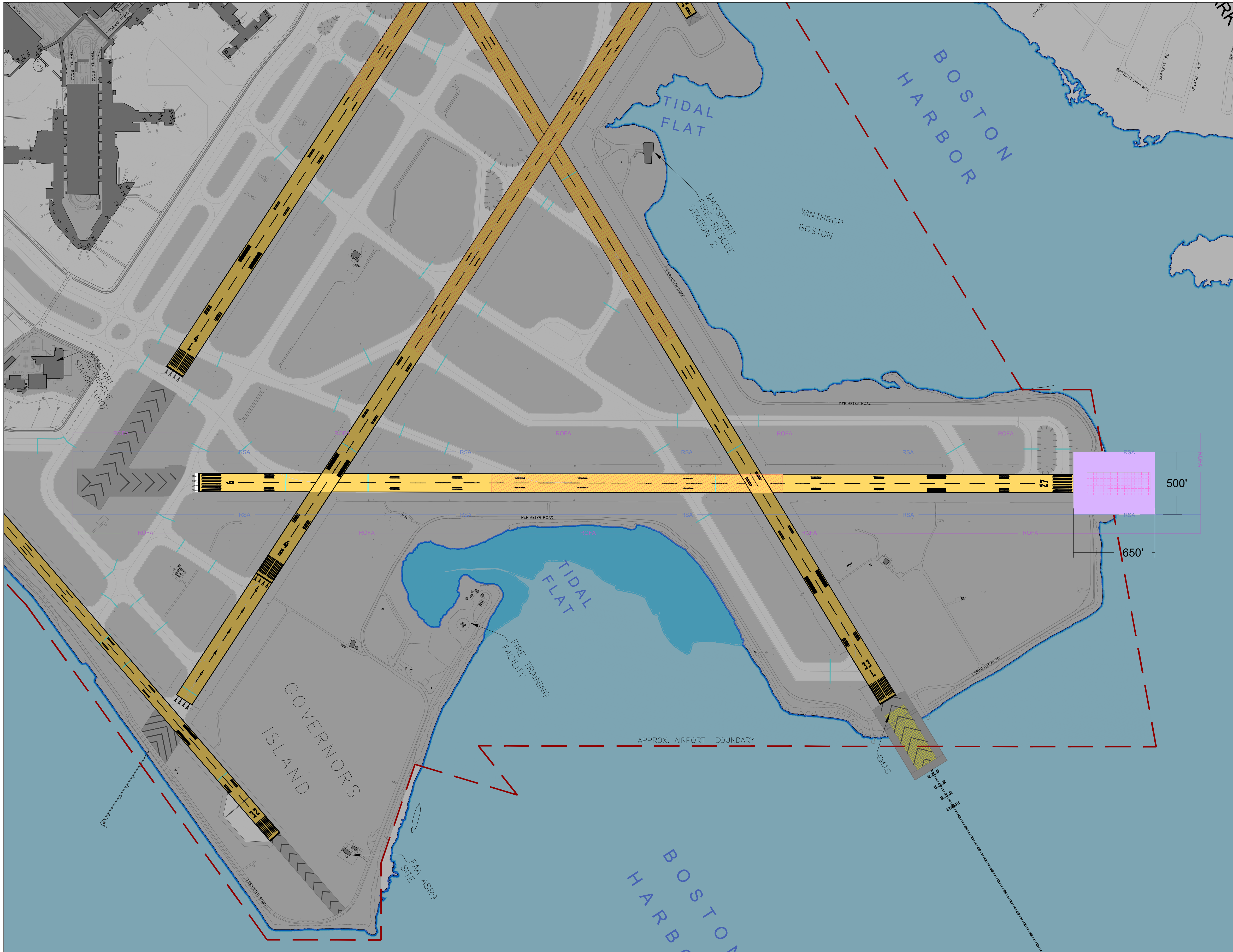
Alternative 4A and 4B Elements

- 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.

This Page Intentionally Left Blank.



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 ENGINEERED MATERIALS ARRESTING SYSTEM (EMAS)
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)

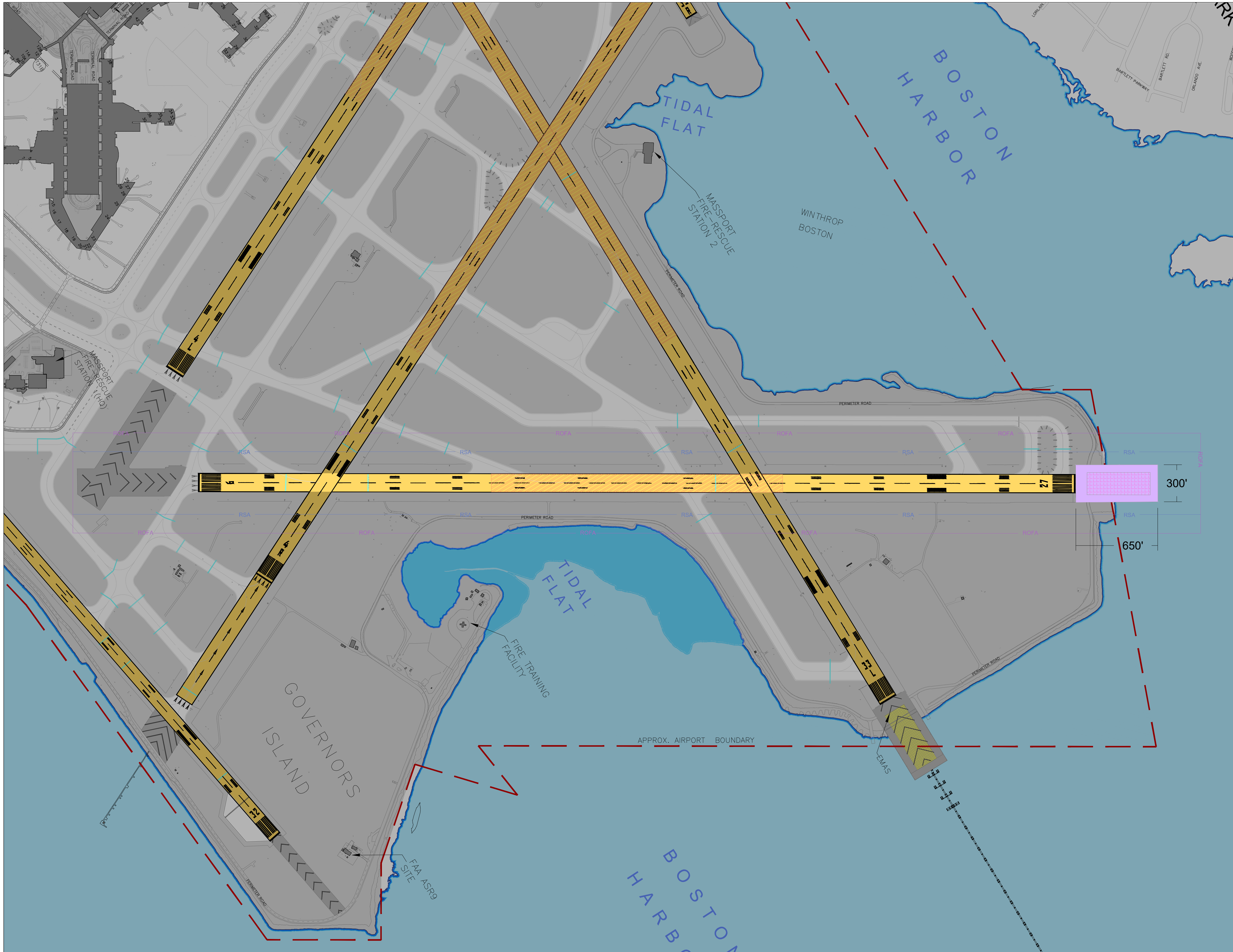
DRAFT - NOT FOR PUBLIC DISSEMINATION

bostonlogan

GRAPHIC SCALE IN FEET
0 400 800 1600

NORTH

EXHIBIT 1.4A
RUNWAY 9-27 RSA ALTERNATIVE 4A - EMAS
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 ENGINEERED MATERIALS ARRESTING SYSTEM (EMAS)
- RUNWAY SAFETY AREA (RSA)
- RUNWAY OBJECT FREE AREA (ROFA)

DRAFT - NOT FOR PUBLIC DISSEMINATION

bostonlogan

GRAPHIC SCALE IN FEET
0 400 800 1600

NORTH

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.

