

DRAFT ENVIRONMENTAL ASSESSMENT/  
ENVIRONMENTAL IMPACT REPORT  
EOEA #14442



BOSTON-LOGAN INTERNATIONAL AIRPORT

# Runway Safety Area

IMPROVEMENTS  
PROJECT



PREPARED FOR  
**Massachusetts Port Authority**  
East Boston, Massachusetts



PREPARED BY  
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July 15, 2010

Secretary Ian A. Bowles  
Executive Office of Energy and Environmental Affairs  
100 Cambridge Street, Suite 900  
Boston, Massachusetts 02114

And

Director Alicia Barton McDevitt  
Executive Office of Energy and Environmental Affairs  
100 Cambridge Street, Suite 900  
Boston, Massachusetts 02114

**Re: Boston-Logan International Airport Runway Safety Area Improvements Project  
Draft Environmental Assessment/Environmental Impact Report (EEA File #14442)**

Dear Secretary Bowles and Director McDevitt:

On behalf of the Massachusetts Port Authority (Massport), I am pleased to submit the Draft Environmental Assessment/Environmental Impact Report (Draft EA/EIR) for the *Boston-Logan International Airport Runway Safety Area Improvements Project* for public review in accordance with the MEPA regulations. This document responds to all of the requirements of the Certificate issued after MEPA review of the Environmental Notification Form (ENF). As was outlined in the ENF, Massport has a continuing program of improving airfield safety at all of its airports. One of the major *Boston-Logan International Airport* ("Logan") initiatives is the enhancement of the runway safety areas (RSAs) at the ends of Runway 33L and Runway 22R. Federal Aviation Administration (FAA) policy requires that Massport enhance the RSAs, 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 and do not extend runways or have any effect on normal runway operations, runway capacity, or types of aircraft that can use the existing runways.

Because of Logan's location on Boston Harbor, any runway-end safety improvement at these runway end locations requires work in the intertidal and subtidal areas. Massport has worked closely with FAA on the concept design of the proposed safety improvements to avoid and minimize impacts, however, there are no feasible alternatives that both meet FAA safety requirements and fully avoid marine resource impacts. Recognizing this at the outset, Massport proactively reached out to the 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 avoidance opportunities. The Draft EA/EIR fully describes the purpose of, and need for, the proposed safety improvements, the alternatives considered, potential environmental impacts and the mitigation strategies for both of the proposed actions. The document also describes how both runways operate and why different safety solutions are appropriate for each runway-end.

At Runway-End 22R, a graded transition to mean low water, known as an Inclined Safety Area (ISA), is proposed. The proposed ISA design will closely mirror the ISA permitted and constructed at Runway-End 22L in the early 1990s. This safety enhancement will primarily affect areas of coastal bank, salt marsh, coastal beach/mud flat, land containing shellfish and a small area of land below mean low water. At Runway-End 33L, an extension to the existing Engineered Materials Arresting System (EMAS) is proposed. It involves construction of a pile-supported deck. The critical resource affected at this site is eelgrass, although there will also be alteration of the armored coastal bank, coastal beach, land containing shellfish and land under the ocean.

The design criteria of the safety improvements included careful consideration of avoidance and minimization of environmental impacts. Notably, to avoid harbor fill, the RSA extension at 33L is proposed as a 470-foot pile-

Secretary Ian A. Bowles  
Director Alicia Barton McDevitt  
July 15, 2010  
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supported deck incorporating EMAS, rather than the construction of FAA's more conventional 1000-foot long filled structure. Furthermore, because of the unique environmental setting and the extraordinary cost of the type of structure proposed, the FAA has approved the narrowing of the pile-supported deck from 500-feet wide to no less than 300-feet wide. Through use of EMAS and the narrowing of the deck, the project has reduced impacts to Land Under the Ocean and has reduced direct alteration of eelgrass, while at the same time significantly enhancing the safety for Logan's domestic and international passengers.

As a result of the ongoing agency coordination, we have received some detailed input regarding the project permitting and an outline of materials needed to complete our initial applications. We have formatted the document so as to address key regulatory issues and will be continuing to refine the project design and to fill data gaps as we proceed toward the Final EA/EIR and post-NEPA/MEPA permitting. Key areas of ongoing study will be the final selection and detailed design of the salt marsh mitigation sites and finalization of a comprehensive strategy to compensate for direct and indirect alteration of eelgrass habitat.

As part of the combined MEPA and NEPA review and to ensure that the public will have adequate opportunity to appreciate the unusual complexities of the permitting issues, we respectfully request an extension of the statutory 30-day Draft EIR MEPA public comment period to 45 days. The 45-day public comment period for the Draft EA/EIR would begin on July 21, 2010, with the publication of the next Environmental Monitor, and would end on September 3, 2010. All parties on the distribution list are being sent a copy of the Draft EA/EIR and the document will be available for inspection at a number of public libraries and on Massport's website ([www.massport.com](http://www.massport.com)).

We understand that the schedule for the construction of these critical safety improvements by 2013 is an aggressive one, but this is a very important project that must meet FAA's timetable for commencement and completion. We greatly appreciate the time and attention that local, state and federal members of our Eelgrass and Salt Marsh Working Group(s) have provided. Their technical guidance has been invaluable.

Together with the FAA, Massport hopes that you and other reviewers of the Draft EA/EIR find the document informative and that it provides a solid basis for the anticipated remaining studies and final permitting. We look forward to your review and to close consultation with you and other reviewers in the coming weeks.

Please feel free to contact me at (617) 568-3524 if you have any questions.

Very truly yours,

Massachusetts Port Authority

A handwritten signature in black ink, appearing to read "Stewart Dalzell". The signature is written in a cursive, flowing style with some overlapping letters.

Stewart Dalzell, Deputy Director  
Environmental Planning and Permitting

cc: R. Doucette/FAA  
A. Canaday/MEPA





# *Boston-Logan International Airport Runway Safety Area Improvements Project*

Draft Environmental Assessment/  
Environmental Impact Report  
EOEA No. 14442

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Prepared for **Massachusetts Port Authority**

Prepared by  ***Vanasse Hangen Brustlin, Inc.***

In association with:

**Jacobs Engineering, Inc.**

**Childs Engineering, Inc.**

**Applied Sciences Associates, Inc.**

**KB Environmental Services, Inc.**

July 2010





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# Acronyms

AC	Advisory Circular
ADCP	Acoustic Doppler Current Profiler
AEE	FAA's Office of Environment and Energy
ALSF	High-Intensity Approach Light System with Sequenced Flashing Lights
AOA	Aircraft Operating Area
ARC	Airport Reference Code
ARFF	Airport Rescue and Firefighting
ATVs	All Terrain Vehicles
BCC	Boston Conservation Commission
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BPP	Basic Project Purpose
BTD	Boston Transportation Department
BWSC	Boston Water and Sewer Commission
CA/T	Central Artery/Tunnel
CAA	Clean Air Act
CBED	City of Boston Environmental Department
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CGP	Construction General Permit
CMR	Code of Massachusetts Regulations
CO	carbon monoxide
COD	Chemical Oxygen Demand
CTA	Central Testing Area
CWA	Clean Water Act
CZM	Massachusetts Office of Coastal Zone Management
CZMA	Federal Coastal Zone Management Act
dBA	A-weighted Decibel
DCR	Massachusetts Department of Conservation and Recreation
DEP	Massachusetts Department of Environmental Protection



DER	Massachusetts Department of Fish and Game Division of Ecological Restoration
DNL	Day-Night Average Sound Level
DMF	Massachusetts Division of Marine Fisheries
DO	Dissolved Oxygen
DOT OIG	U.S. Department of Transportation, Office of Inspector General
EA	Environmental Assessment
EDR	Environmental Data Report
EEA	Executive Office of Energy and Environmental Affairs (formerly the Executive Office of Environmental Affairs or EOEA)
EFH	Essential Fish Habitat
EIR	Environmental Impact Report
EMAS	Engineered Materials Arresting System
ENF	Environmental Notification Form
EO	Executive Order
ERDC	Environmental Research and Development Center
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding Of No Significant Impact
GHG	Green House Gas
GPS	Global Positioning System
HEC-18	Federal Highway Administration's Hydraulic Engineering Circular No. 18
HILR	High Intensity Runway Edge lights
ILF	In-Lieu Fee Program
ILS	Instrument Landing System
ISA	Inclined Safety Area
LOS	Level of Service
L10	A-weighted sound level exceeded 10 percent of the time
L <sub>dn</sub>	Day-night average sound level
L <sub>eq</sub>	Average background sound level
L <sub>max</sub>	Maximum sound level
L <sub>peak</sub>	Peak Sound Level
MALSR	Medium-Intensity Approach Lighting System with Runway Alignment
MassGIS	Massachusetts Geographic Information System





MA WPA	Massachusetts Wetland Protection Act
MBTA	Massachusetts Bay Transportation Authority
MCP	Massachusetts Contingency Plan
MEPA	Massachusetts Environmental Policy Act
M.G.L.	Massachusetts General Law
MGP	Massachusetts General Permit (Section 404)
MLW	Maximum Landing Weight
MOU	Memorandum of Understanding
MTOW	Maximum Takeoff Weight
MWRA	Massachusetts Water Resources Authority
NaAc	Sodium Acetate
NAAQS	National Ambient Air Quality Standards
Navaid	Navigational aid
NEPA	National Environmental Policy Act
NepRWA	Neponset River Watershed Association
NGVD	National Geodetic Vertical Datum
NHESP	Massachusetts Natural Heritage and Endangered Species Program
NMFS	National Marine Fisheries Service
NO <sub>2</sub>	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	Nonpoint Source
NTU	Nephelometric Turbidity Units
O <sub>3</sub>	Ozone
O&M	Operations and Maintenance
OOC	Order of Conditions
ORW	Outstanding Resource Waters
OSHA	Occupational Safety and Health Administration
OWMM	open-water marsh management
PAPI	Precision Approach Path Indicator
Pb	Lead
PM	Particulate Matter
PRAS	Preferential Runway Advisory System
psi	Pounds per square inch
RCRA	Resource Conservation and Recovery Act



RCNM	Roadway Construction Noise Model
RMS	Root mean square
ROMS	Regional Ocean Modeling System
RPZ	Runway Protection Zone
RSA	Runway Safety Area
SAS	Special Aquatic Sites
SAV	Submerged Aquatic Vegetation
SEL	Sound Exposure Level
SIP	State Implementation Plan
SO <sub>x</sub>	Sulfur Oxides
SPCC	Spill Prevention Control and Countermeasures
SWAN	Simulating WAVes Nearshore
SWPPP	Stormwater Pollution Prevention Plan
SWQS	Surface Water Quality Standards
SWSA	South West Service Area
TMA	Transportation Management Association
TSS	Total Suspended Solids
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	Volatile Organic Compounds
VOR/DME	Very High Omnidirectional Range/Distance Measuring Equipment
WHA	Wildlife Hazard Area



# Summary

**Project Name and Location:** Boston-Logan International Airport Runway Safety Area Improvements Project  
**Proponent:** Massachusetts Port Authority (Massport)  
**EOEA Number:** EOEA Number 14442  
**Construction Date:** 2011-2013  
**Estimated Construction Cost:** Approximately \$75 million.

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## S.1 Introduction

The Massachusetts Port Authority (Massport) is proposing to enhance the runway safety areas (RSAs) at the ends of Runway 33L and Runway 22R at Boston-Logan International Airport (Logan Airport) (Figure S-1). The proposed improvements are required to enhance the RSAs, to the extent feasible, to be consistent with the current Federal Aviation Administration's (FAA) airport design criteria for RSAs and to enhance rescue access in the event of an emergency. RSAs are safety improvements and do not extend runways or have any effect on normal runway operations, runway capacity, or types of aircraft that can use the runways. Massport filed an Environmental Notification Form (ENF) for the RSA Improvements Project on June 30, 2009, in compliance with the Massachusetts Environmental Policy Act (MEPA).

Project construction is anticipated to begin in July 2011, following the issuance of permits. For the purposes of this Draft Environmental Assessment/Environmental Impact Report, a three-season construction schedule is proposed that would account for environmental, operational and runway restrictions and ensure that Massport meets the FAA's 2013 schedule for having runway safety improvements constructed.

### S.1.1 NEPA Overview

The FAA has determined that the proposed project, identified by Massport (the Sponsor) to meet FAA safety requirements, requires an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA). FAA has received and adopted this Draft EA to identify alternatives to the Sponsor's proposed project and to document the potential environmental effects associated with the construction and operation of proposed safety improvements at Logan Airport.

Figure S-1 Location of Proposed RSA Improvements



### S.1.1 MEPA History

In June 2009, Massport submitted an ENF to the Massachusetts Executive Office of Energy and Environmental Affairs (EEA), in accordance with the Massachusetts Environmental Policy Act and its implementing regulations (301 CMR 11.00). The ENF explained the purpose of the project, which is to reduce the risk of injury to passengers and damage to aircraft in emergency situations by enhancing the RSAs at the ends of Runway 33L and Runway 22R consistent with FAA’s design criteria. This project purpose was adopted by the U.S. Army Corps of Engineers (USACE) as the basic project purpose for Section 404 of the Clean Water Act permitting.<sup>1</sup> The ENF was circulated to interested parties and a Public Notice of Environmental Review was published on July 8, 2009, in accordance with MEPA regulations 301 CMR 11.05 and 301 CMR 11.15. A public scoping meeting was held on July 30, 2009 to solicit public input on development of the Draft EA/EIR scope.

<sup>1</sup> Letter from the U.S. Army Corps of Engineers to Stewart Dalzell, Massport. Dated March 12, 2010.





The Secretary of the Executive Office of Energy and Environmental Affairs issued a Certificate on the ENF on August 14, 2009, confirming the need to prepare an Environmental Impact Report (EIR) (see Appendix 1). The Certificate approved coordinated submission of required documentation under NEPA and stated that “the planning for this project would be best served by a coordinated review and the submission of a single set of documents to satisfy the requirements of both MEPA [Section 11.09(4)(c)] and NEPA.”

### S.1.2 Public and Agency Coordination

In coordination with the FAA, Massport has sought public involvement throughout the scoping, planning, and analysis of the proposed Logan Airport RSA Improvements Project. Comments received during early coordination on environmental impacts of proposed actions have been considered and are addressed in Chapter 4, *Environmental Consequences*. Opportunity for public involvement was provided, as described below. Massport has also consulted directly with resource agencies and the affected community regarding potential impacts, minimization of these impacts, and mitigation strategies.

Massport presented the proposed RSA improvements to two community groups well in advance of any regulatory filings. The initial two public briefings were held on October 15, 2007 with the Orient Heights Civic Association and on October 24, 2007 with AIR, Inc., and a subsequent meeting was held to brief City of Boston staff. The goal of these meetings was to acquaint the abutting communities with the overall safety project and solicit early input regarding potential neighborhood issues. Massport continues informally to update those groups on project status. Massport also began agency consultation and coordination, prior to the submittal of the ENF, by reaching out to numerous resource agencies to receive data and feedback regarding affected environmental resources and potential impacts. Briefings with the Boston Environmental Department were also held in 2007, 2008, and 2009 as described in Chapter 7, *Public and Agency Involvement*. Letters were mailed to agencies in November 2007 requesting specific information such as: federally protected threatened and endangered wildlife, fishery or plant species; Priority Habitat and Estimated Habitat of Rare Wildlife locations; and historic or cultural resources. The results of this coordination are documented in Chapter 3, *Affected Environment*, and correspondence is provided in Appendix 4, *Agency Correspondence*.

Massport established two working groups to discuss avoidance and minimization of impacts to coastal wetland resources, and ultimately mitigation options, as conceptual design of the proposed Runway 33L and Runway 22R Runway Safety Area improvements advanced. These Working Groups included local, state, and federal resource agency representatives, and met multiple times from April 2009 to June 2010 to provide advice and regulatory guidance to Massport regarding impacts and mitigation. Coordination with the Working Groups will continue through the permitting process.

Public comment on the ENF was sought through a Public Notice of Environmental Review on July 8, 2009 and a public scoping meeting was held at Logan Airport on July 30, 2009. The Secretary received nine comment letters on the ENF, all but one from local, state, and federal agencies. Responses to public and agency comments on the ENF are provided in Appendix 2, *Response to Comments*.

To initiate public review under the state wetlands regulatory process, Massport filed a Notice of Intent (NOI) with the Boston Conservation Commission. A Notice of the Public Hearing regarding the NOI for the proposed



Project, as required under the Massachusetts Wetlands Protection Act (MA WPA), was published in the Boston Herald and was posted in Boston City Hall on January 26, 2010. The NOI public hearing was held on February 3, 2010.

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## S.2 Project Description

The purpose of the project is *to increase safety for aircraft and passengers in emergency situations by enhancing the RSAs at the ends of Runway 33L and Runway 22R consistent with FAA's design standards*. RSAs reduce the risk of damage to aircraft, and injury to persons inside the aircraft, should the aircraft undershoot, overshoot, or veer off the runway. RSAs also provide additional safety during less than ideal weather conditions, in the event that aircraft overrun the existing runway during landing or an aborted take-off.

As stated in FAA Order 5100-38B, "The highest aviation priority of the United States 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 enhance the safety and security of our national airport system. The *Department of Transportation Inspector General's 2009 Report to Congress On the Status of Runway Safety Areas at US Airports* listed Runway 33L at Logan Airport as one of the top 11 priority runway end safety enhancement projects in the United States.

The FAA requires airports to provide a safety area 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 unintentional 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 RSA Improvements Project would advance an overriding public interest: safety. Safety enhancements 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.

The FAA requires that airports that receive federal funding for airport improvement projects and commercial service airports, regulated under 14 Code of Federal Regulations (CFR) Part 139, *Certification of Airports*, provide standard RSAs where possible. The RSAs for Runway 33L and Runway 22R do not meet the FAA minimum dimensional standards for RSAs (Figures S-2 and S-3). In November 2005, Congress mandated that all commercial service airports (including Logan Airport) improve their RSAs by 2015. The Department of Transportation's Office of the Inspector General reported in 2009 that Logan Airport was one of the 11 of the nation's largest airports needing to improve RSAs. The report noted that "critical RSA improvements need to be made sooner rather than later to lower the risk of passenger injuries and aircraft damage in the event of runway accidents." To achieve this goal, FAA's current Airport Capital Improvement Program for Logan Airport has allocated funding for the completion of construction of the Logan Airport RSA project no later than 2013. Until an airport corrects RSA deficiencies, the FAA will not provide funding for even routine maintenance activities such as replacing or rehabilitating the runway pavement.

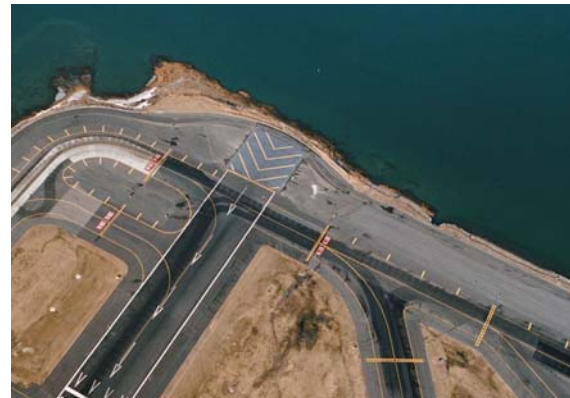
The Logan Airport runways are generally aligned in three directions with runway ends pointing toward six distinct compass headings. For safety, aircraft must generally take off and land into the wind, so the availability

of specific runway configurations is determined by wind speed and direction, and other weather conditions. The Airport's multiple runway layout provides operating flexibility necessary to accommodate the airport's coastal location and highly variable wind conditions. Runway 4L-22R is primarily operated when wind conditions are northeasterly, when aircraft primarily arrive to Runway 4L, or southwesterly when aircraft primarily depart Runway 22R. Runway 15R-33L is operated when winds are northwesterly when aircraft either arrive or depart Runway 33L or southeasterly when aircraft arrive/depart Runway 15R. Runway 15R-33L is also Logan Airport's longest runway and is typically used by aircraft that require a longer runway and is one of two key runways (the other being Runway 4R) requested by pilots when aircraft need to return to the airport due to emergency situations.

Figure S-2 Existing Runway 33L End



Figure S-3 Existing Runway 22R End

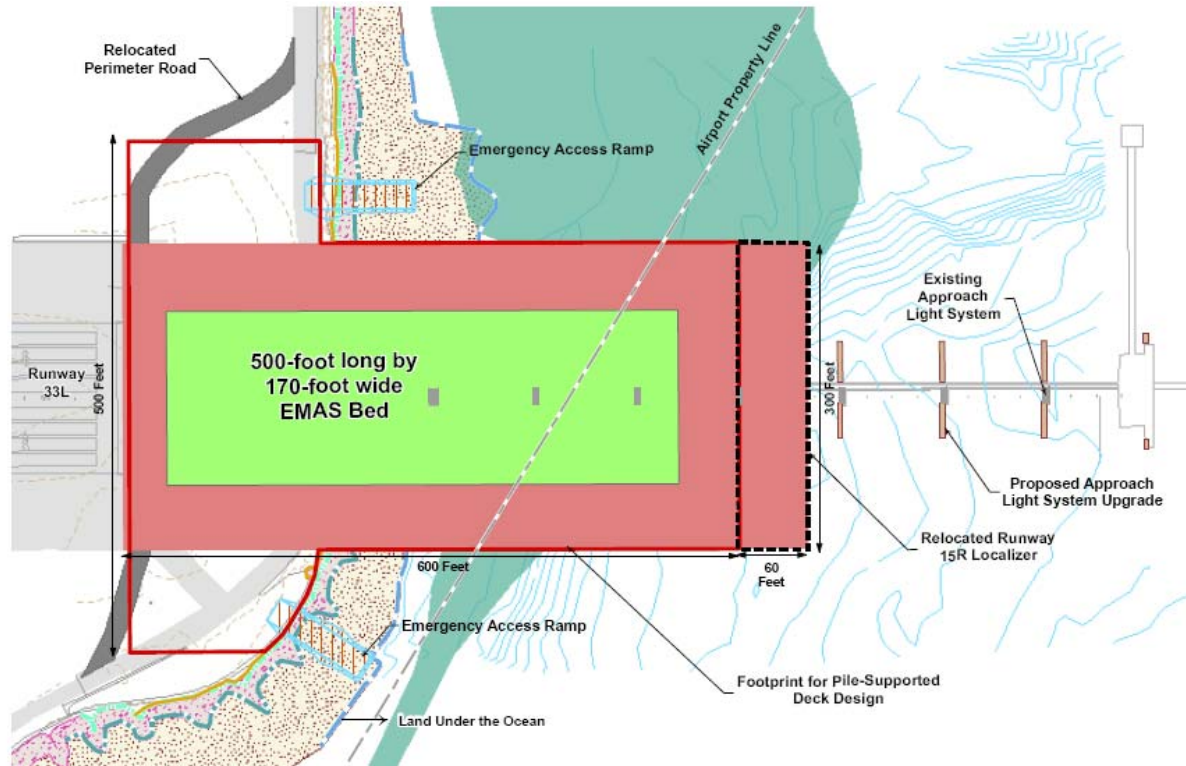


### S.2.1 Runway 33L Runway Safety Area Improvements

The proposed Runway 33L Runway Safety Area (RSA) improvements include constructing a 600-foot long RSA with Engineered Materials Arresting System (EMAS)<sup>2</sup> on a 300-foot wide pile-supported deck, as described in Chapter 2, *Alternatives* and shown in Figure S-4. The deck, extending over the water, would be 470 feet long. The Proposed Action also includes moving the existing offset localizer to a new pile-supported deck at the end of the RSA, and upgrading the approach light system to a Category III Instrument Landing System (Cat III ILS) which includes a High-intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2). Part of the existing timber light pier (approximately 560 feet) would be removed and the approach lights would be incorporated into the new deck.

<sup>2</sup> An EMAS bed is constructed of collapsible concrete blocks with predictable deceleration forces. When an aircraft rolls into an EMAS bed, the tires of the aircraft collapse the lightweight concrete, and the aircraft is slowed down to a safe stop in a way that minimizes damage to the aircraft.

Figure S-4 Runway 33L Proposed Action



While the proposed Runway 33L RSA improvements would result in impacts to coastal wetland resources, including Coastal Bank, Coastal Beach, Land Under the Ocean, and Submerged Aquatic Vegetation (eelgrass), impacts from this alternative are less than that proposed for the three preliminary alternatives, as described in Chapter 2, *Alternatives*. The Proposed Action would maintain runway utility and capacity, and would provide protection and functionality near equivalent to a RSA that fully meets the FAA design criteria.<sup>3</sup> Massport and FAA retained this alternative based on the safety benefits achieved reduced environmental impacts and cost feasibility. This alternative and the No-Action/No-Build Alternative are the only alternatives that the MEPA Certificate required be carried forward in the Draft EA/EIR. The No-Action/No-Build Alternative assumes that Runway 33L improvements would not occur and routine maintenance at the airport would continue.

The proposed Runway 33L RSA improvements would extend the length of the existing RSA from 187.5 feet to a total of 600 feet. The new section of the RSA would have a width of 300 feet. Overall, the FAA determined that:

<sup>3</sup> Federal Aviation Administration, *Runway Safety Area Determination: Runway 15R-33L General Edward Lawrence Logan International Airport East Boston, Massachusetts*, January 30, 2009, p. 6.



“It is not practical for [the Runway 33L RSA] to meet full standards but it can be improved with a 600 [foot] by 300 [foot] runway safety area with 70 knot EMAS protection for Boeing 747-400, subject to environmental review and approvals.”<sup>4</sup> The FAA also determined that “reductions below 300 feet are unacceptable due to the need for a corridor on either side of the EMAS bed for emergency response and maintenance vehicles.”<sup>5</sup>

The existing EMAS bed would be extended to a total length of 500 feet. As part of this alternative, the existing 20-foot wide airport perimeter road would be relocated between the runway’s threshold and the EMAS bed (it is currently located at the end of the existing EMAS bed). Emergency access ramps to the water would be installed on the north and south sides of the RSA and ladders or concrete steps would be provided on the sides and end of the RSA. The localizer would be repositioned to the end of the RSA and installed on a 60-foot long and 300-foot wide pile-supported deck.

Since the ENF was filed, Massport considered various pile types and configurations. Five of six construction options are considered in detailed in this Draft EA/EIR. These alternate deck structures and piling combinations were evaluated at the conceptual design level to assess costs, minimize impacts, and evaluate constructability. Because the overall impacts of the different deck and piling configurations to coastal wetlands resources and coastal processes would be similar, all five options were retained to provide flexibility in the design-build process.

All five deck and pile options would contain the following elements:

- A RSA approximately 600 feet long by 300 feet wide located partially on land and partially on the proposed deck with various pile supporting options.
- A deck structure approximately 470 feet long, with a surface area of approximately 141,000 square feet (3.2 acres);
- An EMAS bed approximately 500 feet long by 170 feet wide located within the RSA;
- Two 25-foot wide emergency access ramps located approximately 30 feet northeast and 70 feet southwest of the proposed deck protected by riprap placed around the edge of the ramps;
- A steel sheet pile cutoff wall approximately 350 feet long at the inshore limit of the deck to prevent settlement and erosion of the backland areas;
- A new deck to support the localizer, approximately 300 feet wide by 60 feet long, supported by thirty-three 16-inch diameter vertical piles;
- Finger pier extensions to the existing light pier to accommodate the CAT III ILS lighting upgrade; and
- Relocating the existing perimeter road, utilities, and a portion of Taxiway C.

These five construction options considered for the Runway 33L RSA are summarized in Table S-1.

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<sup>4</sup> *ibid.*  
<sup>5</sup> *ibid.*



Table S-1 Runway 33L RSA Construction Options

Option	Pile Type	Pile Size (inch diameter)	Pile Number	Batter Piles <sup>1</sup>	Bent Number <sup>2</sup>	Bent Spacing (ft)	Deck Type
1	Pipe Pile	20	442	48	26	12	Cast in-place
2	Pipe Pile	20	182	48	7	70	Precast planks
3	Pipe Pile	20	155	48	5	100	Precast planks
5	Caisson	48	112	0	7	70	Precast planks
6	Caisson	48	80	0	5	100	Precast planks

<sup>1</sup> Batter piles are bracing piles driven at an angle to the vertical to provide resistance to horizontal forces.

<sup>2</sup> A pile bent is an array of piles driven in a row and fastened together at the top by a pile cap or bracing

Note: Option 4 eliminated in the alternatives screening process.

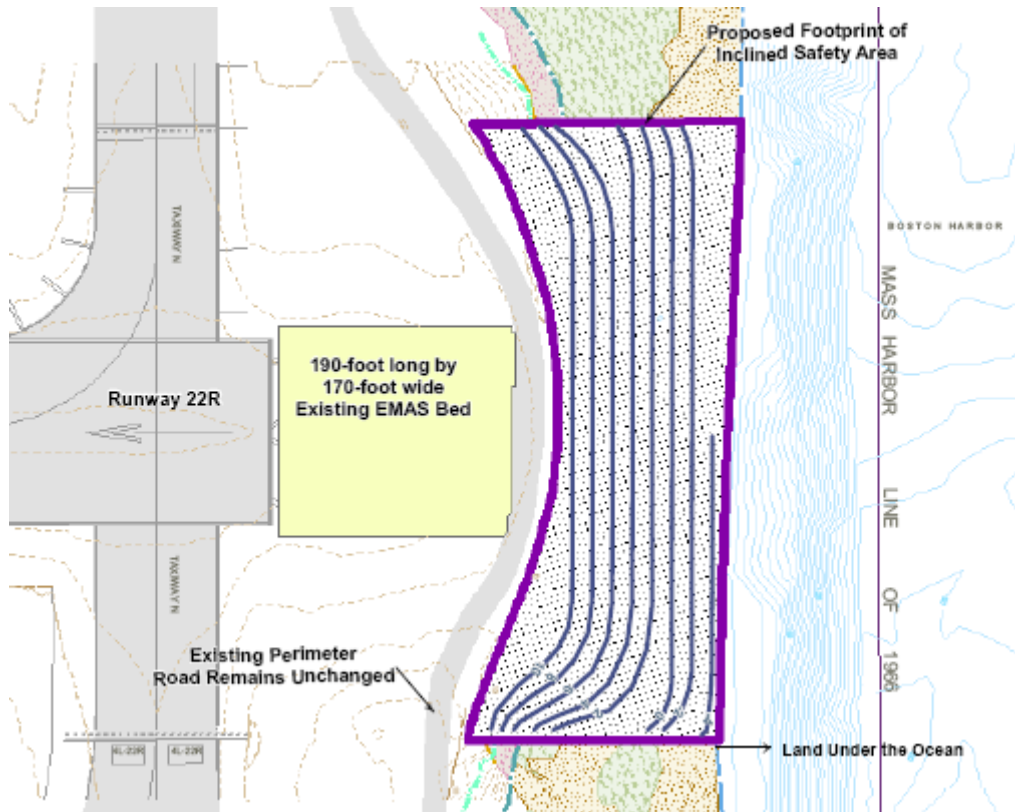
### S.2.2 Runway 22R Inclined Safety Area Improvements

The proposed Runway 22R improvement enhance the existing RSA by constructing an inclined safety area (ISA), as described in Chapter 2, *Alternatives*. This alternative was advanced to the conceptual design phase because it would enhance the existing RSA and rescue access in the event of an emergency, at a construction cost which appears to be feasible while minimizing impacts to environmental resources. The MEPA Certificate issued for the ENF stated that the alternatives that should be carried forward to the Draft EA/EIR and analyzed are the ISA and the No-Action/No-Build Alternative for Runway 22R. The No-Action/No-Build Alternative assumes that Runway 22R enhancements would not occur and routine maintenance at the airport would continue.

The proposed Runway 22R ISA would be similar to the ISA previously constructed at the Runway 22L end. It would require gravel fill to be placed approximately 130 feet north from the top of Coastal Bank and would be graded over the full 500-foot width of the extended safety area down to the mean lower low water elevation.<sup>6</sup> The proposed Runway 22R ISA would include placing approximately 8,450 cubic yards of fill, contained within a perimeter wall of stone-filled gabions and surfaced with crushed stone. Emergency access ramps would not be required because the ISA itself would provide first responders with access between the water and the airfield. The perimeter road would not be relocated. Figure S-5 depicts the proposed Runway 22R ISA.

<sup>6</sup> Mean Lower Low Water (MLLW) = the average daily lower low water level of the tide at a location. Some locations have diurnal tides--one high tide and one low tide per day. At most locations, there are semidiurnal tides--the tide cycles through a high and low twice each day, with one of the two high tides being higher than the other and one of the two low tides being lower than the other.

Figure S-5 Runway 22R Proposed Action



### S.3 Environmental Impacts

The proposed RSA improvements Project will result in impacts to Salt Marsh, Land Containing Shellfish, and Submerged Aquatic Vegetation (eelgrass), Coastal Bank, and Coastal Beach, as explained in Chapter 4, *Environmental Consequences*.

#### S.3.1 Resources Not Present/Not Affected

Several resource categories were not evaluated in the Draft EA/EIR due to either the absence of a resource within the Study Area or because the proposed RSA Improvements Project would not affect the resource category. Impact categories not present or affected by implementation of any alternatives are described in Chapter 3, *Affected Environment*, and include:

- Air Quality;
- Compatible Land Use and Noise;
- Socioeconomic Impacts;
- Environmental Justice Populations;
- Department of Transportation Act, Section 4(f) Properties;





- Farmlands;
- Natural Resources, Energy Supply, and Sustainable Design; and
- Wild and Scenic Rivers.

### S.3.2 Avoidance and Minimization

An extensive alternatives analysis was undertaken by the FAA and Massport for the preparation of the Draft EA/EIR and ENF, as described in Chapter 2, *Alternatives* and Appendix 3, *Alternatives Analysis and FAA Determinations*. The only alternative that would completely avoid impacts to environmental resources is the No-Action/No-Build Alternative. The No-Action/No-Build Alternative is not an acceptable alternative because it does not meet the requirements of the 2005 federal mandate to enhance the safety of RSAs at Logan Airport. The impacts described in this Draft EA/EIR are the unavoidable impacts remaining after Massport has taken all reasonable steps to avoid and minimize effects of the project.

#### S.3.2.1 Avoidance

The alternatives analysis to select a recommended Runway 33L safety project was completed by Massport in coordination with FAA, as described in Chapter 2, *Alternatives* and Appendix 3, *Alternatives Analysis and FAA Determinations*. The first screening level of the Runway 33L alternatives analysis determined whether an alternative should be carried forward to the second screening level based on the alternative's runway utility and capacity. Runway 15R-33L, the longest runway at Logan Airport, is essential to the airport's role as the long-haul gateway for New England. Any reduction in utility and capacity would have an adverse impact on Logan Airport operations, particularly during less-than-ideal weather conditions where Runway 15R-33L provides the runway length needed for safe aircraft operations. Alternatives that would fully avoid impacts to Boston Harbor were not acceptable because they would substantially reduce the runway's utility and capacity. Additionally, Massport and FAA dismissed alternatives that would have:

- Increased impacts to adjacent East Boston neighborhoods;
- Reduced safety margins for other runways at Logan Airport; and
- Increased penetrations to the Runway 15R approach surface and the Runway 33L departure surface.

Because of the proximity of the salt marsh to the existing runway end, the only Runway 22R RSA alternative that would avoid environmental resource impacts, without further reducing safety at Logan Airport, is the No-Action/No-Build Alternative. The No-Action/No-Build Alternative does not meet the project's purpose of *enhancing safety*.

#### S.3.2.2 Minimization

Massport and FAA have strived to minimize environmental impacts to the extent practicable. Massport and FAA will continue to work to minimize these impacts as the design of the safety improvements and agency review progresses.

The Runway 33L alternatives analysis presented in Chapter 2, *Alternatives*, incrementally reduced impacts to wetland resources potentially resulting from the construction of a RSA. The alternatives analysis considered both the standard 1,000-foot long and 500-foot wide RSA and smaller RSA footprints utilizing EMAS, as well as



both a solid fill and pile-supported structure. Massport and FAA selected a pile-supported deck with the smallest footprint that still provides the degree of safety consistent with the FAA guidelines. Potential wetlands impacts have been minimized by choosing the Proposed Action because it would:

- Utilize EMAS rather than a full 1,000-foot long RSA;
- Minimize the width of the RSA from 500 to 300 feet, in compliance with FAA guidance; and
- Include a deck and pile-supported structure, rather than a solid fill structure which would have significant direct impacts to coastal wetlands.

The Runway 22R alternatives analysis presented in Chapter 2, *Alternatives*, incrementally reduced impacts to wetland resources potentially resulting from the construction of a RSA. The alternatives analysis considered both the standard 1,000-foot long and 500-foot wide RSA and smaller RSA footprints utilizing an expanded EMAS bed, as well as both a solid fill and pile-supported structure. Massport selected the inclined safety area that provides the degree of safety consistent with the FAA guidelines. Potential wetlands impacts have been minimized by choosing the Proposed Action because the inclined safety area has a smaller footprint than the larger RSAs and the solid fill or pile-supported structures or a smaller RSA allowed by expanding the EMAS bed. Further minimization is not feasible. Minimization options evaluated during the preparation of this Draft EA/EIR are described below:

- Reduce the width of the ISA from 500 feet to 300 feet. This was evaluated but rejected as being insufficient for the safety objectives of the proposed project. The existing RSA at the Runway 22R end is 500 feet wide. This provides a safe width to allow aircraft that leave the runway to come to a stop. The ISA needs to be the same width as the RSA so that aircraft, should they leave the runway and miss the existing 170-foot wide EMAS bed, can safely transition into the water. A 500-foot ISA is required at the Runway 22R end because there are no navigational aids at this location that would help a pilot remain on the runway centerline in the event of an overshoot.
- Reduce the length of the fill. The proposed ISA provides a 12.3 percent slope from the existing RSA to the water. A steeper slope of the ISA would not be consistent with the safety objectives of the proposed project, since reducing the length of the fill would increase the risk of damage to an aircraft, and would be too steep for emergency response personnel or vehicles to reach an aircraft on the ISA or in the water.

### S.3.3 Runway 33L RSA Impacts

The proposed Runway 33L RSA improvements would affect coastal wetlands resources within an area of approximately 3.65 acres, as described in Chapter 4, *Environmental Consequences* and summarized below.

#### S.3.3.1 Wetlands

The proposed Runway 33L safety improvements would result in permanent impacts to Coastal Bank, Coastal Beach/Tidal Flats, Land Containing Shellfish, Submerged Aquatic Vegetation (eelgrass), and Land Under the Ocean. A portion of this area is also defined as waters of the United States, and is subject to federal jurisdiction. There is a state-jurisdictional buffer zone extending 100 feet from the top of Coastal Bank. Work proposed within the buffer zone includes removing a segment of the existing perimeter road (which will be relocated



outside of the buffer zone) and converting that area to grass. Work within the buffer zone also includes reconstructing the existing EMAS bed. The hydrological analysis described in Chapter 4, *Environmental Consequences*, demonstrates that the proposed pile-supported deck would not change coastal currents or wave impacts in the vicinity of the Runway 33L RSA.

#### **Coastal Bank**

Each of the proposed Runway 33L deck construction options would result in the unavoidable alteration of 315 linear feet of the man-made Coastal Bank to install the sheet piling and fill structure that would support the approach slab and landward end of the RSA deck. An additional 80 linear feet of the riprap slope would be altered for the emergency access ramps. This would convert the existing rip-rap bank to a sheet pile bank or crushed stone ramps, and would not affect the functions or significant interests of the Coastal Bank including storm damage prevention and flood control. The new sheet pile bank would maintain the stability of the Coastal Bank.

#### **Coastal Beach (Intertidal)**

Each of the proposed Runway 33L construction options would result in the alteration of Coastal Beach (the intertidal beach), ranging from 65 square feet (Option 3) to 250 square feet (Option 1), to install the fill structure that would support the approach slab and landward end of the RSA deck, and to install some of the deck pilings. An additional 4,320 square feet of Coastal Beach would be converted to two emergency access ramps.

#### **Land Under the Ocean (Subtidal)**

The proposed Runway 33L RSA improvements would affect the interests of the MA WPA significant to Land Under the Ocean, especially the protection of marine fisheries and wildlife habitat. Each of the construction options would result in the loss of Land Under the Ocean to install pilings needed to support the RSA deck (including the localizer). The area of loss is directly related to the size and number of pilings, and ranges from 395 square feet (Option 3) to 1,045 square feet (Option 5).

Eelgrass (submerged aquatic vegetation) is a habitat type of the state-regulated Land Under the Ocean, and is also considered to be a Special Aquatic Site under the federal Section 404(b)(1) guidelines (Figure S-6). The environmental analysis, as described in Chapter 4, *Environmental Consequences*, assumes that the entire portion of the eelgrass bed under the proposed Runway 33L deck would be shaded and would no longer receive sufficient light to survive. It is conservatively estimated that this would result in the loss or impairment of 60,100 square feet of eelgrass due to direct shading from the proposed deck (approximately 3 percent of the entire existing eelgrass bed), as this area would not receive enough light for eelgrass survival. An additional 6,500 square feet of eelgrass near the deck is expected to be indirectly affected by shading, although this is less certain. Each of the deck construction options would result in the same impacts to eelgrass, since the size of the RSA (and localizer) deck would be the same under all five construction options.



Figure S-6 Existing Eelgrass Beds and Light Pier at the Runway 33L End



#### Land Containing Shellfish (intertidal and subtidal)

Each of the proposed Runway 33L construction options would result in the alteration of Land Containing Shellfish (a state-regulated resource area that overlays Coastal Beach and Land Under the Ocean) as a result of placing pilings to construct the RSA improvements. Direct impacts range from 460 square feet (Option 3) to 1,175 square feet (Option 5).

#### S.3.3.2 Waterways and Tidelands

The proposed RSA improvements would have permanent impacts to waterways and tidelands protected under the Massachusetts Public Waterfront Act (Massachusetts General Law Chapter 91) as described below. Although the physical loss of tideland (based on the footprint of the area of natural substrate replaced by pilings) varies slightly among the proposed deck/piling options, the options would result in the same deck footprint. The affected Chapter 91 resources are therefore considered to be the area of the deck footprint seaward of the mean high tide line, approximately 159,000 square feet (3.65 acres) and extending approximately 470 feet seaward of the high tide line.

As defined at 310 CMR 9.03(3), Chapter 91 does not apply to any previously filled tidelands within the geographical boundary of Logan Airport. The waters adjacent to Logan Airport, extending 500 feet seaward of the mean high water line, are designated as the Logan Airport Security Zone under Massachusetts General Law (M.G.L.) Chapter 90 Section 61. Although the proposed RSA improvements would involve work in Chapter 91 waterways and tidelands, there are no significant impacts to the public's interests in these tideland areas as described in Chapter 6, *Regulatory Compliance*. The only interests currently provided by the proposed RSA



Project Sites are limited shellfishing, living marine resources, and water quality. Limited shellfishing will continue to be permitted within the Security Zone, in those areas that have historically supported that activity. The RSA Improvements Project is designed to protect, restore, and enhance living marine resources, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*. Water quality goals will continue to be attained, and improvements will result from upgrades to the existing airfield stormwater management system.

### S.3.3.3 Fish, Wildlife and Plants

Boston Harbor is designated as Essential Fish Habitat (EFH) for 18 species. A small amount of habitat that could be used by fish species (approximately 3.65 acres) would be altered by the proposed Runway 33L pilings and shaded by the deck. There are, however, native fish species that will benefit from the shaded zone and substrate created by the deck. The Massachusetts Division of Marine Fisheries (DMF) has recommended a time of year restriction for in-water, silt producing work extending from February 15<sup>th</sup> through June 30<sup>th</sup> for the protection of winter flounder, one of the fish species for which Boston Harbor is designated as EFH. Winter flounder use near-shore areas for spawning, larval settlement, and juvenile development.<sup>7</sup> The safety improvements are not anticipated to have permanent impacts to fish habitat at the Runway 33L end. There are no permanent impacts to EFH.

There are no anticipated permanent impacts to wildlife, as the loss of habitat is small. Wildlife can use similar habitat on Airport property or elsewhere in Boston Harbor. The Massachusetts Natural Heritage and Endangered Species Program (NHESP) indicated that the proposed Project would not adversely affect the actual resource area habitat for upland sandpiper, a state-protected species.<sup>8</sup> The proposed Runway 33L RSA improvements would replace a portion of Coastal Beach/Tidal Flat, eliminating habitat for certain benthic organisms, but the pilings could provide attachment substrate for other benthic organisms. Impacts to plants would include the loss of habitat (coastal beach and land under the ocean) for marine algae and eelgrass. This is a negligible loss of habitat that would not impact the local populations of these species in Boston Harbor.

### S.3.3.4 Federally-Listed Threatened and Endangered Species

The proposed Runway 33L pile-supported deck could impact habitat potentially used by sea turtles, but would not result in an adverse effect that would jeopardize the continued existence of these species or adversely change their critical habitat in Boston Harbor. There would be no direct impacts to listed species. The five construction options would have a similar effect on eelgrass and therefore on sea turtle habitats. Although sea turtles have never been reported in Boston Harbor, NMFS considers that sea turtles may be found seasonally in Boston Harbor. The proposed Runway 33L RSA improvements are not likely to affect federally-listed whale species, including the North Atlantic right, the humpback, the fin, the sei, and the sperm whales, as the proposed RSA would be constructed in an area too shallow to be used by whales and none have been reported in the immediate vicinity of the proposed improvements.

### S.3.3.5 Water Quality

The proposed Runway 33L safety improvements would not generate pollutants or affect water quality. As described in Chapter 3, *Affected Environment*, the existing and proposed EMAS bed would not be accessed by

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<sup>7</sup> Comment Letter on the ENF received from the Massachusetts Division of Marine Fisheries, dated August 7, 2009.

<sup>8</sup> Letter received from the Massachusetts Natural Heritage and Endangered Species Program dated March 26, 2010.



vehicles other than during an emergency, due to its composition. 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.

All outfalls would continue to be regulated under the Airport's existing National Pollutant Discharge Elimination System (NPDES) permit, as described in Chapter 3, *Affected Environment*. Stormwater sampling of the airfield outfalls is an ongoing requirement of the NPDES permit and would continue following the construction of the Runway 33L RSA improvements. Stone rip rap at these outfalls prevents erosion and sedimentation resulting from stormwater discharges. Runoff from the perimeter roadway and portions of the existing Runway 33L RSA do not enter the closed drainage system and sheet flow across the rip rap slope into Boston Harbor. Overland sheet flow from the RSA and adjacent areas do not constitute regulated discharges under the NPDES permit.

All of the proposed Runway 33L deck construction options would have the same water quality impacts. The differences among the piling configurations, which are unique to each option, would have negligible impact on water quality. The five construction options would have the same drainage system and potential effects on stormwater in the vicinity of Runway 33L. Stormwater runoff from the deck will be discharged via scuppers located beneath the deck at several locations to prevent erosive forces from disturbing sediment and impacting the receiving water. To comply with the regulatory requirement to improve existing condition, Massport proposes to install stormwater treatment units at an outfall adjacent to the work area. The proposed stormwater management system complies with the Massachusetts Stormwater Management Regulations, as discussed in Chapter 6, *Regulatory Compliance*.

#### **S.3.3.6 Historical, Archaeological, and Cultural Resources**

As documented in Chapter 3, *Affected Environment*, there are no historic resources directly adjacent to the proposed Runway 33L RSA. The Build Alternative would not affect any known historic or archaeological resources. The Massachusetts Board of Underwater Archaeological Resources does not have any record of underwater archaeological resources in the project area and it is highly unlikely that a resource would be found during construction due to the type of construction and project location – all on a previously-filled area.

#### **S.3.3.7 Light Emissions and Visual Impacts**

The proposed Runway 33L improvements would have no significant impacts to light emissions or visual setting. The existing Medium Intensity Approach Lighting System with Runway Alignment (MALSR) lighting system would be upgraded to a CAT III ILS ALSF-2, which requires adding lights to the piers immediately adjacent to the end of the RSA pier. These lights would be at the same elevation as the existing lights, and would be distant (approximately 5,000 feet) from any residential receptors within the Point Shirley neighborhood of Winthrop. The proposed Runway 33L RSA improvements would have a negligible change on the view of the Airport from the nearest neighborhood of Point Shirley and Deer Island. As noted in Chapter 3, *Affected Environment*, the existing view is a low-profile shoreline, the coastal bank, and the existing 2,400-foot timber light pier. The proposed RSA improvements would be viewed from a distance and, because of its low profile, would blend in with the existing shoreline, and would appear similar to the existing light pier.



### S.3.3.8 Construction Period Impacts

Although there are no permanent construction-period impacts, construction activities may have temporary effects on water quality from sedimentation; 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. This section summarizes the potential effects of construction activities, in response to the requirements of the Secretary's Certificate and NEPA requirements at FAA *Order 1050.1E; Appendix A, Section 3*.

Temporary disturbances to water quality would occur during construction of the Runway 33R RSA improvements. Construction is likely to disturb benthic sediments in the water column and increase turbidity in the vicinity of operations. Runway 33L deck construction Options 5 and 6 are expected to generate excavated sediment and use drilling fluid during drilling of caissons. Drilling fluid, likely composed of a bentonite slurry or a polymer fluid, would be displaced up and out of the steel casing as the concrete is pumped in.

Barges would transport most of the required construction equipment, personnel, and materials. The only materials expected to be delivered by truck to the airport would be the EMAS blocks, concrete and asphalt. Massport's agreement with the Contractor will specify that direct construction truck traffic access to the Runway 33L construction site be through the North Gate for the duration of construction. For the purposes of the Draft EA/EIR, use of the North Gate only was analyzed, as the South Gate is not operational at all times. The use of the North Gate is restricted by vehicle and load size and length. The projected daily need for these types of heavy and light trucks were used to estimate the daily number of truck arrivals and total truck trips (arrivals plus departures) to the airport as presented in Chapter 4, *Environmental Consequences*. The proposed Runway 33L RSA improvements construction would generate approximately 18 to 56 total truck trips per weekday. The Runway 33L RSA improvements construction would have minimal impact on airport roadways, based on the maximum of 20 total construction truck trips in the peak hour periods and access restrictions and infrastructure improvements. The airport roadway infrastructure accommodates over 119,000 daily trips each weekday and can accommodate the anticipated 56 additional construction truck trips associated with the proposed Runway 33L RSA improvements construction without causing capacity or delay problems. Vehicular traffic flow on the airport roadway network during construction would be managed so that the quality of traffic flow would not deteriorate to unacceptable levels of service. If necessary, Massport has the ability modify contractor schedules and access routes to minimize impacts.

The proposed construction of the Runway 33L RSA 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. However, these impacts would be *de minimis* and comply with the General Conformity Rule of the federal Clean Air Act.

The construction of the proposed Runway 33L RSA improvements would generate noise associated with construction activities. Construction equipment is expected to be used only during daytime hours (7 AM to 7 PM) consistently throughout the Project's construction phase to install the pile-supported deck. The



L<sub>10</sub> (day-night average)<sup>9</sup> sound levels at all receptors would be below the City of Boston's residential criterion of 75 dBA (sound pressure level measured on a logarithmic scale in units of decibels).<sup>10</sup> Sound levels from construction would be similar for all of the construction options, and would not result in significant noise impacts at any off-airport location.

### S.3.4 Runway 22R Inclined Safety Area (ISA) Impacts

The proposed Runway 22R safety improvements would affect coastal wetlands resources in an area of approximately 1.9 acres. This area consists of Coastal Bank, Coastal Beach/Tidal Flats, Salt Marsh, Land Containing Shellfish, and Land Under the Ocean.

#### S.3.4.1 Wetlands

The proposed Runway 22R ISA improvements would result in permanent impacts to Coastal Bank, Salt Marsh, Coastal Beach, Land Under the Ocean, Land Containing Shellfish, and Land Subject to Coastal Storm Flowage. A portion of this area is also defined as waters of the United States, and is subject to federal jurisdiction. There is a state-jurisdictional buffer zone extending 100 feet from the top of Coastal Bank. There are no permanent impacts to this buffer zone, which contains the perimeter road and a portion of the existing Runway 22R EMAS bed. The ISA is not expected to change wave direction or velocity or to result in increased erosion or deposition because of its orientation.

#### Coastal Bank

The proposed Runway 22R ISA improvements would result in the unavoidable alteration of 530 linear feet of Coastal Bank in order to construct the ISA. However, the proposed Runway 22R ISA would not affect the interests protected by the MA WPA that are significant to Coastal Bank, as is not significant to storm damage prevention or flood control because it does not supply sediment to coastal beaches, coastal dunes or barrier beaches. The proposed ISA would maintain or improve the stability of the bank.

#### Coastal Beach (Intertidal Mud Flats)

Approximately 26,630 square feet of Coastal Beach/Tidal Flat would be lost due to the construction of the Runway 22R ISA. However, the proposed Runway 22R ISA would not affect the interests protected by the MA WPA that are significant to Coastal Beach and Land Under the Ocean. It is not likely to impact any adjacent or downdrift Coastal Beach and will not interfere with littoral drift.

#### Salt Marsh

Approximately 35,040 square feet of Salt Marsh (including 7,110 square feet of *Phragmites*-dominated Salt Marsh) would be lost due to the construction of the Runway 22R ISA (Figure S-7). The proposed Runway 22R ISA would impact the interests significant to Salt Marsh, and therefore, requires a MA WPA Variance because work would not meet the regulatory performance standards described in the MA WPA. Chapter 6, *Regulatory Compliance*, describes the proposed Runway 22R ISA's consistency with the MA WPA Variance requirements.

9 A-weighted sound level which is exceeded for 10 percent of the time during the time period. During a 10- minute period, the L10 would be the sound level which was exceeded by other sound levels for 10 minutes.

10 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 S-7 Salt Marsh at the Runway 22R End



#### Land Under the Ocean (Subtidal)

Approximately 700 square feet of Land Under the Ocean would be lost due to the placement of fill required to construct the inclined safety area. There are no eelgrass beds located within the proposed Runway 22R ISA improvements area. The proposed Runway 22R RSA improvements would have no adverse effects on marine fisheries and wildlife habitat protected by Land Under the Ocean, as high densities of polychaetes, mollusks, or macrophytic algae are not present in the vicinity of Runway 22R.

#### Land Containing Shellfish (Intertidal and Subtidal)

Approximately 62,370 square feet of Land Containing Shellfish would be lost due to the placement of fill required to construct the inclined safety area. The proposed Runway 22R ISA would affect the interests significant to Land Containing Shellfish mapped by the DMF as a conditionally restricted designated shellfish growing area. The proposed project will not introduce any pollutants to the marine environment that would affect water quality in the vicinity of Runway 22R.

#### S.3.4.2 Waterways and Tidelands

The proposed Runway 22R ISA improvements would have permanent impacts to waterways and tidelands. An area of approximately 1.4 acres below the mean high water line would be affected due to the construction of the ISA, a nonwater-dependent use. No public access is currently allowed within the proposed Project area. Limited shellfish harvesting by licensed clammers is allowed within the Security Zone with prior notice from DMF. Historically, because of the paucity of harvestable shellfish, little if any shellfishing has been conducted in the area adjacent to Runway 22R.



Although the proposed RSA improvements would impact Chapter 91 waterways and tidelands, there are no significant impacts to the public's interests in these tideland areas. The only interests currently provided by the proposed RSA Project Site are limited shellfishing, living marine resources, and water quality. The Project is designed to protect, restore, and enhance living marine resources, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

#### **S.3.4.3 Fish, Wildlife and Plants**

The proposed Runway 22R ISA would replace a portion of the Coastal Beach/Tidal Flat present at Runway 22R with a stone substrate, as described in Chapter 3, *Affected Environment*. This would alter habitat for benthic organisms. The small amount of habitat lost due to the proposed ISA is minor, and there is available habitat elsewhere on Airport property and throughout Boston Harbor. There would be limited impacts to shellfishermen resulting from the proposed project, as the population of harvestable soft shell clams is small and the resulting impacts to shellfish harvesting would not be significant. A small amount of intertidal habitat that could be used by fish species (approximately 1.4 acres, including salt marsh and coastal beach) would be altered.

The proposed Runway 22R ISA would require the removal of salt marsh grasses present at the end of Runway 22R, to be replaced with gravel fill. A stand of common reed (*Phragmites australis*) at the Runway 22R end would also be removed. The vegetation does not provide important wildlife value, although starlings and red-winged blackbirds have been observed in this area. The removal of common reed and salt marsh vegetation eliminate areas of potential wildlife hazards within the FAA-designated Wildlife Hazard Area, as these are potential roosting sites for starlings and red-winged blackbirds and potential habitat for shorebirds, brant, and seagulls.

#### **S.3.4.4 Federally-Listed Threatened and Endangered Species**

The proposed Runway 22R ISA would result in the loss of approximately 1.4 acres of intertidal habitat and 700 square feet of subtidal habitat that could potentially be used by sea turtles. Although sea turtles have never been reported in Boston Harbor, NMFS considers that sea turtles may be found seasonally in Boston Harbor. Shellfish, mollusks, benthic organisms, and jellyfish found at the Runway 22R end are potential food sources for sea turtles. The impact area is minor, and there is similar habitat and substrate in the areas adjacent to the Project area.

#### **S.3.4.5 Water Quality**

The proposed Runway 22R ISA would have no permanent impacts to water quality. No vehicles would operate on the proposed ISA, no new impervious surfaces and no new stormwater conveyance systems would be created and the proposed ISA would not result in any new discharge of untreated stormwater. There would be no change to the quality and quantity of stormwater runoff resulting because the proposed ISA is not an area with higher pollutant loading and would not generate permanent changes in total suspended solids (TSS). The proposed project would be in compliance with the Massachusetts Stormwater Management regulations and the existing NPDES permit as explained in Chapter 6, *Regulatory Compliance*.



#### S.3.4.6 Historical, Archaeological, and Cultural Resources

There are no anticipated impacts to historical, archaeological, or cultural resources as a result of the Build Alternative. There would be no change to the Runway 22R end that may cause an adverse effect to any known historical, archaeological, or cultural resource. The Massachusetts Board of Underwater Archaeological Resources does not have record of underwater archaeological resources in the project area and it is highly unlikely that a resource would be found because the Runway 22R ISA is located almost entirely landward of mean low water.

#### S.3.4.7 Light Emissions and Visual Impacts

There would be no changes to the lighting system at Runway 22R. The ISA would have a negligible change on the view of Runway 22R from the East Boston neighborhood of Orient Heights, particularly along Bayswater Street, and from Constitution Beach, a public beach also in Orient Heights. As noted in Chapter 3, *Affected Environment*, the existing view from both Bayswater Street and Constitution Beach is a low-profile shoreline, salt marsh vegetation, and the coastal bank.

#### S.3.4.8 Construction Period Impacts

Construction activities may have a temporary effect on water quality from sedimentation, traffic and the transportation network in the vicinity of Logan Airport, noise that would affect area residents, and the emission of air pollutants. This section summarizes the potential effects of construction activities, in response to the requirements of the Secretary's Certificate and NEPA requirements at FAA *Order 1050.1E; Appendix A, Section 3*.

Water quality in the vicinity of the proposed Runway 22R ISA improvements could be temporarily affected by short-term construction activities, particularly due to the excavation and dredging required to remove unsuitable substrate materials and to place new stone fill. The work would consist of the excavation and removal of soft organic soils in the intertidal and coastal bank areas and replacement with crushed stone/granular soil to provide a stable base for the slope. The perimeter of the inclined safety area would be protected from erosion by the placement of gabions (partitioned, wire fabric containers filled with stone to form flexible, permeable structures for earth retention). Excavation of material within the intertidal zone would be completed during periods of low tide. The area would be surrounded by a siltation curtain/ debris boom to contain and minimize any debris or siltation. Construction completed at the Runway 22R end would follow a comprehensive Soil Erosion and Sediment Control Plan to minimize temporary impacts. The gabions wrapped with filter fabric installed during construction would also act as a barrier to sediment releases and reduce resulting turbidity.

Unlike Runway 33L, construction of the proposed Runway 22R ISA would be primarily undertaken from the landside, as most of the materials and workers would arrive by truck. The majority of workers would be transported to the site by shuttle bus. The Contractor for the proposed Runway 22R ISA would be under the same access restrictions for direct construction truck traffic access as the Runway 33L construction. Vehicular traffic flow on the airport roadway network during construction would be managed so that the quality of traffic flow would not deteriorate to unacceptable levels of service. If necessary, Massport has the ability to modify contractor schedules and access routes to minimize impacts.



The proposed construction of the Runway 22R ISA 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, and the generation of fugitive dust from disturbance of unpaved areas. However, these impacts would be *de minimis* and comply with the General Conformity Rule of the federal Clean Air Act.

The construction of the proposed Runway 22R ISA improvements would generate noise associated with construction activities. Construction equipment is expected to be used only during daytime hours (7 AM to 7 PM) consistently throughout the Project’s construction phase. Construction noise would be below the City of Boston’s residential impact criteria at all locations.

## S.4 Mitigation Measures

The proposed RSA Improvements Project would result in unavoidable impacts to Salt Marsh, Eelgrass (Submerged Aquatic Vegetation), and Land Containing Shellfish. Massport has committed to providing compensatory mitigation, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings* and listed in Table S-2. The proposed safety improvements would not affect the functions or significant interests of Coastal Bank, including storm damage prevention and flood control. Temporary impacts to environmental resources during construction would be mitigated through emissions and noise controls, as well as soil and erosion controls to prevent adverse water quality impacts.

Table S -2 Proposed Project Mitigation Commitments

Environmental Categories	Proposed Mitigation Measure	Approximate Total Cost	Implementation Schedule	Implementation Responsibility
Eelgrass	A mitigation program that will combine replacing lost eelgrass area and function by creation of new eelgrass, at a 3:1 replacement loss ratio, out-of-kind mitigation, or in-lieu payments.	\$1.0 to \$1.2 million	During Construction	Massport
Land Containing Shellfish	Provide in-lieu fee for off-site restoration.	TBD	TBD	Massport
Water Quality	Install stormwater management treatment structure at either Outfall 30 or Outfall 31 at the Runway 33L end	\$60,000	During Construction	Massport
Salt Marsh	Restoration/creation of salt marsh at a 2:1 replacement:loss ratio.	\$600,000 to \$1.1 million	During Construction	Massport
	Monitor compensatory Salt Marsh for success and invasive plant species, and implement an invasive species control plan.	\$125,000 (\$25,000 per year)	5-year period following construction	Massport

TBD To be determined

Massport developed separate salt marsh and eelgrass mitigation processes, in consultation with the Salt Marsh and Eelgrass Working Groups. The Salt Marsh Working Group is comprised of representatives of the following agencies: FAA, USACE, U.S. Environmental Protection Agency (USEPA), MA Office of Coastal Zone Management (CZM), DEP, Massachusetts Department of Conservation and Recreation (DCR), Massachusetts



Department of Fish and Game Division of Ecological Restoration (DER, formerly CZM WRP), and Boston Environment Department. The Eelgrass Working Group includes representatives from the FAA, USACE, USEPA, CZM, DEP, DCR, DER and DMF, and the Boston Environment Department.

Proposed mitigation measures for permanent impacts to Salt Marsh, Submerged Aquatic Vegetation, Land Containing Shellfish, and Water Quality (Stormwater) are summarized in the following sections.

#### **S.4.1 Salt Marsh and Mud Flats**

Mitigation for the unavoidable loss of salt marsh and mud flats at Runway 22R would be provided by restoring historically-altered salt marsh in the vicinity of Boston Harbor.

DEP has stated that a 2:1 replacement/creation ratio would be required as part of MA WPA variance. The USACE would require the same mitigation ratio. DEP typically seeks strict replication by requiring mitigation sites to be on-site or adjacent to the affected site, in the same watershed, and in-kind with the same elevation, habitat type, hydrological connection, ecological functions, and other key characteristics. Higher ratios tend to be required for restoration, enhancement, or preservation. Therefore, based on current guidance, a 2:1 mitigation goal is proposed, which would total approximately 123,340 square feet (3 acres), as restoration or creation. The total mitigation goal is twice the total area of salt marsh and intertidal beach (mud flats).

In February 2010, Massport conducted a GIS analysis and aerial photo interpretation to identify potential mitigation sites within the study area. The study area includes most of the area within the Boston Harbor and other areas depicted in the Salt Marsh Mitigation Study Area. The preliminary site selection criteria, described in Chapter 5, *Proposed Mitigation and Section 61 Findings*, helped select potential sites and exclude sites that would not fit the mitigation requirements.

A total of 40 potential sites were initially identified. Of the 40 sites identified, ten sites were advanced to field reconnaissance, and Massport recommends that five sites be advanced for further evaluation. The site evaluation included field reconnaissance, used objective evaluation criteria, and other input from agencies. While it would be preferable to complete the mitigation at one location, it is possible that more than one site could be used.

The site identification criteria considered FAA's requirements for wildlife hazards. FAA Advisory Circular (AC) 150/5200-33B, *Hazardous Wildlife Attractants on or Near Airports* (August 28, 2007) provides standards, practices and recommendations to assist airports to comply with the wildlife hazard management requirements of Title 14 CFR Part 139, *Certification of Airports*. As the AC notes, wildlife-aircraft strikes have resulted in the loss of hundreds of lives worldwide as well as billions of dollars in aircraft damage. Wildlife hazards are constructed or natural areas that encourage wildlife to enter an airport's approach or departure airspace and present potential hazards to aviation. The AC establishes a minimum separation distance of 10,000 feet between an airport's Aircraft Operating Area (AOA), the ground surface on which airports operate, and any hazardous wildlife attractant. The AC further recommends a 5-mile separation between the airport and a hazardous wildlife attractant on the approach and departure paths. Section 2-4 of the AC specifically addresses wetlands. Paragraph (c) notes that mitigation for wetland impacts from airport projects must be designed so it does not



create a wildlife hazard. FAA recommends that wetland mitigation projects that may attract hazardous wildlife be outside of the separation distances (10,000 feet and 5 miles) unless the wetlands provide unique functions that must remain on-site. The U.S. Department of Agriculture's Animal and Plant Inspection Service (APHIS) is responsible for determining whether a mitigation area would constitute a wildlife hazard. The FAA and the USACE have signed a Memorandum of Agreement at the national level concerning the implementation of the AC with regard to Section 404 permits.

A conceptual salt marsh restoration plan, which would be implemented for the selected mitigation site(s), is described in Chapter 5, *Proposed Mitigation and Section 61 Findings*. This plan will be developed in detail in the Final EA/EIR based on DEP<sup>11</sup> and USACE<sup>12</sup> mitigation guidance, once agency consensus is reached on the site(s).

#### S.4.2 Eelgrass

Mitigation for the unavoidable loss of eelgrass at Runway 33L would be provided by a combination of measures to restore and protect eelgrass beds in Boston Harbor and adjacent coastal waters, and could include mapping or studies having a broader scope than just Boston Harbor. Based on guidance from the USACE and DEP, the mitigation goal for the Runway 33L RSA improvements is 3:1, or 4.2 acres.

Massport has identified a range of potential mitigation options, based on consultation with the Eelgrass Working Group. This is a list of potential mitigation measures currently being developed and evaluated. Massport anticipates that the final list of mitigation commitments presented in the Final EA/EIR will be a subset of these strategies that will provide the most practicable benefit to eelgrass on the Massachusetts Coast. The final mitigation program will be evaluated after receipt of additional agency and public comments. Specific elements of the eelgrass mitigation program include:

- Conducting a site selection study to identify optimal locations for eelgrass restoration within Boston Harbor and South Shore estuaries;
- Identifying up to 3 sites for initial test planting;
- Determining if substrate modification (replacing organic substrates with sand) would enhance restoration success; and
- Planting or seeding eelgrass at one or two sites, over a 4.2-acre area, to achieve a target of at least 1.5 acres of high-density eelgrass (60-80 percent cover) after 3 years.
- Massport is also willing to consider in-kind restoration by funding installation of Conservation Moorings. Each conventional mooring replaced by a Conservation Mooring would restore approximately 900 square feet of eelgrass. Replacing 50 conventional moorings would restore approximately 1 acre of eelgrass. This mitigation option would substitute for replacement or restoration at other sites, or would reduce the amount of restoration planting required.

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11 Massachusetts Department of Environmental Protection, Bureau of Resource Protection, Wetlands and Waterways Program: Massachusetts Inland Wetland Replication Guidelines, March 2002.

12 U.S. Army Corps of Engineers, Addendum to New England District Compensatory Mitigation Guidance: Compensation for Impacted Aquatic Resource Functions, File No. NAE-2006-3648, December 18, 2007.



In the alternative, Massport is equally willing to undertake out-of-kind mitigation to provide protect and enhance existing eelgrass beds in Boston Harbor and elsewhere in Massachusetts that would achieve an equivalent level of wetland functions and meet the “no-net-loss” provision of the regulations. These measures could include:

- Funding a research program to address the causes of eelgrass decline in the Commonwealth;
- Funding an Eelgrass Mapping program, in coordination with DEP and other agencies, to more accurately define the limits of eelgrass beds in critical areas and protect these unmapped beds from inadvertent damage;
- Constructing artificial reefs to enhance fish habitat, one of the principal functions that eelgrass beds provide.

As noted above, consultation with the agencies and the literature review indicated that there are several areas within Boston Harbor that appear suitable for eelgrass restoration, taking into consideration wave hydrodynamics, depth, water quality, and substrate quality. Prior to developing a Final EA/EIR, Massport would work with the resource agencies to select potential restoration sites and to establish a restoration plan, if that were the selected mitigation option.

#### S.4.3 Land Containing Shellfish

Shellfish mitigation for the RSA Improvements Project would likely consist of an in-lieu funding agreement for off-site transplanting and seeding by DMF. Mitigation costs to restore/replace shellfish habitat for the Runway 33L RSA and Runway 22R ISA improvements are currently being determined in coordination with the DMF.

#### S.4.4 Water Quality

Standard 7 of the Massachusetts Stormwater Regulations (the Redevelopment Standard) requires that redevelopment projects result in an improvement over the existing conditions. In order to comply with this portion of the regulations, proposed and existing catch basins within the Runway 33L project area, if altered during construction, will include deep sumps and hoods, providing additional measures of sediment removal and protection against discharge of spilled oil or floatable debris. A new stormwater treatment unit would be installed at either Outfall A-30 or A-31 at the Runway 33L end.

#### S.4.5 Construction-Period Mitigation Commitments

Temporary, short-term impacts from construction activities would be mitigated to the extent practicable, as listed in Table S-3. 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 150/5370-10 (latest edition), Standards for Specifying Construction of Airports*.<sup>13</sup> 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 Project and would be reviewed by the appropriate regulatory agencies as part of the permit applications. In order to mitigate for any unintended consequences to historic or archeological resources during

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<sup>13</sup> Advisory Circular 150/5370-10, Standards for Specifying Construction of Airports.



construction, an Unanticipated Discovery Plan would be developed by Massport and implemented during construction.

**Table S-3 Proposed Construction Mitigation Commitments**

Environmental Categories	Proposed Mitigation Measure
Eelgrass	Implement erosion and sedimentation control measures according to the Soil Erosion and Sediment Control Plan. Restrict barge movement to designated construction corridors outside of the eelgrass bed.
Water Quality	Develop and implement a comprehensive Soil Erosion and Sediment Control Plan in accordance with NPDES and DEP standards. Apply water to dry soil to prevent dust production. Stabilize any highly erosive soils with erosion control blankets and other stabilization methods, as necessary. Use sediment control methods (such as silt fences and hay bales), during excavation to prevent silt and sediment entering the stormwater system and waterways. Maintain construction equipment to prevent oil and fuel leaks. Silt curtains/semi-permanent (overnight) debris booms and secondary boom use around the barge for additional containment, and silt fencing. Collect and pump slurry and/or silty water to a containment area on the barge and the placement of sediment on sheets of plastic film to contain runoff.
Salt Marsh	Implement erosion and sedimentation control measures according to the Soil Erosion and Sediment Control Plan.
Noise	Maintain mufflers on construction equipment. Keep truck idling to a minimum. Fit air-powered equipment with pneumatic exhaust silencers. Do not allow nighttime construction.
Traffic	Limit construction traffic to federal or state highways, restricting use of East Boston roadways by construction vehicles. Implement construction worker vehicle trip management, including requiring contractors to provide off-airport parking, use high-occupancy vehicle transportation modes for employees, and join the Logan Transportation Management Association (TMA).
Air Quality	Keep truck idling to a minimum. Retrofit appropriate diesel construction equipment with diesel oxidation catalyst and/or particulate filters. Implement construction worker vehicle trip management, including requiring contractors to provide off-airport parking, use high-occupancy vehicle transportation modes for employees, and join the Logan Transportation Management Association (TMA).
Hazardous Materials and Solid Waste	Pre-characterize any materials that would be dredged or excavated from the Project areas to determine course of action for removal.





#### S.4.5.1 Water Quality

Spill prevention measures would be deployed throughout the construction phase to prevent pollution from construction equipment and erosion, as well as sedimentation controls during construction phases. The following spill prevention measures would be deployed throughout the Runway 33L improvements construction phase in order to prevent pollution from construction equipment or material:

- Installing protective measures, such as silt curtains/semi-permanent (overnight) debris booms, particularly around pile bents, secondary boom use around the excavation barge for additional containment, and silt fencing to prevent sediment from impacting water quality;
- Collecting and pumping slurry and/or silty water to a containment area on the barge and the placement of sediment on sheets of plastic film to contain runoff; and
- Managing contaminated materials encountered during construction according to the Massachusetts Contingency Plan (310 CMR 40.00) and Massachusetts General Law Chapter 21E; Oil and Hazardous Materials Release Prevention and Response Act.

Erosion and sedimentation controls would be used during the Runway 33L upland earthwork and construction phases as described below. Proposed controls are provided as recommendations for the site contractor and do not constitute or replace the final Stormwater Pollution Prevention Plan that must be fully implemented by the Contractor and owner in Compliance with USEPA NPDES regulations and with Massport's contractor requirements.

- Hay bale barriers will be placed around upland work areas to trap sediment transported by runoff before it reaches the drainage system or leaves the construction site. Bales will be set at least four inches into the existing ground to minimize undercutting by runoff and will be backed up with silt fencing.
- Existing catch basins will be protected with hay bale barriers (where appropriate) or silt sacks throughout construction.
- Stabilization of open soil surfaces will be implemented within 14 days after grading or construction activities have temporarily or permanently ceased. Slope stabilization will be used to minimize erosion on slopes of 3:1 or flatter.
- The contractor or subcontractor will be responsible for implementing each control shown on the Sedimentation and Erosion Control Plan.

Excavation within the Runway 22R intertidal zone would be completed primarily during periods of low tide. The area will be surrounded by a siltation curtain/ debris boom to contain and minimize any debris or siltation. Construction completed at the Runway 22R end would follow a comprehensive Soil Erosion and Sediment Control Plan to minimize temporary impacts. The gabions wrapped with filter fabric installed during the first phase of construction would also act as a barrier to sediment releases and reduce resulting turbidity beyond the project limits.



#### S.4.5.2 Hazardous Materials

The sediments in the Runway 22R area were sampled and subjected to both physical and chemical analysis in accordance with the Massachusetts Water Quality Certification Regulations and compared to NOAA's Sediment Quality Guidelines. The sediments are not anticipated to contain hazardous materials. However, in order to reduce the potential for any hazardous material to be released during dredging or excavation, the soils would be further pre-characterized through soil sampling.

#### S.4.5.3 Surface Transportation

Runway 33L RSA improvements will be constructed primarily from the water, which substantially reduces the number of construction vehicles accessing the airport. The Airport roadways can support the anticipated construction-related traffic, therefore, no mitigation is proposed and no transportation access plan is proposed. Massport requires all contractors to limit construction-related traffic to access and egress to the airfield via only state and federal highways and the Airport roadway network prohibiting construction-related traffic on the local East Boston roadways. Massport also requires contractors to implement a construction worker vehicle trip management, including requiring contractors to provide off-airport parking, use high-occupancy vehicle transportation modes for employees, and join the Logan Transportation Management Association (TMA).

#### S.4.5.4 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 transport vessels; evaporative emissions from asphalt placement and curing; and the generation of fugitive dust from disturbance of unpaved areas, as described in Chapter 4, *Environmental Consequences*. As part of its project approvals process, Massport requires all contractors to adhere to certain construction guidelines that relate to:

- Construction vehicle/equipment anti-idling;
- Retrofitting of appropriate diesel construction equipment with diesel oxidation catalyst and/or particulate filters; and
- Construction worker vehicle trip management, including requiring contractors to provide off-airport parking, use high-occupancy vehicle transportation modes for employees, and join the Logan TMA.

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## S.5 Permits and Approvals

In addition to compliance with NEPA and MEPA, a number of local, state, and federal permits are needed for the proposed Project, as listed in Table S-4. Permitting for both the Runway 33L and Runway 22R RSA improvements would be similar since many of the same resources would be affected. The Runway 33L and Runway 22R RSA improvements could be permitted separately since each is a single and complete project that would be constructed independently of the other and possibly at different times. Massport has initiated the process for MA WPA Variance on January 20, 2010 by submitting a Notice of Intent to the Boston Conservation Commission (BCC) that was procedurally denied and submitted its request for a Variance to the DEP Commissioner on March 31, 2010. Chapter 4, *Environmental Consequences*, provides additional project details



relative to the project impacts. In response to that filing, DEP has issued a letter listing specific information required for its review of the Variance request (see Appendix 4, *Agency Correspondence*).

**Table S-4 Required Permits and Approvals**

Issuing Agency	Approval or Permit
U.S. Army Corps of Engineers	Clean Water Act, Section 404 and Section 10 Individual Permit
U.S. Environmental Protection Agency Region I	National Pollutant Discharge Elimination System Construction General Permit
Massachusetts Office of Coastal Zone Management	Coastal Zone Management, Federal Consistency Determination
Massachusetts Executive Office of Energy and Environmental Affairs	Public Benefits Determination
Massachusetts Department of Environmental Protection	Massachusetts Wetlands Protection Act Variance Massachusetts Public Waterfront Act Variance/Approval (Chapter 91) Clean Water Act, Section 401 Water Quality Certificate Section 61 Finding

## S.6 ENF Certificate Requirements

The Secretary’s Certificate on the ENF required specific information to be included in the Draft EA/EIR (see Appendix 1). Table 1.4-1 lists the general requirements of the Certificate and where in the Draft EA/EIR that information can be found.