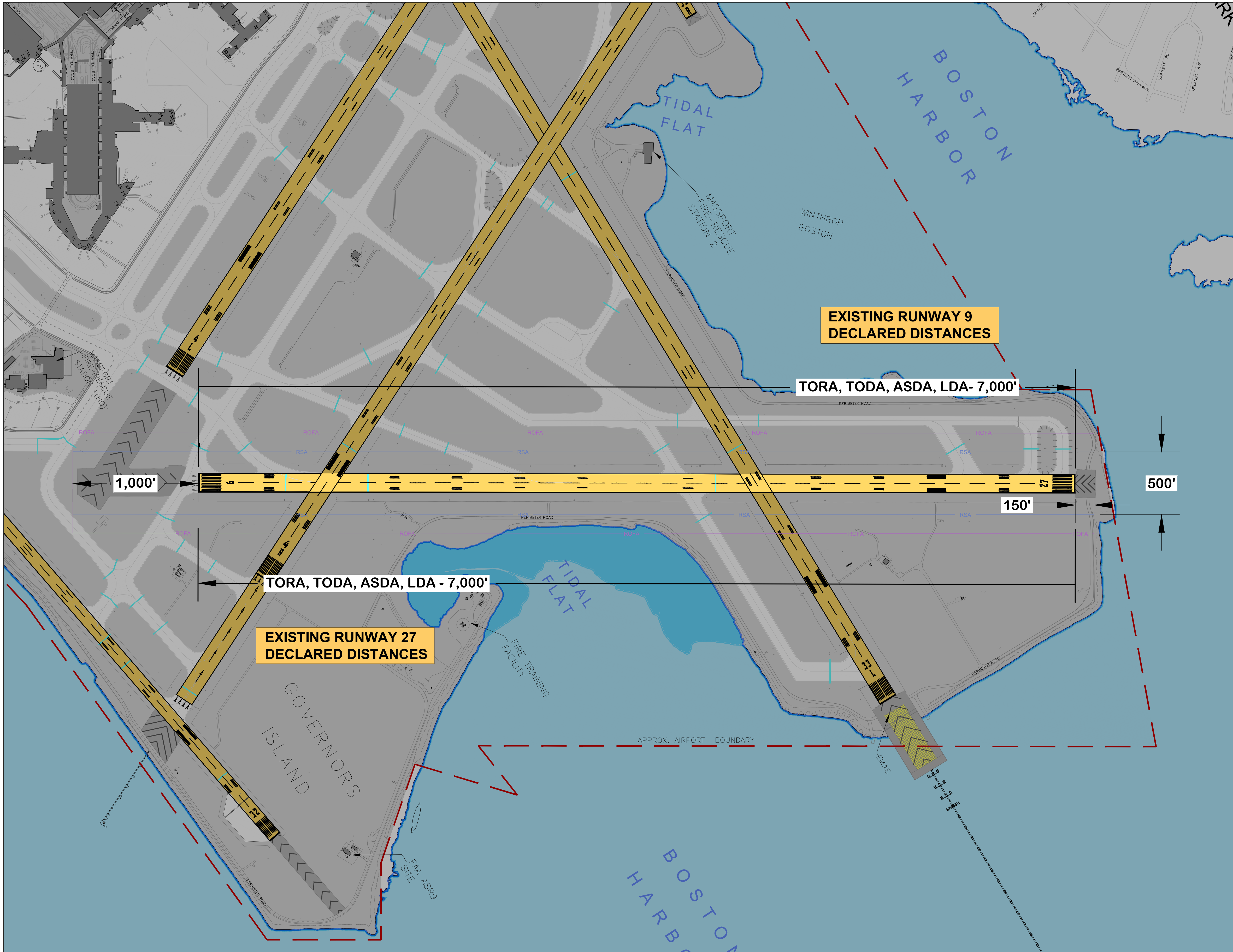
Constraints of Alternative 4A and 4B

- 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)

DRAFT - NOT FOR PUBLIC DISSEMINATION

RIM Study bostonlogan

GRAPHIC SCALE IN FEET

0 400 800 1600

NORTH

EXHIBIT 1.5

RUNWAY 9-27 RSA ALTERNATIVE 5 - NO ACTION

DIMENSIONAL GAP ALTERNATIVES

This Page Intentionally Left Blank.

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.

Appendix F- RMAT Output Report

This Page Intentionally Left Blank.

RMAT Output Report Introduction

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.

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 DEIR 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.

This Page Intentionally Left Blank.

RMAT Climate Resilience Design Standards Tool Project Report

Logan Airport Runway 27 End RSA Improvements Project

Date Created: 4/20/2022 10:15:36 AM   Created By: jgoldberg   Download

Project Summary

Link to Project

Estimated Construction Cost: $110000000.00
End of Life Year: 2100
Project within mapped Environmental Justice population: Yes

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
- Maximum annual daily rainfall exceeds 10 inches within the overall project's useful life

- Existing impervious area of the project site is between 10% and 50%

Extreme Precipitation - Riverine Flooding

This project received a "Not Exposed" because of the following:

- No historic riverine flooding at project site
- The project is not within a mapped FEMA floodplain [outside of the Massachusetts Coast Flood Risk Model (MC-FRM)]
- Project is more than 500ft from a waterbody
- Project is not likely susceptible to riverine erosion

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
- Less than 10% of the existing project site has canopy cover
- Located within 100 ft of existing water body
- No tree removal

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)?	2100
Location of Project:	Boston
Estimated Capital Cost:	$110,000,000
Who is the Submitting Entity?	Private Other Massachusetts Port Authority (Massport) Stewart Dalzell (sdalzell@massport.com)
Is this project being submitted as part of a state grant application?	No
Which grant program?	
What stage are you in your project lifecycle?	Permitting
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 or permitting?	Yes
Brief Project Description:	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 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 Submission Comments:	

Project Ecosystem Benefits

Factors Influencing Output

✓ Project reduces storm damage

Factors to Improve Output

✓ Incorporate nature-based solutions that may provide flood protection
✓ Protect public water supply by reducing the risk of contamination, pollution, and/or runoff of surface and groundwater sources used for human consumption
✓ Incorporate strategies that reduce carbon emissions
✓ Incorporate green infrastructure or nature-based solutions that recharge groundwater
✓ Incorporate green infrastructure to filter stormwater
✓ Incorporate nature-based solutions that improve water quality
✓ Incorporate nature-based solutions that sequester carbon carbon
✓ Increase biodiversity, protect critical habitat for species, manage invasive populations, and/or provide connectivity to other habitats
✓ Preserve, enhance, and/or restore coastal shellfish habitats
✓ Incorporate vegetation that provides pollinator habitat
✓ Identify opportunities to remediate existing sources of pollution
✓ Provide opportunities for passive and/or active recreation through open space

✓ Increase plants, trees, and/or other vegetation to provide oxygen production
✓ Mitigate atmospheric greenhouse gas concentrations and other toxic air pollutants through nature-based solutions
✓ Identify opportunities to prevent pollutants from impacting ecosystems
✓ Incorporate education and/or protect cultural resources as part of your project

Is the primary purpose of this project ecological restoration?

No

Project Benefits

Provides flood protection through nature-based solutions	No
Reduces storm damage	Yes
Recharges groundwater	No
Protects public water supply	No
Filters stormwater using green infrastructure	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 pollinator habitat	No
Provides recreation	No
Provides cultural resources/education	No

Project Climate Exposure

Is the primary purpose of this project ecological restoration?	No
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: 75

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

Report Comments

N/A

This Page Intentionally Left Blank.

Appendix G– Environmental Justice Supporting Documentation

This Page Intentionally Left Blank.

G.1- Environmental Justice Outreach Plan

This Page Intentionally Left Blank.

Environmental Justice Outreach Plan

Introduction

The Massachusetts Port Authority (Massport) is committed to prioritizing inclusive public outreach efforts that engage potentially-impacted environmental justice (EJ) and disadvantaged communities. This document outlines Massport's EJ Outreach Plan for the Boston Logan International Runway 27 Runway End Safety Area (RSA) Improvements Project (the Project), which meets or exceed guidance provided under with the Massachusetts Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA). Per the *Transition Rules for Public Involvement Requirements for Environmental Justice Populations*, which was released during the development of the Environmental Notification Form (ENF) for this Project, all ENFs filed with the MEPA Office are required to identify the location of a project relative to EJ populations, as depicted on the Executive Office of Energy and Environmental Affairs (EEA) Environmental Justices Maps Viewer (EJ Maps Viewer).[1] Massport consulted with the MEPA Office prior to filing the ENF and again during preparation of this Draft Environmental Impact Report (DEIR) to discuss an appropriate EJ outreach strategy for this safety enhancement project. This outreach strategy will extend into the design and construction of the Project.

Project Description

As described in more detail in Chapter 1, *Project Description and Permitting,* Massport proposes to improve the RSA at the end of Runway 27 at Boston Logan International Airport (Logan Airport or the Airport). The proposed improvements are part of a continuing the Federal Aviation Administration (FAA) safety program required to improve the RSAs, to the extent feasible, to be compliant with the FAA's current airport design standards and to enhance rescue access in the event of an airfield emergency.

The eastern end of Runway 9-27 does not meet the current FAA design standards for length, as this runway was constructed before the current FAA design standards were in place. RSAs 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 collapsible concrete blocks that when run over, slow down, and can safely stop and minimize damage to an aircraft during an emergency.

Based on the 2019 FAA determination for Runway 9-27, the preferred RSA improvement option is construction of a 306-foot-wide pile-supported deck extending 650 feet from the existing runway threshold, with an EMAS installed on the deck. Because of the irregular shoreline, it is expected that the 306-foot-wide deck would extend to the northeast by approximately 450 feet over Boston Harbor. 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 such as exists at the adjacent Runway 33L End.

1 These data were obtained from https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations.

Environmental Justice Background and Coordination

In collaboration with the MEPA Office, Massport developed a community outreach and public engagement plan (EJ Outreach Plan) specifically focused on EJ communities that could be affected by the Runway 27 End RSA Project. The program was prepared and is being implemented to meet or exceed the MEPA *Public Involvement Protocol for Environmental Justice Populations* (2021 EJ Policy).[2] Although the Project ENF was filed prior to issuance of the final protocols, Massport is continuing to voluntarily comply with the 2021 EJ Policy, and its updates and is working closely with the MEPA Office to strive for appropriate and comprehensive outreach and analysis of EJ populations within the Study Area.

The 2021 EJ Policy expands upon *An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy* by further recognizing EJ principles and populations, and the environmental benefits and burdens on EJ communities. An EJ population is a neighborhood (defined as a census block group) that includes one or more of the following demographic characteristics:

- **Income:** The annual median household income is not more than 65 percent of the statewide annual median household income;
- **Minority:** Minorities (i.e., individuals who identify themselves as Latino/Hispanic, Black/African American, Asian, Indigenous people, and people who otherwise identify as non-white) comprise 40 percent or more of the population;
- **English Language Isolation:** 25 percent or more of households lack English language proficiency; or
- **Minority and Income:** Minorities comprise 25 percent or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 percent of the statewide annual median household income.

Additionally, the Secretary of EEA can designate a geographic portion of a neighborhood as an EJ population.

Figure G-1 displays the EJ populations within a 1-mile radius of the Project Site. Based on the 2020 U.S. Census data provided by the EJ Maps Viewer created by EEA[3] and the definitions above, there are four EJ block groups within 1 mile of the Project Site. Three are located in the City of Boston and one is located in the Town of Winthrop. Although only portions of the EJ block groups fall within the 1-mile radius, the entire EJ block group is included in EJ outreach efforts. The only residences within 1 mile of the Project Site are within the Winthrop block group.

2 Governor Baker signed *An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy* (the Climate Roadmap Act) on March 26, 2021, Session Law 2021, c. 8, ss. 57-60, which defined EJ principles and populations, and environmental benefits and burdens. The *Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs* (2021 EJ Policy), originally issued in 2002 and recently updated on June 24, 2021, incorporates the definitions from the *Climate Roadmap Act* and reinforces an inclusive community involvement in the environmental decision-making process. The 2021 EJ Policy also builds upon federal guidelines under Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.* Executive Order 12898 has since been amended under Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad*, effective January 27, 2021.