**Table S-5 ENF Certificate Requirements**

Requirement	Draft EA/EIR Section
Joint submittal and review of EA and EIR	Entire document
Distribution, including shellfish industry and local shellfish representatives and libraries	Chapter 8
Project summary and history	Sections 1.2 and 1.3; Sections 2.2 and 2.3
Description of Runway 33L Alternatives Analysis	Section 2.2 and Appendix 3
Description of Runway 22R Alternatives Analysis	Section 2.3 and Appendix 3
Existing and proposed plans	Figures 2-1, 2-5, 2-9, and 2-12
Construction phasing, logistics, and schedule	Sections 2.2.4 and 2.3.4
Environmental Consequences analysis	Chapter 4
Runway 33L wetland impacts	Section 4.2.1
Runway 33L impacts to eelgrass (submerged aquatic vegetation)	Section 4.2.1



Table S-5 ENF Certificate Requirements (continued)

Requirement	Draft EA/EIR Section
Runway 33L impacts to coastal processes	Section 4.2.1; Appendix 6
Runway 33L construction-related sedimentation and turbidity	Section 4.2.1
Runway 22R wetland impacts	Section 4.3.1
Runway 22R impacts to salt marsh	Section 4.3.1
Runway 22R impacts to coastal processes	Section 4.3.1; Appendix 6
Runway 22R construction-related sedimentation and turbidity	Section 4.3.1
Runway 22R dredging and/or excavation impacts and dredging performance standards	Sections 4.3.1 and 4.3.7
Runway 33L habitat assessment, including Essential Fish Habitat, and impacts	Sections 3.3.4 and 3.4.2; Section 4.2.3
Runway 22R habitat assessment, including Essential Fish Habitat, and impacts	Sections 3.3.4 and 3.5.2; Section 4.3.3
Runway 33L impacts to land containing shellfish and to shellfishmen	Sections 4.2.1, 4.2.2, and 4.2.3
Runway 22R impacts to land containing shellfish and to shellfishmen	Sections 4.3.1, 4.3.2, and 4.3.3
Coordination with Massachusetts Natural Heritage and Endangered Species Program	Section 3.3.4; Sections 4.2.3 and 4.3.3; Appendix 3
Coordination with National Marine Fisheries Service and U.S. Fish and Wildlife Service	Section 3.3.5; Sections 4.2.3 and 4.3.3; Appendix 3
Runway 33L water quality impacts	Section 4.2.5
Runway 22R water quality impacts	Section 4.3.5
Unanticipated Discovery Plan for submerged cultural resources	Sections 4.2.6 and 4.3.6
Runway 33L construction-period impacts (traffic, noise and air quality)	Section 4.2.9
Runway 22R construction-period impacts (traffic, noise and air quality)	Section 4.3.9
Cumulative wetland impact analysis	Section 4.4.2
Mitigation measures	Chapter 5
Avoidance and minimization measures	Sections 2.2 and 2.3; Section 5.2
Wetland Mitigation Plan	Section 5.2
Wetlands Replication Plan	Section 5.2
Agency Involvement in developing wetland mitigation plans	Section 5.2 and Section 7.3
Analysis of wetland mitigation sites, on-site and off-site	Section 5.2
Construction-period and post-construction wetland mitigation measures	Section 5.3
Waterways and Tidelands mitigation	Sections 4.2.2 and 4.3.2
Salt Marsh mitigation	Section 5.2.1
Eelgrass mitigation	Section 5.2.2



Table S-5 ENF Certificate Requirements (continued)

Requirement	Draft EA/EIR Section
Land containing shellfish mitigation measures	Section 5.2.3
Water quality mitigation measures during construction and post-construction	Section 5.2.4 and 5.3.1
Construction-related mitigation	Section 5.3
Section 61 Findings	Section 5.4
State Agency Action	Chapter 6
Statement of compliance with the:	
<ul style="list-style-type: none"> <li>• Massachusetts Wetlands Protection Act performance standards and Variance criteria</li> <li>• Section 401 Water Quality Certification</li> <li>• Massachusetts Chapter 91 License and Variance criteria</li> <li>• U.S. Army Corps of Engineers Individual Section 10/Section 404 permit</li> <li>• Coastal Zone Management Federal Consistency Review</li> <li>• National Pollutant Discharge Elimination System General Permit</li> <li>• Massachusetts Stormwater Management Standards</li> </ul>	<p>Section 6.5</p> <p>Section 6.8</p> <p>Section 6.6</p> <p>Section 6.2</p> <p>Section 6.4</p> <p>Section 6.3</p> <p>Section 6.5.3</p>
Massachusetts Public Benefits Determination	Section 6.7
Responses to comments	Appendix 2



# 1

## Purpose and Need

The Massachusetts Port Authority (Massport) is proposing to enhance the runway safety areas (RSAs) at the ends of Runway 33L and Runway 22R at Boston-Logan International Airport (Logan Airport). The location of the safety improvements are shown on Figure 1-1. The proposed safety improvements are required to enhance the RSAs, to the extent feasible, to be consistent with the Federal Aviation Administration's (FAA) current airport design criteria for RSAs and to enhance rescue access in the event of an emergency. As an older airport, Logan Airport was constructed before many of the current safety standards were developed and several of the runway ends currently end at the water's edge. Typical RSAs at commercial-service airports, based on FAA requirements, extend 1,000 feet beyond the ends of the runway and are 500 feet wide. RSAs are safety improvements and do not extend runways or have any effect on normal runway operations, runway capacity or types of aircraft which can use the runways. Logan Airport is a commercial service airport that receives federal funding for airport improvement projects and is required by the FAA to meet the RSA design criteria contained in the FAA Airport Design Advisory Circular,<sup>1</sup> to the extent feasible.

The existing RSA at the end of Runway 33L does not meet standard FAA design criteria for overrun and undershoot protection for the design aircraft for that runway, the Boeing 747-400. The existing RSA is 187.5 feet long and 500 feet wide. Within this area is a 158-foot long and 170-foot wide Engineered Material Arresting System (EMAS) bed, installed in 2006 as an interim safety measure. An EMAS bed is constructed of collapsible concrete blocks with predictable deceleration forces. When an aircraft rolls into an EMAS bed, the tires of the aircraft collapse the lightweight concrete, and the aircraft is slowed down in a way that minimizes damage to the aircraft and its passengers. The existing EMAS bed is designed to be capable of arresting a Boeing 757-200 exiting the runway at a speed of 38 knots or less or a Boeing 737-800 at 42 knots or less, but provides minimal arrestment for the design aircraft, the Boeing 747-400. The existing Runway 33L RSA is also too short to provide undershoot protection consistent with the FAA criteria. The proposed project is intended to enhance the Runway 33L RSA so that it provides overrun and undershoot protection consistent with the design criteria in the FAA's Airport Design Advisory Circular (*Advisory Circular 150/5300-13, Airport Design*, December 31, 2009) to the extent feasible.


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<sup>1</sup> United States Department of Transportation, Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13, Airport Design, Changes 1 through 15*, December 31, 2009.





Legend

 RSA Improvements



0 625 1,250 2,500 Feet



Logan RSA

Figure 1-1

Location of Proposed RSA Improvements



The existing RSA at the end of Runway 22R meets the minimum FAA design criteria for overrun protection for the runway's design aircraft but does not comply with undershoot requirements. Runway 22R is very rarely used for arrivals and has an 815-foot displaced threshold. The Runway 22R RSA enhancement is primarily intended to protect aircraft in the event that an aircraft arriving on Runway 4L overruns and fails to stop on the runway. The RSA is 215 feet long and 500 feet wide, and includes a 190-foot long and 170-foot wide EMAS bed. The EMAS bed provides the minimum arrestment speed acceptable by the FAA (40 knots) for the design aircraft, the Boeing 757-200. The Runway 22R EMAS bed also provides arrestment at higher speeds for many of the smaller aircraft frequently using this runway. The arresting performance improves with lighter aircraft (e.g. EMAS bed will arrest a Boeing 737-800 that leaves the runway at 51 to 57 knots or less and a CRJ-200 that leaves the runway at 60 to 66 knots or less). As a condition of approving the installation of the existing EMAS bed, the FAA required Massport to consider options for further enhancing the level of safety provided by the existing RSA. The proposed safety improvements at this location are consistent with that commitment.

In support of agency review of the project as an initial step in the formal permitting process, this Chapter describes the formal agency findings related to purpose of and need for the proposed RSA improvements and describes the FAA airport design criteria for RSAs.

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## 1.1 Purpose of the Project

The purpose of the project is to increase safety for aircraft and their passengers in emergency situations by enhancing the RSAs at the ends of Runway 33L and Runway 22R consistent with FAA's design standards. The USACE has adopted this as the project purpose under Section 404 of the Clean Water Act.<sup>2</sup>

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## 1.2 FAA Design Criteria for Runway Safety Areas

The FAA requires airports to provide a safety area 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 unintentional "excursion" from the runway in an emergency situation. An "excursion" from the runway can include an overrun (an arriving aircraft fails to stop before the end of the runway or an aborted takeoff), 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 commercial service airports, regulated under 14 Code of Federal Regulations (CFR) Part 139, *Certification of Airports*, provide standard RSAs where possible. In November 2005, Congress mandated that all commercial airports improve their RSAs by 2015.

FAA determines minimum dimensional standards for RSAs based on the "critical" or "design" aircraft that operates or is forecasted to operate at an airport. The RSAs for Runway 33L and Runway 22R do not meet the FAA standards. These deficiencies must be addressed before any future runway improvements can be undertaken at Logan Airport. To emphasize the critical project safety need, until an airport corrects RSA deficiencies, the FAA will not provide funding for even routine maintenance activities such as replacing or rehabilitating the runway pavement.

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<sup>2</sup> Letter from the U.S. Army Corps of Engineers to Stewart Dalzell, Massport. Dated March 12, 2010.





The design criteria for RSAs are provided in the FAA's *Advisory Circular 150/5300-13, Airport Design*, December 31, 2009.<sup>3</sup> The FAA Airport Design Advisory Circular contains a coding system, referred to as the Airport Reference Code (ARC), which standardizes design requirements for airports. The ARC contains design requirements for the length and width of runways and taxiways, and requirements for the associated RSAs, all of which are based on the type of aircraft that currently, or are expected to use the airport in the future. The ARC is an alphanumeric code that categorizes various aircraft based upon the approach speed (alpha) and wingspan (numeric); the higher the alphanumeric code, the larger and more demanding the aircraft. An ARC of A-I defines the design dimensions for small airports that serve small single and multi-engine aircraft, while an ARC of D-V defines the design dimensions for larger airports that serve large multi-engine commercial service aircraft.<sup>4</sup> Runways, taxiways, and associated safety areas are designed to accommodate the design aircraft, which is the most demanding aircraft (the aircraft with the highest landing speed and longest wingspan) expected to use an airport on a regular basis, now or in the future.<sup>5</sup>

The Boeing 747-400, which falls into one of the highest ARC categories and groups (D-V), is the design aircraft for Runway 15R-33L.<sup>6</sup> The Boeing 757-200 is the design aircraft for Runway 4L-22R and falls into the midrange of ARC categories and groups (C-IV).<sup>7</sup> The standard RSA for both of these large commercial service aircraft is 1,000 feet long and 500 feet wide at each runway end. FAA standards require that RSAs are:<sup>8</sup>

- Cleared and graded with no potentially hazardous ruts, humps, depressions, or other surface variations;
- Drained by grading to prevent water accumulation; and
- Capable under dry conditions of supporting snow removal and aircraft rescue fire fighting (ARFF) equipment, and the occasional passage of aircraft without causing significant damage to the aircraft.

At airports where space is limited and land is not available to accommodate the standard 1,000-foot long by 500-foot wide RSAs, the FAA has approved the use of Engineered Materials Arresting System (EMAS) to provide overrun protection. EMAS is a bed of collapsible concrete blocks with predictable deceleration forces. In an emergency situation, when an aircraft rolls into an EMAS bed, the tires of the aircraft collapse the lightweight concrete, and the aircraft is slowed down in a way that minimizes damage to the aircraft.<sup>9</sup> *FAA Order 5200.9, Financial Feasibility and Equivalency of Runway Safety Area Improvements and Engineered Materials Arresting Systems*, states



Aircraft arrested by EMAS.  
Photograph courtesy of Zodiac Aerospace

3 United States Department of Transportation, Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13, Airport Design, Changes 1 through 15*, December 31, 2009.  
4 Edwards and Kelcey, Inc., *Massport Runway 15R-33L Safety Area Study Technical Report*, December 2005, p. 03-1.  
5 *ibid.*  
6 SH&E, Inc, Edwards and Kelcey, Inc., Flight Transportation Associates, Inc., *Massport Runway 15R-33L Safety Area Study*, December 2005, pp. 03-1-03-3 and 05-9.  
7 SH&E, Edwards and Kelcey, and Flight Transportation Associates, *Runway 4L/22R Safety Area Analysis*, March 29, 2004.  
8 United States Department of Transportation, Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13, Airport Design, Changes 1 through 15*, December 31, 2009.  
9 Federal Aviation Administration Fact Sheet, *Engineered Material Arresting System (EMAS)*, June 15, 2007.



that EMAS should provide “protection against overruns by the design aircraft exiting the runway at 70 knots (but no less than 40 knots).”<sup>10</sup> The FAA has determined that an EMAS bed with a 70-knot arrestment speed (based on the design aircraft) provides a level of safety that is generally equivalent to a full 1,000-foot long RSA.

The standard 1000-foot long RSA can be reduced to 600 feet if an EMAS system is installed and if the runway has either instrument or visual vertical guidance for approaches in the opposite direction. If the runway does not have vertical guidance, the RSA would need to be 1,000 feet in length to meet the design criteria in the FAA Airport Design Advisory Circular.<sup>11</sup>

Table 1.2-1 summarizes the design criteria, as per the FAA Airport Design Advisory Circular,<sup>12</sup> for the RSAs at the ends of Runway 33L and Runway 22R where enhancements are proposed.

**Table 1.2-1 FAA Design Criteria for Runway 33L and Runway 22R RSAs**

FAA Design Criteria	Runway 33L RSA <sup>1</sup>	Runway 22R RSA <sup>2</sup>
Conventional RSA	1,000 feet long and 500 feet wide	1,000 feet long and 500 feet wide
RSA with EMAS Bed <sup>3</sup>		
RSA	600 feet long and 500 feet wide	600 feet long and 500 feet wide
EMAS Bed		
With 60 psi Strength Blocks	352 feet long (40-knot arrestment speed EMAS bed) <sup>1</sup> and 150 feet wide <sup>4, 5</sup>	190 feet long (40-knot arrestment speed EMAS bed) <sup>4</sup> and 150 feet wide <sup>4, 6</sup>
	676 feet long (70-knot arrestment speed EMAS bed) <sup>2</sup> and 150 feet wide <sup>4, 5</sup>	466 feet long (70-knot arrestment speed EMAS bed) <sup>4</sup> and 150 feet wide <sup>4, 6</sup>
With 80 psi Strength Blocks	500 feet long (70-knot arrestment speed EMAS bed) <sup>2</sup> and 150 feet wide <sup>4</sup>	Not feasible at this location based upon fleet mix and design aircraft

1 The RSA must provide overrun and undershoot protection for the design aircraft, the Boeing 747-400 (ARC D-V).  
2 The RSA must provide overrun protection for the design aircraft, the Boeing 757-200 (ARC C-IV).  
3 The EMAS bed is constructed within the footprint of the overall RSA length and width. The EMAS bed footprint is typically smaller than the overall RSA dimensions.  
4 For Runways 33L and 22R a width of at least 150 feet is required.  
5 SH&E, Inc., Edwards and Kelcey, Inc., Flight Transportation Associates, Inc., *Massport Runway 15R-33L Safety Area Study*, December 2005, p. 05-11.  
6 Vanasse Hangen Brustlin, Inc. and Jacobs Edwards and Kelcey, Inc., *Draft Runway 22R Safety Area Improvements Alternatives Feasibility Study Technical Report*, July 24, 2007.

### 1.3 Need for the Project

As noted above, Logan Airport as a commercial service airport that receives federal funding for airport improvement projects, is required by the FAA to meet the RSA design criteria contained in the FAA Airport Design Advisory Circular,<sup>13</sup> to the extent feasible.

10 U.S. Department of Transportation, Federal Aviation Administration, FAA Order 5200.9, *Financial Feasibility and Equivalency of Runway Safety Area Improvements and Engineered Materials Arresting Systems*, March 15, 2004, p. 4, Paragraph 7b.  
11 United States Department of Transportation, Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13, Airport Design, Changes 1 through 15*, December 31, 2009.  
12 *ibid.*



This project would advance an overriding public interest. The public interest served is aviation safety. Safety enhancements 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 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, when it is more likely that an aircraft will need additional distance to land. The USACE has determined that the public interest served is safety as indicated in its letter determining the project purpose.<sup>14</sup>

At the state level, RSA improvements have been found to advance an overriding public interest, which is necessary for the Massachusetts Department of Environmental Protection (DEP) to issue a variance from the Massachusetts Wetlands Protection Act. Variances have previously been issued to Massport for RSA improvements at Runway 22L at Logan Airport (DEP Variance File No. 6-554/82-118, May 4, 1993) and Hanscom Field (DEP Variance File No. 103-0635, April 11, 2008). DEP has also issued variances for RSA approvals at the Gardner, New Bedford, North Adams, Norwood, Pittsfield, and Provincetown Airports.

### 1.3.1 Runway 33L

The existing RSA at the end of Runway 33L does not meet current FAA design criteria (Table 1.2-1) for overrun and undershoot protection for the runway's design aircraft, the Boeing 747-400. The existing RSA is 187.5 feet long and 500 feet wide. Within this area is a 158-foot long and 170-foot wide EMAS bed, installed in 2006 as an interim safety measure. The existing EMAS bed is constructed of 60 pounds per square inch (psi) strength blocks and is capable of arresting a Boeing 757-200 exiting the runway at a speed of 38 knots or less or a Boeing 737-800 at 42 knots or less,<sup>15</sup> but provides minimal arrestment of the design aircraft, the Boeing 747-400. The existing Runway 33L RSA also does not provide undershoot protection consistent with the FAA criteria. There is a need to enhance the Runway 33L RSA so that it provides overrun and undershoot protection consistent with the current design criteria in the FAA's Airport Design Advisory Circular (Table 1.2-1)<sup>16</sup> to the extent feasible.

The Runway 33L end was the site of a fatal aircraft accident at Logan Airport in 1982. On the evening of January 23, 1982, World Airways Flight 30, a McDonnell Douglas DC-10-30 airplane carrying 212 passengers from Newark International Airport touched down on Runway 15R-33L approximately 2,800 feet beyond the normal landing threshold. The runway was icy and the braking conditions were poor. When they determined that they could not safely stop the aircraft on the runway, the pilots steered the plane to avoid hitting the approach light pier. The aircraft skidded to a stop and the forward section of the plane separated and landed in the harbor. Two passengers in the forward section were never found and were presumed dead. This project seeks to protect aircraft and passengers from precisely this risk, as well as protecting aircraft arriving over the water that may land short of the runway.

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13 United States Department of Transportation, Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13, Airport Design, Changes 1 through 15*, December 31, 2009.

14 Letter from the U.S. Army Corps of Engineers to Stewart Dalzell, Massport. Dated March 12, 2010.

15 Final Design Report for an EMAS at Runway 33L End at General Logan International Airport in East Boston, MA, Engineered Arresting Systems Corp. (ESCO), August 24, 2006, pp. 9 - 10.

16 United States Department of Transportation, Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13, Airport Design, Changes 1 through 15*, December 31, 2009.



On March 3, 2009, the United States Department of Transportation Office of Inspector General (DOT OIG) released a report entitled *Actions Taken and Needed to Improve FAA's Runway Safety Program*. The report states that:

“...over the last 10 years, 75 aircraft have overrun or veered off the Nation’s runways, resulting in nearly 200 injuries and 12 fatalities. In February 2005, 14 people were injured after an aircraft overran a runway at Teterboro Airport in New Jersey. Ten months later, another aircraft skidded off a runway while landing in icy conditions at Chicago’s Midway Airport. The aircraft finally stopped in a public street—killing 1 person and injuring 4 persons in a car and another 18 on board the aircraft.”<sup>17, 18</sup>

The report goes on to indicate that, while FAA has made significant progress in improving RSAs as required by the 2005 mandate by Congress, further action is needed. The DOT OIG report made specific recommendations, including proposals that FAA take action at 11 of the nation’s largest airports.<sup>19</sup> Logan Airport was one of the 11 airports that the DOT OIG identified as requiring further action to improve RSAs. Specifically, the DOT OIG acknowledged installation of the existing EMAS bed by Massport in 2006 as an interim safety measure for Runway 33L, but stated that FAA and Massport should complete the full RSA improvements as soon as possible.<sup>20</sup> The report noted that “critical RSA improvements need to be made sooner rather than later to lower the risk of passenger injuries and aircraft damage in the event of runway accidents.” To achieve this goal, FAA’s current Airport Capital Improvement Program for Logan Airport has allocated funding for the Logan Airport RSA project in 2013. The funding availability requires that the project be completed before the end of 2013. Until an airport corrects RSA deficiencies, the FAA will not provide funding for even routine maintenance activities such as replacing or rehabilitating the runway pavement.

### 1.3.2 Runway 22R

The existing RSA at the end of Runway 22R provides overrun protection for the runway’s design aircraft, the Boeing 757-200, due to the existing EMAS bed. The RSA is 215 feet long and 500 feet wide, and includes a 190-foot long and 170-foot wide EMAS bed constructed of 60 psi strength blocks. The EMAS bed provides the minimum arrestment speed acceptable by the FAA (40 knots) for the design aircraft, the Boeing 757-200. The Runway 22R EMAS bed also provides arrestment at higher speeds for many of the smaller aircraft frequently using this runway. The arresting performance improves with lighter aircraft. The EMAS bed will arrest a Boeing 737-800 that leaves the runway at 51 to 57 knots and a CRJ-200 that leaves the runway at 60 to 66 knots.<sup>21</sup> Because the existing RSA does not meet FAA’s dimensional standards, as a condition of approving the installation of the existing EMAS bed the FAA required Massport to pursue additional improvements beyond the limits of the interim EMAS and to construct practical improvements to upgrade the safety area to better

17 United States Department of Transportation, Office of Inspector General, *Actions Taken and Needed to Improve FAA's Runway Safety Program*, March 3, 2009, p. 1.

18 On January 19, 2010, EMAS was credited with safely stopping a US Airways/PSA Airlines Canadair CRJ-200 en route from Charleston West Virginia to Charlotte, North Carolina. During takeoff, the pilot overran Runway 23. The takeoff was aborted as the pilot responded to a warning signal, coming to a stop in the EMAS bed before a steep drop at the runway's end. There were no reported injuries.

19 United States Department of Transportation, Office of Inspector General, *Actions Taken and Needed to Improve FAA's Runway Safety Program*, March 3, 2009, p. 3.

20 United States Department of Transportation, Office of Inspector General, *Actions Taken and Needed to Improve FAA's Runway Safety Program*, March 3, 2009, p. 11.

21 SH & E, Inc, Edwards and Kelcey, Inc., *Flight Transportation Associates, Inc., Runway 4L/22R Safety Area Analysis*, March 29, 2004, p. 16.



serve any anticipated future fleet mix with less operational restrictions on the runway.<sup>22</sup> While the EMAS bed increased the safety of the Runway 22R RSA, additional improvements are needed to protect aircraft that are not stopped by the EMAS, and to provide access to the water for emergency responders.

Consistent with this request, Massport has considered options for enhancing the level of safety of the existing RSA for both overruns (aircraft landing on Runway 4L and exiting the runway at the Runway 22R end) and undershoots (aircraft landing short on Runway 22R). The FAA and Massport determined that the undershoot requirement is mitigated by the operational use of Runway 22R and its geometry. In reviewing the layout and functionality of Runway 22R, historically this runway has rarely been used for arrivals. In addition, its arrival threshold is displaced 815 feet from the actual end of the runway. While this 815-foot displacement area is available for Runway 4L arrival roll-out and Runway 22R departures, it is not available for Runway 22R arrivals. According to the FAA, the displacement area can be used to satisfy undershoot requirements for Runway 22R arrivals. The remaining requirement for vertical guidance has been satisfied through the installation of a Precision Approach Path Indicator (PAPI). Therefore, the Runway 22R RSA is intended to protect aircraft in the event that an aircraft arriving on Runway 4L overruns and fails to stop on the runway.

In 1993, the DEP issued a Wetlands Protection Act Variance to construct an inclined safety area at Runway 22L, which has a RSA substantially identical to that proposed for Runway 22R. The Variance Decision stated that:

“...the proposed project will promote an overriding public interest. The inclined safety area at Runway 22L will improve airport operations in the event of an aircraft accident, will help minimize aircraft damage in the event of an overrun/undershoot, and result in enhanced survivability from such accidents.”<sup>23</sup>

This same conclusion applies with equal force to the proposed Runway 22R RSA.

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22 Federal Aviation Administration, Runway Safety Area Determination: General Edward Lawrence Logan International Airport East Boston, Massachusetts, June 6, 2004, p. 1.  
23 DEP Variance File No. 6-554/82-118, May 4, 1993.



# 2

## Alternatives

This chapter describes the existing Runways 33L and 22R, their Runway Safety Areas (RSAs), and the process undertaken by Massport and FAA to identify reasonable alternatives for enhancing safety that the existing runway ends. The proposed RSA improvements are safety enhancements and do not extend the runways or have any effect on normal runway operations, runway capacity, or types of aircraft that can use the runways. As required by the Secretary's Certificate on the Environmental Notification Form (ENF) and the National Environmental Policy Act (NEPA), the Draft Environmental Assessment/Environmental Impact Report (EA/EIR) summarizes alternatives that have been explored for the project. To the extent that alternatives have been eliminated in reliance on discussions with the FAA, such communications are documented and included in Appendix 3, *Alternatives Analysis and FAA Determinations*.

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### 2.1 No-Action/No-Build Alternative

The NEPA process requires that the Proposed Action be compared to the No-Action/No-Build Alternative. Similarly, the Massachusetts Environmental Policy Act (MEPA) process requires consideration of a no-action/no-build alternative. In this Draft EA/EIR, the No-Action or No-Build Alternative assume that Runway 33L or Runway 22R RSA enhancements would not occur and routine maintenance at the airport would continue. Other airport projects occurring in the same timeframe of the RSA improvements, such as the separate project to repave Runway 15R-33L and the Southwest Service Area (SWSA) Redevelopment Program including a Consolidated Car Rental Facility, are assessed under cumulative impacts (Section 4.4). Other airport projects also are analyzed in the Logan Airport Environmental Data Report (EDR) which annually discloses the projects underway or under consideration at Logan Airport.

As required by NEPA and MEPA, the No-Action/No-Build Alternative is the basis against which the environmental impacts of the alternatives carried forward for analysis are evaluated.

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### 2.2 Runway 33L

This section describes the alternatives considered for the Runway 33L RSA, including a description of the Proposed Action, construction methods and phasing, and estimated project costs. Section 2.2.1 provides a description of Runway 33L and its use. Section 2.2.2 describes the design criteria used to develop alternatives



for RSA enhancement, the screening process and screening criteria applied to each alternative and a description of the RSA alternatives evaluated for Runway 33L. Section 2.2.3 identifies the proposed action, and Section 2.2.4 describes the construction methods for the proposed action.

The Secretary’s Certificate on the ENF directed Massport to evaluate a 600-foot long by 300-foot wide RSA with EMAS on a pile-supported deck. The Certificate also required that Massport:

- Evaluate alternative configurations and alignments, if any, that would meet safety objectives while minimizing impacts;
- Present any design refinements of the preferred alternative; and
- Present and identify the advantages and disadvantages of the preferred alternative.

### 2.2.1 Description and Use of Runway 33L

At 10,083 feet, Runway 15R-33L is the longest of Logan Airport’s six runways. As shown on Figure 1-1, the Runway 15R end is at the western edge of the airfield, and the Runway 33L end is at the eastern edge. Runway 15R has a displaced threshold, which is a runway threshold that is located at a point other than the physical beginning of a paved runway surface. 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 take-offs. The 880-foot runway threshold is in place to give aircraft arriving on Runway 15R clearance over obstructions in East Boston (an elevated highway). In the case of Runway 15R, the displaced threshold is located 880 feet from the west end of the runway which reduces the length of runway available for arrivals by 880 feet; therefore, the landing length available on Runway 15R is 9,203 feet. The departure length for Runway 15R remains at 10,083 feet. The displaced threshold has no effect on arriving or departing aircraft using Runway 33L which can use the full 10,083-foot length.

Runways 15R and 33L are used for both arrivals and departures. In 2008, 3 percent of all jet aircraft departures and 2 percent of all jet aircraft arrivals occurred on Runway 15R, while 16 percent of all jet aircraft departures and 11 percent of all jet aircraft arrivals occurred on Runway 33L (Table 2.2-1).<sup>1</sup>

Table 2.2-1 Runway Use by Jet Aircraft (2008)<sup>1</sup>

	Runway <sup>2</sup>									
	4L	4R	9	14 <sup>2</sup>	15R	22L	22R	27	32 <sup>3</sup>	33L
Departures	0%	6%	33%	<0.1%	3%	<0.1%	36%	6%	NA	16%
Arrivals	6%	30%	NA	NA	2%	17%	NA	33%	2%	11%

Source: Massachusetts Port Authority, Boston-Logan International Airport 2008 Environmental Data Report, September 2009.

1 Jet aircraft are not able to use Runway 15L or 33R due to its length of 2,557 feet.

2 Runway 14-32 opened in December 2006. (Runway 14-32 is unidirectional with no arrivals to Runway 14 and no departures from Runway 32).

3 2008 runway use by jet aircraft data was used for the analysis, as 2009 data was not available at that time.

1 Massachusetts Port Authority, *Boston-Logan International Airport 2008 Environmental Data Report*, September 2009.



Runway 15R-33L is the runway that is used by the majority of heavy aircraft serving international and national destinations. Although Runway 15R-33L accommodates a number of different aircraft, including turboprops and heavy, light, and regional jets (Table 2.2-2), it is the longest runway at Logan Airport and is designed to handle heavy long-haul commercial jet aircraft (Airbus 330/340 and Boeing 747/777) serving international markets in Europe/Middle East, Canada, Central/South America, Bermuda/Caribbean, and Asia/Pacific. Runway 15R-33L is also the critical runway for expected, long-haul international service to destinations in Asia including Beijing, Shanghai, and Tokyo. In 2008, Logan Airport accommodated 35,908 international operations, representing 9 percent of the total aircraft operations that year (371,604).<sup>2</sup> Runway 33L is also favored by heavy jet aircraft because it has few obstructions. Runway 15R-33L is the preferred over-water arrival and departure runway for noise abatement night-time operations by heavy, wide-body commercial jets. Table 2.2-2 shows the mix of aircraft using Runway 15R-33L in 2008.

**Table 2.2-2 Runway 15R-33L Aircraft Fleet Mix (2008)**  
(Percentage of Total Aircraft Operations on Runway 15R-33L, by Aircraft Type)

Runway	Arrivals					
	Heavy Jets A <sup>1</sup>	Heavy Jets B <sup>2</sup>	Light Jets A <sup>3</sup>	Light Jets B <sup>4</sup>	Regional Jets <sup>5</sup>	Turboprops (Non-jets) <sup>6</sup>
15R	2.78%	2.15%	1.52%	1.76%	1.64%	1.52%
33L	14.22%	14.56%	10.19%	11.92%	9.17%	5.78%
Total	17.00%	16.71%	11.71%	13.68%	10.81%	7.3%
Runway	Departures					
	Heavy Jets A <sup>1</sup>	Heavy Jets B <sup>2</sup>	Light Jets A <sup>3</sup>	Light Jets B <sup>4</sup>	Regional Jets <sup>5</sup>	Turboprops (Non-jets) <sup>6</sup>
15R	17.02%	10.51%	2.84%	3.11%	2.02%	9.18%
33L	18.42%	19.14%	15.55%	17.11%	15.45%	12.45%
Total	35.44%	29.65%	18.4%	20.22%	17.47%	21.63%

Source: 2008 modeled operation data generated by HMMH for the Massachusetts Port Authority, *Boston-Logan International Airport 2008 Environmental Data Report*, September 2009.

- 1 Heavy Jets A= Boeing 747s, Airbus 340s, DC-8s.
- 2 Heavy Jets B = Boeing 767s, Boeing 777s, Airbus 300s, Airbus 310s, Airbus 330s, DC-10s, L1011s, Boeing/McDonnell Douglas MD11s.
- 3 Light Jets A = Boeing 717s, Boeing 727s, DC-9s, F100s, Boeing/McDonnell Douglas MD90s.
- 4 Light Jets B = Boeing 737s, Boeing 757s, Airbus 319s, Airbus 320s, Beech 146s, Boeing/McDonnell Douglas MD80s.
- 5 Regional Jet = Embraer 135, Embraer 145, Embraer 170, Embraer 190, Bombardier CRJ 2, Bombardier CRJ 7, Bombardier CRJ 9, Fairchild Dornier 328JET.
- 6 Corporate Jets and Turboprops = Beech King Air, Cessna 402.

RSAs are located at either end of Runway 15R-33L. The RSA for the Runway 15R end is 500 feet wide and 1,000 feet long beyond the runway end, meeting the FAA standard RSA dimensions for the runway’s design aircraft. The Runway 33L RSA is intended to provide protection in the event that an aircraft arriving on Runway 15R 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 33L lands short of the runway threshold (an undershoot). The existing RSA for the Runway 33L end (Figure 2-1) is 187.5 feet long and 500 feet wide. A 158-foot long and 170-foot wide Engineered Material Arresting System (EMAS) bed was installed (within that area, and set back

<sup>2</sup> *ibid.*





13 feet from the runway threshold) in 2006 as an interim safety enhancement. The existing RSA for the Runway 33L end provides some protection for aircraft in the event of an overrun, but does not provide the level of protection for aircraft overruns and undershoots required by FAA's Airport Design Advisory Circular.<sup>3</sup>

Runway 15R-33L is equipped with navigational aids (navaids). Navaids include visual or electronic devices, either airborne or on the ground, that provide guidance information or position data to aircraft using the runway. At the Runway 33L end these include:

- Instrument Landing System (ILS) including localizer and glide slope antenna (rated as Category II);
- Very High Omni-Directional Range/Distance Measuring Equipment (VOR/DME);
- Medium intensity approach lighting system with runway alignment indicator lights (MALSR). A MALSR is an approach light system that extends 2,400 feet away from the runway threshold that is a required component of an ILS approach. The MALSR lights, spaced at 200-foot intervals, are located on a pile-supported timber pier that extends 2,400 feet into Boston Harbor; and
- A precision approach path indicator (PAPI). A PAPI is a visual guidance aid that provides pilots with visual approach slope guidance to the runway touchdown area, which is 1,000 feet down the runway from the runway end.

A 20-foot wide airport perimeter road is located within the Runway 33L RSA. The perimeter road is used by airport maintenance vehicles, emergency vehicles such as firefighting trucks, State Police, Massport Operations, FAA, and construction vehicles. The perimeter road provides a vital link to key locations around the airfield and is necessary for airport operations and emergency access.

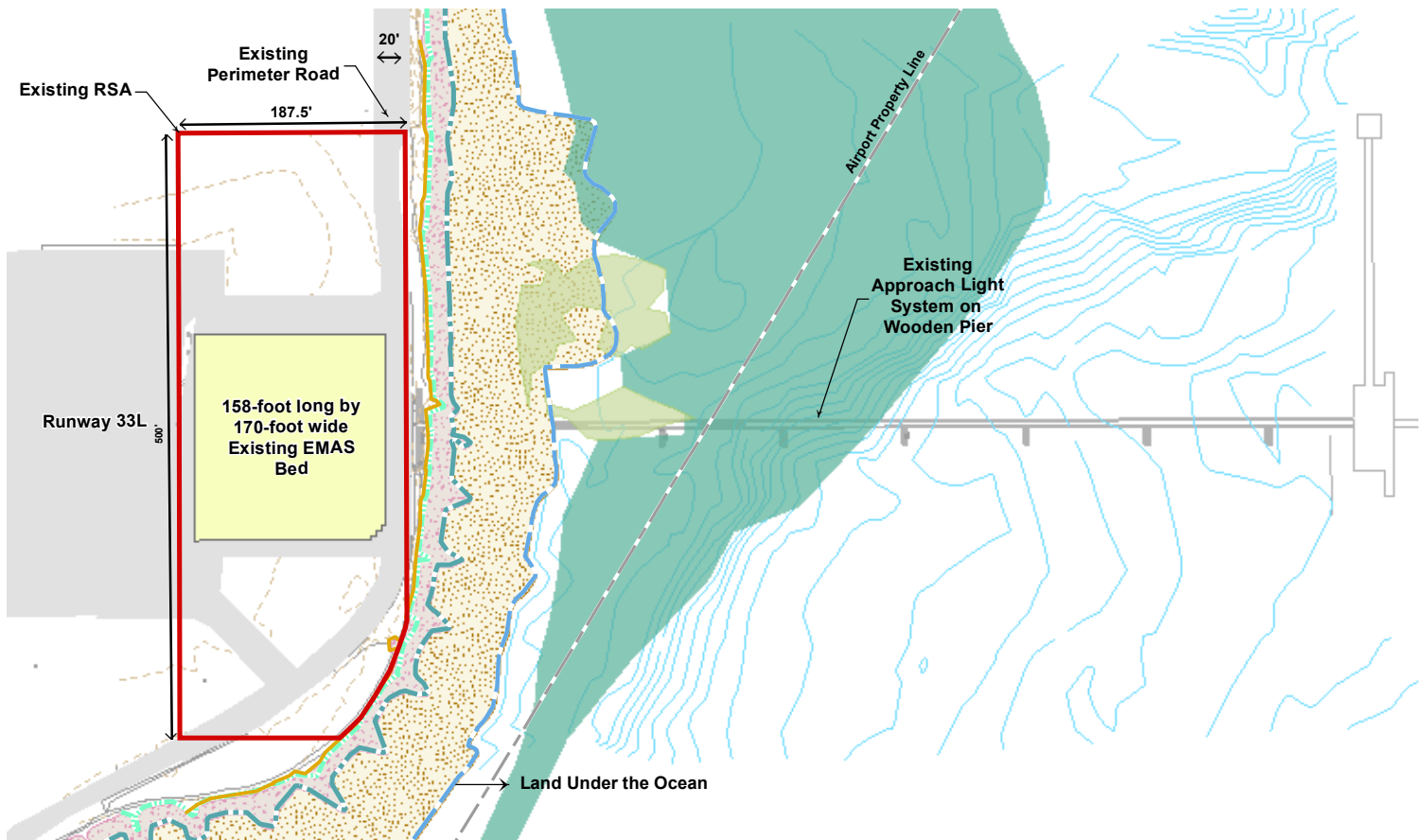
## 2.2.2 Runway Safety Area Enhancement Alternatives for Runway 33L

This section describes the process undertaken by Massport and FAA to identify reasonable alternatives for enhancing the RSA at the end of Runway 33L, including the design criteria, the screening process and screening criteria applied to each alternative. This is followed by a description of the RSA alternatives evaluated for Runway 33L and the proposed action. Additional details of the comprehensive screening process are presented in Appendix 3, *Alternatives Analysis and FAA Determinations*.













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<sup>3</sup> United States Department of Transportation, Federal Aviation Administration, Advisory Circular (AC) 150/5300-13, Airport Design, Changes 1 through 15, December 31, 2009

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**Legend**

- |  |                   |   |  |
|--|-------------------|---|--|
|  | Existing RSA      |  | Existing Contour                               |
|  | Existing EMAS Bed |  | Existing Bathymetric Contour                   |
|  | Coastal Bank      |  | Mean High Water (4.58')                        |
|  | Coastal Beach     |  | Mean Low Water (-4.51')                        |
|  | Mussel Bed        |  | Top of Coastal Bank                            |
|  | Limit of Eelgrass |  | Limit of Land Subject to Coastal Storm Flowage |



Logan RSA

Figure 2-1

**Existing Runway 33L RSA**



#### 2.2.2.1 Design Criteria

The alternatives considered in this Draft EA/EIR for enhancing the Runway 33L RSA were developed to incorporate each of the design criteria described below.

- **Provide overrun and undershoot protection for aircraft consistent with FAA design criteria.** The alternative must provide protection in the event that an aircraft arriving on Runway 15R fails to stop before the Runway 33L threshold (overrun) or if an aircraft arriving on Runway 33L lands short of the runway threshold (undershoot). The level of protection provided must be consistent with the FAA design criteria of 1,000 feet (or equivalent with an EMAS bed) for an overrun and 600 feet for an undershoot (see Chapter 1; *Purpose and Need*, Section 1.2 of this document for further details).
- **Provide protection for the runway's design aircraft.** The Boeing 747-400, with a Maximum Takeoff Weight (MTOW) of 870,000 pounds and Maximum Landing Weight (MLW) of 630,000 pounds, is the design aircraft for Runway 33L.<sup>4</sup>
- **Retain nav aids and perimeter road.** The alternative must retain or relocate existing nav aids and the perimeter road.

As a result of the screening analyses, no alternatives are being brought forward for environmental review and consideration that would reduce safety or affect normal runway operations, runway capacity, or types of aircraft that can use the runways.