3 Executive Office of Energy and Environmental Affairs, EJ Maps Viewer: https://mass-eoeea.maps.arcgis.com/apps/MapSeries/index.html?appid=535e4419dc0545be980545a0eeaf9b53

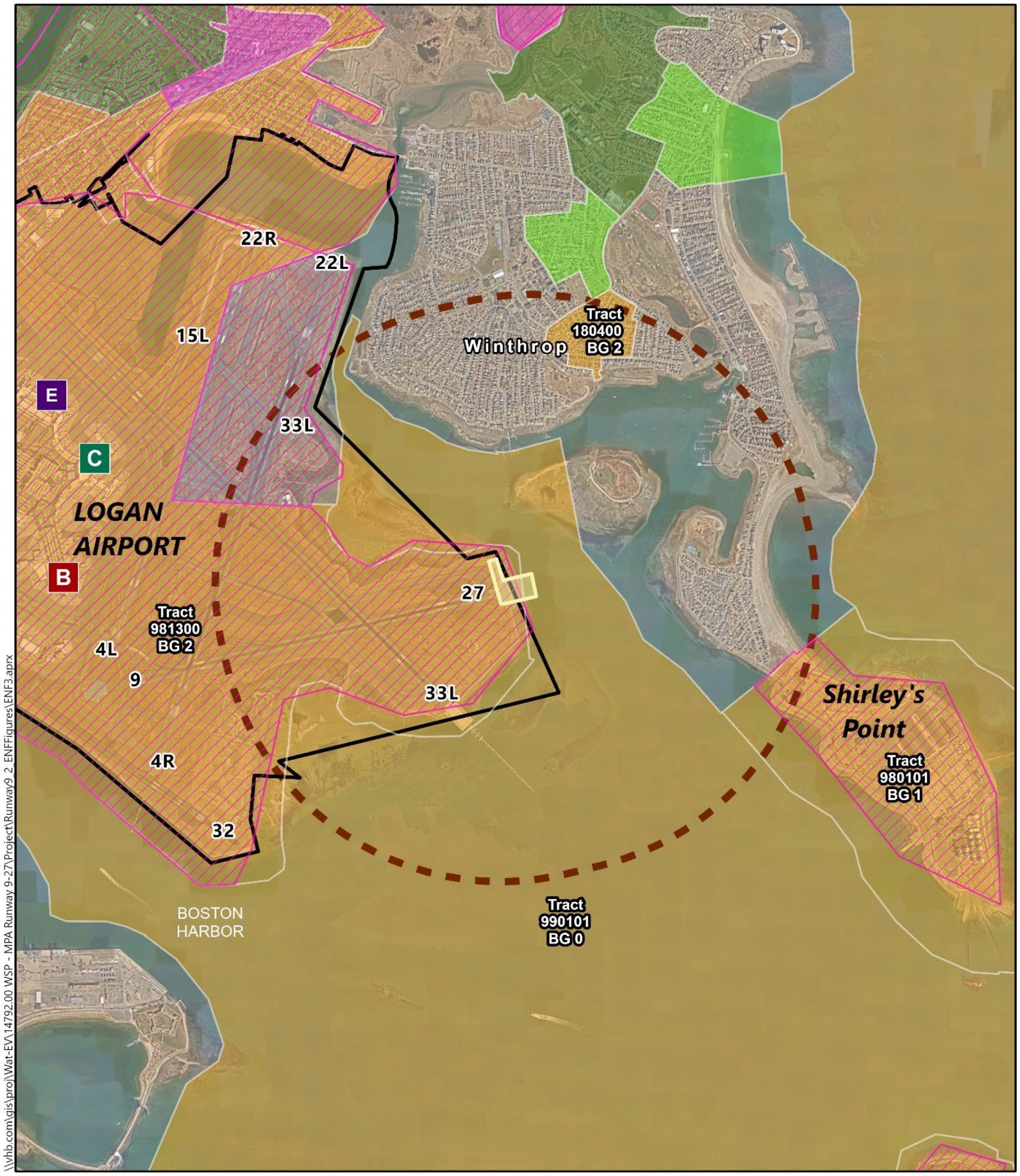


Figure G-1: Environmental Justice Populations **Runway 27 End RSA Improvements Project**

- Proposed Project Site
- 1 Mile Site Radius
- Airport Boundary
- Languages spoken by at least 5% of the census tract who do not speak English Very Well
- Minority *
- Income
- Minority and Income
- Minority and English Isolation

0 1250 2500 5000 Feet

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

*Although Block Group 2 Census Tract 180400 is classified as Minority, it meets the Climate Roadmap Act definition of Minority and Income.

The 1-mile radius includes area within the East Boston and Harbor Islands communities, and the Town of Winthrop. The EJ block groups that have an area within 1 mile of the Project Site meet the minority EJ criterion, and do not meet the Income or English Language Isolation criteria. Block Group (BG) 1, Census Tract (CT) 9801.01 has a total minority population of 62 percent, while BG 2, CT 9813 and BG 2, CT 1804 have a total minority population of 41 percent and 26 percent[4] respectively. The only EJ block group that contains residential land uses is BG 2, CT 1804 in Winthrop.

Summary of Communities

The EJ block group in East Boston within 1 mile of the Project Site (BG 2, CT 9813) consists entirely of the Logan Airport campus and East Boston Memorial Park, both of which abut residential areas not included within the EJ block group. The entire East Boston community has an American Community Survey (ACS) demographic profile[5] of 3.3 percent Black or African American of the total population and 50.4 percent Hispanic or Latino of the total population. The EJ block group in the Harbor Islands community within 1 mile of the Project Site (BG 1, CT 9801.01) is located on Deer Island and consists of the Deer Island Wastewater Treatment Plant campus; the EJ block group does not contain residential area, although it abuts a residential area of Winthrop. While the Harbor Islands are their own Boston community, there are no community-specific ACS[6] demographic data available for them. The EJ block group in Winthrop within 1 mile of the Project Site (BG 2, CT 1804) is a residential area, and includes the residential area bound north by River Road and south by Washington Avenue. The entire Town of Winthrop has an ACS demographic profile[7] of 4.3 percent Black or African American of the total population and 11.7 percent Hispanic or Latino of the total population. There is an additional EJ block group identified by the EJ Maps Viewer (BG 0, CT 9901.01), but it wholly consists of water resources and is not included in the EJ Outreach Plan.

Summary of Languages Spoken

The 2021 EJ Policy states that all identified census tracts with languages spoken by 5 percent or more of residents who identify as not speaking English “very well," in addition to any languages identified from the English Language Isolation EJ criterion, must be incorporated into public involvement efforts. While none of the block groups within 1 mile of the Project Site were identified as having English Language Isolation in the 2020 ACS Census data, two of these EJ block groups are within census tracts that are identified by the ACS and the EEA as having “Languages spoken by at least 5 percent of population in the census tract who do not speak English very well.” Therefore, these census tracts have a population of more than 5 percent that are linguistically isolated, but less than 25 percent of households within the EJ block groups that are linguistically isolated. The populations that meet these criteria include 6. 4 percent Spanish or Spanish Creole-speakers in Census Tract 9801.01 and 20.2 percent Spanish or Spanish Creole-speakers in Census Tract 9813.

Effective communication with stakeholders, including Massport and the City of Boston, among others, will be required to adequately consider and address needs, concerns, and interests of Logan Airport’s constituency of passengers and users, and EJ communities within a 1-mile radius of the Project Site that may be impacted by the Proposed Project.

---

4 Although Block Group 2, Census Tract 180400 is classified as meeting the EJ Minority criterion, it meets the Climate Roadmap Act definition of Minority and Income. The Minority designation is used in the EJ Outreach Plan for consistency with the EJ criteria data in the EJ Maps Viewer.
5 These data were obtained from https://data.boston.gov/dataset/2020-census-for-boston.
6 These data were obtained from https://data.boston.gov/dataset/2020-census-for-boston.
7 These data were obtained from https://www.census.gov/quickfacts/winthroptowncitymassachusetts.

Stakeholders

A stakeholder list of individuals and groups associated with this Project and EJ communities has been developed for public engagement purposes. The list includes state and city officials, organizations, and community groups. Massport has a longstanding relationship with the City of Boston, and works to engage the City of Boston and its residents in changes to Logan Airport and community needs. Boston and Winthrop elected officials and community organizations, groups, and committees are listed in the **Tables G.1-1 and G.1-2**[8] below. State, city, and community stakeholders have been and will continue to be engaged throughout the Project development process and will be kept apprised of relevant Project permitting steps, details, and impacts. Additional community stakeholders may be added to outreach efforts as the Project progresses.

Table G.1-1 Primary City and State Officials

Elected Official Name	Title	Phone	Email
Michelle Wu	Mayor of Boston	(617) 635-3115	michelle.wu@boston.gov
Adrian Madaro	State Representative - 1st Suffolk	(617) 722-2130	Adrian.Madaro@mahouse.gov
Lydia Edwards	State Senator - 1st Suffolk and Middlesex	(617) 722-1673	Lydia.Edwards@masenate.gov
Gabriela Coletta	Boston City Council, District 1	(617) 635-3200	gabriela.coletta@boston.gov
Nathalia Benitez	East Boston Community Liaison	(617) 635-2681	nathalia.benitezperez@boston.gov
Michael Flaherty	City Councilor, At-Large	617-635-4205	michael.flaherty@boston.gov
Ruthzee Louijeune	City Councilor, At-Large	617-635-4376	ruthzee.louijeune@boston.gov
Julia Mejia	City Councilor, At-Large	617-635-4217	julia.mejia@boston.gov
Erin Murphy	City Councilor, At-Large	(617) 635-3115	erin.murphy@boston.gov
Anthony Marino	Winthrop Town Manager	-	amarino@town.winthrop.ma.us
Michel Denis	Haitian Community Liaison	-	michel.denis@boston.gov
Denise Dos Santos	Cape Verdean Community Liaison	(617) 635-1880	denise.dossantos@boston.gov
Kevin Tran	Vietnamese Community Liaison	(617) 635-4873	kevin.tran@boston.gov
Uju Onochie	African Community Liaison	(617) 635-3307	chinonye.onochie@boston.gov