#### 2.2.2.2 Alternatives Screening Process and Screening Criteria

A multi-tiered screening process was established by Massport and FAA to identify reasonable alternatives for enhancing the RSA at the end of Runway 33L. The screening process and screening criteria are described below and shown in Figure 2-2.

- **Screening Level 1 - Candidate Alternatives.** Several initial or candidate alternatives were developed to meet the current FAA RSA design criteria described in Section 2.2.2.1 of this document. Runway utility and capacity were used as screening criteria to assess whether a candidate alternative should be carried forward for further analysis in the next stage of the screening process or eliminated from further consideration. Each candidate alternative was assessed based on whether it maintained normal runway operations, maintained the utility and capacity of Runway 15R-33L, and maintained the types of aircraft that can currently use the runway.
- **Screening Level 2 - Preliminary Alternatives.** Based on the results of the first level of the screening process, preliminary alternatives were developed, all of which maintained normal runway operations, the utility and capacity of Runway 15R-33L, and the types of aircraft that can currently use the runway. Potential environmental impacts and feasibility (constructability and cost) were used as screening criteria to assess whether a preliminary alternative should be carried forward for further analysis in the Draft EA/EIR or eliminated from further consideration. The potential environmental impact of a preliminary alternative was considered first, and then the constructability and cost of the preliminary

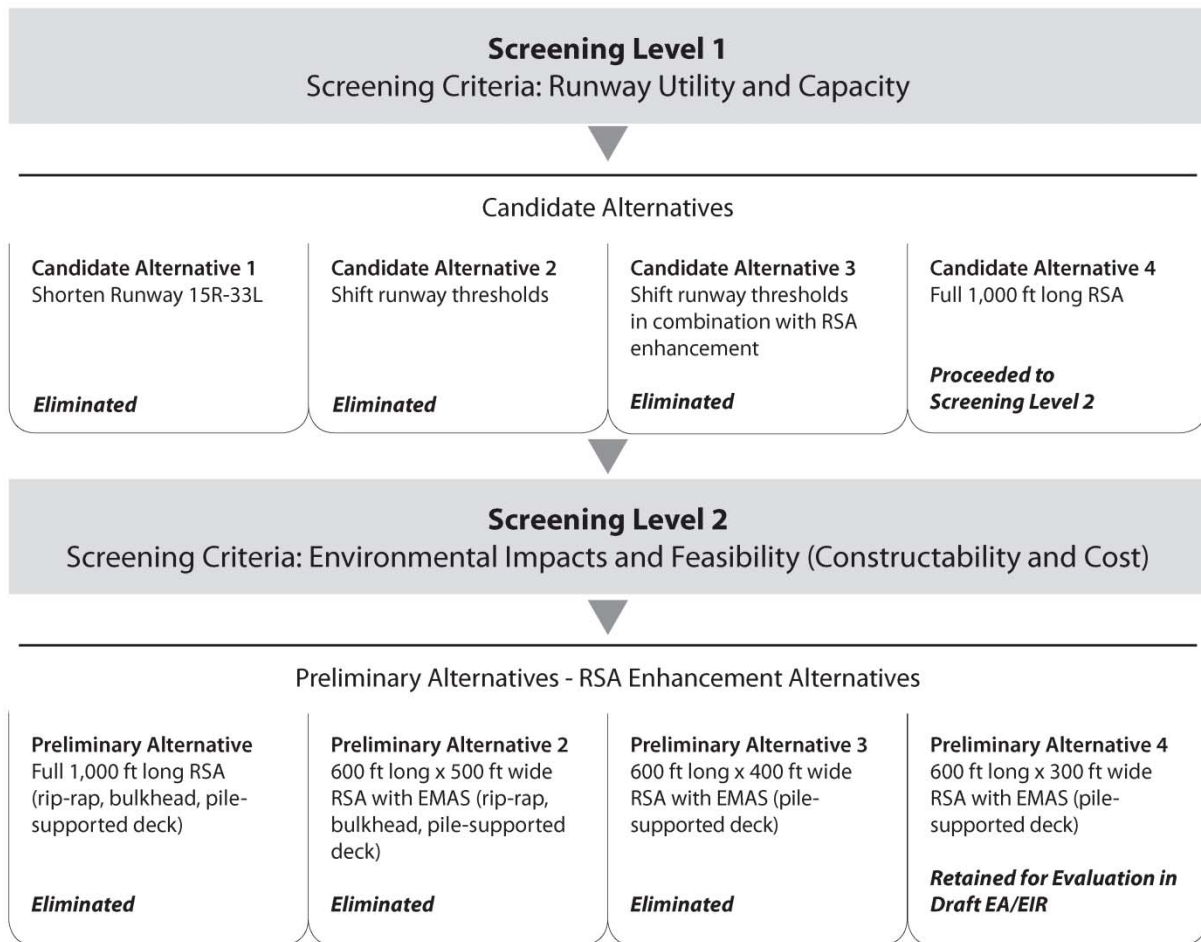
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<sup>4</sup> Edwards and Kelcey, Inc., Massport Runway 15R-33L Safety Area Study Technical Report, December 2005, p. 03-1.



alternative was considered. The FAA has a maximum feasible cost guideline of \$25 million for safety area improvements using EMAS with a 70-knot arrestment speed for the design aircraft and 600 foot undershoot protection.<sup>5</sup> However, in the *Runway Safety Area Determination: Runway 15R-33L General Edward Lawrence Logan International Airport East Boston, Massachusetts*, dated January 30, 2009, the FAA determined that with 2 million passengers aboard jet operations in 2007 involving the Runway 33L RSA, it was justified to exceed the \$25 million threshold.<sup>6</sup> (See Appendix 3, *Alternatives Analysis and FAA Determinations*).

Figure 2-2 Runway 33L Alternatives Screening Process



<sup>5</sup> Federal Aviation Administration, *Runway Safety Area Determination: Runway 15R-33L General Edward Lawrence Logan International Airport East Boston, Massachusetts*, January 30, 2009, p. 6.

<sup>6</sup> *ibid*, p. 6.



### 2.2.2.3 Alternatives Evaluated in the ENF

This section describes the candidate and preliminary alternatives evaluated and then dismissed by Massport and FAA as alternatives for enhancing the Runway 33L RSA following the review of the ENF. These alternatives were analyzed by Massport and found to be infeasible due to unacceptable environmental impacts or cost. The MEPA Certificate issued for the ENF by the Secretary of Energy and Environmental Affairs (dated August 14, 2009) stated that the alternatives that should be carried forward to the Draft EA/EIR and analyzed for Runway 33L are the 600-foot long by 300-foot wide RSA with EMAS on a pile-supported deck (Proposed Action) and the No-Action/No-Build Alternative. The Proposed Action is described in Section 2.2.3. The No-Action/No-Build Alternative assumes that Runway 33L RSA enhancements would not occur and routine maintenance at the airport would continue. Other airport projects occurring in the same timeframe of the RSA improvements are assessed under cumulative impacts (Section 4.4 of this document). Appendix 3, *Alternatives Analysis and FAA Determinations*, describes the alternatives considered for the Runway 33L RSA improvements and the rationale for their elimination.

#### Candidate Alternatives

In the ENF, Massport and FAA evaluated four candidate alternatives for enhancing the Runway 33L RSA in the first level of the screening process (See Figure 2-3).

The following alternatives were considered:

- Runway 33L Candidate Alternative 1 – Shorten Runway 15R-33L
- Runway 33L Candidate Alternative 2 – Shift Runway Thresholds
- Runway 33L Candidate Alternative 3 – Shift Runway Thresholds in Combination with RSA Enhancement
- Runway 33L Candidate Alternative 4 – Full 1,000-Foot Long RSA

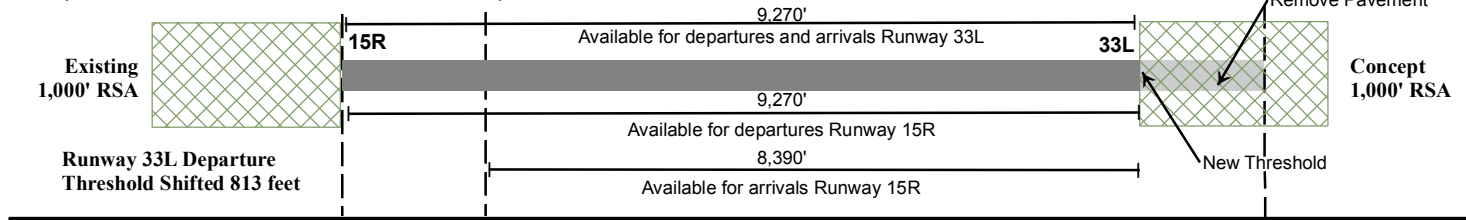
As discussed in Appendix 3, *Alternatives Analysis and FAA Determinations*, and in the ENF, Massport and FAA determined that only Candidate Alternative 4 would be retained on the basis that it would not reduce safety or have any adverse impact on the utility of Runway 15R-33L. This alternative was carried forward for further analysis in the second level of the screening process.

#### Preliminary Alternatives

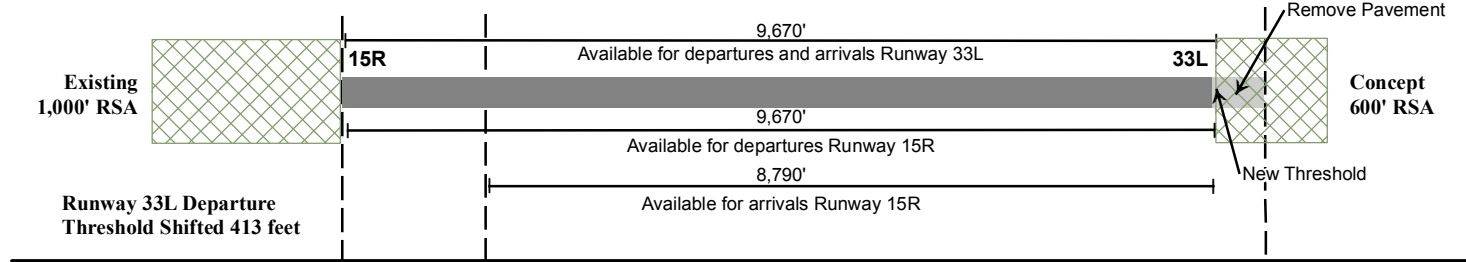
Based on the results of the first level of the screening process, four preliminary alternatives were developed. All of the preliminary alternatives require enhancement of the RSA and maintain the utility of Runway 15R-33L. The Preliminary Alternatives (Figure 2-4) considered both standard RSAs and RSAs with EMAS and included:

- Runway 33L Preliminary Alternative 1 - Full 1,000-Foot Long RSA
  - Alternative 1A - Solid Fill with Steel Sheet Bulkhead
  - Alternative 1B - Solid Fill with Rip Rap Stone Dike
  - Alternative 1C - Pile-Supported Deck

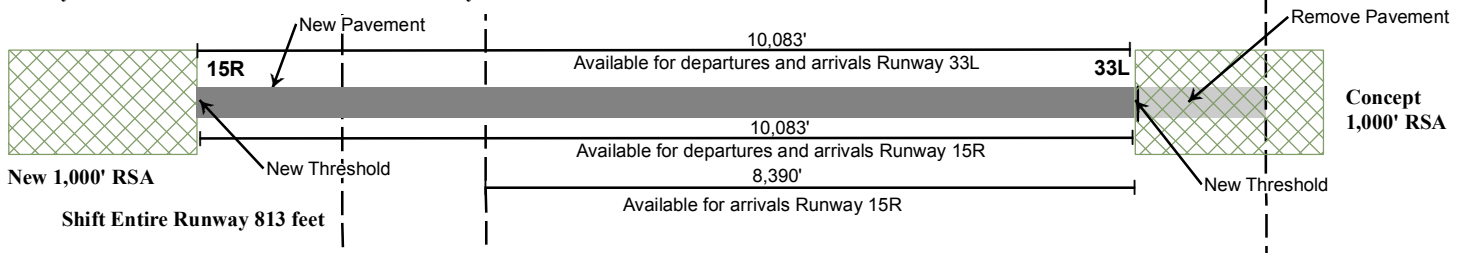
**Runway 33L Candidate Alternative 1 - Shorten Runway 15R-33L / Threshold Shifted 813 feet**



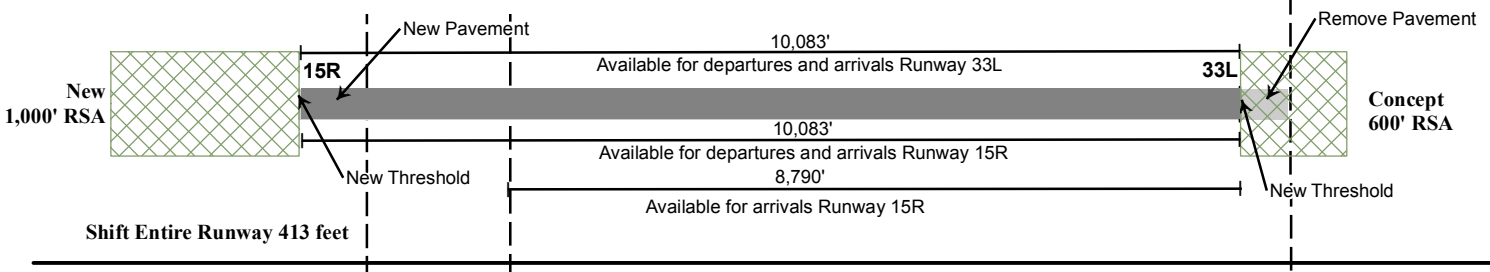
**Runway 33L Candidate Alternative 1 - Shorten Runway 15R-33L / Threshold Shifted 413 feet**



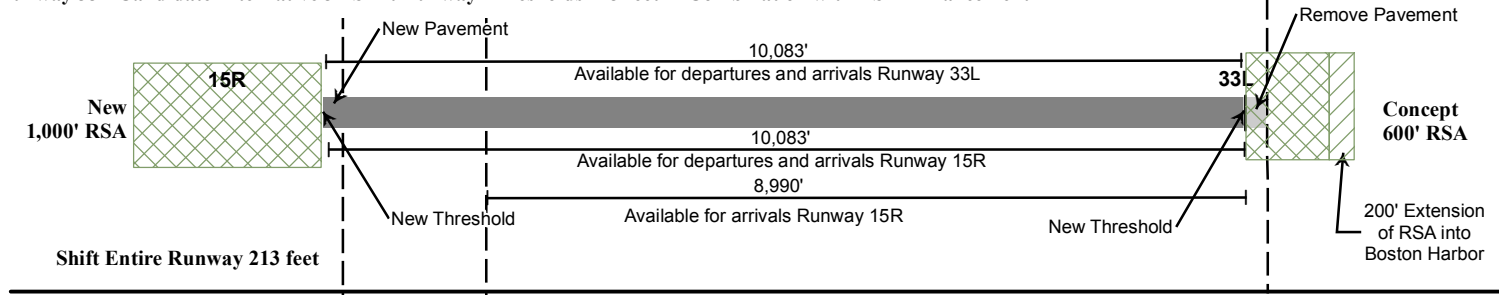
**Runway 33L Candidate Alternative 2 - Shift Runway Thresholds 813 feet**



**Runway 33L Candidate Alternative 2 - Shift Runway Thresholds 413 feet**



**Runway 33L Candidate Alternative 3 - Shift Runway Thresholds 213 feet in Combination with RSA Enhancement**



Existing Threshold

Existing 880' Displaced Threshold

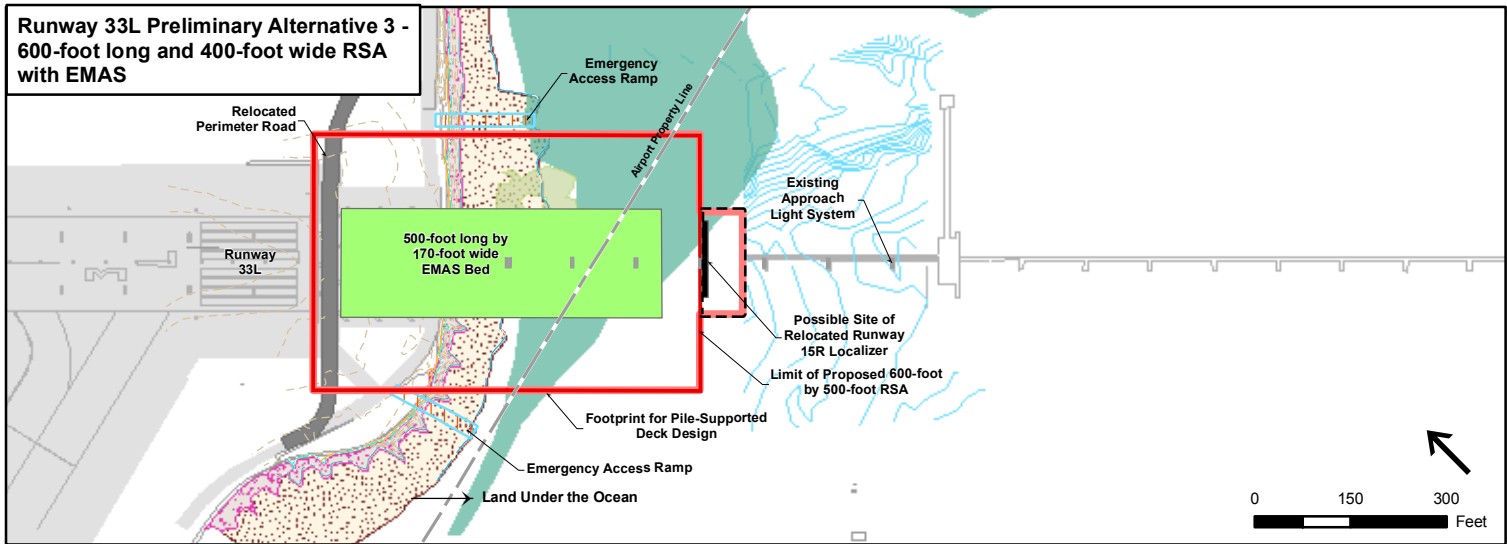
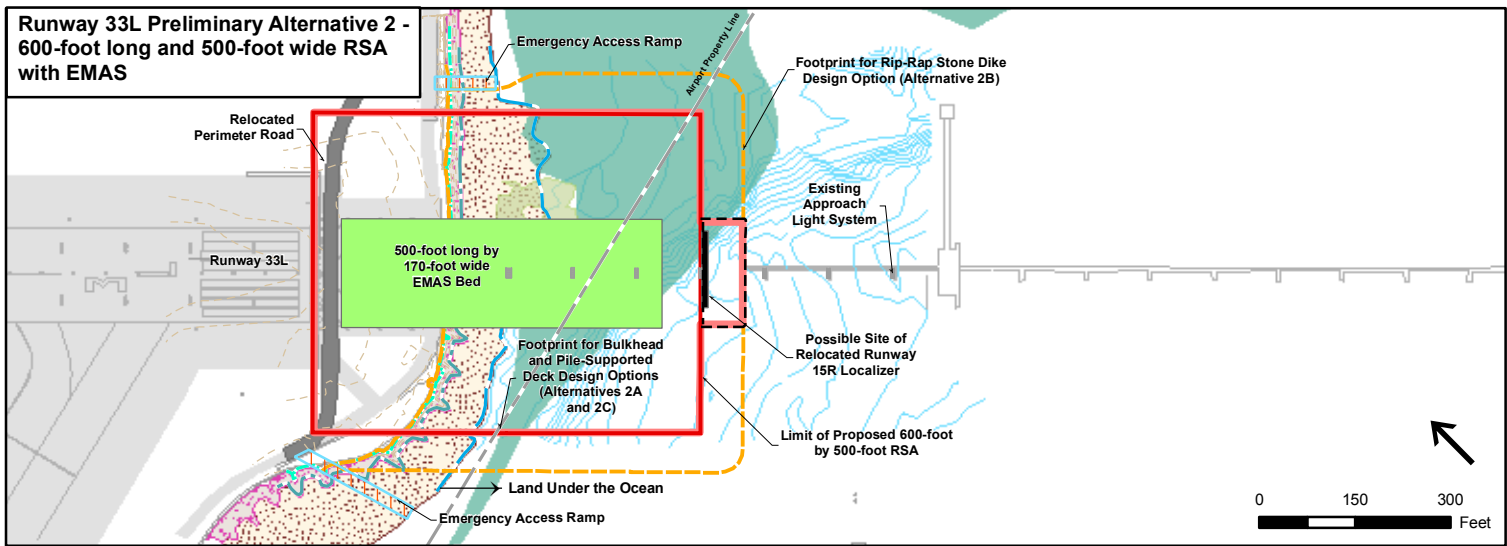
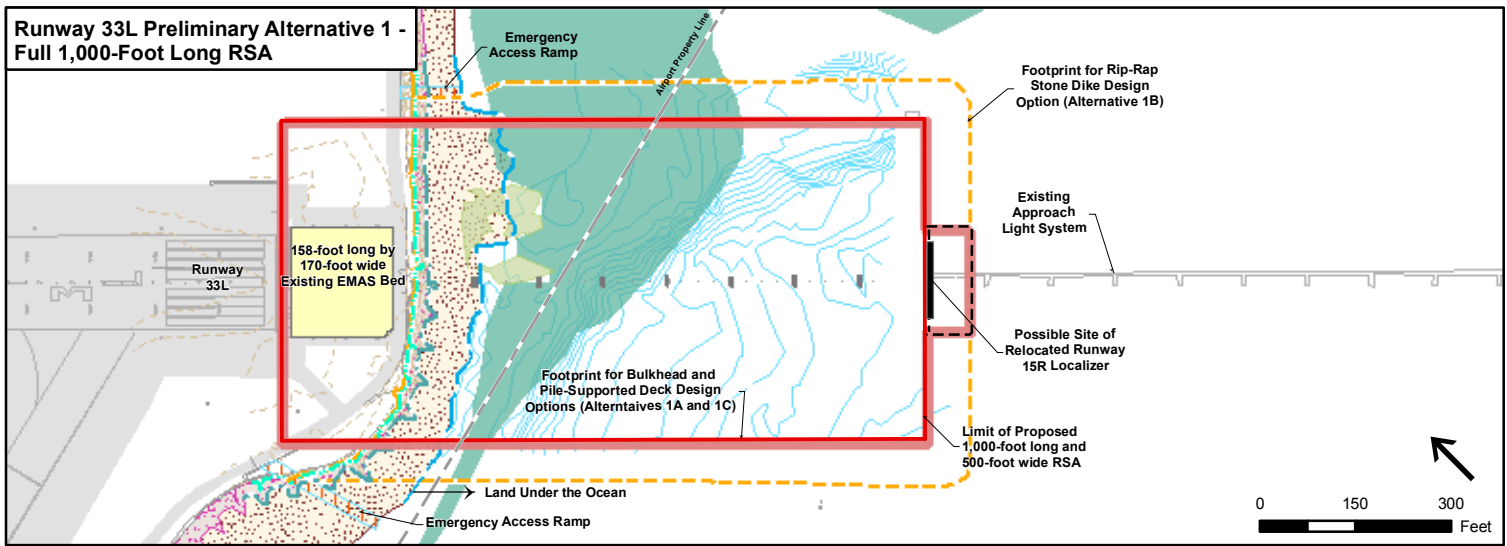
Existing Threshold

Note: Not to Scale



Logan RSA

**Figure 2-3**  
**Runway 33L RSA**  
**Candidate Alternatives**



**Legend**

- Existing EMAS Bed
- New EMAS Bed
- Limit of Rip-Rap Stone Dike
- Footprint for Bulkhead or Pile-Supported Deck
- RSA Footprint
- Emergency Ramps
- Pile Supported Deck for Localizer
- Existing Bathymetric Contour
- Existing Contour
- Limit of Land Subject to Coastal Storm Flowage
- Mean High Water (-4.58')
- Mean Low Water (-4.51')
- Top of Coastal Bank
- Coastal Bank
- Coastal Beach
- Mussel Bed
- Eelgrass



Logan RSA

Figure 2-4

**Runway 33L RSA Preliminary Alternatives**

Source: Jacobs Edwards & Kelcey, Inc.  
Childs Engineering Corps.  
Massport - Bathymetric Contours

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- Runway 33L Preliminary Alternative 2 – 600-Foot Long and 500-Foot Wide RSA with EMAS
- Runway 33L Preliminary Alternative 3 – 600-Foot Long and 400-Foot Wide RSA with EMAS on Pile-Supported Deck
- Runway 33L Preliminary Alternative 4 – 600-Foot Long and 300-Foot Wide RSA with EMAS on Pile-Supported Deck

Screening criteria included environmental resource impacts, changes to coastal processes, constructability, and cost. As discussed in Appendix 3, *Alternatives Analysis and FAA Determinations*, and in the ENF, the FAA and Massport determined that Preliminary Alternatives 1 through 3 would be eliminated and that only Preliminary Alternative 4 – 600-Foot Long and 300-Foot Wide RSA with EMAS on a Pile-Supported Deck would move forward into the Draft EA/EIR analysis. The Secretary agreed with this conclusion stating that “Because Massport has indicated that several of the examined alternatives are infeasible due to cost or unacceptable environmental impacts, the alternatives that should be carried forward to the DEIR are the 600-foot long by 300-foot wide RSA with EMAS on a pile-supported deck and the no action alternative for Runway 33L.”<sup>7</sup>

### 2.2.3 Runway 33L Proposed Action

The Proposed Action for Runway 33L (Preliminary Alternative 4) is construction of a 600-foot long RSA with EMAS on a Pile-Supported Deck (Figure 2-5). The deck portion of the RSA would be 300 feet wide, with the landside portion remaining 500 feet wide. The Proposed Action also includes moving the existing localizer to a new pile-supported deck at the end of the RSA, and upgrading the approach light system to a Category III Instrument Landing System (Cat III ILS) to include a High-intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2). Part of the existing timber light pier (approximately 560 feet) would be removed and the approach lights would be incorporated into the new deck.

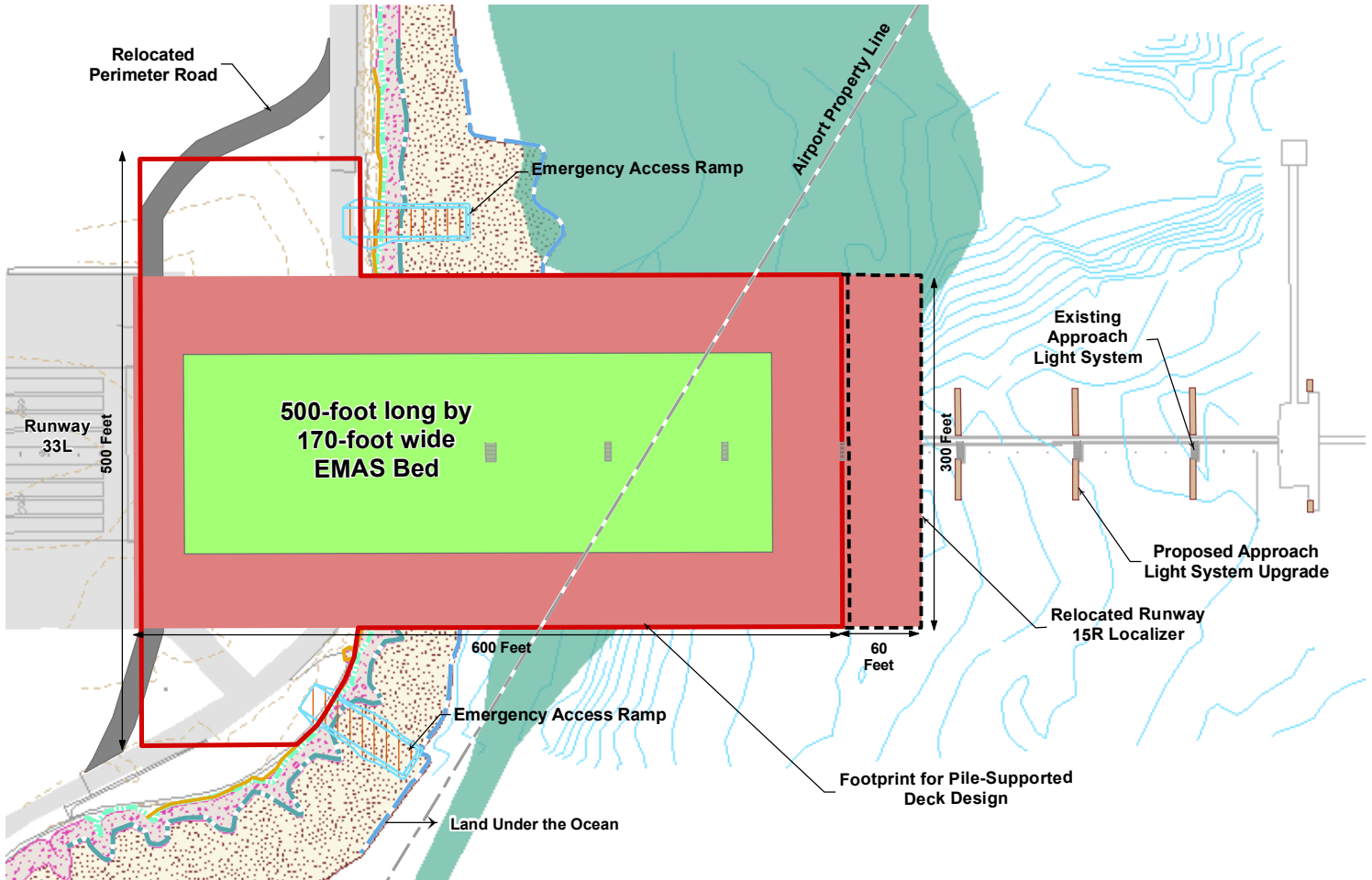
While the proposed Runway 33L RSA improvements would result in impacts to the same environmental resources as described for the rejected alternatives it would reduce the impacts to the majority of environmental resources including Coastal Bank, Coastal Beach, Land Under the Ocean, and Submerged Aquatic Vegetation (eelgrass). This alternative would also maintain runway utility, and would provide protection and functionality near equivalent to a RSA that fully meets the design criteria.<sup>8</sup> This is the only alternative that the MEPA Certificate required be carried forward in the Draft EA/EIR. Massport and FAA retained this alternative on the basis that it was the alternative proposed by the FAA in its determination based on environmental impacts and cost.

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<sup>7</sup> EOE #14442 ENF Certificate August 14, 2009.

<sup>8</sup> Federal Aviation Administration, *Runway Safety Area Determination: Runway 15R-33L General Edward Lawrence Logan International Airport East Boston, Massachusetts*, January 30, 2009, p. 6.





**Legend**

- New EMAS Bed
- Footprint for Pile-Supported Deck
- Existing and Proposed RSA
- Emergency Ramps
- Localizer
- Upgraded Approach Light System
- Relocated Perimeter Road
- Existing Contour
- Existing Bathymetric Contour
- Mean High Water (4.58')
- Mean Low Water (-4.51')
- Top of Coastal Bank
- Limit of Land Subject to Coastal Storm Flowage
- Mussel Bed
- Eelgrass
- Coastal Bank
- Coastal Beach



**Logan RSA**

**Figure 2-5**  
**Runway 33L**  
**Proposed Runway Safety Area**  
**(600 Feet by 300 Feet)**

Source: Jacobs Edwards & Kelcey, Inc.  
 Childs Engineering Corps.  
 VHB Fieldwork - 2008



The proposed Runway 33L RSA improvements would extend the length of the existing RSA from 187.5 feet to 600 feet. The new section of the RSA would have a width of 300 feet. While the RSA would not fully comply with the current design criteria in the FAA's Airport Design Advisory Circular for RSAs<sup>9</sup> in terms of width, the FAA determined that the risk of an undershoot occurring outside of the 300-foot width is reduced by centerline guidance of the existing CAT II ILS and MALSR visual aid on the runway.<sup>10</sup> The FAA strongly rejected consideration of any length of less than 600 feet "since the marginal costs and environmental impacts were not judged significant enough to offset the compromises in RSA function."<sup>11</sup>

Overall, the FAA determined that:

"It is not practical for [the Runway 33L RSA] to meet full standards but it can be improved with a 600 [foot] by 300 [foot] runway safety area with 70 knot EMAS protection for Boeing 747-400, subject to environmental review and approvals."<sup>12</sup> The FAA also determined that "reductions below 300 feet are unacceptable due to the need for a corridor on either side of the EMAS bed for emergency response and maintenance vehicles."<sup>13</sup>

The existing 158-foot long and 170-foot wide EMAS bed (with 60 psi strength EMAS blocks) would be removed and replaced with a new EMAS bed constructed of 80 psi strength EMAS blocks and would have a total length of 500 feet. The EMAS bed would begin 40 feet from the runway's threshold. As stated above, FAA determined that reductions below 300 feet would be unacceptable due to the need for a corridor on either side of the 170-foot wide EMAS bed for emergency response and maintenance vehicles to safely maneuver and turn around without the risk of driving off and over the deck.<sup>14</sup> As part of this alternative and to reduce the need for a larger deck, the existing 20-foot wide airport perimeter road would be relocated between the runway's threshold and the EMAS bed (it is currently located at the end of the existing EMAS bed).

Two emergency access ramps would be installed, one on either side of the RSA, and ladders or concrete steps would be provided on the sides and end of the RSA to further improve access in and out of the water in the event of an aircraft crash. The localizer would be repositioned to the end of the RSA and installed on a 60-foot long and 300-foot wide pile-supported deck.

#### 2.2.3.1 Deck and Pile Configuration Options Screening

The Runway 33L RSA improvements would have an overall length of 600 feet, of which approximately 470 feet would be on a pile-supported deck extending into Boston Harbor. The deck portion of the RSA would be 300 feet wide, with the landside portion remaining 500 feet wide. Since the ENF, Massport considered various

9 United States Department of Transportation, Federal Aviation Administration, Advisory Circular (AC) 150/5300-13, Airport Design, Changes 1 through 15, December 31, 2009.

10 Federal Aviation Administration, *Runway Safety Area Determination: Runway 15R-33L General Edward Lawrence Logan International Airport East Boston, Massachusetts*, January 30, 2009, p. 6.

11 Federal Aviation Administration, *Runway Safety Area Determination: Runway 15R-33L General Edward Lawrence Logan International Airport East Boston, Massachusetts*, January 30, 2009, p. 5.

12 Federal Aviation Administration, *Runway Safety Area Determination: Runway 15R-33L General Edward Lawrence Logan International Airport East Boston, Massachusetts*, January 30, 2009, p. 7.

13 Federal Aviation Administration, *Runway Safety Area Determination: Runway 15R-33L General Edward Lawrence Logan International Airport East Boston, Massachusetts*, January 30, 2009, p. 6.

14 *ibid.*



pile types and configurations. These alternate deck structures and piling combinations were evaluated at the conceptual design level to assess costs, minimize impacts, and evaluate constructability. As described below, the overall impacts of the different deck and piling configurations to coastal wetlands resources and coastal processes would be similar.