8 Includes organizations provided in the EJ Reference List provided by MEPA on May 9, 2022.

Table G.1-2 Primary Community Groups

Organization	Contact Name	Contact Information	Additional Information
Air, Inc. *	Chris Marchi, Vice President	cbmarchi@gmail.com	https://airportimpactreliefinc.org/
Appalachian Mountain Club*	Heather Clish, Director of Conservation and Recreation Policy	hclish@outdoors.org	https://www.outdoors.org/
Asian Community Development Corporation*	May Lui, Community Outreach Coordinator	may.lui@asiancdc.org	https://asiancdc.org/
Association of Latino Professionals for America (ALPFA) – Boston Chapter	Luz Arregoces, Director of Community Affairs	luz.arregoces@boston.alpfa.org	https://www.alpfa.org/page/boston Part of Greater Boston Latino Network (GBLN); Represents Latino students and professionals
BCYF PARIS STREET	Boston Centers for Youth and Families	(617) 635-4920 BCYF@boston.gov	Community center that offers a wide range of diverse features and programs
BCYF PINO			
Boston Farms Community Land Trust*	Joy Gary, Executive Director	joy@bostonfarms.org	https://www.bostonfarms.org/
Boston Harbor Now*	Alice Brown, Chief of Planning and Policy	abrown@bostonharbornow.org	https://www.bostonharbornow.org/
	Kathy Abbott, President and CEO	kabbott@bostonharbornow.org	
Browning the GreenSpace*	Kerry Bowie, Board President	kerry@msaadapartners.com	http://browningthegreenspace.org/
Chappaquiddick Tribe of the Wampanoag Nation*	Alma Gordon, President	tribalcouncil@chappaquiddick-wampanoag.org	https://chappaquiddickwampanoag.org/
Chappaquiddick Tribe of the Wampanoag Nation, Whale Clan*	Patricia D. Rocker, Council Chair	rockerpatriciad@verizon.net	
Charles River Conservancy*	Laura Jasinski, Executive Director	ljasinski@thecharles.org	https://thecharles.org/
Charles River Watershed Association*	Heather Miller	hmiller@cwra.org	https://www.crwa.org/

Table G.1-2 Primary Community Groups

Organization	Contact Name	Contact Information	Additional Information
Chaubunagungamaug Nipmuck Indian Council*	Kenneth White, Council Chairman	acw1213@verizon.net	https://www.nipmuck.org/
Chinatown Community Land Trust*	Lydia Lowe, Executive Director	lydia@chinatownclt.org	https://chinatownclt.org/
Chinatown Residence Association*	Hing Sang	chinatownresidents@gmail.com	https://chinatownresidents.wordpress.com/
Chinese Progressive Association*	Karen Chen, Executive Director	karen@cpaboston.org	https://cpaboston.org/
City Life/Vida Urbana	Frances Amador, Lead Organizer for East Boston	(617) 397-3773 famador@clvu.org	https://www.clvu.org/ Community organization for racial, social, and economic justice empowerment.
Clean Water Action*	Cindy Luppi, New England Director	cluppi@cleanwater.org	https://www.cleanwateraction.org/
Coalition for Social Justice*	Deb Fastino, Executive Director	dfastino@aol.com	https://coalitionforsocialjustice.org/
Community Action Works*	Sylvia Broude, Executive Director	sylvia@communityactionworks.org	https://communityactionworks.org/
Conservation Law Foundation*	Staci Rubin, Senior Attorney	srubin@clf.org	https://www.clf.org/
E4TheFuture*	Pat Stanton, Project Manager	pstanton@e4thefuture.org	https://e4thefuture.org/
Environment Massachusetts*	Ben Hellerstein, MA State Director	ben@environmentmassachusetts.org	https://environmentmassachusetts.org/
Environmental League of MA*	Nancy Goodman, Vice President for Policy	ngoodman@environmentalleague.org	https://www.environmentalleague.org/
GreenRoots, Inc. *	Maria Belen Power, Associate Executive Director	mariabelenp@greenrootschelsea.org	https://www.greenrootschelsea.org/
	Eugene Benson, Former City Planning and Urban Affairs Professor	eugene.benson@gmail.com	
Healthcare without Harm*	Winston Vaughan,	wvaughan@hcwh.org	https://noharm.org/

Table G.1-2 Primary Community Groups

Organization	Contact Name	Contact Information	Additional Information
	Director of Climate Solutions		
Herring Pond Wampanoag Tribe*	Melissa Ferretti, Chair	melissa@herringpondtribe.org	https://www.herringpondtribe.org/
Mashpee Wampanoag Tribe*	Brian Weeden, Chair	Brian.Weeden@mwtribe-nsn.gov	https://mashpeewampanoagtribe-nsn.gov/
Mass Audubon*	Heidi Ricci, Director of Policy	hricci@massaudubon.org	https://www.massaudubon.org/
Mass Climate Action Network (MCAN)*	Sarah Dooling, Executive Director	sarah@massclimateaction.net	https://www.massclimateaction.org/
Mass Community Labor United*	Lee Matsueda, Executive Director	lee@massclu.org	https://www.massclu.org/
Mass Land Trust Coalition*	Robb Johnson, Executive Director	robb@massland.org	https://massland.org/
Mass Rivers Alliance*	Julia Blatt, Executive Director	danielledolan@massriversalliance.org juliablatt@massriversalliance.org	https://www.massriversalliance.org/
Massachusetts Commission on Indian Affairs (MCIA) *	John Peters, Jr., Executive Director	john.peters@mass.gov	
Massachusetts Tribe at Ponkapoag*	Elizabeth Soloman	Solomon.Elizabeth.e@gmail.om	https://massachusetttribe.org/
Mystic River Watershed Association*	Melanie Gárate, Climate Resiliency Project Manager	melanie.garate@mysticriver.org	https://mysticriver.org/
	David Queeley, Director of Projects	david.queeley@mysticriver.org	
	Julie Wormser, Deputy Director	julie.wormser@mysticriver.org	
Neighbor to Neighbor*	Andrea Nyamekye, Associate Director	Andrea@n2nma.org elvis@n2nma.org	https://n2nma.org/en/
Neponset River Watershed Association*	Andres Ripley, Natural Resource Specialist	ripley@neponset.org	https://www.neponset.org/
New England United for Justice*	Noemi Mimi Ramos, Executive Director	mimi.neunited4justice@gmail.com	https://neu4j.org/

Table G.1-2 Primary Community Groups

Organization	Contact Name	Contact Information	Additional Information
Nipmuc Nation (Hassanamisco Nipmucs) *	Cheryll Toney Holley, Chair	crwritings@aol.com	https://www.nipmucnation.org/
North American Indian Center of Boston*	Raquel Halsey, Executive Director	rhalsey@naicob.org	http://www.naicob.org/
Ocean River Institute*	Rob Moir, Executive Director	rob@oceanriver.org	https://www.oceanriver.org/
Pocassett Wampanoag Tribe*	Cora Pierce	Coradot@yahooe.com	
Save the Harbor/Save the Bay*	Bruce Berman	Bruce@bostonharbor.com	https://www.savetheharbor.org/
Sierra Club MA*	Deb Pasternak, Director, MA Chapter	deb.pasternak@sierraclub.org	https://www.sierraclub.org/massachusetts
Sociedad Latina, Inc.	Jenna Clark, Workforce and Community Engagement Coordinator	jclark@sociedadlatina.org	Part of Greater Boston Latino Network (GBLN); Supports Latino youth and families regarding inequality and access within the community
Southwest Boston Community Development Coalition*	Patricia Alvarez	palvarez@swbcdc.org	https://www.swbcdc.org/
Stockbridge-Munsee Tribe*	Bonney Hartley, Historic Preservation Manager	bonney.hartley@mohican-nsn.gov	https://www.mohican.com/
The Massport Community Advisory Committee (MCAC)	Aaron Toffler, Executive Director	atoffler@massportcac.org	https://massportcac.org/
The Trust for Public Land*	Kelly Boling, MA and RI State Director	kelly.boling@tpl.org	https://www.tpl.org/
The Trustees of Reservations*	Linda Orel, Director of Policy	lorel@thetrustees.org	https://thetrustees.org/
Unitarian Universalist Mass Action Network*	Claire B.W. Muller, Movement Building Director	claire@uumassaction.org	https://www.uumassaction.org/

Table G.1-2 Primary Community Groups

Organization	Contact Name	Contact Information	Additional Information
Wampanoag Tribe of Gay Head (Aquinnah)*	Bettina Washington, Tribal Historic Preservation Officer	thpo@wampanoagtribe-nsn.gov	https://wampanoagtribe-nsn.gov/
Winthrop Commission for Diversity, Inclusion, and Community Relations	Denise Quist	(617) 846-1742	https://www.town.winthrop.ma.us/commission-diversity-inclusion-and-community-relations

*Included in EJ Reference List provided by MEPA.

EJ Outreach Plan and Strategy

Massport is committed to inclusion efforts and is implementing EJ outreach strategies to encourage community members to engage in the MEPA and NEPA processes and Project discussions. This plan outlines stakeholder engagement strategies and actions to meet the MEPA and NEPA requirements. Massport will consult with the MEPA Office and the EEA EJ director to further develop the EJ Outreach Plan as needed.

Massport has identified a team to coordinate and facilitate EJ outreach and engagement to promote effective communication and level of involvement of EJ stakeholders. Team staff members are listed in **Table G.1-3**.

Table G.1-3 Massport Team Staff Members

Project Team Role	Project Team Member	Address/Phone/Email
Senior Project Manager	Sarah Dennechuk	Massachusetts Port Authority One Harborside Drive, Suite 200S East Boston, MA 02128 sdennechuk@massport.com (617) 568-5971
Deputy Director Environmental Planning and Permitting	Stewart Dalzell	Massachusetts Port Authority One Harborside Drive, Suite 200S East Boston, MA 02128 sdalzell@massport.com (617) 568-3524
Public Affairs	Michael Vatalaro	Massachusetts Port Authority One Harborside Drive, Suite 200S East Boston, MA 02128 MVatalaro@massport.com (617) 568-3735
Massport Noise Abatement Officer	Flavio Leo	Massachusetts Port Authority One Harborside Drive, Suite 200S East Boston, MA 02128 FLeo@massport.com (617) 561-3333

The outreach team will follow and build upon Massport's current public outreach efforts, which includes meetings, notifications, online tools, and other resources. These resources will be made fully accessible to the public and EJ stakeholders to optimize public participation. Massport regularly engages with the MCAC for Project updates and input. In addition to stakeholders and individuals involved in the MCAC meetings, Massport has and will continue to offer discussions with elected officials and key stakeholders to provide adequate support of EJ populations during the process.