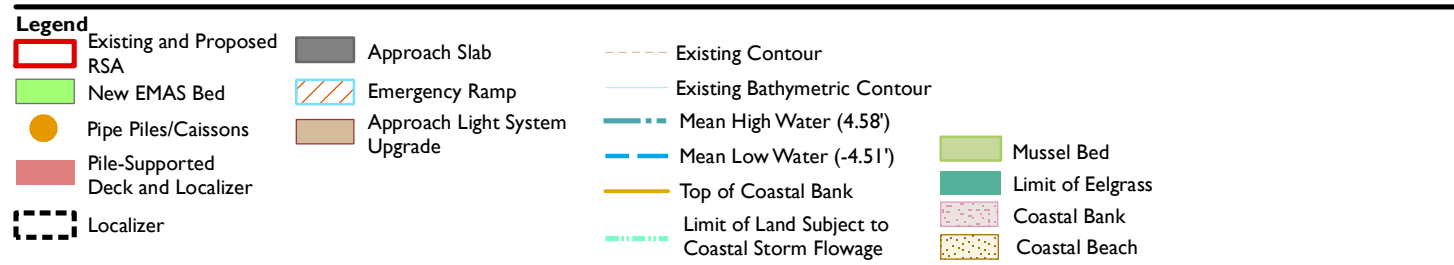
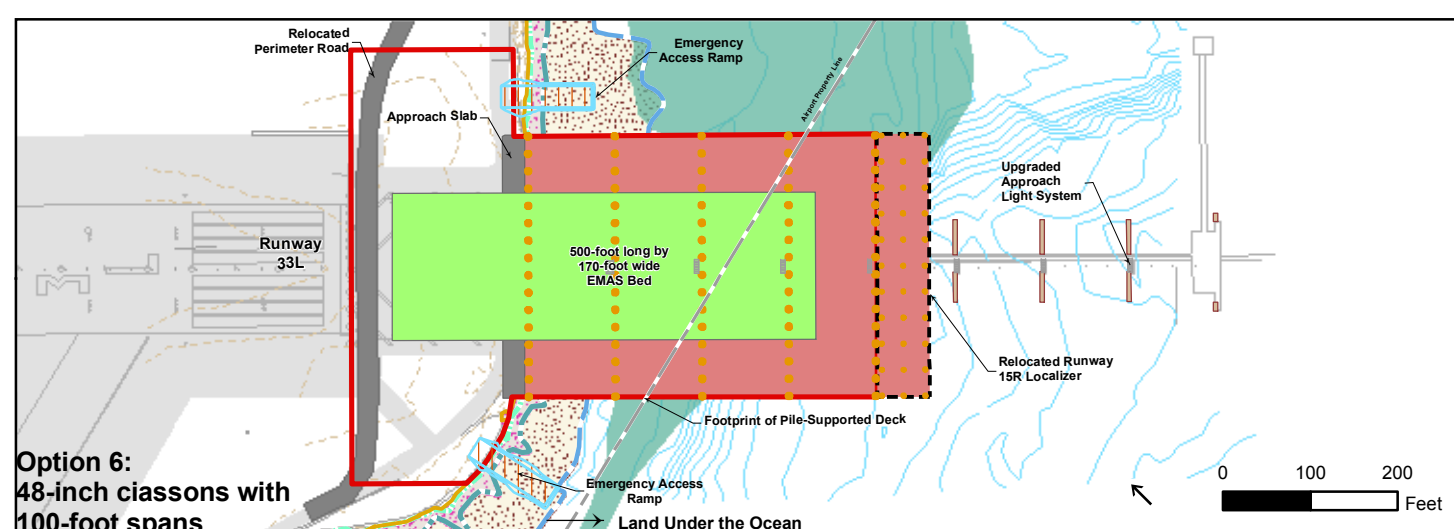
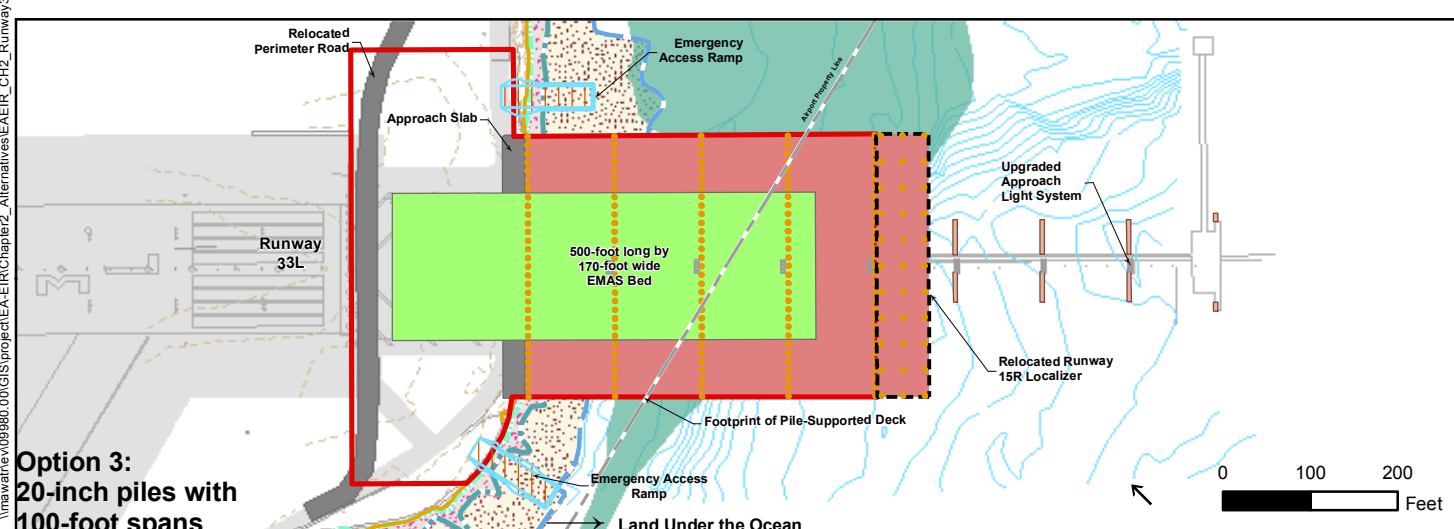
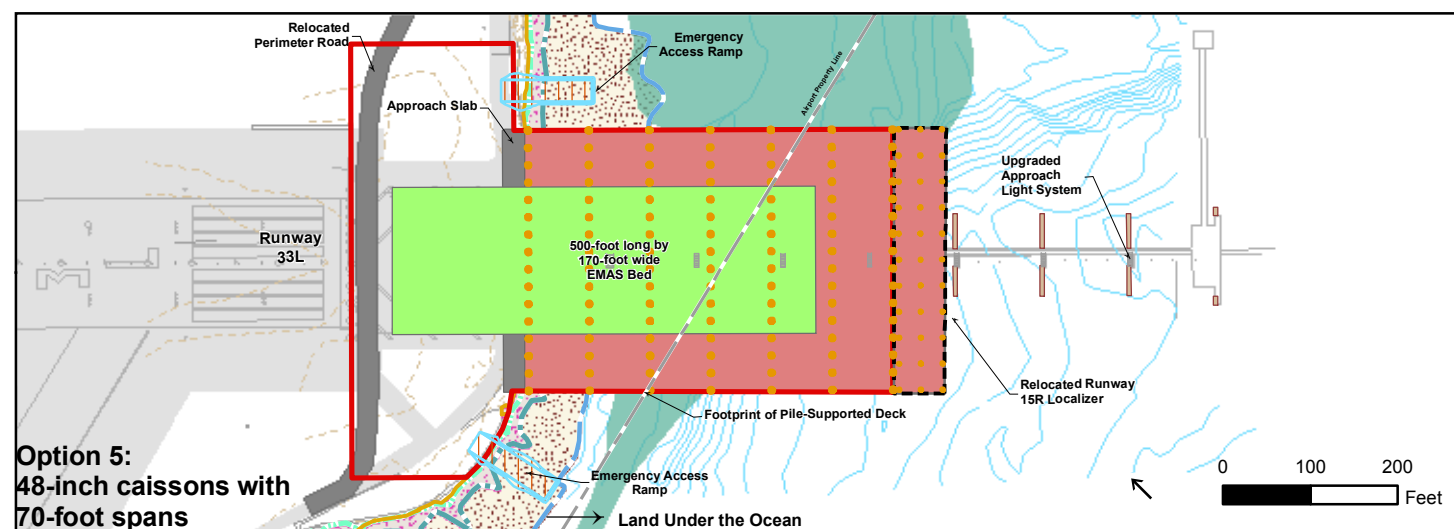
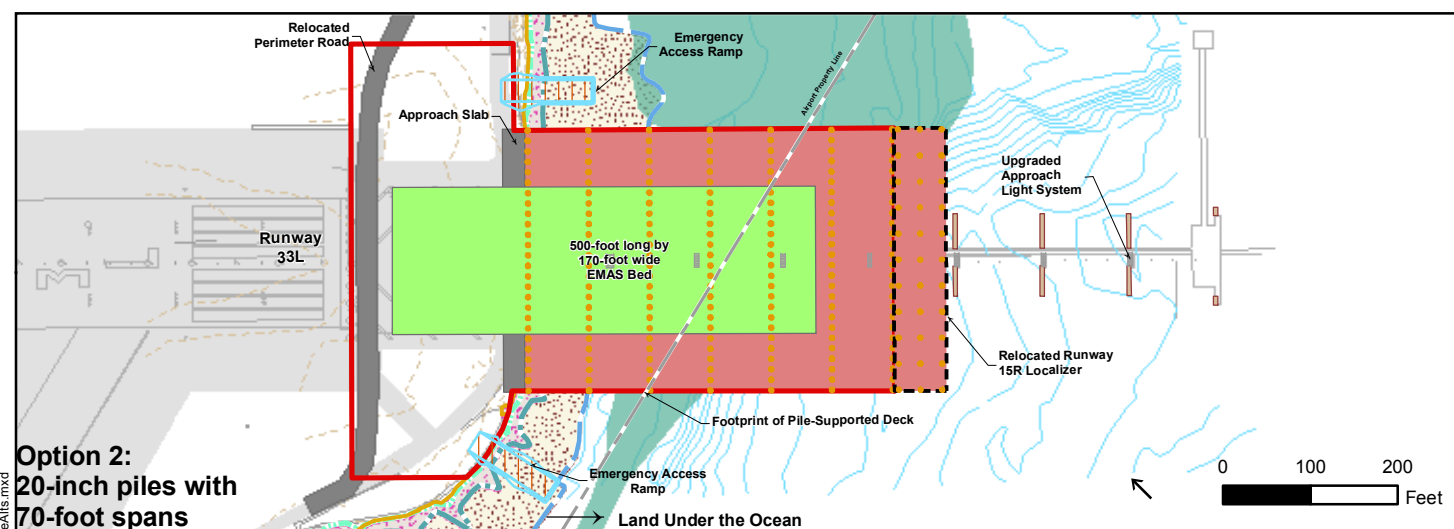
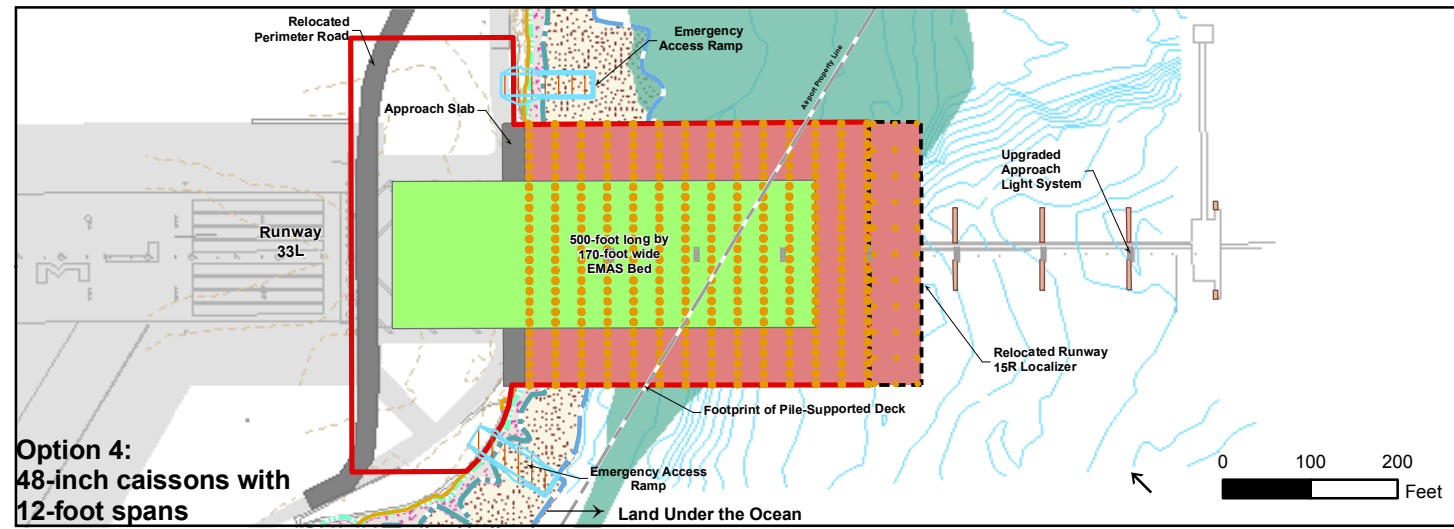
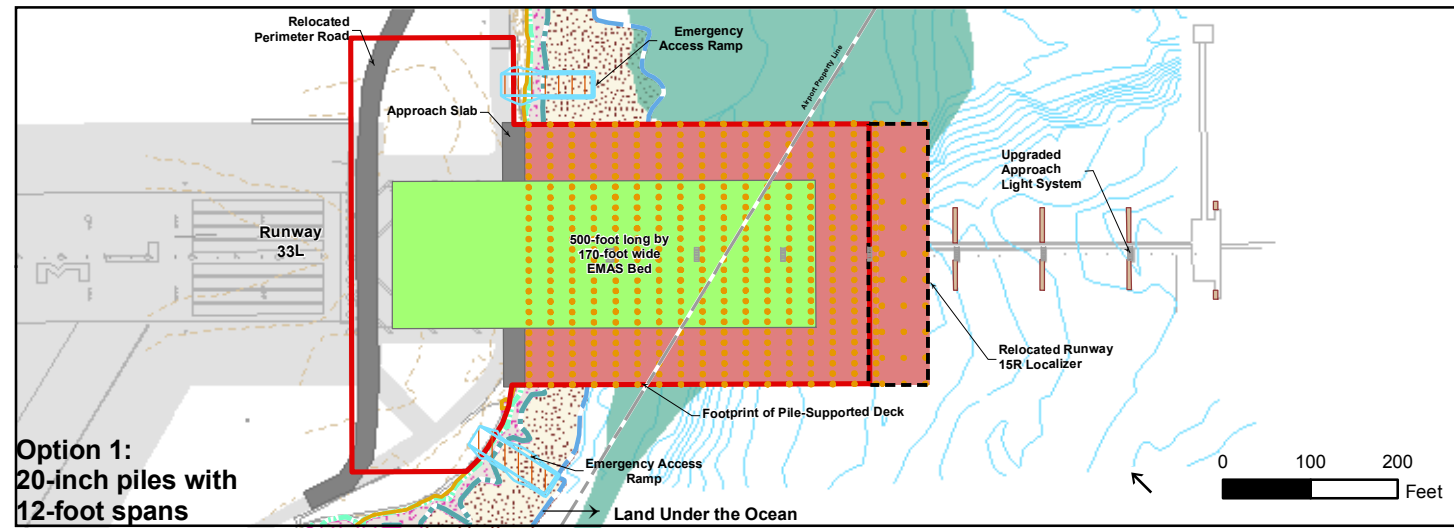
The Construction Options are still conceptual and for the purposes of analysis for this Draft EA/EIR, all six deck and pile options evaluated contain the following project elements:

- A RSA approximately 600 feet long located partially on land and partially on the proposed deck with various pile supporting options.
- A proposed deck structure approximately 470 feet long and 300 feet wide, with a surface area of approximately 141,000 square feet (3.2 acres);
- An EMAS bed approximately 500-feet long by 170-feet wide located within the RSA;
- Two 25-foot wide emergency access ramps, one each located on either side of the proposed deck;
- A steel sheet pile cutoff wall approximately 350 feet long at the inshore limit of the deck to prevent settlement and erosion of the backland areas;
- A transition slab (25 feet wide) spanning from the land to the pile-supported structure;
- A new deck to support the localizer, approximately 300 feet wide by 60 feet long, consisting of:
  - Thirty-three 16-inch diameter vertical piles,
  - Four 16-inch diameter batter piles<sup>15</sup> arranged in 11 bents and 3 rows, and
  - Cast-in-place pile caps with 15-inch thick precast/pre-stressed plank deck and 3-inch thick concrete overlay; and
- Finger pier extensions to the existing light pier to accommodate the CAT III ILS, with:
  - Three 5-foot by 40-foot extensions (8 new timber piles),
  - Three 5-foot by 35-foot extensions (6 new timber piles), and
  - Two 5-foot by 10-foot extensions (2 new timber piles).

Six construction options were developed for the Runway 33L RSA (Figure 2-6 and Figure 2-7), as described in the following sections and Table 2.2-3.

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<sup>15</sup> A batter pile is a pile that is driven at an inclination to the vertical pile to provide resistance to horizontal forces.

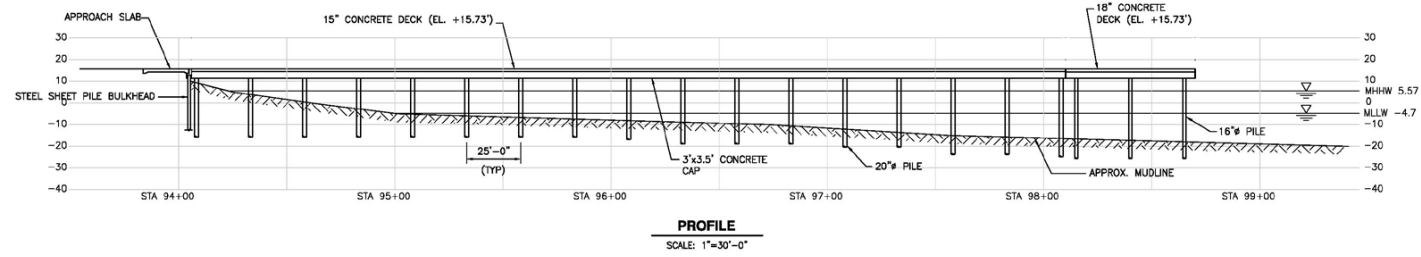


Logan RSA

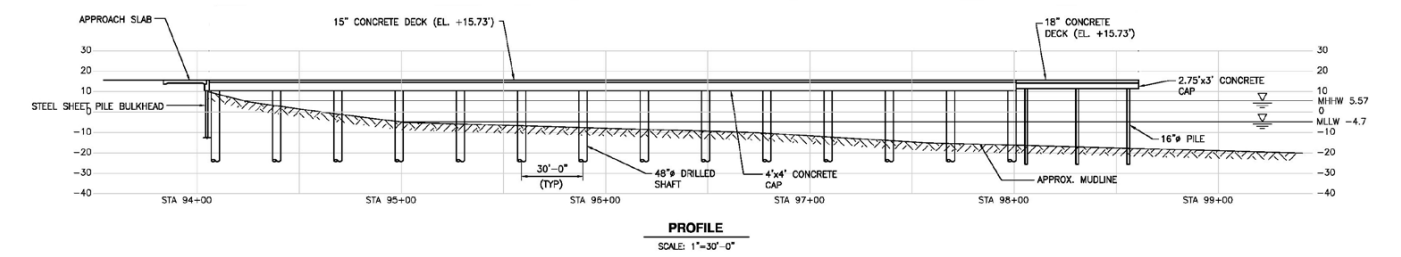
**Figure 2-6  
Runway 33L RSA  
Construction Options**



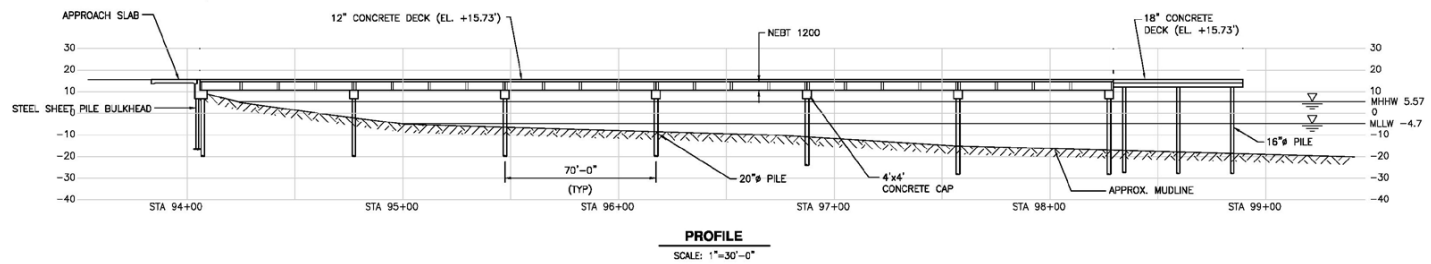
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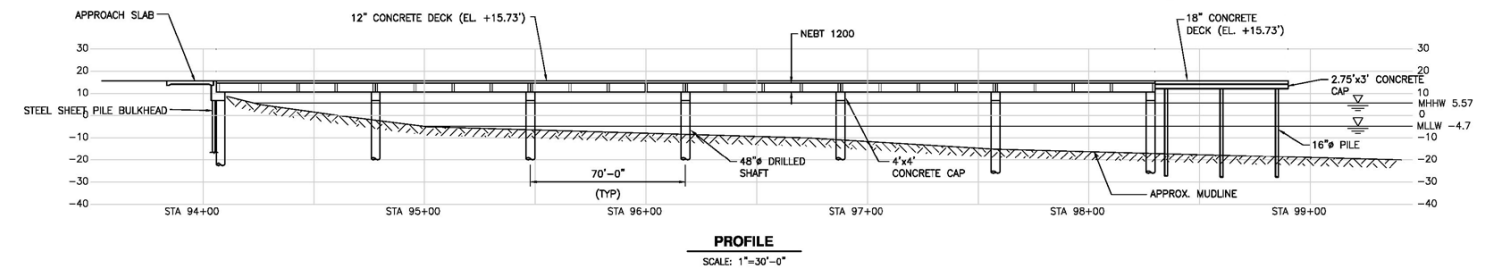
**Option 1: 20-inch Piles with 12-foot Span**



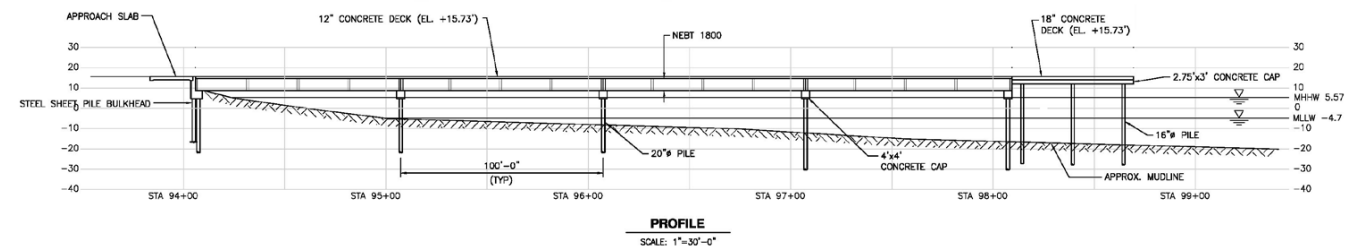
**Option 4: 48-inch Caissons with 12-foot Span**



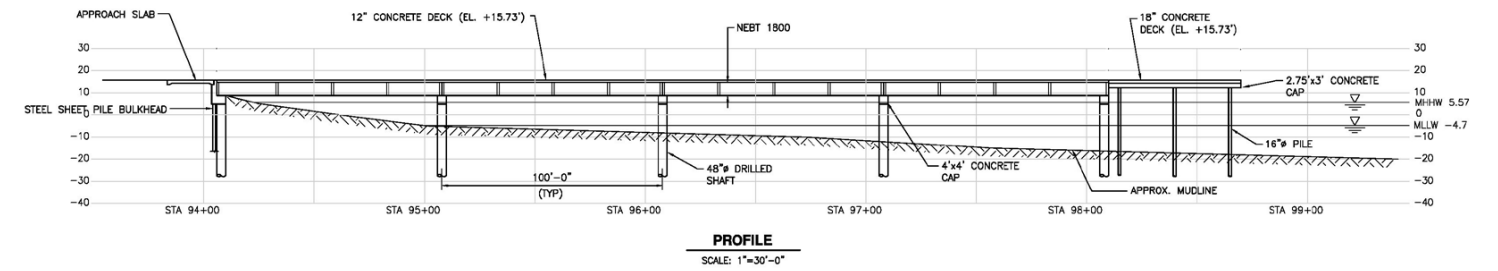
**Option 2: 20-inch Piles with 70-foot Span**



**Option 5: 48-inch Caissons with 70-foot Span**



**Option 3: 20-inch Piles with 100-foot Span**



**Option 6: 48-inch Caissons with 100-foot Span**



Logan RSA

Figure 2-7

Runway 33L Construction Options  
Cross Sections

Illustrative purposes only



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Table 2.2-3 Runway 33L Construction Options

Option	Pile Type	Pile Size (inch diameter)	Pile Number	Batter Piles <sup>1</sup>	Bent Number <sup>2</sup>	Bent Spacing (ft)
1	Pipe Pile	20	442	48	26	12
2	Pipe Pile	20	182	48	7	70
3	Pipe Pile	20	155	48	5	100
4	Caisson	48	364	0	26	12
5	Caisson	48	112	0	7	70
6	Caisson	48	80	0	5	100

<sup>1</sup> Batter piles are bracing piles driven at an angle to the vertical to provide resistance to horizontal forces.

<sup>2</sup> A pile bent is an array of piles driven in a row and fastened together at the top by a pile cap or bracing

**Option 1: 20-Inch Diameter Pipe Pile with 12-Foot Bent Spacing**

The deck and pile configuration of Option 1 includes the following:

- 442 vertical piles and 48 batter piles;
- 20-inch diameter pipe pile foundation system, driven to rock (steel pipe 6-30 inches typically filled with concrete and used for underpinning);
- 26-bent pile arrangement spaced 12 feet apart; and
- Cast in-place pile-cap deck system with 12-inch thick precast/pre-stressed plank deck and 3-inch thick concrete overlay (slab or connecting beam which covers the heads of a group of piles, tying them together so that the structural load is distributed and they act as a single unit).

**Option 2: 20-Inch Diameter Pipe Pile with 70-Foot Bent Spacing**

The deck and pile configuration of Option 2 includes the following:

- 182 vertical piles and 48 battered piles;
- 20-inch diameter pipe pile foundation system driven to rock;
- 7-bent pile arrangement spaced 70 feet apart; and
- Cast in-place pile cap deck system with precast/pre-stressed concrete “T” beams and 12-inch thick concrete overlay.

**Option 3: 20-Inch Diameter Pipe Pile with 100-Foot Bent Spacing**

The deck and pile configuration of Option 3 includes the following:

- 155 vertical piles and 48 battered piles;
- 20-inch diameter pipe pile foundation system driven to rock;
- 5-bent pile arrangement spaced 100 feet apart; and





- Cast in-place pile cap deck system with precast/pre-stressed concrete “T” beams and 12-inch thick concrete overlay.

#### **Option 4: 48-Inch Drilled Shaft with 12-Foot Bent Spacing**

The deck and pile configuration of Option 4 includes the following:

- 137,865 square foot deck area (303 x 455 feet);
- 364 vertical caissons (shaft of concrete placed under a building column or wall and extending down to hardpan or rock);
- 48-inch diameter drilled shaft concrete caissons socketed in rock;
- 26-bent caisson arrangement spaced 12 feet apart; and
- Cast in-place pile-cap deck system with 12-inch thick precast/pre-stressed plank deck and 3-inch thick concrete overlay (slab or connecting beam which covers the heads of a group of piles, tying them together so that the structural load is distributed and they act as a single unit).

#### **Option 5: 48-Inch Drilled Shaft with 70-Foot Bent Spacing**

The deck and pile configuration of Option 5 includes the following:

- 112 vertical caissons;
- 48-inch diameter drilled shaft concrete caissons socketed in rock;
- 7-bent caisson arrangement spaced 70 feet apart; and
- Cast in-place pile cap deck system with precast/pre-stressed concrete “T” beams and 12-inch thick concrete overlay.

#### **Option 6: 48-Inch Drilled Shaft with 100-Foot Bent Spacing**

The deck and pile configuration of Option 6 includes the following elements:

- 80 vertical caissons;
- 48-inch diameter drilled shaft concrete caissons socketed in rock;
- 5-bent caisson arrangement spaced 100 feet apart; and
- Cast in-place pile cap deck system with precast/pre-stressed concrete “T” beams and 12-inch thick concrete overlay.

### **2.2.3.2 Environmental Resource Impacts Screening**

A preliminary screening of potential environmental impacts was completed for the six construction options to determine which options should be carried forward in the environmental analysis for the RSA project. All of the construction options would have the same deck footprint, resulting in shading approximately 159,000 square feet (3.65 acres) of intertidal and subtidal habitats based on the combined footprint of the RSA deck and the localizer deck. Table 2.2-4 compares both the seabed and scour impacts from the six construction options.



Option 4 would have the greatest impact to environmental resources of all the proposed construction options due to the large number of piles required (447), combined with it having the largest area per pile (12.5 square feet). Option 4 would have the largest footprint of all the proposed pile options at 4,637 square feet. This option would impact approximately 3,310 square feet of Land Under the Ocean, 985 square feet of Coastal Beach resource area, and would also result in seabed scour over an area 6.2 feet away from each pile (total of approximately 2,200 feet of scour impact). In comparison, other construction option footprints ranged from approximately 500 to 1,500 square feet, affecting approximately 400 to 1,050 square feet of Land Under the Ocean and 60 to 250 square feet of Coastal Beach.

Options 5 and 6 would have the second largest footprint (1,487 and 1,087 feet, respectively) and second largest scour impacts (6.2 feet away from each pile) due to their largest area per pile (12.5 square feet). Constructing caisson piles required for Options 5 and 6 would also necessitate removing and disposing of potentially contaminated seabed material, as discussed in Chapter 4, *Environmental Consequences*. Although Options 2 and 3 would include a greater number of piles, the proposed pile area is smaller (2 square feet), thereby resulting in the smallest footprints (586 and 52 square feet, respectively) and smallest seabed scour impacts (3.5 feet away from each pile).

Table 2.2-4 Comparison of Environmental Impacts from Pile Configuration Options

Option	Total Piles <sup>1</sup>	Pile Footprint Impact (sq ft) <sup>2</sup>	Loss of Land Under Water (sq ft) <sup>3</sup>	Loss of Coastal Beach (sq ft) <sup>3</sup>	Scour distance from each pile (ft) <sup>4</sup>	Total Seabed Scour (sq ft) <sup>4</sup>
1	573	1,150	840	250	3.5	25,890
2	313	586	425	105	3.5	11,060
3	286	527	395	65	3.5	9,400
4	447	4,637	3,310	985	6.2	59,040
5	195	1,487	1,045	130	6.2	22,250
6	163	1,087	775	110	6.2	15,910

<sup>1</sup> Total number of piles/caissons for the deck, localizer, and light pier extension. Each option has the same number of piles for the localizer (37) and for the light pier extensions (46).

<sup>2</sup> Total number of piles multiplied by the area per pile.

<sup>3</sup> Based on GIS data analysis.

<sup>4</sup> 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.

### 2.2.3.3 Draft EA/EIR Deck and Pile Options

The impacts from deck and pile configuration Option 4 were approximately one order of magnitude higher in impact area than the average impact areas from other options, therefore Option 4 was eliminated from further evaluation in the analysis (Chapter 4, *Environmental Consequences*). Option 1 would include the second largest total seabed scour area, but would have a smaller direct impact footprint in comparison to Options 5 and 6, therefore this option has been carried forward as a potential pile configuration alternative. Options 2, 3, 5 and 6 vary slightly in the distance of scour away from each pile (3.5 to 6.2 feet); however, they are similar in total seabed scour area (9,000 to 22,000 square feet).



Due to the imperceptible differences in total scour area and other environmental factors, Options 1, 2, 3, 5, and 6 have been carried forward for further analysis in this Draft EA/EIR. Massport has not identified a preferred construction option at this time. Since there are negligible differences in environmental impacts, Massport's ultimate decision on the construction methodology will be based on constructability, construction costs and the potential impacts on the use and operations of Runway 15R-33L during construction.

Construction technique is an important consideration in the evaluation of project alternatives for several reasons. Like most airfield projects, any proposed improvements must be constructed without permanently closing the runway. The overall duration of the construction and the ability to quickly start and stop construction are critical to the safe and efficient operations of Logan Airport. In addition to cost factors, the ability to quickly construct the safety improvements is critical to airfield operations and also is anticipated to minimize potential environmental impacts.

#### 2.2.4 Construction

FAA Order 1050.1E, Appendix A, Section 5, requires that the environmental document must include a description of the type and nature of the construction and measures to be taken to minimize adverse effects. A description of the construction process and phasing is provided in this Chapter because it is an essential element of the description of the Proposed Action. In addition, the Secretary's Certificate on the ENF required that the Draft EA/EIR:

- Estimate a construction schedule and hours of construction;
- Identify and describe any project phasing and timing, and/or planned construction sequencing;
- Discuss airfield operational impacts of the construction, such as temporary runway closures; and
- Consider transporting all or part of the needed construction equipment and materials via barge.

This section describes the construction techniques and activities associated with the Runway 33L RSA improvements. Due to environmental and operational constraints, the construction period for the proposed Runway 33L RSA improvements is expected to extend over approximately three years, with periods of inactivity likely during the winter months. The information presented here is based on the preliminary construction plans which have been prepared to date, and it represents the best estimate of construction activities which can be made at this time. When the proposed Runway 33L RSA improvements are in the final design and construction phase, Massport will prepare detailed phasing and construction sequence procedures to ensure continual safe operation of the runways, protection for critical resources, as well as airport roadways, and utilities. In an effort to expedite construction, Massport is considering constructing the Runway 33L RSA improvements using a design/build approach. 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 33L RSA improvements are addressed in Chapter 4, *Environmental Consequences*.



#### 2.2.4.1 Construction Techniques and Activities

This section provides a description of the elements of the Proposed Action at a concept level, and how these elements were assumed to be constructed.

##### Upland Work

Work in upland portions of the project area includes relocating the existing perimeter road, constructing a new taxiway connector (Taxiway C1 connector) west of Taxiway C, relocating utilities, and installing a concrete approach slab between the upland and the deck (Figure 2-8).

##### Sheet Pile and Riprap

The existing riprap slope between the perimeter road and the intertidal areas would be replaced with a filled sheet-pile structure protected with riprap.

##### Pile Installation

Construction Options 1, 2, and 3 assumed use of 20-inch steel piles that would be set with a vibratory hammer and then driven to capacity with an impact hammer. The piles would be aligned in position using a template. The template would consist of two H-piles vibrated 20 feet into the bottom every 20 feet along the pile bents 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. All work would be done from a barge.

The analysis assumed that Construction Options 5 and 6 would be installed using a steel pipe casing with a vibratory hammer operated from a barge-mounted crane. Once the casing is set to a specific elevation, a drilling rig would be brought in on a separate barge. The drill or auger would excavate the inside of the casing down through the clay and into the rock below. This process would remove sediment from the inside of the casing and place the material on the deck of a barge. This sediment would then be moved to a deck barge using a loader and scale pan for disposal off site at an approved facility. Excavate would be tested at a transfer location at the selected contractor's yard and disposed of according to Massport procedures and/or any permit conditions. As the concrete is pumped in, the drilling fluid would be displaced up and out of the steel casing. The drilling fluid would be collected and filtered/de-sanded for reuse on the next caisson.

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 150-ton to 250-ton cranes depending on the operation. The barges would be supported by spuds (vertical steel shafts that hold the barge in place and at a constant elevation). Material barges would also be 45 feet wide and 150 feet long. It is assumed that a maximum of three spud barges would be required on site each day with 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 five to ten feet deep. The temporary environmental impacts associated with barge use are addressed in Chapter 4, *Environmental Consequences*.



### **Pile/Caisson Caps Installation**

When pile driving/caisson installation has sufficiently progressed to complete one bent, a reinforced concrete cap would be installed over those piles or caissons. The concrete cap would be formed using steel forms designed to span between the piles. Rebar would be installed with support from a barge-mounted crane. Forms and rebar would be delivered via barge. Concrete would be pumped into the forms via pumps from shore. Work would be supported by a barge mounted crane.

### **Bulb Tee Deck Construction**

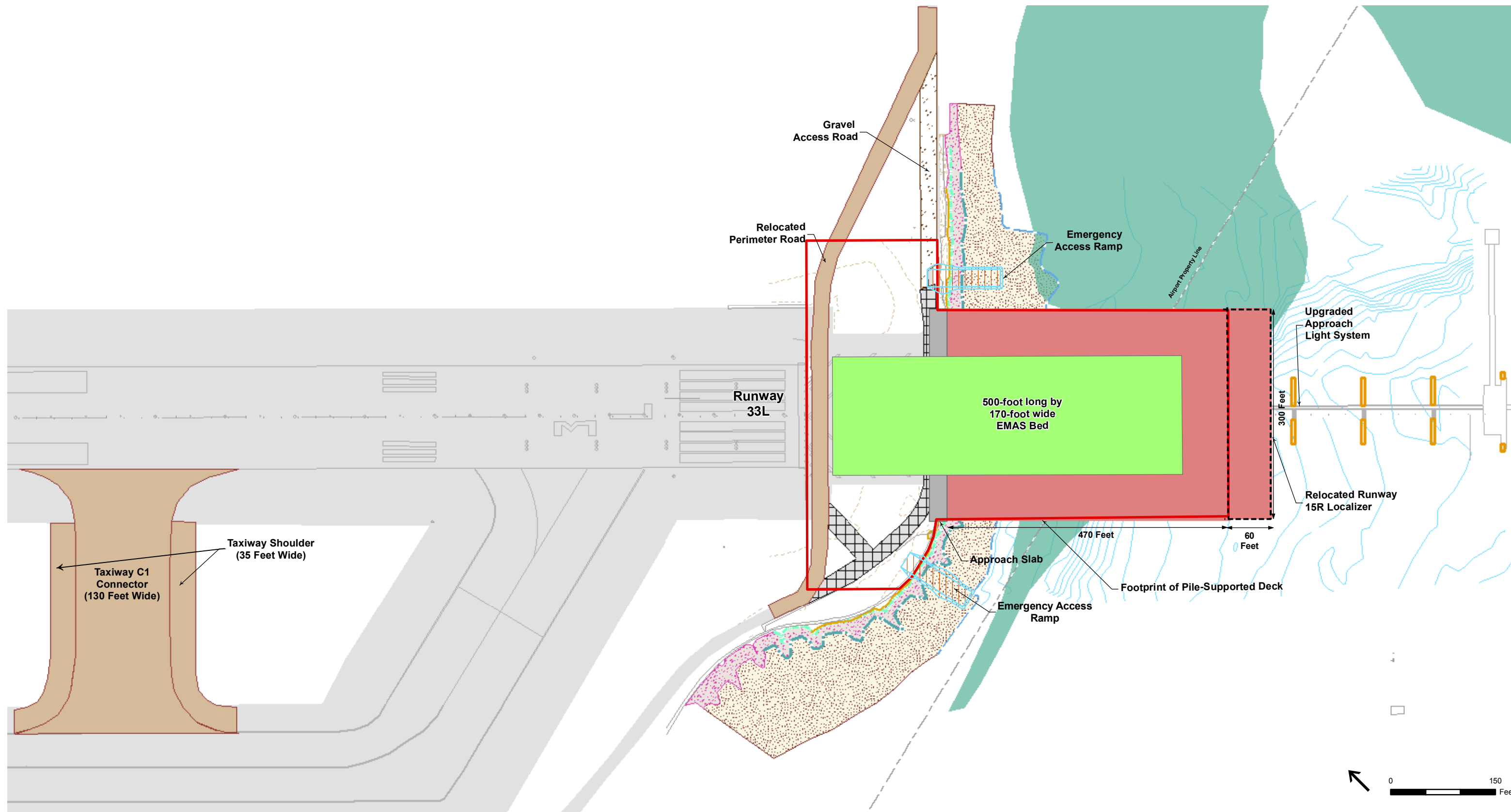
The long span (70 or 100 feet) New England Bulb Tee girders would be manufactured off-site at an approved precast concrete plant. The girders would be transported to the contractors staging site by barge or truck. The girders would then be placed on a transport barge (or if delivered by barge) would be towed to the project site for installation. To place the 100-foot long girders over the first span a large 300-ton crane would likely be required.

### **Light Pier Construction**

Prior to the installation of the deck plank, the portion of the light pier within the deck footprint would be selectively demolished, and a temporary lighting system installed.

### **Precast Plank Erection**

For Options 2, 3, 5 and 6, precast planks would be manufactured off site. The planks would be delivered to the contractor's staging area via truck or barge. The planks would then be loaded onto barges and transported to the project site. A barge-mounted crane would hoist the planks into position on top of the pile caps. Following installation, a poured concrete deck overlay would be constructed starting from the shore and moving out toward the water.



- Legend**
- New EMAS Bed
  - Proposed and Existing RSA
  - Pile-Supported Deck and Localizer
  - Footprint of Localizer
  - Approach Slab
  - Emergency Ramp
  - Footprint of Pile-Supported Light Pier Extensions
  - Demolished Pavement
  - Gravel Access Road
  - Taxiway C1 and Relocated Perimeter Road
  - Existing Paved Surfaces
  - Existing Contour
  - Existing Bathymetric Contour
  - Mean High Water (4.58')
  - Mean Low Water (-4.51')
  - Top of Coastal Bank
  - Limit of Land Subject to Coastal Storm Flowage
  - Mussel Bed
  - Limit of Eelgrass
  - Coastal Bank
  - Coastal Beach

Logan RSA

**Figure 2-8**  
**Taxiway C1 Connector and Relocated Perimeter Road**

Source: Jacobs Edwards & Kelcey, Inc. Childs Engineering Corps.



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#### 2.2.4.2 Construction Sequencing and Phasing

The Secretary's Certificate required that the Draft EA/EIR estimate the construction schedule and hours of construction, and discuss how construction would be undertaken in a way that minimizes impacts to resources. This section responds to the requirements of the Certificate and describes the assumed logistics, phasing and duration of the construction of the proposed Runway 33L RSA improvements.

##### Logistics

The proposed Runway 33L RSA improvements are located within the secure airfield area at the southeasterly end of Runway 33L and would primarily be an overwater structure with minimal upland construction activity. Construction would generally be performed from floating, barge mounted equipment which has the additional benefit of mobility in the event of Logan Airport operations requiring the approach to Runway 33L to be cleared. Because of the large quantity and size of construction materials involved, a water based transportation system of barges and tugs is expected to be utilized to bring the bulk of materials (with the exception of concrete and EMAS blocks) to the site in order to minimize impact on airfield operations and allow for timely delivery and stockpiling. The water transportation staging area would be at the contractor's yard and would most likely be located in Quincy, East Boston, or Charlestown. Personnel would primarily be transported by watercraft to and from the construction site. Landside access would primarily be restricted to management, safety, quality assurance and maintenance personnel. Concrete materials, asphalt, and the EMAS blocks would arrive by truck via the South Boston By-pass Road and/or Route 1A. Trucks and barges entering the Airport would follow the standard Logan Airport escort procedures.

Overnight barges would be moored near the Airport but outside of runway protection zones. With prior authorization and inspection, barges can be inside or outside of the Airport Security Zone as long as there are no penetrations into the runway protection zone (RPZ). A layover anchorage outside the Airport Security Zone would be identified. The southwestern side of the existing light pier is the current proposed mooring location. Anchorage would occur using a low impact anchor such as a pile-driven anchor. The depth of water would likely be 20 feet or greater. A chain would be attached to the anchor pile and attached to a mooring buoy used to moor the barges. A weighted anchor could be used in lieu of a pile type anchor to minimize impacts to the ocean floor.

##### Construction Phasing

Several factors have guided the proposed construction phasing. Two critical factors are marine resource-based time of year restrictions and runway use. The following section discusses how these issues have informed construction phasing.

A number of the federal and state resource protection agencies have identified times of year that are critical to species lifecycles, including times when adverse impacts should be avoided. The Massachusetts Division of Marine Fisheries (DMF) has recommended a time-of-year restriction related to winter flounder that extends from February 15<sup>th</sup> through June 30<sup>th</sup>. As noted in its comment letter on the ENF, during this annual window, in-water projects are precluded from silt-producing work. These restrictions do not entirely preclude in-water works at these times, but such work cannot affect the resource areas. These time-of-year windows were the critical natural resource considerations.





Runway use at Logan Airport is a response to wind and weather conditions. Any proposed construction associated with a runway may have to stop and start due to weather and runway use requirements. The Airport relies on Runway 15R-33L primarily between November and March to accommodate the historic wind direction patterns during that time of year. In addition, Runway 15R needs to be available at night throughout the year. Based on the DMF recommended time-of-year restriction noted above, the pile-driving operation can be done from July 1<sup>st</sup> through February 14<sup>th</sup>. For the purposes of this document it is anticipated this operation would be conducted between July 1<sup>st</sup> and November 30<sup>th</sup> during 2011, 2012 and 2013. However, actual pile-driving operations could be extended beyond November should wind/weather permit. On-site work would occur seven days a week between the hours of 7AM and 7PM.<sup>16</sup>

A three-season construction schedule is proposed that would account for operational and runway restrictions and ensure that Massport meets the 2013 FAA schedule for having safety improvements constructed. In November 2005, Congress mandated that all commercial passenger airports improve their RSAs by 2015. The Department of Transportation's Office of the Inspector General reported in 2009 that Logan was one of the 11 of the nation's largest airports needing to improve RSAs. The report noted that "critical RSA improvements need to be made sooner rather than later to lower the risk of passenger injuries and aircraft damage in the event of runway accidents." To achieve this goal, FAA's current Capital Improvement Program for the New England Region has allocated funding for the Logan Airport RSA project in 2013. For the purposes of the Draft EA/EIR analysis, the construction generally would be completed in four phases over three construction seasons:

- Start July 1, 2011: Phase 1 – construct the perimeter road, Taxiway C1 Connector, install riprap, sheet pile, and the first pile bent;<sup>17</sup>
- Start July 1, 2012: Phase 2 –waterside work including any remaining piles, pile caps and the entire deck structure;
- Start July 1, 2013: Phase 2 complete deck construction; Phase 3 – construct the localizer pier extension and light pier improvements, and Phase 4 – install the EMAS bed.<sup>18</sup>

This is a conservative estimate, for purposes of evaluating the maximum construction-period traffic, air emissions, and noise. If construction were extended over a full 12-month period, the peak daily impacts for these resources would be reduced.

#### 2.2.4.3 Construction Costs

Estimated costs for the proposed Runway 33L RSA improvements construction options range between \$50 million and \$60 million for the pile-supported deck structure, depending on the foundation option (Table 2.2-5). The cost of constructing the Taxiway C1 Connector, the localizer relocation, and the approach light upgrade is approximately \$14 million. Although Option 1 includes the smallest deck support structure, it would be the most expensive to construct because it includes the largest number of 20-inch diameter piles. Options 2, 3,

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<sup>16</sup> In accordance with the City of Boston Noise Ordinance.

<sup>17</sup> Perimeter Road relocation, Taxiway C1 Connector, riprap and sheet pile installation would not generate sediment and could occur before July 1.

<sup>18</sup> Deck construction would not generate sediment and could occur before July 1.



and 6, would all cost approximately the same, while Option 5 would be slightly more expensive since it would require the greatest number of caissons.

Table 2.2-5 Runway 33L Proposed Action: Estimated Construction Costs

Element	Construction Cost Estimate	Design and Construction Phase Services	Construction Contingency	Total Estimated Cost
Highest RSA Cost Option (Option 1)	\$45 million	\$6 million	\$9 million	\$60 million
Lowest RSA Cost Option (Option 2)	\$38 million	\$5 million	\$7 million	\$50 million
Taxiway C1 Connector, Localizer, and Approach Light Upgrade (common to all options)	\$11 million	\$1 million	\$2 million	\$14 million

## 2.3 Runway 22R

This section describes the alternatives considered for the Runway 22R RSA improvements, including a description of the Proposed Action, construction methods, and project costs. Section 2.3.1 provides a description of Runway 22R and its use. Section 2.3.2 presents the design criteria used to develop alternatives for RSA enhancement, the screening process and screening criteria applied to each alternative, and a description of the RSA alternatives evaluated for Runway 22R. Section 2.3.3 identifies the proposed action. Section 2.3.4 discusses the construction process and duration, and Section 2.3.5 provides the conceptual construction cost estimate.

The Secretary’s Certificate on the ENF directed Massport to evaluate the Inclined Safety Area and the No-Action/No-Build alternatives for Runway 22R. The Certificate also required that Massport:

- Evaluate alternative configurations and alignments, if any, that would meet safety objectives while minimizing impacts;
- Present any design refinements of the preferred alternative;
- Present and identify the advantages and disadvantages of the preferred alternative;
- Examine whether there are feasible alternatives to the placement of fill; and
- Evaluate whether the amount of fill can be further reduced.

### 2.3.1 Description and Use of Runway 22R

At 7,860 feet, Runway 4L-22R is the third longest at Logan Airport. As shown on Figure 1-1, the Runway 22R end is at the northern end of the airfield, and the Runway 4L end is at the southern end. Runway 22R has an 815-foot displaced threshold, which reduces the length of runway available for arrivals. The threshold for



Runway 22R is displaced because of obstructions (buildings) in the Orient Heights section of East Boston. The paved area behind the threshold is available for departures and roll-out for Runway 4L arrivals.

Runway 22R is used primarily for aircraft departures to the south, while Runway 4L is used primarily for aircraft arrivals from the south. In 2008, Runway 22R accommodated 36 percent of all jet aircraft departures, while the opposite end of the runway, Runway 4L, accommodated 6 percent of all jet aircraft arrivals (Table 2.2-1).<sup>19</sup> Runway 4L-22R accommodates a number of different aircraft including turboprops and heavy, light, and regional jets (Table 2.3-1), is designed to handle heavy commercial jet aircraft. In 2008, Runway 4L-22R was used most frequently for arrivals by turboprops and regional jets but was used by a number of different aircraft including turboprops and heavy, light, and regional jets for departures.

Historically this runway has very rarely been used for arrivals. As mentioned above, its arrival threshold is displaced 815 feet from the actual end of the pavement. While this 815-foot displacement area is available for Runway 4L arrival roll-out, and Runway 22R departures, it is not available for Runway 22R arrivals. According to the FAA, the displacement area can be used to satisfy undershoot requirements for any Runway 22R arrivals. The remaining requirement for vertical guidance has been satisfied through the installation of a precision approach path indicator (PAPI). Therefore, the Runway 22R RSA is intended to protect aircraft in the event that an aircraft arriving on Runway 4L overruns and fails to stop on the runway. Runway 4L has a 1,000-foot long RSA.

**Table 2.3-1 Runway 4L-22R Aircraft Fleet Mix (2008)**  
(Percentage of Total Aircraft Operations on Runway 4L-22R, by Aircraft Type)

Runway	Arrivals					
	Heavy Jets A <sup>1</sup>	Heavy Jets B <sup>2</sup>	Light Jets A <sup>3</sup>	Light Jets B <sup>4</sup>	Regional Jets <sup>5</sup>	Turboprops (Non-jets) <sup>6</sup>
4L	0.93%	0.90%	4.09%	3.34%	11.03%	22.33%
22R	0.00%	0.00%	0.00%	0.00%	0.00%	3.16%
Total	0.93%	0.90%	4.09%	3.34%	11.03%	25.49%

Runway	Departures					
	Heavy Jets A <sup>1</sup>	Heavy Jets B <sup>2</sup>	Light Jets A <sup>3</sup>	Light Jets B <sup>4</sup>	Regional Jets <sup>5</sup>	Turboprops (Non-jets) <sup>6</sup>
4L	0.00%	0.00%	0.00%	0.00%	0.00%	13.70%
22R	33.26%	35.90%	36.52%	35.50%	36.12%	39.09%
Total	33.26%	35.90%	36.52%	35.50%	36.12%	52.79%

Source: Massachusetts Port Authority, Boston-Logan International Airport 2008 Environmental Data Report, September 2009.

- 1 Heavy Jets A= Boeing 747s, Airbus 340s, DC-8s;
- 2 Heavy Jets B = Boeing 767s, Boeing 777s, Airbus 300s, Airbus 310s, Airbus 330s, DC-10s, L1011s, Boeing/McDonnell Douglas MD11s;
- 3 Light Jets A = Boeing 717s, Boeing 727s, DC-9s, F100s, Boeing/McDonnell Douglas MD90s;
- 4 Light Jets B = Boeing 737s, Boeing 757s, Airbus 319s, Airbus 320s, Beech 146s, Boeing/McDonnell Douglas MD80s;
- 5 Regional Jet = Embraer 135, Embraer 145, Embraer 170, Embraer 190, Bombardier CRJ 2, Bombardier CRJ 7, Bombardier CRJ 9, Fairchild Dornier 328JET
- 6 Corporate Jets and Turboprops = Beech King Air, Cessna 402

<sup>19</sup> Massachusetts Port Authority, *Boston-Logan International Airport 2008 Environmental Data Report*, September 2009.



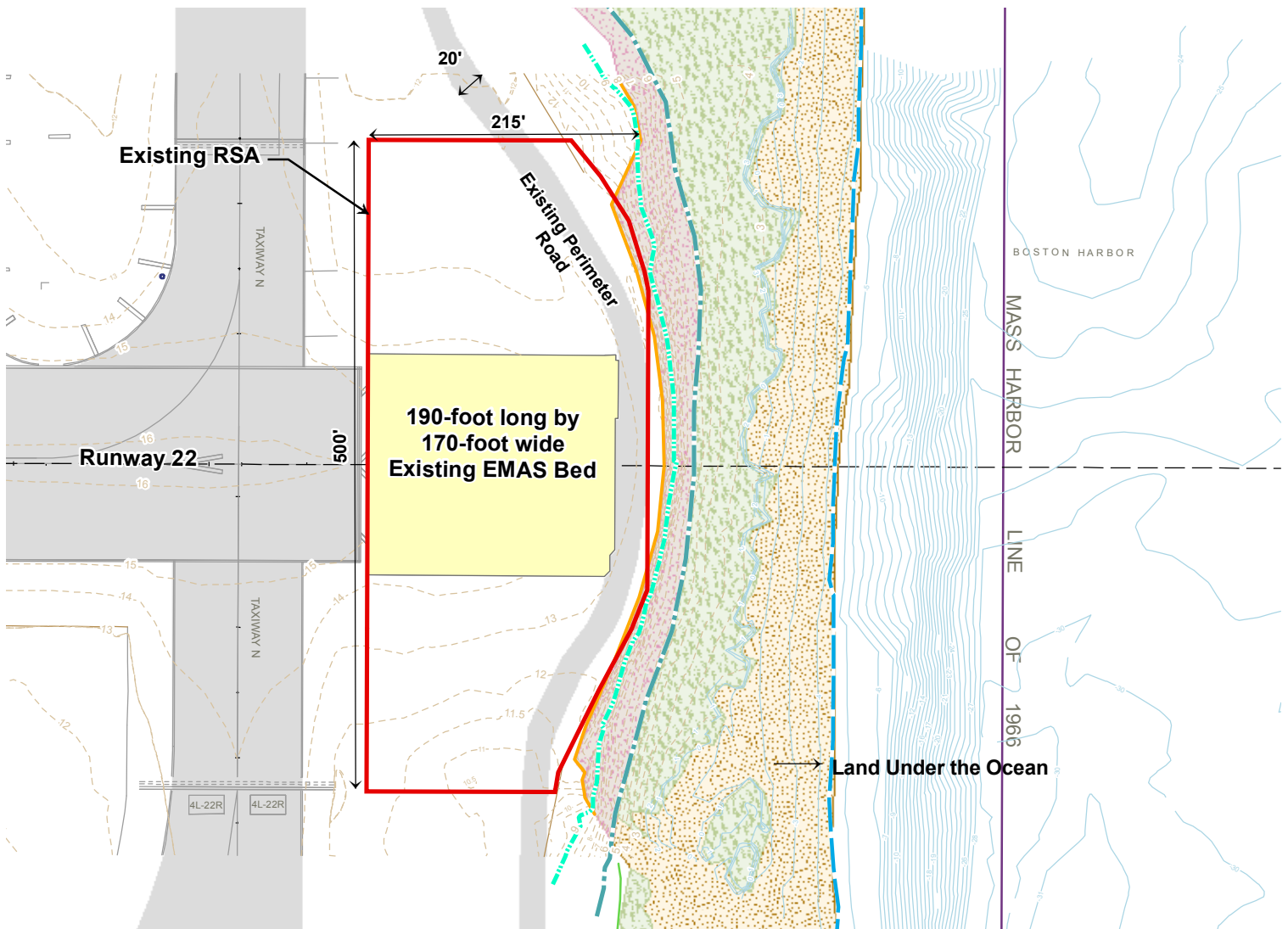
The RSA for Runway 22R is 215 feet long and 500 feet wide (Figure 2-9). The level of safety provided by the existing RSA with EMAS was the maximum possible on without extending the RSA beyond the existing limit of pavement. The existing EMAS configuration, however, does not provide the opportunity for the design aircraft to safely transition in the event the aircraft exits the EMAS bed and enters the harbor, and does not provide emergency vehicles easy or safe access to/from the water. The 190-foot long and 170-foot wide EMAS bed for aircraft overrun protection was constructed in 2005. The EMAS bed is set back five feet from the runway threshold and meets design standards for EMAS use as described in the FAA's Airport Design Advisory Circular;<sup>20</sup> the EMAS bed in its current configuration provides the minimum FAA-defined arrestment speed of 40 knots for the design aircraft (Boeing 757-200). The EMAS bed is designed to stop the design aircraft if it is traveling at speeds of 40 knots or less when it leaves the end of the runway. The arresting performance of the Runway 22R EMAS bed improves with lighter aircraft, particularly for many of the smaller aircraft (smaller than the design aircraft) frequently using this runway. For example, the EMAS bed would arrest a Boeing 737-800 that leaves the runway at 51 to 57 knots and a CRJ-200 that leaves the runway at 60 to 66 knots.<sup>21</sup>

The existing airport perimeter road is located at the northern edge of the existing EMAS bed, within the RSA. One navaid, a PAPI, is located at the Runway 22R end.

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20 United States Department of Transportation, Federal Aviation Administration, Advisory Circular (AC) 150/5300-13, Airport Design, Changes 1 through 15, December 31, 2009.  
21 SH & E, Inc, Edwards and Kelcey, Inc., Flight Transportation Associates, Inc., *Runway 4L/22R Safety Area Analysis*, March 29, 2004, p. 16.

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**Legend**

- Existing RSA
- Existing EMAS Bed
- Coastal Bank
- Coastal Beach
- Salt Marsh
- Existing Contour
- Existing Bathymetric Contour
- Mean High Water (4.58')
- Mean Low Water (-4.51')
- Top of Coastal Bank
- Limit of Land Subject to Coastal Storm Flowage



Logan RSA

Figure 2-9

**Existing Runway 22R RSA**

Source: Jacobs Edwards & Kelcey, Inc. Childs Engineering Corps. Office of Geographic and Environmental Information (2004, 2006 MassGIS)



### 2.3.2 Runway Safety Enhancement Alternatives for Runway 22R

This section responds to the requirements of the Secretary’s Certificate, and describes the process undertaken by Massport and FAA to identify reasonable alternatives for enhancing the Runway 22R RSA.

#### 2.3.2.1 Design Criteria

The existing Runway 22R RSA meets the minimum FAA design criteria for overrun protection for the runway’s design aircraft, the Boeing 757-200, but does not provide for aircraft transitioning into the water or for emergency vehicles to access the aircraft in the event the aircraft exits the existing EMAS bed. FAA required Massport to investigate options to further enhance safety at this runway end. It was determined that Runway 22R does not provide a sufficient overrun area for landings on Runway 4L approach for Category C and D aircraft. The FAA Runway Safety Area Determination directed Massport to pursue additional improvements beyond the existing EMAS bed including a longer EMAS bed, an inclined safety area, or other RSA enhancement options that may be subsequently identified.<sup>22,23</sup> (See Appendix 3, *Alternatives Analysis and FAA Determinations*).

#### 2.3.2.2 Preliminary Alternatives

Massport conducted a RSA feasibility analysis for the Runway 22R end. The results of that analysis combined with the FAA review and determination approved the placement of a 190-foot long EMAS bed that meets minimum standards, with the requirement of follow-on work to determine additional practical actions that could further enhance safety. As part of this RSA study, the technical team reviewed the operational use of Runway 4L-22R and possible options to further enhance the safety area, environmental impacts, and related costs. Based on this analysis, Massport developed four alternatives and sub-options for the Runway 22R RSA which were evaluated in the ENF and are described in Appendix 3, *Alternatives Analysis and FAA Determinations*. The screening process for the Runway 22R RSA enhancement alternatives is shown in Figure 2-10.

Figure 2-10 Runway 22R Alternatives Screening Process

Screening Criteria: Cost			
<b>Alternative 1</b> EMAS enhancement on solid fill  <i>Eliminated</i>	<b>Alternative 2</b> EMAS enhancement on pile-supported deck  <i>Eliminated</i>	<b>Alternative 3</b> EMAS replacement using 80 psi strength blocks in current configuration  <i>Eliminated</i>	<b>Alternative 4</b> Inclined safety area  <i>Retained</i>

22 SH&E, Inc. and Flight Transportation Associates, Inc., Runway 4L/22R Safety Area Analysis, March 29, 2004.

23 Federal Aviation Administration, Runway Safety Area Determination: General Edward Lawrence Logan International Airport East Boston, Massachusetts, June 6, 2004, p. 1.



**2.3.2.3 Alternatives Evaluated In the ENF**

This section summarizes the alternatives described in the ENF. Appendix 3, *Alternatives Analysis and FAA Determinations*, provides the detailed analysis of these options that was presented in the ENF.

The following alternatives for the Runway 22R RSA were evaluated in the ENF. Alternatives 1, 2 and 3 were eliminated from further analysis in the Draft EA/EIR due to cost or unacceptable environmental impacts, and Alternative 4 is proceeding into this Draft EA/EIR analysis:

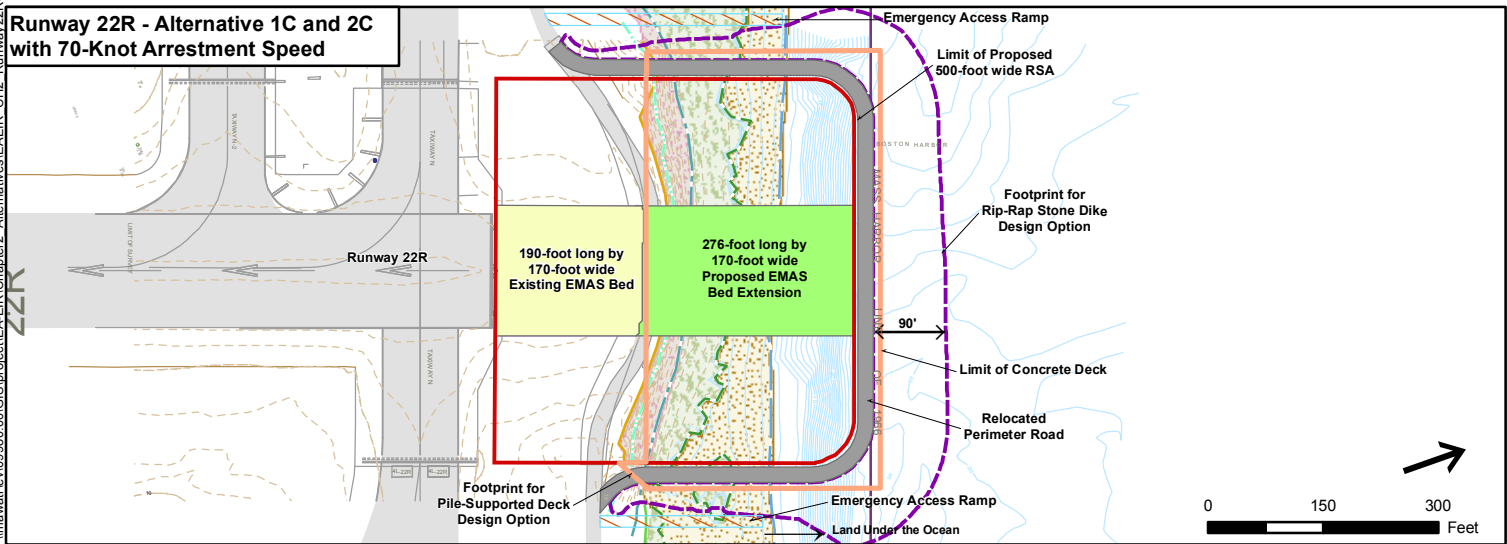
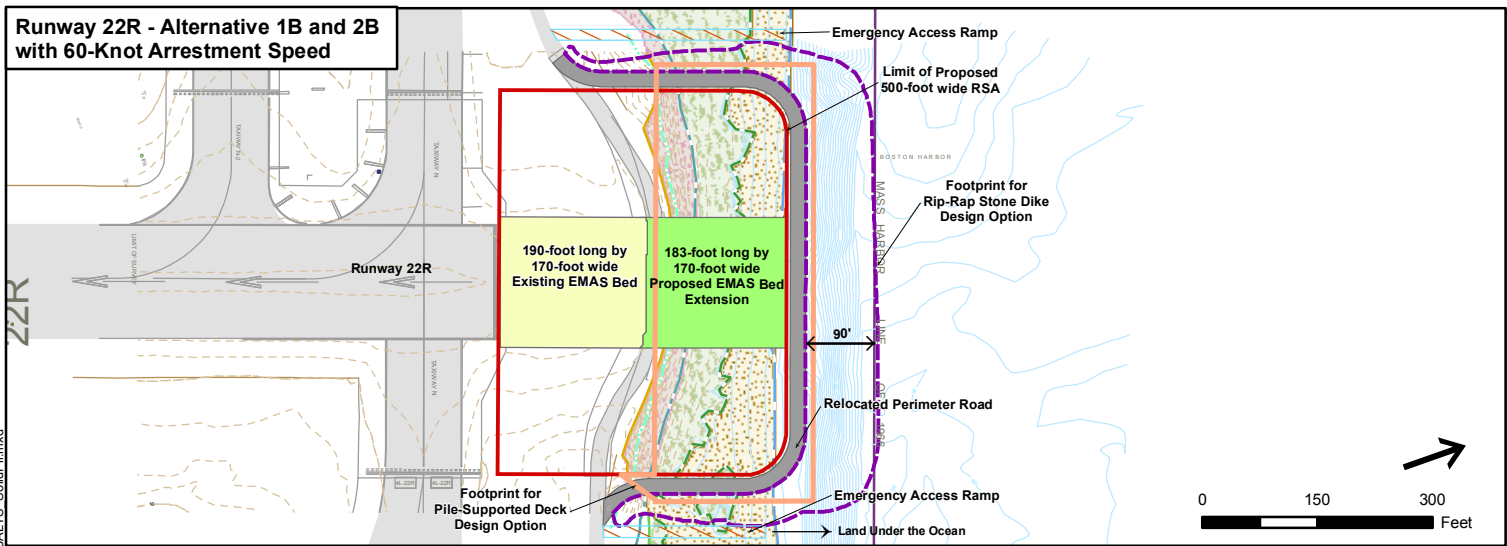
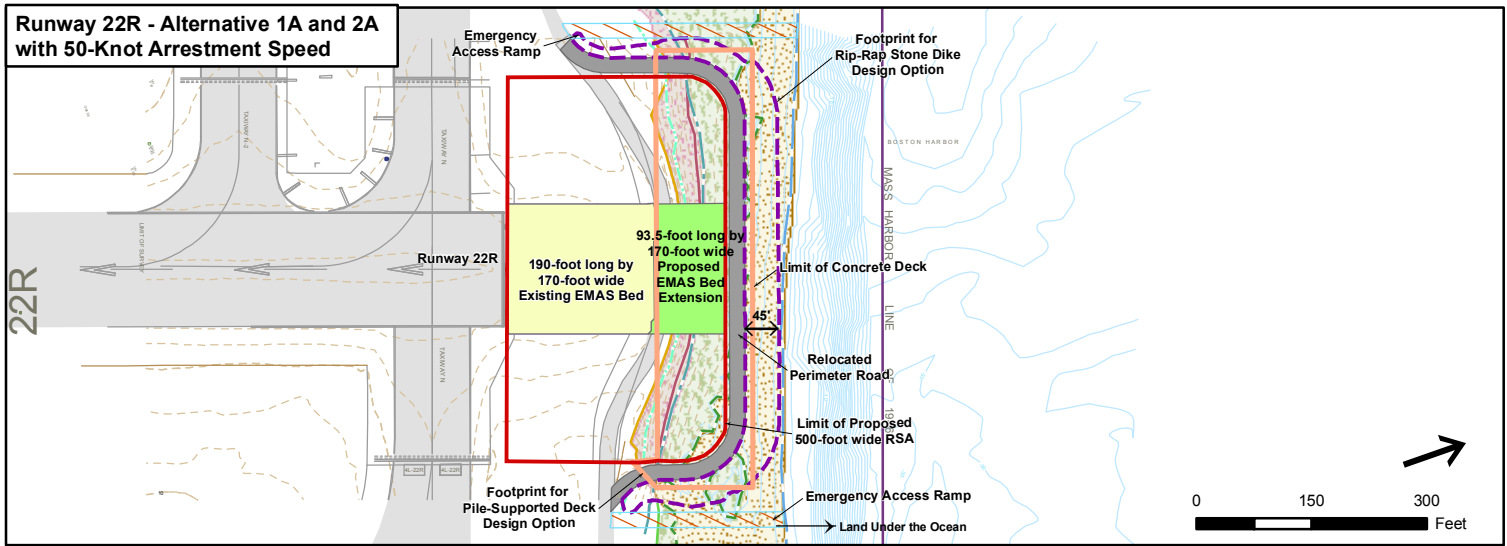
- Runway 22R Alternative 1 – EMAS Enhancement on Solid Fill (See Figure 2-11)
- Runway 22R Alternative 2 – EMAS Enhancement on a Pile-Supported Deck (See Figure 2-11)
- Runway 22R Alternative 3 – EMAS Replacement Using 80 psi Strength Blocks in Current Configuration
- Runway 22R Alternative 4 – Inclined Safety Area (ISA) (See Figure 2-12)

Table 2.3-2 summarizes Alternatives 1 and 2, with the design options considered. Each of these options would have required building a solid fill or deck structure extending from 115 to nearly 400 feet into the approximately 1,500-foot channel between the Airport and the East Boston (Bayswater Street) shore. These structures would reduce the width of the navigation channel due to the length of the structure and the associated Logan Airport security zone. Both the solid fill and deck structures were eliminated from further consideration because they were not considered financially feasible by the FAA as an option for further enhancing the level of safety provided by the existing RSA, and did not avoid impacts to salt marsh. Alternative 3 was considered but rejected because it would not meet the safety objectives of the project.

**Table 2.3-2 Summary of Runway 22R ENF Alternatives**

Alternative	Arresting Speed (knots)	Length of Deck or Fill (feet)	Estimated Cost (\$M)	Rationale
<b>Alternative 1 – Solid Fill</b>				
1A	50	160	\$17.5	Dismissed because of cost <sup>1</sup>
1B	60	293	\$31.7	Dismissed because of cost and environmental impact
1C	70	386	\$47.4	Dismissed because of cost and environmental impact
<b>Alternative 2 – Pile-Supported Deck</b>				
2A	50	115	\$23.7	Dismissed because of cost <sup>1</sup>
2B	60	203	\$35.9	Dismissed because of cost and environmental impact
2C	70	296	\$50.6	Dismissed because of cost and environmental impact

<sup>1</sup> Environmental impacts are the same as for the proposed Inclined Safety Area (Alternative 4).



**Legend**

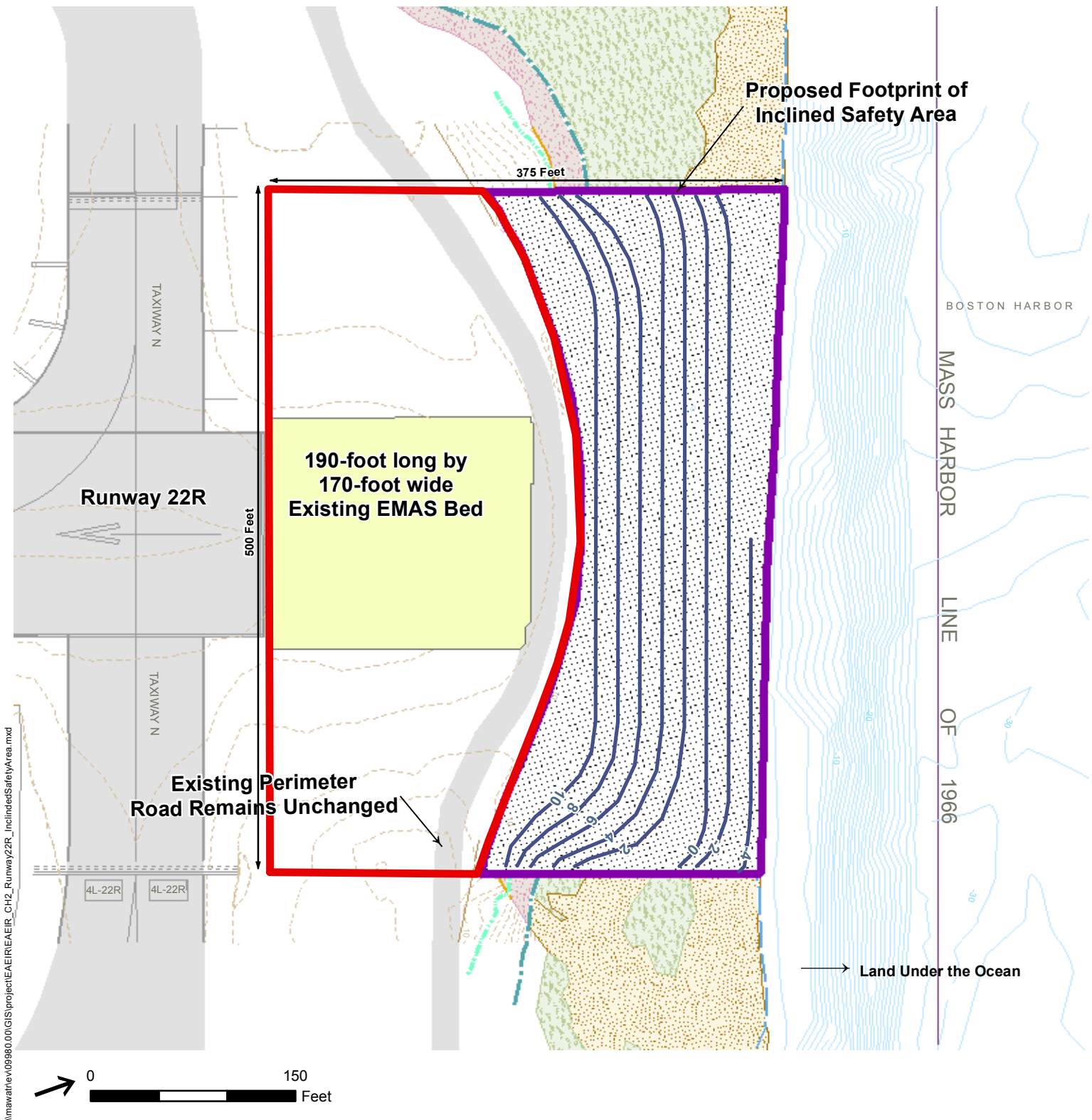
- RSA Footprint
- Footprint for Pile-Supported Deck
- Footprint for Rip-Rap Stone Dike
- 20-foot wide Relocated Perimeter Road
- Emergency Access Ramps
- Existing EMAS Bed
- Extended EMAS Bed
- Existing Contour
- Existing Bathymetric Contour
- Mean High Water (4.58')
- Mean Low Water (-4.51')
- Top of Coastal Bank
- Limit of Land Subject to Coastal Storm Flowage
- Coastal Bank
- Coastal Beach
- Salt Marsh



Logan RSA

**Figure 2-11**  
**Runway 22R RSA**  
**Alternative 1 -**  
**EMAS Enhancement on Solid Fill**  
**and Alternative 2 -**  
**EMAS Enhancement on**  
**Pile-Supported Deck**





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- Legend**
- Existing EMAS Bed
  - RSA
  - Gravel
  - Inclined Safety Area
  - Proposed Contour

- Existing Contour
- Existing Bathymetric Contour
- Mean High Water (4.58')
- Mean Low Water (-4.51')
- Top of Coastal Bank
- Limit of Land Subject to Coastal Storm Flowage

- Coastal Bank
- Coastal Beach
- Salt Marsh



Logan RSA

**Figure 2-12**  
**Runway 22R**  
**Proposed Inclined Safety Area**

Source: Jacobs Edwards & Kelcey, Inc.  
Childs Engineering Corps.  
Massport - Bathymetric Contours



The Runway 22R Alternative 4 – ISA would enhance the existing RSA by installing an inclined safety area at the end of Runway 22R, similar to the inclined safety areas previously installed at the end of Runways 22L and 27. Massport and FAA retained this alternative for further analysis because constructing an inclined safety area would enhance the existing RSA, and enhance rescue access in the event of an emergency, at a construction cost which appears to be feasible. The Secretary’s Certificate on the ENF states that the “analysis provided in the ENF indicates that several of the examined alternatives are infeasible due to cost or unacceptable environmental impacts. Therefore, the alternatives that should be carried forward from the ENF to the Draft EA/EIR are the inclined safety area and no action alternative for Runway 22R.<sup>24</sup> This alternative is further discussed below. Appendix 3, *Alternatives Analysis and FAA Determinations*, describes the alternatives considered for the Runway 22R RSA enhancements and the rationale for their elimination. The ISA and the No-Action/No-Build Alternative are the only Runway 22R RSA alternatives carried forward in the Draft EA/EIR, as directed in the MEPA Certificate, which confirmed that all other alternatives examined are infeasible due to cost or unacceptable environmental impacts.

### 2.3.3 Proposed Action

The Runway 22R Alternative 4 – Inclined Safety Area would enhance the existing RSA by constructing an inclined safety area at the end of Runway 22R. This alternative was advanced to the conceptual design phase because it would enhance the existing RSA and rescue access in the event of an emergency, at a construction cost which appears to be feasible.

The MEPA Certificate issued for the ENF stated that the alternatives that should be carried forward to the Draft EA/EIR and analyzed are the ISA and the No-Action/No-Build Alternative for Runway 22R. The No-Action/No-Build Alternative assumes that Runway 22R enhancements would not occur and routine maintenance at the airport would continue. Other airport projects occurring in the same timeframe of the RSA improvements are assessed under cumulative impacts (Section 4.4 of this document). The MEPA Certificate also required that Massport evaluate whether there are feasible alternatives to placing fill (such as piles) and whether the amount of fill could be reduced.

The proposed Runway 22R ISA would not increase the arrestment speed of the existing 60 psi strength EMAS bed, which meets the current minimum FAA Design Standards for overrun protection for the design aircraft (Boeing 757-200), but would provide a smoother transition into the water for any aircraft that exits the runway at a speed greater than 40 knots. There is a substantial elevation change and slope gradient from the end of the existing EMAS bed down to the mean low water elevation. An inclined safety area would re-grade this area to provide a more constant slope in the event that the aircraft exited the EMAS bed and entered the water, and would reduce the potential for loss of life and damage to any aircraft that fails to stop within the existing EMAS bed. It would also significantly enhance access by rescue personnel as well as egress by passengers.

The proposed Runway 22R ISA would be similar to the ISA previously constructed at the Runway 22L end. It would require gravel fill to be placed approximately 130 feet north from the top of Coastal Bank and would be

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<sup>24</sup> EOE #14442 ENF Certificate August 14, 2009.



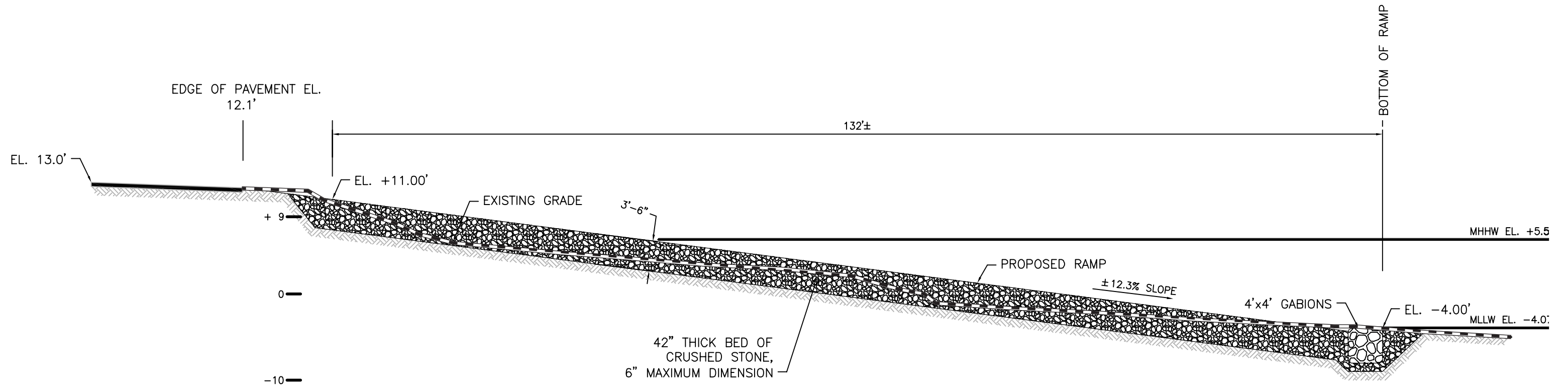
graded over the full width of the safety area down to the mean lower low water elevation.<sup>25</sup> The proposed Runway 22R ISA would include placing approximately 8,450 cubic yards of fill, contained within a perimeter wall of stone-filled gabions and surfaced with crushed stone. Emergency access ramps would not be required because the ISA would provide first responders with access between the water and the airfield. The perimeter road would not be relocated. Figure 2-12 and Figure 2-13 show the proposed Runway 22R ISA. The proposed Runway 22R ISA construction would take place fully within the Airport Boundary.

The Secretary's Certificate required that Massport evaluate whether impacts of the Runway 22R ISA could be minimized by design modifications. As discussed above, the ISA cannot be constructed on pilings because it would not be financially feasible and would not reduce impacts to salt marsh, which would be adversely impacted or lost due to shading. Two minimization options were evaluated during preparation of this Draft EA/EIR, as described below.

- Reduce the width of the ISA from 500 feet to 300 feet. This was evaluated but rejected as being incompatible with the safety objectives of the proposed Runway 22R ISA. The existing RSA at the Runway 22R end is 500 feet wide. This provides a safe width to allow aircraft that leave the runway to come to a stop. The ISA needs to be the same width as the RSA so that aircraft, should they leave the runway and miss the existing 170-foot wide EMAS bed, can safely transition into the water.
- Reduce the length of the fill from approximately 130 feet. The proposed ISA provides a 12.3 percent slope from the existing RSA to the water. A steeper slope of the ISA would not be consistent with the safety objectives of the proposed Runway 22R ISA, since reducing the length of the fill would increase the risk of damage to an aircraft, and would be too steep for emergency response personnel or vehicles to reach an aircraft on the ISA or in the water.

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<sup>25</sup> Mean Lower Low Water (MLLW) = the average daily lower low water level of the tide at a location. Some locations have diurnal tides--one high tide and one low tide per day. At most locations, there are semidiurnal tides--the tide cycles through a high and low twice each day, with one of the two high tides being higher than the other and one of the two low tides being lower than the other.



Logan RSA

Figure 2-13

Runway 22R Inclined Safety Area Cross Section



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### 2.3.4 Construction

The FAA's NEPA regulations, at FAA *Order 1050.1E, Appendix A, Section 5*, requires that the environmental document must include a description of the type and nature of the construction and measures to be taken to minimize adverse effects. In addition, the Secretary's Certificate on the ENF required that the Draft EA/EIR:

- Estimate a construction schedule and hours of construction;
- Identify and describe any project phasing and timing, and/or planned construction sequencing;
- Discuss airfield operational impacts of the construction, such as temporary runway closures; and
- Consider transporting all or part of the needed construction equipment and materials via barge.