The EJ Outreach Plan includes:

- Making translations available in Spanish, including through the Project website and notifications to local EJ and community groups.
- Providing information on how to request additional language translation services on meeting invitations and outreach materials.
- Providing a call-in option for virtual meetings for those with limited technology access.

The team will identify other opportunities for communicating with EJ communities with limited technology access. These options include, but are not limited to, paper mailers instead of email communication in both Spanish and English, alternative paper feedback forms, one-page flyers for distribution at locations that are frequented by EJ populations, and an effort to provide mostly in-person meetings when COVID-19 protocols allow Massport to do so safely. Notification of public meetings, filings, and permit applications will be placed at traditional repositories and non-traditional information repositories, such as houses of worship, community centers, community web sites, and other means as appropriate. The expected schedule for the environmental review and construction is summarized in **Table G.1-4.**

Table G.1-4 Expected Environmental Review and Construction Schedule

Permit/Filing	Anticipated Date
MEPA ENF Filing	August 30, 2021 (actual)
Draft EIR	June 30, 2022
Draft EA/Final EIR	Fall/Winter 2022
NEPA/MEPA decisions issued	Fall/Winter 2022
File permit applications	2022 - 2023
Final Design	2023 – 2024
Construction	2025 – 2026

In preparation for these meetings, Massport has and will continue to reach out to the local and state elected officials, representatives in East Boston and Winthrop, the MCAC, and community groups surrounding the Project Site. Notice of the meetings are to be placed in the *Boston Herald*, *East Boston Times*, *Winthrop Transcript*, and *El Mundo*, as well as on Massport's website at www.massport.com. Massport will share meeting promotional materials with various state, city, and community stakeholders to increase engagement within their constituency. The outreach team will provide pre-meeting discussions with key stakeholders to ensure important topics and any concerns are incorporated into the public meeting. A press release will follow public meetings. Direct communication with the outreach team may be directed to MVatalaro@massport.com. Massport plans to solicit feedback throughout the Project timeline for the overall EJ engagement and involvement process via a stakeholder survey.

The public outreach conducted to date and the planned future outreach can be found in **Table G.1-5. Table-G.1-6** summarizes the Project filings and anticipated construction schedule.

Table G.1-5 Outreach Timeline

Date	Outreach Type	Outreach Method
July 30, 2019	Environmental Status and Planning Report (ESPR)	Initial Project description and status presented in 2017 ESPR.
December 31, 2020	Environmental Data Report (EDR)	Project description and status presented in 2018/2019 EDR.
February 23, 2021	ENF Agency Consultation Meeting	Approximately 25 agency representatives attended a project briefing and discussion led by Massport. Attendees represented the FAA, MEPA, Massachusetts Department of Environmental Protection (MassDEP), Massachusetts Natural Heritage and Endangered Species Program (NHESP), Massachusetts Division of Marine Fisheries (DMF), U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA) Fisheries Service, Massachusetts Office of Coastal Zone Management (CZM), U.S. Environmental Protection Agency (USEPA), and U.S. Army Corps of Engineers (USACE).
June 29, 2021	ENF Pre-Filing Virtual Meeting	Translated project summary on Massport website (remains available) and in meeting invite. Public notices in English and Spanish published in East Boston Times, Winthrop Transcript, and El Mundo. Phone calls/emails to MCAC, elected officials, neighborhood associations, organizations. Spanish translation during meeting.
August 31, 2021	ENF Filing	Filing posted on Massport's website. Translated Project summary on Massport website (remains available). Distribution included agencies, municipalities from surrounding area, Massport CAC, and Community Organizations. ENF public notice translated in Spanish and published in the Boston Herald.
September 22, 2021	ENF Virtual Consultation Session/Public Meeting	Translated Project summary on Massport website (remains available). Distribution included agencies, municipalities from surrounding area, MCAC, and Community Organizations. ENF public notice translated in Spanish and published in the Boston Herald. Spanish translation during meeting.
June 6, 2022	DEIR Agency Consultation Meeting	Approximately 12 agency representatives attended a project briefing and discussion led by Massport. Attendees represented MassDEP, NHESP, DM, NOAA Fisheries, CZM, USEPA, and Boston Conservation Commission (BCC).
June 30, 2022	DEIR Filing	Email to EJ Reference List provided by MEPA. Executive summary translated in Spanish posted on Massport website.

Table G.1-6 Project Filings and Construction Notifications

Timing	Outreach Type	Outreach Method
During DEIR Comment Period	Voluntary Virtual Public Meeting	Spanish translation streaming present. Spanish translated Project summary will be posted in Massport's website in advance.
6 Months Prior to Construction	Public Notice	English and Spanish notice published in Boston Herald, El Mundo, and Winthrop Times providing Project status update.
3 Months Prior to Construction	Public Notice	English and Spanish notice published in Boston Herald, El Mundo, and Winthrop Times providing Project status update.
3 Months Prior to Construction	Virtual Public Meeting	Spanish translation streaming present.
2 Weeks Prior to Construction	Public Notice	English and Spanish notice published in Boston Herald, El Mundo, and Winthrop Times providing Project status update.

Documentation of all feedback and surveys, letters, stakeholder communication, meeting notes and attendees, Project outcomes, and other EJ public engagement records will be kept by the team.

G.2- Supporting DPH EJ Tool Data

This Page Intentionally Left Blank.

Environmental Justice Supporting Documentation

To understand potential existing vulnerabilities faced by Environmental Justice (EJ) populations within the Study Area, Vulnerable Health EJ Criteria, as defined by the Massachusetts Department of Public Health (DPH) EJ Tool (DPH EJ Tool),[1] were identified within a 1-mile radius of the Project Site.

Tables G.2-1 and **G.2-2** provide a summary of the census tracts within the 1-mile radius that have Elevated Blood Lead Prevalence and Low Birth Weight Rate per 1,000, respectively. Census tracts that include EJ block groups identified in **Table 6-1** of Chapter 6, *Environmental Justice and Public Outreach* are noted within these tables. The EJ block groups within the 1-mile of the Project Site are not within census tracts that have rates of Elevated Blood Lead Prevalence and Low Birth Weight Rate per 1,000 that are significantly higher.

The Heart Attack and Childhood Asthma criteria are only shown at the community level. **Tables G.2-3** and **G.2-4** present these vulnerabilities, as well as Elevated Blood Lead Prevalence and Low Birth Weight Rate per 1,000 at the community level, for the City of Boston and the Town of Winthrop, respectively, using a 1-mile radius from the Project Site. No vulnerable health criteria at the community level in the Town of Winthrop were identified as significantly higher. Elevated Blood Lead Prevalence, Low Birth Weight, and Childhood Asthma were identified as significantly higher at the community level in the City of Boston; however, these findings do not directly correlate to the census tracts that include EJ block groups because this data is presented at the community level.

All data counts identified in the DPH EJ tool were included in these tables for transparency. The following bullets provide additional explanation from the DPH EJ Tool about the data presented in these tables:

- **Statistical Significance and Confidence Intervals:** With a 95 percent confidence interval, there is a possibility that those identified as “not statistically different” or “statistically significantly lower” are actually not due to chance, and that those “statistically significantly higher” are actually due to chance. The Massachusetts Environmental Public Health Tracking (MA EPHT) defines statistical significance as the likelihood that the difference found between groups was not due to chance alone. Statistical significance can be based on the use of statistical tests and comparison of confidence intervals. Overlapping confidence intervals indicate that any difference in the screening or prevalence observed may be due to chance. Confidence intervals that do not overlap are considered statistically significant and indicate a small likelihood that the difference is due to chance.[2]
- **Stability:** Stability refers to the reliability of the rate; when there are too few cases, the rate is unstable or considered unreliable.[3]

1 Commonwealth of Massachusetts. 2021. MA DPH Environmental Justice Tool. https://matracking.ehs.state.ma.us/Environmental-Data/ej-vulnerable-health/environmental-justice.html.
2 Commonwealth of Massachusetts. 2021. Massachusetts Environmental Public Health Tracking, MA EPHT All Inclusive glossary. https://matracking.ehs.state.ma.us/Glossary/index.html.
3 Commonwealth of Massachusetts. 2021. MA DPH Environmental Justice Tool. https://dphanalytics.hhs.mass.gov/ibmcognos/.

Table G.2-1 Elevated Blood Lead Prevalence by Census Tract

Census Tract	Community	Statistical Significance	Stability	Case Count	Rate per 1,000	Confidence Intervals	Statewide Rate Per 1,000	110% Statewide Rate per 1,000	>110% Statewide Rate?[2]
1805	Winthrop	Not statistically different	Stable	3	27	12.3-41.7	16.1	17.7	Yes
9901[1]	Winthrop	Statistically significantly lower	Unstable	0	0	0-0	16.1	17.7	No
1803	Winthrop	Not statistically different	Unstable	1	16.9	3.4-30.4	16.1	17.7	No
Elevated Blood Lead Prevalence Not Shown									
9813[1]	Boston	Not Shown	Not Shown	Not Shown	Not Shown	Not Shown	16.1	17.7	N/A

Source: DPH EJ Tool, 2021.
Notes: Year Range 2015-2019.
All census tracts in this table are also classified as “Low Birth Weight Rate per 1,000” in Table G.2-2.
For determining prevalence, children can be counted only once per year, but can appear in multiple years. Prevalence is the number of tests in a given blood lead level category out of all the children screened in that year within specific age ranges, per 1,000 children.”
1 EJ block group present within.[4]
2 The determination of greater than 110 percent statewide rate was made by comparing the rate per 1,000 to the 110 percent statewide rate per 1,000.

Table G.2-2 Low Birth Weight Rate per 1,000 by Census Tract

Census Tract	Community	Statistical Significance	Stability	Case Count	Rate per 1,000	Confidence Intervals	Statewide Rate Per 1,000	110% Statewide Rate per 1,000	>110% Statewide Rate?[2]
1805	Winthrop	Not statistically different	Unstable	1	271.7	33.5-509.9	216.8	238.5	Yes
9901[1]	Winthrop	Statistically significantly lower	Unstable	0	0	0-0	216.8	238.5	No
1803	Winthrop	Not statistically significantly different	Unstable	0	0	0-546.6	216.8	238.5	No
Low Birth Weight Rate per 1,000 Not Shown									
9813[1]	Boston	Not Shown	Not Shown	Not Shown	Not Shown	Not Shown	216.8	238.5	N/A

Source: DPH EJ Tool, 2021.
Notes: Year Range 2011-2015.
All census tracts in this table are also classified as “Elevated Blood Lead Prevalence” in Table G.2-1.
1 EJ block group present within.
2 The determination of greater than 110 percent statewide rate was made by comparing the rate per 1,000 to the 110 percent statewide rate per 1,000.

4 Commonwealth of Massachusetts. 2021. Massachusetts Environmental Public Health Tracking, Childhood Lead Poisoning. https://matracking.ehs.state.ma.us/Health-Data/Childhood_Blood_Lead_Levels.html.

Table G.2-3 Vulnerabilities by Community (Boston)

Year Range	Health Topic	Statistical Significance	Stability	Case Count	Rate per 1,000	Confidence Intervals	Statewide Rate per 1,000	110% Statewide Rate per 1,000	>110% Statewide Rate?[2]
2015 - 2019	Elevated Blood Lead Prevalence[1]	Statistically significantly higher	Stable	296	17.7	16.8-18.6	16.1	17.7	Equal
2011 - 2015	Low Birth Weight	Statistically significantly higher	Stable	197	282.4	264.8-300.1	216.8	238.5	Yes
Year Range	**Health Topic**	**Statistical Significance**	**Stability**	**Case Count**	**Rate per 10,000 Label**	**Confidence Intervals**	**Statewide Rate per 10,000**	**110% Statewide Rate per 10,000**	**>110% Statewide Rate?[2]**
2013 - 2017	Heart Attack	Statistically significantly lower	Stable	719	23.8	23-24.5	26.4	29.1	No
2013 - 2017	Pediatric Asthma ED Visits	Statistically significantly higher	Stable	1059	172.8	168.2-177.5	83.1	91.4	Yes

Source: DPH EJ Tool, 2021.
1 Rate Type: BLL Rate per 1,000.
2 The determination of greater than 110 percent statewide rate was made by comparing the rate per 1,000 or 10,000 to the 110 percent statewide rate per 1,000 or 10,000.
ED Emergency Department

Table G.2-4 Vulnerabilities by Community (Winthrop)

Year Range	Health Topic	Statistical Significance	Stability	Case Count	Rate per 1,000	Confidence Intervals	Statewide Rate per 1,000	110% Statewide Rate per 1,000	>110% Statewide Rate?[2]
2015 - 2019	Elevated Blood Lead Prevalence[1]	Not statistically different	Stable	10	21.6	15.7-27.5	16.1	17.7	Yes
2011 - 2015	Low Birth Weight	Not statistically significantly different	Unstable	3	171.5	78.3-264.7	216.8	238.5	No
Year Range	**Health Topic**	**Statistical Significance**	**Stability**	**Case Count**	**Rate per 10,000 Label**	**Confidence Intervals**	**Statewide Rate per 10,000**	**110% Statewide Rate per 10,000**	**>110% Statewide Rate?[2]**
2013 - 2017	Heart Attack	Statistically significantly lower	Stable	30	21.2	17.8-24.6	26.4	29.1	No
2013 - 2017	Pediatric Asthma ED Visits	Statistically significantly lower	Unstable	8	45.4	31.2-59.7	83.1	91.4	No

Source: DPH EJ Tool, 2021.
1 Rate Type: BLL Rate per 1,000.
2 The determination of greater than 110 percent statewide rate was made by comparing the rate per 1,000 or 10,000 to the 110 percent statewide rate per 1,000 or 10,000.
ED Emergency Department

Appendix H- Draft Construction Management Plan

This Page Intentionally Left Blank.

Draft Construction Management Plan

H.1 Introduction

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. The purpose of the Runway 27 End RSA Improvements Project (the Project or the Proposed Project) is to enhance safety for aircraft and their passengers in emergency situations by constructing improvements to the existing RSA. The proposed improvements are part of a continuing safety program and are required to meet the RSA design criteria contained in the Federal Aviation Administration's (FAA) Advisory Circular (AC) 150/5300-13B, *Airport Design*, to the extent practicable, and to enhance rescue access in the event of an emergency.[1]

Massport filed an Environmental Notification Form (ENF) for the Runway 27 End RSA Improvements Project on August 31 2021, in compliance with the Massachusetts Environmental Policy Act (MEPA). The Secretary of the Executive Office of Energy and Environmental Affairs (EEA) issued a Certificate on the ENF on October 8, 2021. The Certificate required that the Draft Environmental Impact Report (DEIR) include a Construction Management Plan (CMP), identifying the schedule for construction of various Project elements, and identifying requirements for environmental time-of-year (TOY) restrictions identified by regulatory and resource agencies to protect marine resources.

This CMP will help guide the construction of the Proposed Project. The CMP identifies key Project issues, considers mitigation measures, and serves as an overall plan for the Project's construction activities. It includes project-specific Best Management Practices (BMPs) to avoid and minimize adverse environmental impacts and addresses potential mitigation related to land disturbance. It also includes a disposal plan for excess construction materials.

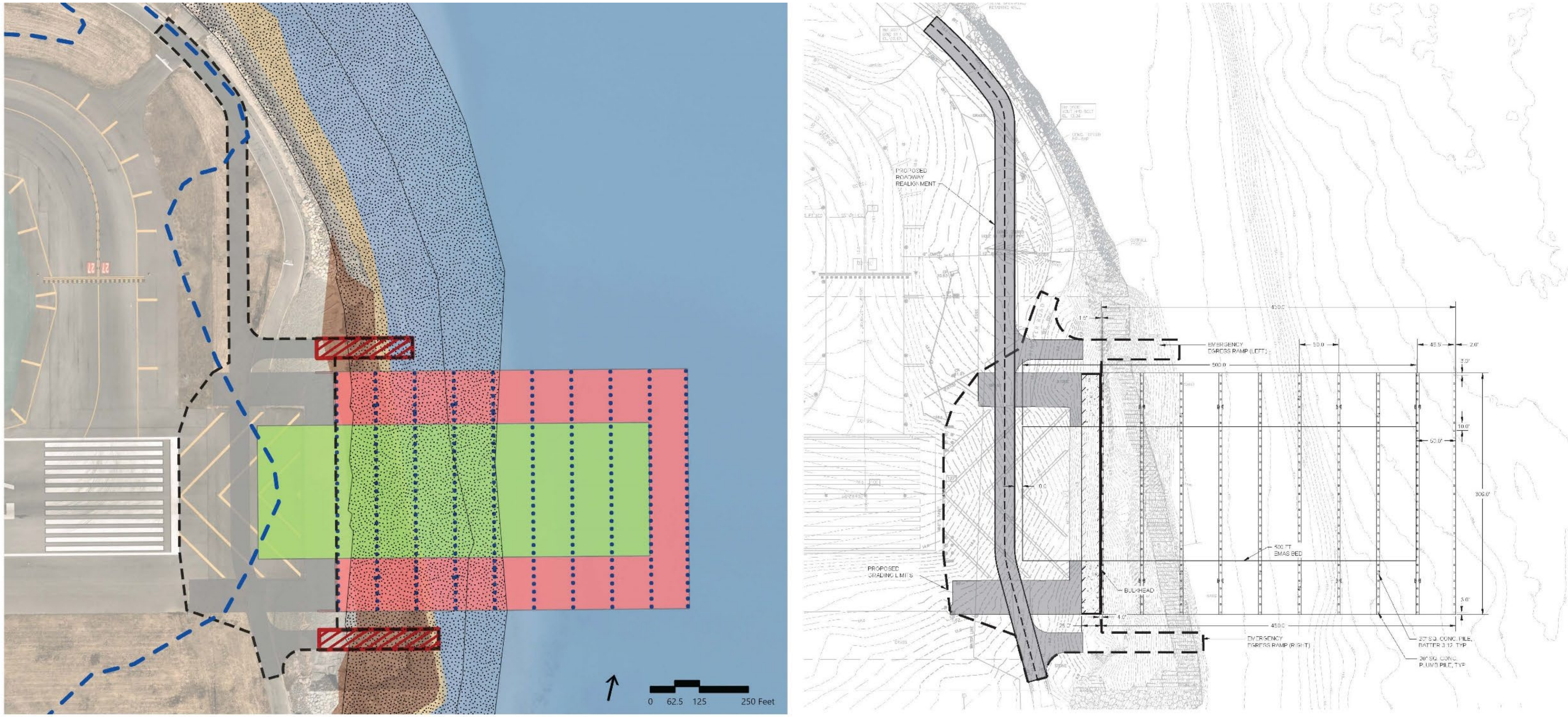
H.2 Project Description

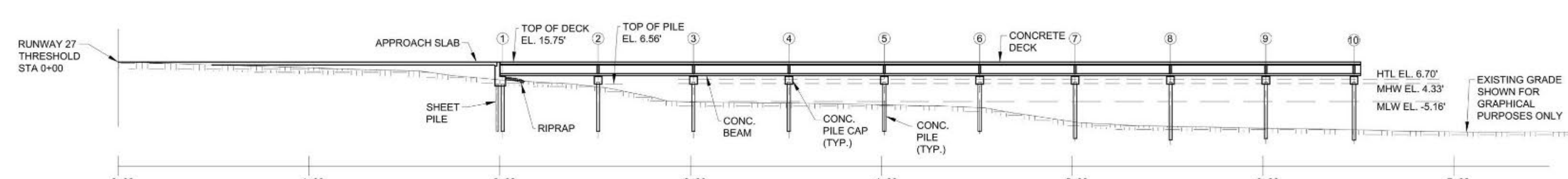
As shown in **Figure H-1**, the Proposed Project would include a 600-foot-long RSA with an Engineered Materials Arresting System (EMAS)[2] on a pile-supported deck (approximately 450 feet long by 306 feet wide). The Project would include:

- Extending the existing Runway 27 End RSA to accommodate a steel sheet pile wall at the inshore limit of the deck to prevent settlement and erosion of the upland areas;
- Installing a transition slab spanning from the land to the pile-supported structure;
- Installing a deck structure approximately 450 feet long and 306 feet wide (an area of approximately 137,700 square feet [3.2 acres]), supported by 326 20-inch square concrete piles;
- Installing an EMAS approximately 500-feet long by 170-feet wide located within the RSA deck;

1 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5300-13B, *Airport Design*, March 31, 2022.
2 An EMAS is constructed of collapsible concrete blocks with predictable deceleration forces. When, in an emergency, an aircraft rolls into an EMAS, the tires of the aircraft collapse the lightweight concrete, and the aircraft is slowed down in a way that minimizes damage to the aircraft.