This section describes the construction techniques and activities associated with the construction of the proposed Runway 22R ISA. The information presented here is based on the preliminary construction plans which have been prepared to date, and it represents the best estimate of construction activities which can be made at this time. When the proposed Runway 22R ISA is in the final design and construction phase, Massport will prepare detailed phasing and construction sequence procedures to ensure continual safe operation of the runways, as well as airport roadways, and utilities, as was successfully done for the Runway 22L ISA.

#### 2.3.4.1 Construction Techniques and Activities

The current construction methodology includes the following steps:

- Excavate a trench around the perimeter of the proposed Runway 22R ISA to hold the stone filled gabions (stone filled baskets used to stabilize soil and prevent erosion);
- Install gabions in the trench to serve as a barrier around the excavation with filter fabric on the inside of the gabion structure to minimize the dispersion of sediment;
- Excavate and grade the interior of the ISA, once the gabions are in place;
- Place clean stone fill and compact.

The work would occur partly within the intertidal zone, thereby subjecting the materials to wave action. During excavation/dredging it is likely that the contractor would work with the tides such that there is no underwater excavation. Dredging is expected to occur using an excavator and small crane from the upland to avoid the need for equipment in the water. Appropriate sedimentation controls would be installed prior to construction.

Soils at Runway 22R would be pre-characterized to determine the material make-up. Based on these results, soils would be excavated out of the intertidal area and placed in trucks for transport to either a Massport-approved disposal facility or the Airport's Central Testing Area (CTA) for testing per standard operating procedure at the Airport before being trucked off-site. This process avoids the need to first stockpile all material at the runway end and then truck all material to the CTA for testing.

All construction materials would likely be transported by truck to the site. Because of the nature and location of the work area, it is not feasible to transport material by barge. Massport will evaluate whether barging could be used to bring stone and/or stone gabions to the site.



#### 2.3.4.2 Construction Phasing

The construction period for the Runway 22R ISA would extend over approximately one construction season (July through November). The proposed Runway 22R ISA would be completed during the same three-year time frame as Runway 33L, depending on the progress made at the Runway 33L end. Scheduling the construction would depend on closures to Runway 15R-33L for resurfacing (a separate project), as these runways cannot be closed simultaneously. Construction of the proposed Runway 22R ISA would not occur at night due to the project’s proximity to the Orient Heights and Bayswater Street neighborhoods in East Boston.

#### 2.3.4.3 Construction Costs

The cost to construct the inclined safety area is estimated to be \$1.4 million, as shown in Table 2.3-3. The cost estimate does not include the cost of salt marsh mitigation. The cost estimate is below the FAA’s maximum feasibility cost for RSA improvement (\$8 million with an EMAS bed having a 40-knot arrestment speed),<sup>26</sup> even when combined with the actual cost of the EMAS bed already installed at the Runway 22R end (\$3.4 million).

Table 2.3-3 Runway 22R Proposed Action: Estimated Construction Costs

	Construction Cost Estimate	Design and Construction Phase Services	Construction Contingency	Total Estimated Cost
Structure	\$1.1 million	\$132,000	\$211,000	\$1.4 million

## 2.4 Summary

This section summarizes the alternatives analysis and description of the Proposed Action for each RSA, and responds to the Secretary’s Certificate requirement that the Draft EA/EIR present and identify the advantage and disadvantages of the preferred alternative. The environmental impacts of each Proposed Action are described in Chapter 4, *Environmental Consequences*, of this Draft EA/EIR, and Chapter 5, *Proposed Mitigation and Section 61 Findings*, presents the proposed mitigation measures and draft Section 61 Findings.

#### 2.4.4 Runway 33L

The proposed Runway 33L RSA improvements include constructing a 600-foot long RSA at the Runway 33L end, with an EMAS bed on a 300-foot wide pile-supported deck. The proposed Runway 33L RSA improvements would include relocating the perimeter road, constructing Taxiway C1 connector, relocating the localizer to the end of the new deck (on a 60-foot long by 300-foot wide extension of the new deck), and upgrading the approach light system. Five construction options have been identified, which vary in the size (20-inch versus 48-inch) of the pilings, the type of pilings (steel versus drilled caissons), the number of pilings (ranging from 80 to 442), and the type of deck support (cast-in-place versus 70- to 100-foot long precast girders). These

<sup>26</sup> FAA Order 5200.9, *Financial Feasibility and Equivalency of Runway Safety Area Improvements and Engineered Materials Arresting System*. March 15, 2004.



construction options would have negligible differences in their environmental impacts, but would range in cost from approximately \$64 to \$74 million.

Construction of any of these options is anticipated to require three construction seasons with in-water (e.g. pile-driving) construction limited to the period from July 1<sup>st</sup> through approximately the end of November. The duration of the construction season was identified to avoid the most sensitive period for fisheries, particularly winter flounder, and an acknowledgement of Runway 15R-33L usage at Logan Airport. Massport anticipates that most of the construction materials and personnel would be transported by barge and that construction equipment would operate from barges.

As documented in Chapter 4, *Environmental Consequences*, since there are negligible differences in environmental impacts, Massport's ultimate decision on the selected Construction Option will be primarily based on construction costs and the potential impacts to the use and operations of Runway 15R-33L. The overall duration of the construction and the ability to quickly start and stop construction are critical to the safe and efficient operations of Logan Airport. In addition to cost factors, the ability to quickly construct the safety improvements is critical to airfield operations and also is anticipated to minimize potential environmental impacts.

As summarized in this Chapter and further discussed in Chapter 4, *Environmental Consequences*, of this Draft EA/EIR, the proposed Runway 33L RSA improvements would result in the loss of intertidal and subtidal wetlands (Coastal Beach, Land Under the Ocean, and Land Containing Shellfish) by placing pilings, and would alter additional area of these resources as a consequence of scour around the pilings. The area under the deck would be shaded, which would result in the loss of eelgrass which provides important fisheries habitat. These impacts have been minimized to the extent practicable, and would be mitigated as described in Chapter 5, *Mitigation and Proposed Section 61 Findings*, of this document.

#### 2.4.5 Runway 22R

The proposed Runway 22R RSA enhancement is to construct an Inclined Safety Area, approximately 130 feet long and 500 feet wide, extending from the existing perimeter road to the low water elevation. This ISA would be similar to the existing Runway 22L ISA, and would be constructed of crushed stone with a perimeter stone gabion wall. The inclined safety area would allow aircraft to transition, in an emergency situation, from the RSA to the water while minimizing damage to aircraft and would provide access for emergency responders in the event of an accident. As documented in this Chapter of the Draft EA/EIR, the proposed Runway 22R ISA would be constructed in a single construction season and would cost approximately \$1.4 million.

As summarized in this Chapter and further discussed in Chapter 4, *Environmental Consequences*, of this Draft EA/EIR, the proposed Runway 22R ISA would result in the loss of intertidal wetlands (Coastal Beach, Land Under the Ocean, and Land Containing Shellfish) by placing fill. The ISA would also result in the loss of an area of salt marsh that is within the fill footprint. These impacts have been minimized to the extent practicable, and would be mitigated as described in Chapter 5, *Mitigation and Proposed Section 61 Findings*, of this document.





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# 3

## Affected Environment

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### 3.1 Introduction

The Affected Environment for the Logan Airport Runway Safety Improvement Project is documented for each applicable environmental resource category, as specified in FAA *Order 1050.1E*<sup>1</sup> and 301 Code of Massachusetts Regulations (CMR) 11.07(g) to provide a context for understanding the impacts of the proposed Project. The purpose of the Affected Environment analysis is to describe the character of the environment in which the proposed Runway Safety Area (RSA) Improvements Project would occur.

This chapter describes environmental resources that the proposed safety improvements would affect. The Project Study Area includes the proposed improvement areas at the ends of both Runways 22R and 33L, and adjacent environmental resources that could be affected by the RSA Improvements Project (Figure 3-1). The Runway 33L end is at the eastern edge of the airfield and the Runway 22R end is at the northernmost tip of the airfield. The amount of information on a potentially affected resource is based on the extent of the expected impact and is commensurate with the impact's importance.<sup>2</sup> This Chapter summarizes the existing or baseline conditions for:

- Physical setting of the Study Area;
- Wetlands;
- Waterways and Tidelands;
- Fish, Wildlife, and Plants;
- Threatened and Endangered Species;
- Water Quality;
- Historical, Archaeological, and Cultural Resources;
- Solid and Hazardous Materials;
- Light Emissions and Visual Setting;
- Surface Transportation;
- Air Quality; and
- Noise Environment.

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<sup>1</sup> FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, released March 20, 2006.

<sup>2</sup> U.S. Department of Transportation Federal Aviation Administration. FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions*. April 28, 2006.



Section 3.2, *Resources Categories Not Considered in the Analysis* describes resources that were not evaluated in the Environmental Assessment/Environmental Impact Report because these resources are not present or would not be affected; Section 3.3, *Environmental Setting* describes the environmental context of the Study Area; Section 3.4, *Runway 33L Existing Environmental Conditions* describes existing environmental conditions within the Runway 33L Study Area; and Section 3.5, *Runway 22R Existing Environmental Conditions* describes the existing environmental conditions within the Runway 22R Study Area.

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## 3.2 Resources Categories Not Considered in the Analysis

Several resource categories were not further evaluated due to either their absence within the Study Area (Figure 3-1), or because the proposed safety improvements would not change aircraft operations or passenger activity levels and hence would not impact the resource category.

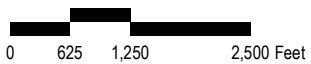
Impact categories not present or affected by implementation of any alternatives include:

- **Air Quality:** There would be no change to air quality at the airport due to the proposed RSA Improvements Project as there are no changes to aircraft operations. Air Quality is, however, addressed as a temporary, construction-related impact. In accordance with the Secretary's Certificate on the ENF, Massport is not required to prepare an analysis of greenhouse gas emissions (GHG) or identify measures to mitigate GHG emissions for the proposed RSA improvements. There is no NEPA requirement to evaluate GHG emissions for these safety improvements.
- **Compatible Land Use and Noise:** The proposed RSA improvements are fully compatible with the existing airport use and will not introduce any new land uses or noise to the project area and its environs. There would be no increase to noise at the airport due to the proposed RSA Improvements Project as the proposed improvements would not affect aircraft operations. Noise is, however, addressed as a temporary, construction-related impact for both safety projects.
- **Socioeconomic Impacts:** The proposed RSA Improvements Project do not affect the socioeconomic characteristics of the area because the Projects are limited to improving safety and does not include changes in employment or economics. The proposed project would not cause housing relocation, relocation of community businesses, disruption of local traffic patterns, or a substantial loss in community tax base. Project construction would have a positive economic impact. The safety improvements would create jobs and some economic benefit.



Legend

 Study Area



Logan RSA

Figure 3-1  
Logan Airport  
Study Area



- **Environmental Justice Populations:** The proposed RSA Improvements Project do not affect the environmental justice populations because the RSA Projects are limited to improving safety, do not impact airport operations, and do not disproportionately affect lower income or minority populations.
- **Department of Transportation Act, Section 4(f) Properties:** There are no historic or archeological resources, as protected under Section 4(f), within the Study Area. There are no parks, recreation areas, or wildlife refuges in the immediate project area that are protected under Section 4(f).
- **Farmlands:** There are no farmlands located within, or adjacent to, Logan Airport.
- **Natural Resources, Energy Supply, and Sustainable Design:** The proposed Runway 33L RSA improvements are generally limited to the construction of an Engineered Material Arresting System (EMAS), a pier, and decking. The proposed Runway 22R ISA is limited to the construction of a stone-surfaced inclined safety area (ISA). There will be no effect on local supplies of energy or natural resources resulting from the proposed RSA Improvement Project.
- **Wild and Scenic Rivers:** There are no Wild and Scenic Rivers located within, or adjacent to, the Study Area.

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### 3.3 Environmental Setting

The following section describes the general environmental characteristics of Logan Airport. Sections 3.4 and 3.5 describe the resources within each portion of the proposed RSA Improvements Project.

#### 3.3.1 Physical Setting

Logan Airport (Figure 3-1) is located on filled land within Boston Harbor within the heavily urbanized Boston Harbor Watershed. The majority of the seabed adjacent to the Logan Airport property is classified as either low-relief mud or altered by anthropogenic modification. Anthropogenically modified areas are those where the effects of human activity such as dredging, spoil disposal, construction, pipelines and cables are clearly visible. Environmental resources within, and adjacent to, the improvement areas are described in the following sections.

#### 3.3.2 Wetlands

Wetlands are present on Airport property. Wetlands within the Study Area are protected by Section 404 of the Clean Water Act as waters of the United States. Section 404 jurisdiction includes the areas of Coastal Beach, Salt Marsh, and Land Under the Ocean protected by the Massachusetts Wetland Protection Act (MA WPA) (310 CMR 10.00). Section 404 jurisdiction also includes Submerged Aquatic Vegetation, such as eelgrass. The functions and values protected by the wetlands present at the Airport include fish and shellfish habitat, production export, sediment/shoreline stabilization, and wildlife habitat.

The wetlands present within the Study Area are also coastal wetlands protected under the MA WPA as:





- Coastal Bank;
- Coastal Beach;
- Salt Marsh;
- Land Containing Shellfish;
- Land Under the Ocean; and
- Land Subject to Coastal Storm Flowage.

There are no inland wetlands within the Study Area that are protected under Section 404 or the MA WPA.

#### 3.3.2.1 Coastal Bank

Coastal Bank extends from mean high water up to where the slope of the Coastal Bank is level. It is the seaward face of any elevated landform. In some areas at the Airport, the Coastal Bank is vegetated, and in other areas altered to be a hard surface such as riprap.

According to the MA WPA, Coastal Banks are likely to be significant to storm damage prevention and flood control. Additionally, Coastal Banks that supply sediment to Coastal Beaches, Coastal Dunes, and Barrier Beaches are significant to storm damage prevention and flood control. The Coastal Bank at the Airport does not serve as a sediment source, but is significant to storm damage prevention and flood control.

#### 3.3.2.2 Coastal Beach

Coastal Beach extends from mean low water to the Coastal Bank. Tidal Flats are the nearly level portion of the Coastal Beach. Tidal Flats are only present at the Runway 22R end. Some areas of Coastal Beach at the Airport are riprap surfaces such as at Runway 33L.

According to the MA 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. The Coastal Beaches at the Airport are significant to all of these interests protected by the MA WPA. In addition, Tidal Flats are likely to be significant to the protection of marine fisheries and to shellfish. The Tidal Flats at the Airport are significant to the protection of marine fisheries and shellfish.

#### 3.3.2.3 Salt Marsh

Salt Marsh is defined by the MA WPA regulations as a coastal wetland that extends landward up to the highest high tide line, and is characterized by plants that are well adapted to, or prefer living in, saline soils. Dominant plants within Salt Marshes are salt meadow cord grass (*Spartina patens*) and/or salt marsh cord grass (*Spartina alterniflora*).

Salt Marshes are significant to the protection of marine fisheries, wildlife habitat, to the protection of land containing shellfish and the prevention of pollution. They are also likely to be significant to storm damage prevention and ground water supply. Salt Marsh is present at the Runway 22R end, and is significant to all of these interests.



#### 3.3.2.4 Land Containing Shellfish

Land Containing Shellfish is found within other coastal wetlands resources subject to the jurisdiction of the MA WPA and it is a significant interest identified in the MA WPA. The shellfish species that are characteristic of Land Containing Shellfish include bay scallop (*Argopecten irradians*), blue mussel (*Mytilus edulis*), ocean quahog (*Acrtica 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*).

Land Containing Shellfish is significant to the protection of shellfish and the protection of marine fisheries when it has been identified and mapped by the local conservation commission or the Massachusetts Department of Environmental Protection (DEP) in consultation with the Massachusetts Division of Marine Fisheries (DMF) or in consultation with the local shellfish constable or the DEP. Most of the intertidal area on the Airport property is identified by the DMF as available for commercial harvest on a conditionally restricted basis and is significant to shellfish. Low densities of shellfish have been observed at the Runway 33L and Runway 22R Study Areas.

#### 3.3.2.5 Land Under the Ocean

Land Under the Ocean extends from the mean low water line seaward to the boundary of the municipality's jurisdiction and includes land under estuaries. The nearshore areas of Land Under the Ocean extend from mean low water seaward to the boundary of the municipality's jurisdiction, but in no case beyond a point where the land is 80 feet below the level of the ocean at mean low water. Land Under the Ocean exists on three sides of the Airport property.

Land Under the Ocean is likely to be significant to the protection of marine fisheries, and where there are shellfish, to protection of shellfish. The nearshore areas are likely to be significant to storm damage prevention, flood control, and protection of wildlife habitat. Land Under Ocean at the Airport is significant to all of these interests.

#### 3.3.2.6 Land Subject to Coastal Flowage

Land Subject to Coastal Storm Flowage includes Coastal Bank, Coastal Beach, and the landward extent of the 100-year floodplain. Floodplains are defined in the federal Executive Order (EO) 11988, *Floodplain Management*, 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).<sup>3</sup>

The one 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. The 0.2 percent annual chance flood (500-year frequency) is also employed to indicate additional areas of flood risk. The 500-year floodplain is the minimum floodplain of concern for Critical Actions.<sup>4</sup> Critical Actions, as described in United States Department of Transportation (USDOT) Order 5650.2, include flooding impacts, such as loss of life, injury to persons, or damage to property.

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<sup>3</sup> 42 Federal Register 26951, Executive Order No. 11988, Floodplain Management, May 24, 1977.

<sup>4</sup> 24 Code of Federal Regulations 55, Subpart A, Section 55.2, 1 October 2002.



The areas subject to flooding were identified and mapped according to existing Flood Insurance Rate Map (FIRM) issued by the Federal Emergency Management Agency (FEMA). The Runway 33L Study Area is included on the City of Boston Community FIRM Panel No. 25025C0082G, revised September 25, 2009. According to the FIRM, the Study Area contains areas of 100-year floodplains.

The Study Area contains areas designated as Zone VE associated with Boston Harbor (Figure 3-2). Zone VE refers to areas inundated by the 100-year floodplain with base flood elevations determined to be 15 feet above National Geodetic Vertical Datum of 1929 (NGVD). These areas also represent Land Subject to Coastal Storm Flowage, as described by the MA WPA, and are 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.”

### 3.3.3 Waterways and Tidelands

Logan Airport is surrounded on three sides by Boston Harbor. Massachusetts General Law Chapter 91 protects the public’s interest in the waterways of the Commonwealth. Chapter 91 does not apply to any of the previously filled tidelands within the geographical boundary of Logan Airport (310 CMR 9.03(3)); only tidelands located below the high tide line are subject to Chapter 91 jurisdiction at the Airport.

The MEPA Certificate called for an explanation of how the DEP Waterways Regulations at 310 CMR 9.00 apply to the Project. This section describes the applicability of the Chapter 91 Waterways regulations to Logan Airport.

#### 3.3.3.1 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.”<sup>5</sup>

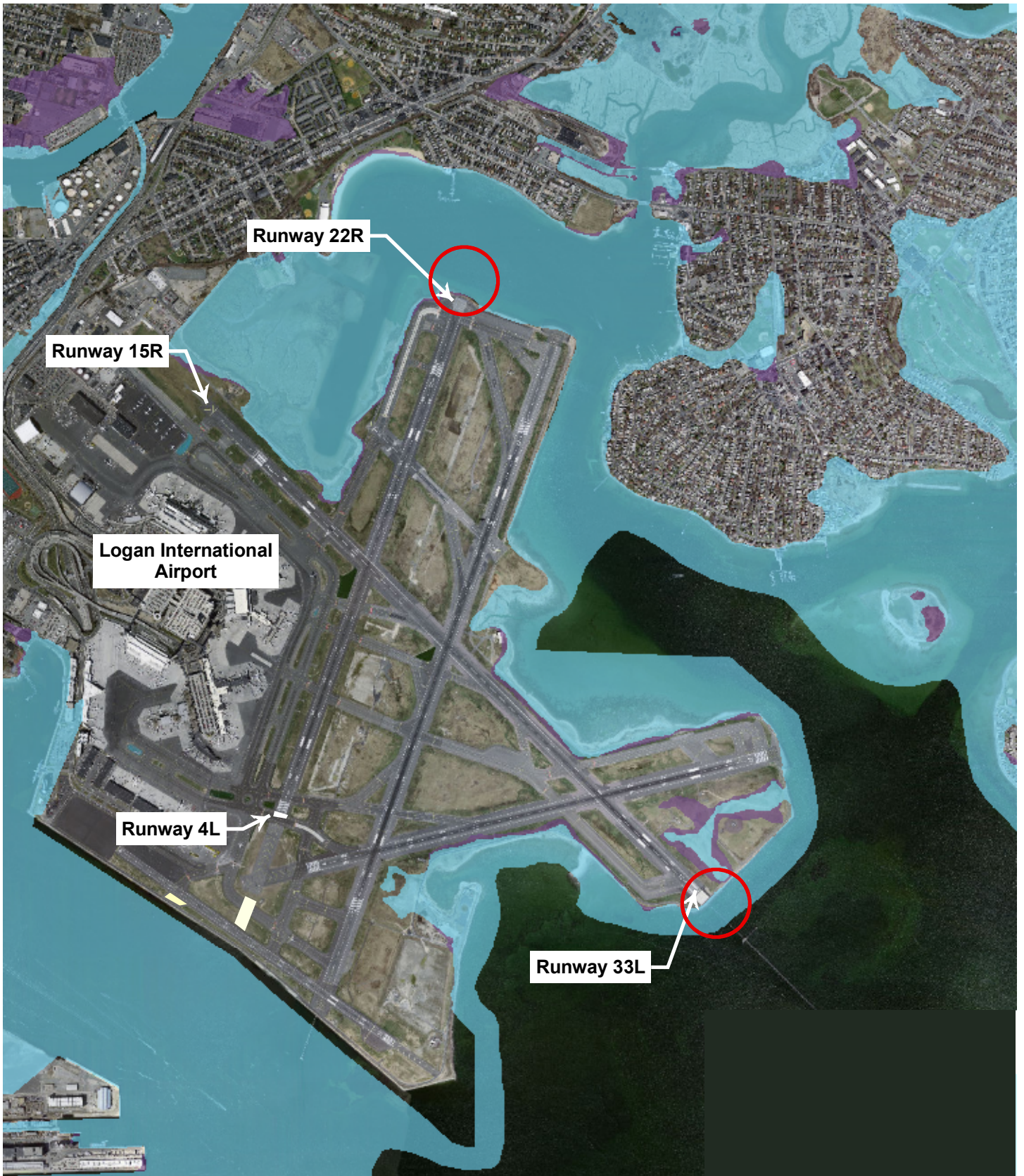
To facilitate operation of Logan Airport by Massport, fee ownership of Logan Airport, and certain adjacent lands under water, was conveyed to Massport by the Enabling Act. Importantly, the Enabling Act also contained a broad authorization by the Massachusetts General Court for Massport to use additional 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.<sup>6</sup> (emphasis added)




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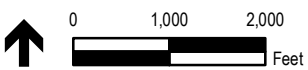
<sup>5</sup> Massachusetts Port Authority Enabling Act, Chapter 465 of the Acts of 1956, Section 2, Paragraph 1 (as amended).  
<sup>6</sup> *ibid.*, Section 4, Paragraph 6.





**Legend**

-  RSA Improvement Study Area
-  500-Year Flood Zone
-  100-Year Flood Zone (including AE and VE Zones)



Logan RSA

**Figure 3-2**  
**Coastal Flood Zones**

Data Sources:  
Jacobs Edwards & Kelcey, Inc.  
Childs Engineering Corps.  
Office of Geographic and Environmental Information (2008)  
2008 Aerial Photography (MassGIS)



The RSA Improvements Project area is entirely composed of areas granted to Massport by the Enabling Act for airport purposes, and adjacent lands under water that the Massachusetts Legislature authorized for use in connection with the airport.

### 3.3.3.2 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 Massachusetts General Law (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 mark at Logan Airport.<sup>7</sup> With extremely limited exceptions described below, and subject in all events to Massport's oversight and permission, public access is not permitted within the Logan Airport Security Zone. Because the RSA Improvements Project would be located entirely within the Logan Airport Security Zone, the RSA Improvements Project does not adversely affect any existing public rights in tidelands.

Non-airport-related activity is totally 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. The approach light system installed on the existing wooden pier which extends into Boston Harbor from the end of Runway 33L already requires boats to circumnavigate the pier, and thus physically excludes boating traffic from the proposed Runway 33L RSA Improvements Project Area.

Limited shellfishing authorized by the Department of Marine Fisheries (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 M.G.L. Chapter 90, Section 61, to register in advance with Massport and to undergo a security investigation which includes a federally-mandated criminal records history check and a United States Transportation Security Administration Terrorism Risk Assessment. Approximately thirty commercial shellfishermen have 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."<sup>8</sup>

Accordingly, pursuant to M.G.L. 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-regulated shellfishing activities that may take place within the Logan Airport Security Zone do not conflict with the use of the RSA Improvements Project for its intended purposes.

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<sup>7</sup> Massachusetts General Law, Chapter 90, Section 61(a).

<sup>8</sup> Massachusetts General Law, Chapter 90, Section 61(b).



### 3.3.3.3 Regulation of Massport Activities Under the Waterways Regulations

The unique role that Massport plays with respect to the tidelands within the Port of Boston under its Enabling Act has resulted in the unique treatment of Massport's projects under the DEP Waterways Regulations. Massport's airport 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 DEP 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.** (emphasis added)."

Consistent with the Enabling Act, the DEP Waterway Regulations [310 CMR 9.03(3)] expressly contemplate that:

"Massport and the [DEP] shall develop [a Memorandum of Understanding ("MOU")] ...in order to further clarify the Department's jurisdiction under M.G.L. Chapter 91 relative to the purposes, powers, and plans of Massport under its Enabling Act."

Although DEP and Massport have entered into a MOU with respect to certain activities within the Port of Boston, no such memorandum has been entered into to address the overriding public safety need for construction of runway safety areas that extend into flowed and submerged tidelands bordering Logan Airport. Massport is prepared to work with DEP toward execution of an appropriate MOU, Chapter 91 license, or variance as DEP deems most suitable for addressing the proposed RSA Improvements Project.

### 3.3.4 Fish, Wildlife and Plants

In conformance with the 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act,<sup>9</sup> the National Marine Fisheries Service (NMFS) has designated Essential Fish Habitat (EFH) within marine, estuarine and freshwaters of the U.S., including Boston Harbor. Designated EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Within Boston Harbor, EFH

<sup>9</sup> *Magnuson-Stevens Fishery Conservation and Management Act*, Public Law 94-265, as amended through October 11, 1996. (<http://www.nmfs.noaa.gov/sfa/magact/>)



has been designated for one or more life stages of 18 species of fish. Species include: Atlantic cod (*Gadus morhua*), haddock (*Melanogrammus aeglefinus*), pollock (*Pollachius virens*), whiting (*Merluccius bilinearis*), red hake (*Urophycis chuss*), white hake (*Urophycis tenuis*), winter flounder (*Pleuronectes americanus*), yellowtail flounder (*Pleuronectes ferruginea*), windowpane flounder (*Scopthalmus aquosus*), American plaice (*Hippoglossoides platessoides*), ocean pout (*Macrozoarces americanus*), Atlantic halibut (*Hippoglossus hippoglossus*), Atlantic sea herring (*Clupea harengus*), bluefish (*Pomatomus saltatrix*), long finned squid (*Loligo pealei*), short finned squid (*Illex illecebrosus*), Atlantic butterfish (*Peprilus triacanthus*), and Atlantic mackerel (*Scomber scombrus*).

The DMF identified fish and shellfish species that may be found in the vicinity of the proposed RSA Improvements Project and concluded that the mudflats surrounding Logan Airport provide habitat for soft shell clams (*Mya arenaria*) and blue mussels (*Mytilus edulis*), which are commercially and recreationally important species of shellfish. Specifically, the intertidal mudflats surrounding Logan Airport have been designated by DMF as Shellfish Growing Area GBH5 (area 5.2 adjacent to Runway 22R and 5.3 adjacent to Runway 33L), which are as available for commercial harvest on a conditionally restricted basis (see Appendix 4, *Agency Correspondence*).




Review of the Massachusetts Natural Heritage and Endangered Species Program (NHESP) Atlas indicates that a large portion of the airfield at Logan Airport is priority habitat for the upland sandpiper (*Bartramia longicauda*), which is listed as endangered in Massachusetts (Figure 3-3). This species is known to occur in the large grassy uplands in the interior of the airfield.

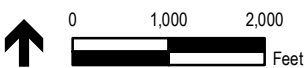
Much of the Airport's airfield is grass. At the water's edge, in a number of locations on Airport property, there are stands of common reed (*Phragmites australis*), an invasive species that can overtake native vegetation. Salt marsh also exists on Airport property near the Runway 22R end at the northwestern end of the Airport. There is a large eelgrass bed off of Runway 33L. There are no other rare or unique plant communities at the Airport.





**Legend**

-  RSA Improvement Study Area
-  NHESP Priority Habitats of Rare Species
-  NHESP Estimated Habitats of Rare Species



Logan RSA

**Figure 3-3**

**Priority and Estimated Habitat of State-listed Rare Species**

Data Sources:  
 Jacobs Edwards & Kelcey, Inc.  
 Childs Engineering Corps.  
 Office of Geographic and Environmental Information (2008)  
 2008 Aerial Photography (MassGIS)  
 2008 NHESP Atlas (MassGIS)



### 3.3.5 Federally-Listed Threatened and Endangered Species

Federally-listed threatened and endangered species are either under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS) or NMFS. Generally, USFWS manages land and freshwater species, while NMFS manages marine and anadromous species. USFWS indicated that there are no federally-listed threatened or endangered species under their jurisdiction within the Project area.<sup>10</sup> According to NMFS,<sup>11</sup> suitable forage and habitat exists in Boston Harbor for three species of federally threatened or endangered sea turtles and five species of whales: loggerhead turtles (*Caretta caretta*), Kemp's ridley turtles (*Lepidochelys kempi*), leatherback sea turtles (*Dermochelys coriacea*), the federally endangered North Atlantic right (*Eubalaena glacialis*), the federally endangered humpback (*Megaptera novaeangliae*), the fin (*Balaenoptera physalus*), the sei (*Balaenoptera borealis*), and the sperm (*Physeter macrocephalus*) whales. NMFS deemed it "likely" that sea turtles are occasionally present in Boston Harbor and therefore, may occasionally be present in the Study Area. Furthermore, NMFS data documents loggerheads and Kemp's ridleys in waters as cold as 11°C. They 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. Agency correspondence is provided in Appendix 4, *Agency Correspondence*.

### 3.3.6 Water Quality

Boston Harbor has seen dramatic improvements in water quality over the last few years, as a result of long-term community involvement and regulatory controls. The Massachusetts Water Resources Authority (MWRA) Deer Island Treatment Plant and Massachusetts Bay Wastewater Effluent Outfall have also contributed to the improvement of water quality in Boston Harbor.

#### 3.3.6.1 Boston Harbor Water Quality

The most recent Water Quality assessment<sup>12</sup> by the DEP includes the latest comprehensive water quality data collected and analyzed for Boston Harbor. The Assessment included a division of Boston Harbor, and adjacent waterbodies, into several segments based on contributing drainage areas and waterbody characteristics. The segments surrounding the proposed Logan RSA Study Area are the Winthrop Bay Segment MA70-10 and the Boston Harbor Segment MA70-01. The Winthrop Bay Segment begins at the tidal flats at Coleridge Street in East Boston and ends at an imaginary line drawn to the northeast of Runway 33L, extending eastward to Point Shirley in Winthrop. The Boston Harbor Segment begins at the above-mentioned line extending eastward into Massachusetts Bay, southward to Point Allerton in Hull, and westward across the mouths of Quincy and Dorchester bays. Both segments are classified within the Massachusetts Surface Water Quality regulations (310 CMR 4) as restricted Class SB Shellfishing waters and are on the 2008 Clean Water Act 303(d) list of impaired waters<sup>13</sup> for pathogens.

The Water Quality Assessment was primarily based on the MWRA's ongoing Combined Sewer Overflow (CSO) monitoring program. MWRA collected monthly surface and bottom water quality samples for Dissolved Oxygen (DO), temperature, turbidity, chlorophyll a, and Total Suspended Solids (TSS) from 1998 to 2000 at

<sup>10</sup> Letter received from the United States Fish and Wildlife Service, New England Field Office, dated December 19, 2007.

<sup>11</sup> Letter received from Mary A. Colligan, NMFS Regional Administrator for Protected Resources, dated July 13, 2009.

<sup>12</sup> Commonwealth of Massachusetts Executive Office of Energy and Environmental Protection, Department of Environmental Protection. *Boston Harbor 1999 Water Quality Assessment Report*. October 2002.

<sup>13</sup> Massachusetts Department of Environmental Protection. *Massachusetts Year 2008 Integrated List of Waters*. December, 2008





Station 129 - Deer Island Flats (between Deer Island and the Airport) and Station 130 - Winthrop Harbor. The outcome of the monitoring programs, described below, depict the overall water quality conditions within the Study Area.

Results of the MWRA's Winthrop Harbor monitoring program showed that the Harbor met the Surface Water Quality Standards (SWQS) for a Class SB waterbody, and support reproduction, migration, growth and other critical functions of aquatic life. Results of the Deer Island Flats monitoring program within the Boston Harbor Segment also showed that this segment of the Harbor also supports the Primary and Secondary Contact Recreational use criteria of the SWQS.

In 2007, the MWRA prepared the *Water Quality Monitoring in Massachusetts Bay 1992-2007*<sup>14</sup> report, which assessed the environmental effects of the relocation of effluent discharge from Boston Harbor to Massachusetts Bay. The closest sampling location to Logan Airport was at station F30, in the vicinity of an outfall site at the tip of Castle Island in South Boston. Analytical results showed significantly lower nutrient concentrations (80-percent reduction) and chlorophyll concentrations in Boston Harbor following the diversion of effluent discharge from the Harbor to the Massachusetts Bay Outfall. Water quality has also improved as a result of the Boston Water and Sewer Commission's (BWSC) recently completed sewer separation work in the Constitution Beach section of East Boston.

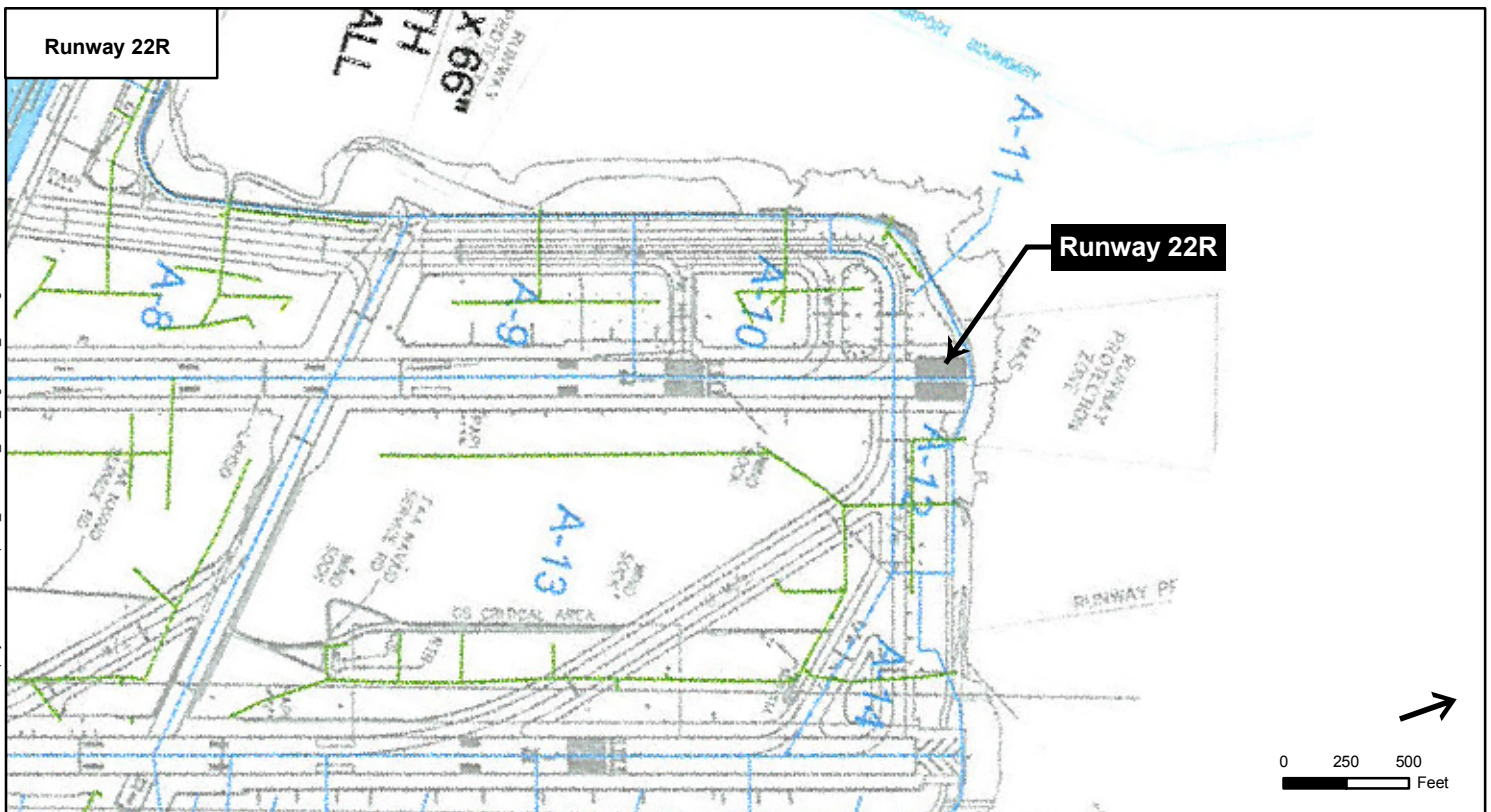
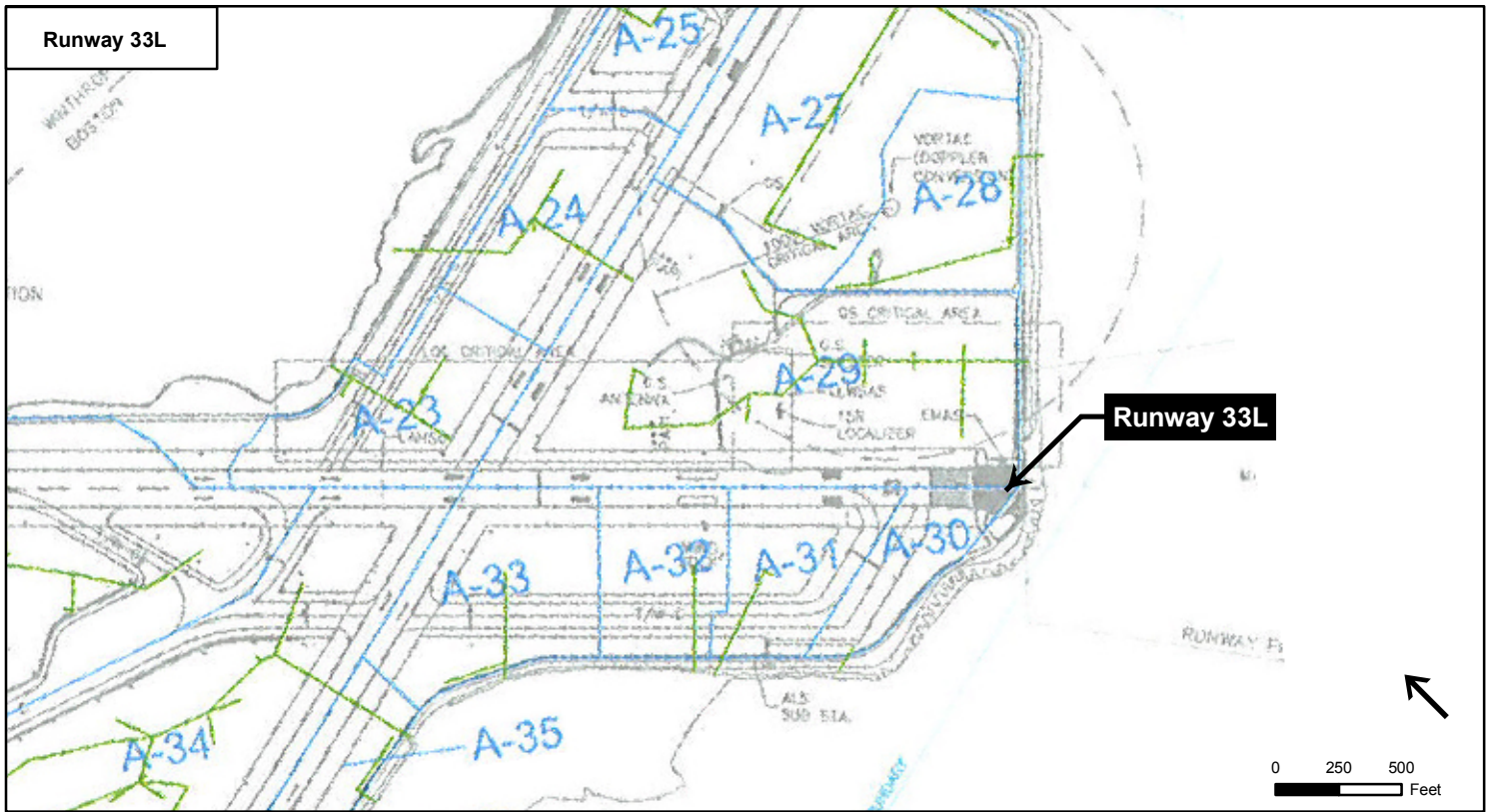
#### 3.3.6.2 Logan Airport

The Stormwater Management system at Logan Airport consists of both a closed and open conveyance system. The closed system 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. These outfalls and associated drainage areas within the Study Area are shown in Figure 3-4. The open stormwater system uses the airfield's grass swales and open channels to infiltrate stormwater from runway surfaces.