- Straightening and realigning the existing 20-foot-wide airport perimeter road to enhance vehicular sight lines and situational awareness;
- Installing two emergency egress ramps, one on each side of the proposed deck; and
- Add life rings on the sides and end of the deck to enhance access in and out of the water in an emergency.





326 20-Inch Square Concrete Piles

The pile configuration includes:

- 326 total piles (294 vertical piles and 32 batter piles)
- 20-inch square concrete piles driven to rock in 10 bents[1] of 31 piles each
- Bents spaced 50 feet apart and piles within each bent spaced 11 feet apart

FIGURE H-1: RSA Deck Support Alternative 2 **Runway 27 End RSA Improvements Project**

Proposed Grading Limits
Pile-Supported Deck
Proposed Engineered Materials Arresting System (EMAS) Bed
Proposed Pavement
Proposed Piles
Proposed Caissons
Proposed Approach Slab
Proposed Emergency Ramp
Coastal Beach
Land Under Ocean
Land Subject to Tidal Action
Federal Emergency Management Agency (FEMA) 100-Year Flood Level
Land Containing Shellfish

1 A bent is an array of piles in a row and fastened together at the top by a pile cap.

This Page Intentionally Left Blank.

H.3 Construction Plan

This section describes the location of and the anticipated method of construction for each of the elements of the Proposed Project.

Upland Work

Work in upland portions of the Project Site includes relocating a section of the existing perimeter road, relocating utilities, and installing a concrete transition slab between the upland and the new deck. The transition slab would be constructed as a slab-on-grade. The slab area would be excavated, the subgrade would be compacted, and an aggregate base course would be placed and compacted before forms are placed and concrete placed.

Steel sheet Pile and Riprap

An approximately 310-foot-wide section of existing riprap slope between the perimeter road and the intertidal areas would be replaced with a filled steel sheet-pile wall approximately 210 feet east of the Runway 27 End, which would be protected with riprap seaward of the wall.

Pile Installation

Approximately 326, 20-inch square concrete piles would be driven to capacity with vibratory[3] and hydraulic hammers. Similar to construction for the adjacent Runway 33L End RSA deck, pre-augering would be conducted prior to pile driving where existing riprap may cause interference with the pile driving. The piles would be aligned in position using a template. The template would consist of two H-piles vibrated 20 feet into the sea floor, every 20 feet along the pile bents[4], with a steel framework welded to the piles. Once the production piles are in place, the framework would be disassembled, and the H-piles would be extracted using a vibratory hammer. Most pile driving work would be conducted from a barge and confined within a silt curtain. The first row of piles closest to the shore may be installed from land, as the water may not be deep enough for the barges.

Typically, the barges used to support the pile driving and drilling operations would be 45 feet wide by 150 feet long. The equipment would include 250-ton to 300-ton cranes depending on the operation. The barges would be supported by spuds.[5] It is assumed that a maximum of three spud barges would be required on-site each day assuming two movements per day for repositioning and the initial mobilization and demobilization for each barge. The spuds would not be vibrated into the bottom; rather they would be set by dropping through the spud wells (gravity) to approximately 5- to 10-feet deep.

Pile-Cap Installation

A pile-cap is a concrete beam that connects the tops of the concrete piles to provide a larger area for the distribution of the deck load onto the piles. When pile driving has sufficiently progressed to complete one bent, a reinforced concrete cap would be installed over those piles. The concrete cap would be precast and would be

3 A vibratory hammer installs piles into the ground by vertical vibrations. Vibratory hammers can be used underwater and are quieter than traditional impact hammers.
4 A bent is an array of piles or drilled shafts in a row and fastened together at the top by a pile-cap or bracing.
5 Spuds are through-deck pilings or steel shafts temporarily driven into the sediment at the bottom of the water to provide stability for the barge when moored. A spud barge is commonly used for marine construction operations.

manufactured off-site at an approved concrete plant. The pile-caps would be transported by barge to the Project Site for installation by a barge-mounted crane. A crane may be used from land to place the pile-caps over the first bent of piles closest to shore because it is too shallow for a barge to reach the correct location; the remaining spans would be placed from a barge. If required, the areas in between the precast sections would be formed of cast-in-place concrete and supplemental rebar, which would be installed with support from a barge-mounted crane. If required, forms and rebar would be delivered via barge. Concrete would be pumped into the forms from concrete trucks on land; the trucks would be temporarily located on the perimeter road or existing pavement at the Runway 27 End.

Girder Construction

Girders are the main horizontal supports for the deck and would rest atop the pile-caps. Similar to the pile-caps, long span (50-foot) girders would be manufactured off-site at an approved precast concrete plant. The girders would be transported from the contractor's off-site staging site by barge to the Project Site for installation. Similar to the pile-caps, a crane would be used from land to place the 50-foot-long girders over the first span of piles closest to shore because it is too shallow for a barge to reach; the remaining spans would be placed from a barge.

Deck Slab

When a sufficient number of girders have been erected, work on the deck slab would commence. Forms would be erected between the girders and at the slab edge. Reinforcement would be installed with support from a barge-mounted crane. Concrete would be placed into the forms from concrete trucks on land via pumps from shore. The concrete trucks would be located on the perimeter road or existing pavement at the Runway 27 End.

Emergency Egress Ramps

For construction of the emergency egress ramps, approximately 80 linear feet of the existing riprap slope would be selectively removed, graded, and replaced with material that would be used to provide a safe surface for accessing the shore by foot from the area seaward of the steel sheet pile structure. The ramps would be constructed in a similar manner to the ramps for the Runway 33L End RSA, where the upland portion consists of asphalt and the lower portion consists of skid and slip-resistant pavers or similar material. The ramps would provide a path for egress from the water and access for emergency responders to enter the water in an emergency. The edge of the ramps would be reinforced with riprap.

H.4 Sequencing and Phasing

This section describes the assumed logistics, phasing, and duration of the construction of the Proposed Project.

Logistics

The proposed Runway 27 End RSA Improvements Project would be located within the legislated 500-foot Logan Airport Security Zone at the eastern end of Runway 27. Construction would primarily be performed from floating barge-mounted equipment but would also include land-based activity to support construction of the proposed RSA deck, to construct the emergency egress ramps, and to realign the existing perimeter road. Barges and tugboats are expected to be utilized to bring in the majority of construction materials to the site (with the exception of materials used for landside elements, cast-in-place concrete, and EMAS blocks and associated materials). Use of barges and tugboats would help to minimize construction-related vehicle traffic on roads, minimize potential impacts to airfield operations, to allow for timely material delivery, and to stockpile materials away from the airfield. The water transportation staging area would be at the contractor's off-site yard and is anticipated to be located in Quincy, East Boston, or Charlestown. Personnel would primarily be transported by watercraft to and from the construction site. Access from land would primarily be limited to management, safety, quality assurance, and maintenance personnel. Concrete materials, asphalt, and the EMAS blocks would arrive by truck. For trucks and equipment that arrive via roadway, the Coughlin Bypass, Route 1A, and Interstate 90 (I-90) would facilitate regional connections. As documented in Massport's standard construction management specifications, construction vehicles are restricted from using local roads. Construction vehicles traveling within the Airport boundary would follow the standard Logan Airport escort procedures. Concrete trucks, which would remain on-site to pump concrete offshore from land, would be located on the perimeter road or existing pavement at the Runway 27 End.

It is anticipated that barges and other vessels supporting construction activities would maneuver in an area up to 220-feet on each side of the footprint of the proposed RSA deck and 250 feet off the end of the deck. Because Runway 9-27 would be closed for the duration of the two 60-day construction periods, barges would be moored overnight within the area but outside the designated navigation channel. Barge anchorage would occur using a low impact anchor such as temporary driven pile anchors. The anchor piles would be removed at the completion of construction. A chain would be attached to the anchor pile and attached to a mooring buoy used to moor the barges. While some temporary disturbance would be caused by driving the anchor piles, the potential for damage to the seabed and benthic habitat would be less than from weighted anchors, which have a bigger footprint, would compress bottom sediments, and are more likely to be dragged along the bottom in rough weather.

Construction Phasing

Two critical factors that guide the proposed construction phasing are marine resource-based TOY restrictions and airfield operational requirements. The following section discusses how these factors were considered in planning for construction phasing.

Federal and state resource protection agencies have identified times of year that are important to species lifecycles, including times when adverse impacts should be avoided. The Massachusetts Division of Marine Fisheries (DMF) and the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NOAA Fisheries) have recommended a construction TOY restriction for the Proposed Project to minimize potential impacts to winter flounder, which use the nearshore areas in the vicinity of the proposed deck for spawning, larval settlement, and juvenile development.[6] The recommended TOY restriction extends from February 15 through June 30. During this annual period, in-water projects are precluded from silt-producing work such as pile driving. These restrictions do not entirely preclude in-water works at these times, but such work cannot affect the resource areas.

Runway use at Logan Airport is a response to wind and weather conditions, runway length requirements, capacity, airport layout, and other factors. To optimize airfield efficiency, there are typically three active runways at any time. 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 serves as the primary arrival runway in the

6 Comment letter on the ENF received from the Massachusetts Division of Marine Fisheries, dated September 28, 2021.

southwest and northwest flows. The Airport relies most heavily on Runway 9-27 between November and March to accommodate the historic prevailing wind direction patterns during that time of year. Construction activity in the Runway 27 End RSA requires the closure of Runway 9-27. Given the important role of Runway 9-27 in accommodating airfield operations, particularly between November and March, and to accommodate the DMF-recommended TOY restriction (February 15 through June 30), construction work would be scheduled to take place in two separate 60-day construction periods for 120 days total. The construction periods include 60 days in 2025 and again in 2026, at some point between July 1 and September 30 of each year. Because the work must be completed in a total of 120 days, work would occur seven days per week during the hours of 7 AM and 7 PM from Monday through Friday, from 8 AM to 7 PM on Saturday, and from 9 AM to 7 PM on Sunday.

The construction generally would be completed as follows:

- Season 1 (2025) – Install piles and pile-caps to support the RSA deck; install steel sheet pile and abutment wall and protective riprap; construct transition slab.
- Season 2 (2026) – Install deck structure and EMAS; realign the existing perimeter road; construct the emergency egress ramps; and complete final grading.

Construction Costs

Estimated cost for the proposed Runway 27 End RSA Improvements Project is $110 million[7] for the pile-supported deck structure, EMAS, and associated structures and on-grade improvements (**Table H-1**).

Table H-1 Estimated Construction Costs

Construction Cost Estimate	Design and Construction Phase Services	Construction Contingency	Total Estimated Cost
$83.4 million	$10 million	$16.6 million	$110 million

H.5 Construction Impacts and Mitigation

This section describes Project-specific BMPs to avoid and minimize adverse environmental impacts and mitigation methods to be used by the contractor.

Construction Impacts

Construction would result in temporary, minor increases in noise, emissions of air pollutants, water quality effects (turbidity), and surface traffic.

Coastal Wetland Resources and Water Quality

Measures would be used during construction to minimize potential impacts on the environment and Boston Harbor. A TOY restriction will be followed for in-water construction activities that have the potential for

7 In the first quarter of 2026 dollars, which is the mid-point of construction.

producing turbidity. Between February 15 and June 30 of any year, no in-water turbidity producing work, such as pile driving, will occur. In addition, pile driving activities will include measures to minimize noise, where possible. During active turbidity producing work, a floating turbidity curtain will be installed around the work area to contain any turbidity that is generated.

Most construction activities will be conducted by equipment operating from barges. During construction, the construction barges will not be allowed to ground during low tide. As necessary, the barges will be moved to deeper water during low tide, until the rising tide provides adequate water depth for the barges to be relocated inshore.

Dewatering is not expected during construction. It is anticipated that the contractor will perform any work for the sheet pile or ramp in coordination with low tides and utilize sand bags or other similar equipment to maintain dry areas during this work. If dewatering is deemed necessary based on the contractor's means and methods, a plan will be issued for review and approval prior to the start of any dewatering activities.

Approximately 30 working days will be needed to complete the pile driving needed for the RSA deck. Completing the work within 30 days will reduce the opportunity for impact to marine resources. As design is progressed to final plans and specifications, additional special provisions may be added to the specifications by Massport and the designer to minimize potential impacts.

Noise

There may be some temporary changes in aircraft noise due to the closure of Runway 9-27 during each of the 60-day construction periods in 2025 and 2026 because, during the closure, aircraft operations would shift from Runway 9-27 to other runways, temporarily increasing the number of operations and aircraft noise along the flight paths of the other runways. However, the primary source of noise during construction would be construction equipment and the marine vessels used for transporting construction equipment, supplies, and workers to the site. Construction noise includes sound associated with use of heavy equipment for excavation, material transport, pile driving, and other construction activities.

Construction sound levels were modeled for 10 noise-sensitive receptor locations in Winthrop located between 3,000 and 10,000 feet from the construction site. Modeled sound levels were below the City of Boston's criteria on noise emitted from construction sites. Depending on the specific machinery, Massport will consider the following measures to reduce the effects of construction noise on adjacent noise sensitive areas:

- Incorporate measures to minimize pile driving noise;
- Provide appropriate manufacturer's noise reduction devices including, but not limited to, a manufacturer's muffler (or equivalently rated material) that is free of rust, holes, and exhaust leaks on construction equipment operating on-site in accordance with OSHA guidelines;
- Ensure that the engine housing doors are kept closed on construction devices with internal combustion engines;
- Cover equipment, such as compressors, generators, pumps, and other such devices with noise insulating fabric as well as operate the device at lower engine speeds during work to the maximum extent possible;
- Use operational controls, such as limiting vehicle engine idling on-site and time-of-day restrictions for certain activities;

- Strategically position construction vehicles to minimize operation near noise sensitive receptors and direct construction haul vehicles away from noise sensitive receptors when traveling to and from the work site;
- Use noise pathway controls where possible, including temporary noise barriers and enclosures free from gaps and holes, placed as close as possible to construction areas;
- Keep the public informed about construction activities and efforts to minimize noise in the community; and
- Use the Massport Noise Complaint system for prompt response and corrective action to noise complaints during construction.

As design is progressed to final plans and specifications, additional special provisions may be added to the specifications by Massport and the designer.

Surface Transportation

Transport to the Project Site for the great majority of the construction equipment, supplies, and employees would be via marine vessel. The Airport roadways can accommodate the anticipated construction-related traffic; therefore, no specific mitigation is proposed, and no Project-specific transportation access plan is proposed. Massport requires all contractors to limit construction-related traffic to access and egress through the North or South Gates using only state and federal highways and the Airport roadway network, prohibiting construction-related traffic on the local East Boston roadways. Massport recommends contractors implement construction worker vehicle trip management, including requiring off-Airport parking and high-occupancy vehicle transportation modes for employees.

Public Access and Navigation

The RSA improvements will occur near an active navigation channel that provides public boating access to Belle Isle Inlet and other areas of Winthrop and East Boston. Although near the channel, the proposed RSA deck will be approximately 175 feet away from the edge of the channel. During construction, most of the equipment and materials will be brought to the Project Site by barge or other water-borne transport. These vessels may occupy portions of the navigation channel intermittently but will not preclude use of the channel by the public. During RSA deck construction, a maneuvering barge may periodically enter the navigation channel. The maneuvering barge may temporarily restrict a portion of the channel, but public use will not be completely restricted. Logan Airport is surrounded by a legislated 500-foot security zone that restricts access by individuals that have not received a valid access badge. The restriction of public access to the airport property is a necessary requirement to maintain public safety. Badged shellfishers under the guidance of DMF are, however, allowed onto the airport property, with proper notice, to harvest clams from the conditionally restricted mud flats. As occurred for the Runway 33L End RSA deck, during construction, these shellfishers will be temporarily restricted from access to the active work zone. Following construction, shellfishers will have full access as previously allowed.

Massport has coordinated with U.S. Coast Guard (USCG) to discuss impacts to the navigation channel as well as ensure that the Logan Airport Security Zone and deck are adequately marked. The UCSG would be notified whenever a construction barge enters the navigation channel. The UCSG additionally recommended relocating and adding buoys that mark the Logan Airport Security Zone as well as adding yellow or white lights to the end of the deck for visibility. As design is progressed to final plans and specifications, additional special provisions may be added to the specifications by Massport and the designer.

Air Quality

Construction is expected to generate short-term construction-related air emissions, including exhaust emissions from on-road construction vehicles, off-road construction equipment and marine vessels; evaporative emissions from asphalt placement and curing; and the generation of fugitive dust from disturbance of unpaved areas.

Estimated emissions from construction in each year that construction would occur are below applicable federal General Conformity *de minimis* thresholds for those pollutants for which the City of Boston is designated nonattainment or maintenance. For fugitive dust emission sources, the particulate matter smaller than or equal to 10 microns in diameter (PM_{10}) and particulate matter smaller than or equal to 2.5 microns in diameter ($PM_{2.5}$) emissions estimate includes the use of dust suppression techniques as standard practice (primarily application of water) to reduce dust emissions by approximately 75 percent. Construction equipment will be maintained according to manufacturer's specifications and operated using U.S. Environmental Protection Agency (USEPA) compliant fuels for on road and off-road equipment and vehicle applications to minimize emissions. Construction equipment will also be required to comply with the Massachusetts Anti-Idling Law. As design is progressed to final plans and specifications, additional special provisions may be added to the specifications by Massport and the designer.

Construction Debris

A small quantity of sediment is anticipated to be generated during dredging associated with construction activities. Sediments can often contain naturally occurring metals and therefore sediments will be properly handled and managed during construction. Spill control and containment BMPs would be used during construction to mitigate potential spills or accidental discharges of fuel, hydraulic fluid, and other construction materials. Access routes, laydown, and soil stockpile storage areas would be designated by Massport and included in the construction documents. Any contaminated oil and/or hazardous materials would be properly identified, sorted for re-use on-site (if possible), or transported off-site for proper disposal. Construction materials would be recycled in accordance with the asphalt pavement, brick, and concrete policy per the Massachusetts Department of Environmental Protection (MassDEP). As design is progressed to final plans and specifications, additional special provisions may be added to the specifications by Massport and the designer.

Proposed Mitigation

Measures to mitigate potential impacts associated with the Project are identified in **Table H-2**. Construction mitigation measures would be incorporated into contract documents and specifications governing construction activities. All construction activities would comply with FAA Advisory Circular 150/5370-10, *Standard Specifications for Construction of Airports*.[8] On-site resident engineers and inspectors would monitor construction activities to ensure mitigation measures are implemented.

8 U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular 150/5370-10H, Standard Specif*ications for* Construction of Airports, December 21, 2018.

Table H-2 Proposed Mitigation Measures and Commitments

Environmental Categories	Mitigation Measure	Implementation Schedule
Land ContainingShellfish	Provide mitigation fee for off-site restoration.	Prior to Construction
Habitat	Replace lost upland grass habitat.	During Construction
Coastal Wetlands	Provide in-lieu fee (USACE) for impacts to Mud Flat	Following Permitting
Water Quality	Develop and implement a comprehensive Soil Erosion and Sediment Control Plan in accordance with National Pollutant Discharge Elimination System and MassDEP standards.	During Construction
	Apply water to dry soil to prevent fugitive dust.	During Construction
	Stabilize any highly erosive soils with erosion control blankets and other stabilization methods, as necessary.	During Construction
	Use sediment control methods (such as silt fences and hay bales) to prevent silt and sediment entering the stormwater system and waterways.	During Construction
	Maintain equipment to prevent oil and fuel leaks.	During Construction
	Silt curtains around pile installation and silt fencing.	During Construction
Noise	Maintain mufflers on construction equipment in accordance with Occupational Safety and Health Administration (OSHA) standards.	During Construction
	Minimize engine idling in accordance with Massachusetts anti-idling regulations.	During Construction
	Fit -powered equipment with pneumatic exhaust silencers.	During Construction
	Minimize nighttime construction.	During Construction
	Incorporate measures to minimize pile driving noise, where possible.	During Construction
Transportation	Limit construction traffic to federal or state highways or Logan Airport roadways, prohibiting use of any East Boston roadways by construction vehicles.	During Construction
	Implement construction worker vehicle trip management techniques.	During Construction
Air Quality and Greenhouse Gas Emissions	Keep idling to a minimum in accordance withanti-idling regulations.	During Construction
	Retrofit appropriate diesel construction equipment withdiesel oxidation catalysts and/or particulate filters.	During Construction
	Implement construction worker vehicle trip management techniques.	During Construction
Hazardous Materials and Solid Waste	Pre-characterize any materials before disposal (if any) to determine course of action for removal.	During Construction