On July 31, 2007, the U.S. Environmental Protection Agency (US EPA) and DEP issued a National Pollutant Discharge Elimination System (NPDES) permit for Logan Airport's stormwater outfalls: NPDES Permit MA0000787. Massport holds a separate NPDES permit for the Fire Training Facility (NPDES Permit MA0032751). The NPDES permit MA0000787 regulates stormwater discharges from the North, West, Northwest, Porter Street, and Maverick Street outfalls, and all of the airfield outfalls. The 2007 NPDES permit sets discharge limitations for pH, oil and grease, and TSS from the North, West and Maverick Street outfalls, but requires only a report of the sampling results for all other outfalls and parameters the permit. Massport developed an Airfield Stormwater Outfall Sampling Plan in March 27, 2008, in accordance with the requirements of the new NPDES permit. The Sampling Plan specified quarterly wet weather sampling at a minimum of seven of the airfield outfalls in order to obtain representative samples of the quality of stormwater runoff from the airfield. Table 3.3-1 shows the results of the perimeter outfall monitoring program for three quarters in 2008.

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<sup>14</sup> Massachusetts Water Resources Authority. *Water Quality Monitoring in Massachusetts Bay 1992-2007: Focus on 2007 Results*. Report 2008-16. September 2008.



**Legend**

-  Stormwater Drainage Line
-  Runway Perimeter Outfall Drainage Areas



Logan RSA

**Figure 3-4**

**Drainage Areas and Perimeter Outfalls**





Table 3.3-1 Logan Airport 2008 Quarterly Wet Weather Monitoring Results - Northwest and Runway/Perimeter Stormwater Outfalls

Outfalls	Date	Maximum Daily Flow (MGD)	Average Quarterly Flow (MGD)	pH (SU)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (ug/L)
Permit Limitations <sup>1</sup>	N/A	None (report)	None (report)	None (report)	None (report)	None (report)	None (report)
Average – Outfalls 9, 19, 20, 21, 23, 33, 39	6/23/08	2.96	0.019	6.8	1.9	22	0.0
Highest Recorded Results (Outfall # 23)	6/23/08	2.94	0.017	6.74	4.6	15	<1.0
Average – Outfalls 9, 19, 22, 23, 33, 34, 40	9/26/08	1.90	0.11	7.61	0.0	26	0.0
Average - Outfalls 9, 18, 20, 21, 23, 33, 38	11/6/08	0.82	0.05	7.31	0.0	7.5	0.0

MGD: Millions of Gallons per Day.

mg/L: milligrams per liter.

SU: Standard Units.

ug/L: micrograms per liter.

<sup>1</sup> NPDES Permit MA0000787, issued July 31, 2007.

Although the outfalls located adjacent to the Study Area for the Runway 33L and Runway 22R RSAs (A-11, A-12, A-29, and A-30; see Figure 3-4) were not included in the sampling program, the monitoring data are representative of water quality in the immediate area surrounding the Airport. Generally, the results of this sampling program include higher concentrations of TSS than those found in Winthrop Harbor or Boston Harbor, as described in Section 3.3.6.

In June of 2008, the highest concentrations found at the airfield outfalls were 4.6 mg/L of oil and grease and 99 mg/L of TSS. Deicing sampling at the North and West Outfalls occurred on four separate dates in February and March 2008. The highest concentrations of deicing and deicing-related compounds included 43 mg/L of ethylene glycol and 59 mg/L of propylene glycol from a sample at the West Outfall, 4,600 mg/L chemical oxygen demand (COD), and over 2,200 mg/L five-day biochemical oxygen demand (BOD<sub>5</sub>) from a sample at the North Outfall.

Due to the large size of the drainage areas and relatively low concentration of these constituents, it is not possible to trace exceedances to specific events. Where a known event, such as a spill, is reported, Massport routinely checks the drainage system for impacts from the event and takes corrective actions if necessary. The 2008 water quality monitoring results for discharge from the outfalls are provided in the *Logan Airport 2008 Environmental Data Report, Appendix J, Water Quality/ Environmental Compliance and Management*,<sup>15</sup> along with the

<sup>15</sup> Massachusetts Port Authority. *Logan Airport 2008 Environmental Data Report, Appendix J, Water Quality/ Environmental Compliance and Management*. EOE #3247, September 2009.



history of water quality monitoring results that dates back to 1993. As these results show, there are no illicit discharges associated with stormwater discharges at Logan Airport.

### 3.3.7 Historical, Archaeological, and Cultural Resources

There are no known historical, archaeological, or cultural resources within the Study Area. According to the Massachusetts Historical Commission, there are no historic or cultural resources at the Airport.<sup>16</sup> Correspondence is provided in Appendix 4, *Agency Correspondence*.

### 3.3.8 Solid and Hazardous Materials

Although there have been reported spills and releases at Logan, 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.

In accordance with the MCP process, Massport continues to assess, remediate, and bring to regulatory closure areas of subsurface contamination. Massport leads the performance of a variety of response actions, including remediation at sites where Massport is the responsible party, where there are multiple responsible parties, and where no responsible party has been identified.<sup>17</sup>

### 3.3.9 Surface Transportation

This section describes the existing surface transportation system near Logan Airport. FAA *Order 5050.4B* requires an assessment of the surface transportation system as part of the NEPA process when the action could cause disruption of local traffic patterns that substantially reduce the level of service (LOS) of roads serving an airport and its surrounding communities.<sup>18</sup> The proposed safety improvements would not change the number of aircraft operations or passenger activity levels, and are anticipated to have only temporary increases in traffic associated with construction workers and vehicles. Short-term construction impacts are expected to be limited to the segments of the East Boston roadways that provide access to the Airport's entrances (Service Road, Frankfurt Street, Maverick Street and Prescott Street).

Service Road is a two-lane roadway that provides access from Frankfurt Street to the MBTA Airport station. At Airport Station, Service Road becomes a four-lane roadway, wrapping along the north cargo area towards Hotel Drive. Frankfurt Street is a two-lane roadway that provides direct access to the North Cargo area and indirect access to Logan Airport via Service Road SR2. Local connections to East Boston and Bennington Street, as well as regional connections via Route 1A are made from Frankfurt Street via Neptune Street. Prescott Street is a two-lane roadway that provides access from both Service Road and Frankfurt Street to the North Cargo area and the airside roadway infrastructure. The southern portion of Logan Airport is served by Maverick Street, a two-lane roadway that provides a direct connection from Chelsea and East Boston to the Southwest Service area

<sup>16</sup> Letter received from the Massachusetts Historical Commission, dated December 7, 2007.

<sup>17</sup> There are a number of phases for the investigation of contaminated sites. Phase I involves initial site investigations for the presence of contamination and Phase II assessments are more comprehensive site investigations. Phase III identifies, evaluates, and selects remediation actions and Phase IV involves the implementation of selected remedial actions. Phase V involves the operation, maintenance and/or monitoring of the remediation program.

<sup>18</sup> Federal Aviation Administration Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects, Federal Aviation Administration United States Department of Transportation, 28 April 2006.



and Harborside Drive. Maverick Street is gate-controlled at the airport to discourage regional traffic from using local roadways to access the airport.

### 3.3.10 Air Quality

The federal Clean Air Act (CAA), the National Ambient Air Quality Standards (NAAQS) (40 CFR part 50), and similar state law govern air quality issues 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 this area. NAAQS includes a group of criteria air pollutants 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<sub>2</sub>); ozone; particulate matter smaller than or equal to 10 microns in diameter (PM<sub>10</sub>); particulate matter smaller than or equal to 2.5 microns in diameter (PM<sub>2.5</sub>); and sulfur oxides (SO<sub>x</sub>).

In accordance with the CAA, and based on air quality monitoring, all areas within Massachusetts are designated with respect to the NAAQS as 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 entire Boston metropolitan area is designated as attainment for all the criteria pollutants except ozone, which is designated as "moderate" nonattainment for the 1997 eight hour ozone standard. The ozone nonattainment area consists of ten counties in Massachusetts (Barnstable, Bristol, Dukes, Essex, Middlesex, Nantucket, Norfolk, Plymouth, Suffolk, and Worcester). Logan Airport is located in Suffolk County. The Boston area is also presently designated as attainment/maintenance for CO, indicating that it is in transition back to attainment for this pollutant.

In 2008, Massport conducted an emission inventory for Logan Airport for the pollutants Volatile Organic Compounds (VOCs), CO, NO<sub>x</sub> and PM<sub>2.5</sub> and PM<sub>10</sub>. Emissions of ozone were not included because it is a secondary pollutant formed by emissions of NO<sub>x</sub> and VOCs, which serve as a surrogate for ozone formation. There were no exceedances for any criteria pollutants at Logan Airport in 2008.<sup>19</sup>

The proposed safety improvements would not result in changes to the number of aircraft operations or vehicles accessing the airport and would not change the results of the emissions inventory. Potential air quality effects will only be considered with respect to the temporary effects of project construction (see Chapter 4, *Environmental Consequences*).

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<sup>19</sup> Massachusetts Port Authority. *Logan Airport 2008 Environmental Data Report, Appendix i, Air Quality*. EOE #3247, September 2009.



### 3.3.11 Noise Environment

The noise environment at Logan Airport has been documented in several previous studies and in the *Logan Airport 2008 Environmental Data Report (EDR) Appendix H, Noise Abatement*.<sup>20</sup> Noise has been evaluated using the FAA's INMv7.0a model that was released for general use on September 17, 2008, and now replaces INMv7.0, that was used as the primary analytical tool to assess the noise environment at Logan Airport. The modeling also includes provisions for over-water sound propagation and hill effects that have been tailored to the local environment and approved by FAA's Office of Environment and Energy (AEE) based on previous special studies. The INM 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, 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 2008 EDR Appendix H, Noise Abatement*.

The 2008 Day-Night Average Sound Level (DNL) contours were prepared using FAA's INMv7.0a 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, a FAA-defined metric for evaluating noise and land use compatibility. The 2008 contour includes the FAA-approved adjustments to account for over-water sound propagation and hill effects in Orient Heights that are unique to Logan Airport.

In general the 2008 DNL 65 dB contour, representing noise reductions, was smaller in almost all locations surrounding the Airport compared to previous years. Fewer departures from Runway 33L reduced noise levels in East Boston. Departures from Runway 9 and 22R increased in 2008 but cumulative noise levels were lower over Winthrop and Boston Harbor than in previous years due to the reduction in overall operations.

The proposed safety improvements would not result in changes to Airport operations and would not change the noise environment. Potential noise effects will only be considered with respect to the temporary effects of project construction (see Chapter 4, *Environmental Consequences*).

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## 3.4 Runway 33L Existing Environmental Conditions

Runway 15R-33L is Logan's longest runway, and extends from the northwest corner of the Airport in East Boston to the edge of Boston Harbor. The southern end of Runway 33L faces the shipping and navigation channels in Boston Harbor. There are no developed areas adjacent to Runway 33L as its end is at the edge of the Boston Harbor, and the Runway itself is surrounded by Airport property (Figure 3-1). The closest neighborhood to the Runway 33L end is the Point Shirley residential neighborhood in Winthrop across Boston Harbor.

This section describes the existing environmental conditions specific to the Runway 33L Study Area (Figure 3-1) that the proposed Runway 33L RSA improvements would affect, based on conceptual design.

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<sup>20</sup> Massachusetts Port Authority. *Logan Airport 2008 Environmental Data Report, Appendix H, Noise Abatement*. EOE #3247, September 2009.



### 3.4.1 Wetlands

The Runway 33L RSA area includes Coastal Bank, Coastal Beach, Land Containing Shellfish, and Land Under the Ocean (Figure 3-5), as defined by the MA WPA regulations (310 CMR 10.00 et seq.). Portions of this area are also subject to MA WPA regulations as Land Subject to Tidal Action and Land Subject to Coastal Storm Flowage. Coastal Beach and Land Under the Ocean are also waters of the United States under federal jurisdiction.

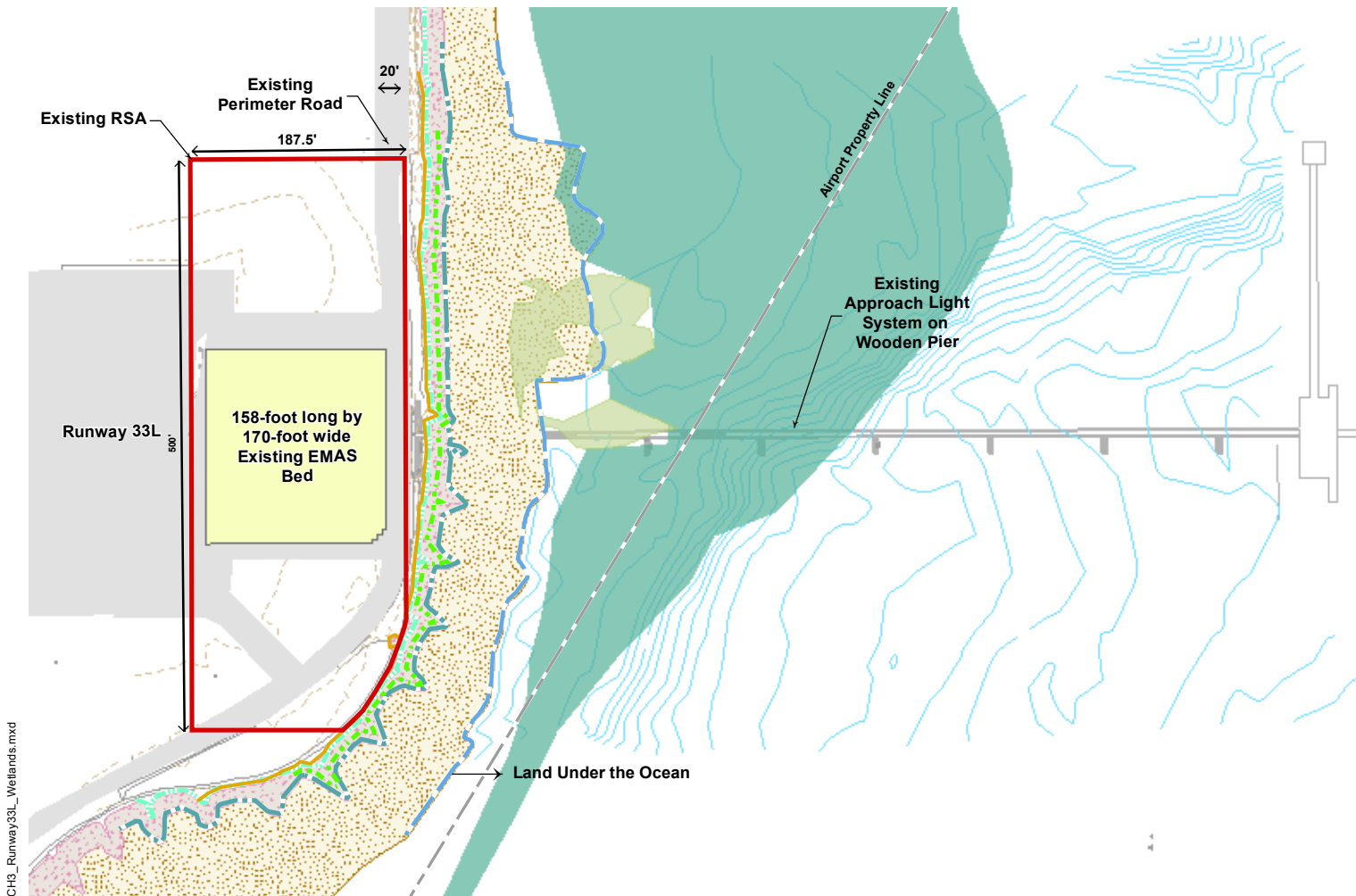
The Coastal Bank at Runway 33L is placed stone. It does not supply sediment and is significant only to storm damage prevention. An existing timber pier that supports the approach lighting system for Runway 33L arrivals extends from the Coastal Bank approximately 2,400 feet into Boston Harbor. West of the pier, several large boulder groins form the upper substrate portion of this high energy environment. Large boulder placed rip-rap is also east of the pier along the upper Coastal Bank, and concrete has been poured over the boulders and cobble-sized stones to help stabilize the slope. Below the riprap and groins, the Coastal Beach is composed of cobbles over gravel and silty sand, and extends down to the mean low water line. Some of the cobbles remain from the recovery effort in 1984 to salvage the World Airways aircraft that crashed at this location. Land Under the Ocean extends seaward from the mean low water line, and consists of sand and silt in varying combinations with no evidence of gravel. Sediment samples were collected at the end of Runway 33L in August and October 2007. In general, the area of Land Under the Ocean in deeper waters contains more silt than sand, while the area in shallower waters contains more sand than silt.<sup>21</sup>

There are no vegetated wetlands (salt marsh) present at the end of Runway 33L. An eelgrass (*Zostera marina*) bed (submerged aquatic vegetation) is located at the end of Runway 33L. Eelgrass beds serve as nursery areas for commercially important fish and shellfish species, provide a feeding area for waterfowl and fish, and are a direct source of food or detritus for coastal food webs. They also act to stabilize sediments and filter excess nutrients from the water, thereby protecting water quality. These meadows are important to the coastal marine ecosystem. Loss of eelgrass habitat due to anthropogenic impacts on the Massachusetts coastal marine ecosystem and other causes such as wasting disease has been extensive. Although eelgrass meadows were once prolific in Boston Harbor and elsewhere along the coast, Boston Harbor beds now can be found in only a few isolated locations.<sup>22</sup>

Field surveys were conducted on October 15, 2007, and April 8, 2008, to map the extent of the eelgrass bed. A total of nine underwater video transects were conducted during the survey on October 15, 2007, to determine the extent and density of the eelgrass bed. On April 8, 2008, the landward edge of the eelgrass bed was mapped using a global positioning system (GPS). The surveys show that the eelgrass bed covers an area of approximately 54 acres. As shown on Figure 3-6, the eelgrass bed is primarily on the east side of the Runway 33L light pier. In this area, the boundary of the eelgrass bed extends from approximately 70 to 1,700 feet from the shoreline (measured from the top of Coastal Bank), and approximately 2,400 feet east of the light pier.

21 Vanasse Hangen Brustlin, Sediment Grain-Size Analysis Draft Technical Memorandum, Boston Logan International Airport, East Boston, Massachusetts, September 19, 2008.

22 <http://www.mass.gov/dfwele/dmf/programsandprojects/hubline/eelgrass.htm>, accessed January 5, 2010.



\\mawair\ev09980\00\GIS\project\EA-EIR\Chapter3\_AE\EAER\CH3\_Runway33L\_Wetlands.mxd



**Legend**

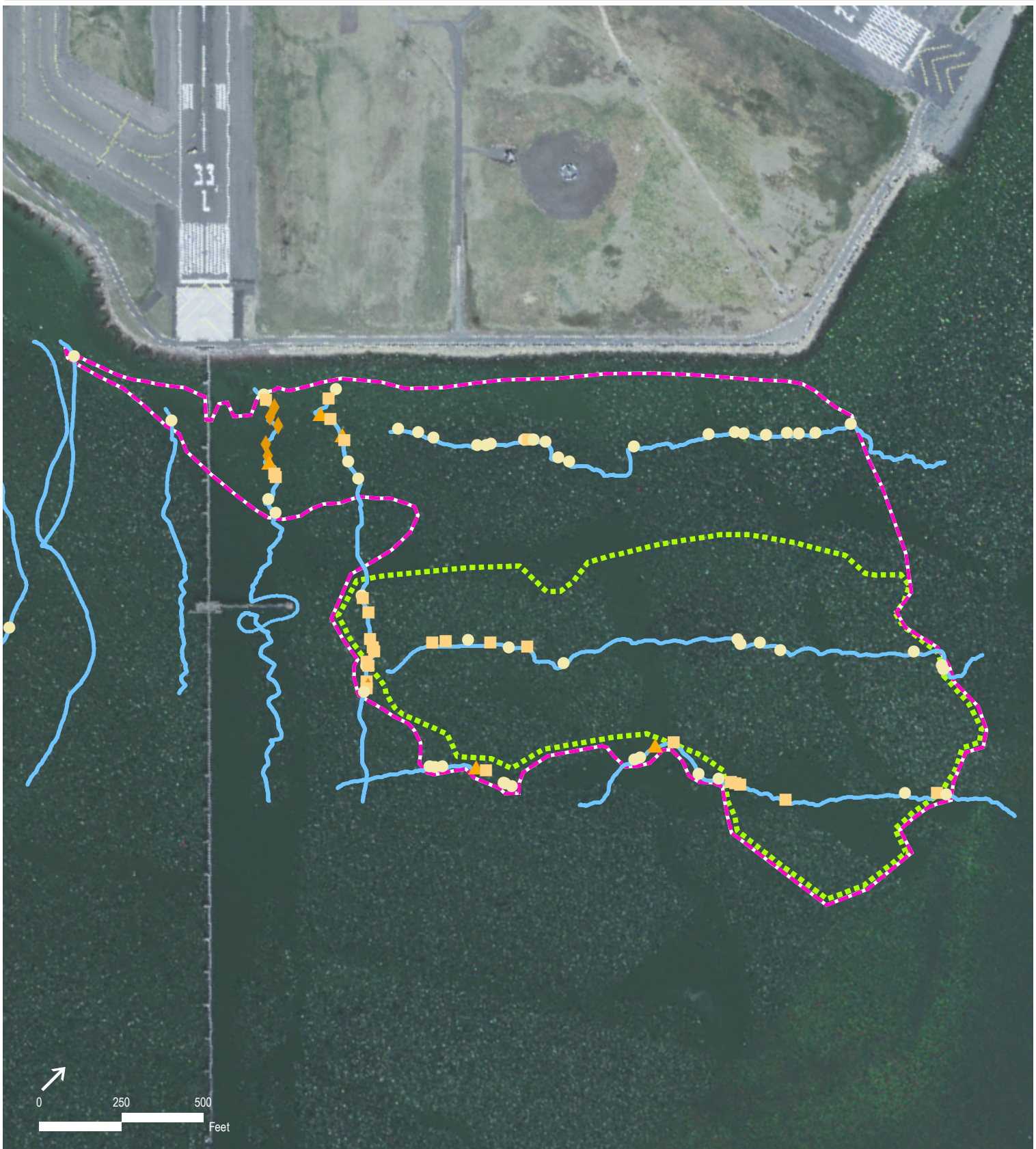
- Existing RSA
- Existing EMAS Bed
- Coastal Bank
- Coastal Beach
- Mussel Bed
- Eelgrass
- Existing Contour
- Existing Bathymetric Contour
- Highest High Water (6.49')
- Mean High Water (4.58')
- Mean Low Water (-4.51')
- Top of Coastal Bank
- Limit of Land Subject to Coastal Storm Flowage



Logan RSA

**Figure 3-5**  
**Runway 33L Coastal Wetlands**





**Legend**

- - - Limit of Eelgrass Bed (June 2008)
  - - - MassGIS Eelgrass Bed (2001)
  - Video Transects
- | Percent Eelgrass Cover (Visual Estimate) |            |
|--|------------|
| ●  | 1% - 20%   |
| ■  | 21% - 40%  |
| ▲  | 41% - 60%  |
| ◆  | 61% - 100% |



Logan RSA

**Figure 3-6**  
**Runway 33L**  
**Eelgrass Survey**

*Data Sources:*  
 CR Environmental, Inc.  
 USGS Digital Raster Graphic (DRG) Boston North - Office of  
 Geographic and Environmental Information (MassGIS)



The eelgrass bed also extends west of the light pier and is approximately 90 to 370 feet from the shoreline (measured from the top of Coastal Bank), and approximately 425 feet west from the light pier.<sup>23</sup> The density of eelgrass is greatest in the area near the shoreline (61 to 100 percent) and further off shore (21 to 60 percent) east of the Runway 33L light pier. Figure 3-6 shows that the boundary of the eelgrass bed identified during the field surveys encompasses the area previously defined by the DEP (2001 MassGIS data). The eelgrass bed has grown substantially since 2001 and is larger than the bed previously defined by DEP. Appendix 5, *Eelgrass Survey Technical Memorandum*, includes photographs taken during the eelgrass survey showing the eelgrass bed.

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 in late summer/early fall of 2007 to characterize the oceanography and surficial geology of the marine waters around the Airport. Conclusions from this study are described below and in Appendix 6A, *Coastal Processes*.

#### 3.4.1.1 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 late August to early October 2007 in a mean water depth of 7.5 m (24.6 ft) just to the southeast of Runway 33L. 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 25 centimeters per second (0.5 knots) were recorded during the ADCP deployment.

#### 3.4.1.2 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 Runway 33L RSA 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 August-October of 2007 was 0.31 meters, and the average wave height was 0.133 meters. Comparing the wave heights recorded by the ADCP with wind speeds recorded at Logan Airport for the same period shows that wind direction plays a role in the heights of local waves at the site. The wave height peaks show a good correlation with the winds from the south, southeast, or southwest. However, there is no clear correlation of wave peaks associated with winds from the north or northwest. Appendix 6A, *Coastal Processes*, shows wave height, direction and period, and well as wind speed and direction recorded during the August-October sampling duration.

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<sup>23</sup> Vanasse Hangen Brustlin, Inc., Eelgrass Survey Draft Technical Memorandum, Boston Logan International Airport, East Boston, Massachusetts, September 26, 2008.





#### 3.4.1.3 Sediment Data

The U.S. Geological Survey (USGS), Massachusetts Office of Coastal Zone Management (CZM), and the National Oceanic Atmospheric Administration (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.<sup>24</sup> Bottom sediments are generally sand, silt, and clay with small fractions of gravel in places. The majority of the seabed in the outer 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 Runway 33L for this Project.<sup>25</sup> The grain size analysis from the samples shows sediment that ranges from 0 to 33 percent gravel, 4 to 92 percent sand, and 8 to 96 percent silt plus clay. Mean values are 6 percent gravel, 50 percent sand, and 44 percent silt plus clay. Figure 3-7 shows the location of the sediment samples.

#### 3.4.1.4 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 stress, termed bed shear stress, applied to the seabed by current and wave energy. Bed shear stress occurring at the seafloor for the entire outer Harbor area from maximum spring tidal currents and waves generated by mean winds was predicted using hydrodynamic and wave models. Sediments will erode from the seabed if the shear stress exceeds a critical value, called critical shear, and it will potentially deposit if critical shear drops below the critical value. The critical shear is defined by the sediment grain size and other properties. Calibrated hydrodynamic and wave models were used to predict the bottom shear expected to occur at the seafloor for the entire outer Boston Harbor area from maximum spring tidal currents and waves generated by mean winds; and from maximum spring tidal currents and waves generated by winds from the December 1992 wind conditions. By overlaying the map of total shear stress (calculated from the combined current and wave stress fields) with a map of the seabed sediment characteristics, the spatial erosion/deposition patterns can be determined at the Project site for future conditions. Appendix 6A, *Coastal Processes*, shows a graphical representation of bottom stress from waves and currents during mean wind, storm wind, and maximum spring tide conditions.

24 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/>.

25 ASA, *Results from Data Collection and Model Calibration of Currents, Waves and Sediment Deposition and Erosion in the Waters Surrounding Boston-Logan International Airport (Draft Memorandum to Vanasse Hangen Brustlin, Inc)*. July 2008.



**Legend**

-  Sediment Samples
-  Acoustic Doppler Current Profiler (ADCP)



Logan RSA

**Figure 3-7**

**Runway 33L  
Sediment Sample Locations**





### 3.4.2 Fish, Wildlife and Plants

This section discusses fish, wildlife and plant species identified within the Runway 33L Study Area. The predominant plant species identified within the waters adjacent to the Runway 33L end include eelgrass, protected under the MA WPA and discussed in the Wetlands section (Section 3.4.1). Other plant species such as Irish moss (*Chondrus crispus*) and brown kelp (*Laminaria agardhii*) were found in the waters off Runway 33L. Primary benthic aquatic species include soft-shelled clams (*Mya arenaria*), blue mussel (*Mytilus edulis*), barnacles (*Balanus* sp.), in addition to the numerous fish species found in Boston Harbor, as described in Section 3.3.4. Polychaetes (*Nereis virens*, *Pectinaria gouldii*), were also found in the Runway 33L Study Area. The intertidal mudflats surrounding Runway 33L have been designated by DMF as part of Shellfish Growing Area GBH5.3 that are available for commercial harvest on a conditionally restricted basis.

A shellfish field survey was conducted off the end of Runway 33L on April 8, June 5 and June 6, 2008. Blue mussels were found in high densities in several areas. A large and densely populated mussel bed is located on the Coastal Beach/Tidal Flat east of the Runway 33L light pier and additional mussel resources are located above the Coastal Beach/Tidal Flat area interspersed within the rocky beach slope (Figure 3-5). The mussel bed on the Coastal Beach/Tidal Flat consists of a dense but patchy bed of live blue mussels attached to a substrate of dead shell and trapped mud that is raised above the flat. Mussels occur at a density of 420 per square meter in this area. Mussels occur at a density of 200 per square meter in the rocky intertidal zone west of the Runway 33L light pier. During the field survey, a small number of live soft shell clams were observed in the Coastal Beach/Tidal Flat areas off the end of Runway 33L. Based on numbers recovered, densities of soft shell clams are estimated at 9.3 per square meter.<sup>26</sup>

A small number of live soft shell clams were collected in the beach and tidal areas within the Runway 33L Study Area (Table 3.4-1). Of the five live soft shell clams collected, no market size individuals were observed. Based on numbers recovered, densities of soft shell clams in the Runway 33L Study Area are estimated at 9.3 per square meter.

Review of the Massachusetts Natural Heritage Atlas indicates there is Priority Habitat in the vicinity of the Runway 33L RSA Study Area (Figure 3-3). Upland sandpiper (*Bartramia longicauda*), which is listed as endangered in Massachusetts, is known to occur in the large grassy uplands in the interior of the airfield, but not within the Runway 33L RSA Study Area.

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<sup>26</sup> Vanasse Hangen Brustlin, Wetland Delineation and Shellfish Survey Results Draft Technical Memorandum, Boston Logan International Airport, East Boston, Massachusetts, September 19, 2008.



Table 3.4-1 Results of Runway 33L Shellfish Survey - Species Observed

Species	Runway 33L Shellfish Quadrant 1	Runway 33L Shellfish Quadrant 2	Runway 33L Shellfish Quadrant 3
<i>Mya arenaria</i> (soft shell clam)	5	0	2
Other Species observed	Various polychaetes	Polychaete: Clam Worm ( <i>Nereis virens</i> ); <i>Scalibregma inflatum</i>	Blue mussel ( <i>Mytilus edulis</i> ) in rock above tidal flat; green crab ( <i>Carcinus maenus</i> ) with eggs; Polychaetes ( <i>Nereis virens</i> , <i>Pectinaria gouldii</i> ), Irish moss ( <i>Chondrus crispus</i> ), and brown kelp ( <i>Laminaria agardhi</i> ); barnacles ( <i>Balanus</i> sp.)
Sediment Characteristics	Sandy silt – Oxidized surface layer black below	Silt sand – abundance of blue mussel shell	Black sandy silt/clay – dead shell on surface

Source: Vanasse Hangen Brustlin, Wetland Delineation and Shellfish Survey Results Draft Technical Memorandum, Boston Logan International Airport, East Boston, Massachusetts, September 19, 2008.

### 3.4.3 Water Quality

The stormwater management system in the vicinity of Runway 33L consists of both a closed and open stormdrain system. The closed system includes catch basins and pipes to convey stormwater from the perimeter roadway and taxiways to two nearby outfalls discharging Boston Harbor: Airfield Outfall A-29, northeast of the Runway end which drains approximately 35.5 acres; and Outfall A-30 which drains approximately 11.6 acres, southwest of the Runway end. These outfalls and associated drainage areas are shown in Figure 3-4. The open stormwater system uses the airfield’s grass swales and open channels to infiltrate stormwater from the runway surface. These outfalls are not monitored by Massport, and are assumed to have discharge characteristics similar to the sampled outfalls described in Table 3.3-1.

Offshore water samples were collected in conjunction with the compilation of vibracore samples off Runway 33L. Vibracore sampling is a method of retrieving undisturbed samples in marine environments to evaluate sub-bottom sediments. The following parameters were recorded: temperature, pH, turbidity, and water depth (Secchi-disk reading). Two water samples were collected off of the end of each runway, in the approximate location where the cores were collected. Temperature and pH were measured in the field with an Extech ExStik II EC-500 probe. Turbidity was recorded using a LaMotte Model BH-3 turbidimeter on samples collected in the field. The Secchi disk was lowered into the waterbody and the depth of the water where the disk vanishes and reappears was recorded as the Secchi disk reading (nearest foot). The depth to bottom measurement was recorded from the boat’s sonar. Table 3.4-2 presents the results of the analysis of water samples that were collected at Runway 33L.



Table 3.4-2 Results of Water Quality Sampling Analysis, Runway 33L

Station	Time	Water Temp. (°C)	pH	Turbidity (NTU)	Secchi disk depth (ft)	Depth to bottom (ft)
Runway 33L NE	8:30	1.6	8.0	0.95	10.3	14.3
Runway 33L SW	8:45	1.7	8.1	0.68	9.5	25.0

NTU: Nephelometric Turbidity Units.

Source: Vanasse Hangen Brustlin, Water Quality Sampling Draft Technical Memorandum, Boston Logan International Airport, East Boston, Massachusetts, September 25, 2008.

The turbidity levels ranged from 0.68 to 0.95 NTU at the end of Runway 33L. The pH levels were steady at 8.0 to 8.1 for all samples, consistent with normal pH values in sea water that are about 8.1 at the surface and decrease to about 7.7 in deep water. The Secchi-disk depth ranged from 9.5 to 10.3 feet for the samples collected. It should be noted that the difficulty of maintaining a constant position in a boat made the Secchi-disk readings more variable than could be obtained from a fixed platform sampling station. Results show that turbidity levels are low, causing limited or no interference with sunlight penetration for photosynthesis.

### 3.4.4 Light Emissions and Visual Setting

According to FAA Order 1050.1E, FAA must consider the extent to which any lighting associated with any action will create an annoyance among people in the vicinity or interfere with their normal activities.<sup>27</sup> Runway 33L is equipped with navigational aids (navaids). Navaids include visual or electronic devices, either airborne or on the ground, that provide guidance information or position data to aircraft using the runway. At the Runway 33L end a Medium Intensity Approach Lighting System with runway alignment indicator lights (MALSR) is used. A MALSR is an approach light system that extends 2,400 feet away from the runway threshold, which is a required component of an ILS approach. The MALSR lights, spaced at 200-foot intervals, are located on a pile-supported timber pier that extends 2,400 feet into Boston Harbor. The closest neighborhood to Runway 33L is the Point Shirley residential neighborhood in Winthrop across the Harbor, which is northeast of the Runway 33L end.

The Runway 33L end is slightly elevated above sea level on filled tidelands. In clear sunny weather conditions, it is possible to see the runway end from the Point Shirley neighborhood across the Harbor. However, the runway end is approximately 1 mile from this neighborhood, a substantial visual distance from the shoreline. The view looking towards the Runway 33L end from the Point Shirley neighborhood is primarily of the open water and the distant end of the light pier, with a low-profile shoreline.

## 3.5 Runway 22R Existing Environmental Conditions

The end of Runway 22R faces East Boston. There are no on-Airport developed areas adjacent to Runway 22R as its end is at the northern edge of the Logan Airport property and the Runway 22R is surrounded by Airport

<sup>27</sup> Federal Aviation Administration. Order 1050.1E, Environmental Impacts: Policies and Procedures, 20 March 2006.



property (Figure 3-1). The closest neighborhood to Runway 22R is the Orient Heights neighborhood and Bayswater Street in East Boston directly across the Harbor.

### 3.5.1 Wetlands

The Runway 22R RSA Study Area includes Coastal Bank, Coastal Beach, Salt Marsh, Land Containing Shellfish, and Land Under the Ocean (Figure 3-8), as defined by the MA WPA regulations (310 CMR 10.00 et seq.). Portions of this area are also subject to MA WPA regulations as Land Subject to Tidal Action and Land Subject to Coastal Storm Flowage. Coastal Beach, Salt Marsh, and Land Under the Ocean are also protected under the federal Section 404 jurisdiction.

Salt Marsh was delineated off the end of Runway 22R in June 2008. Wetlands were identified based on the presence of salt marsh grasses (*Spartina alterniflora* and *S. patens*) and common glasswort (*Salicornia europaea*). Salt marsh is located on a peat terrace at the end of Runway 22R that varies in width from 30 feet in the east to 120 feet wide to the west. To the east is a small 30-foot long break in the salt marsh fringe along the shoreline and an isolated "island" of salt marsh (Figure 3-8). Salinity fluctuates, as it is influenced by freshwater input, winds and tidal factors. However, the salt marsh appears to be healthy and densely vegetated. The seaward boundary of the Salt Marsh is an abrupt vertical face of the peat mat and is eroding, most likely due to wakes from pleasure boat traffic in the adjacent waterway.<sup>28</sup>

The Coastal Bank at the Runway 22R end is dominated by the invasive common reed (*Phragmites australis*). This area of Coastal Bank is stable and not eroding, and it contributes to the interest of storm damage prevention. The Coastal Beach/Tidal Flat consists of silty sand and extends seaward to the mean low water line. Small patches of green algae (*Enteromorpha* sp.) were observed submerged just beyond the low mean water line. Animals observed on the tidal flat and just below mean low water include common periwinkles, eastern mud snails, hermit crabs (*Pagurus longicarpus*), sand shrimp (*Crangon septemspinosa*), and common painted worm (*Nephtys incisa*). Northern rock barnacles and green crab were noted in the intertidal zone. Herring gulls (*Larus argentatus*) were observed foraging along the tidal flats. Species of shellfish including soft shell clams and razor clams (*Ensis directus*) have also been observed on the Tidal Flat surface.

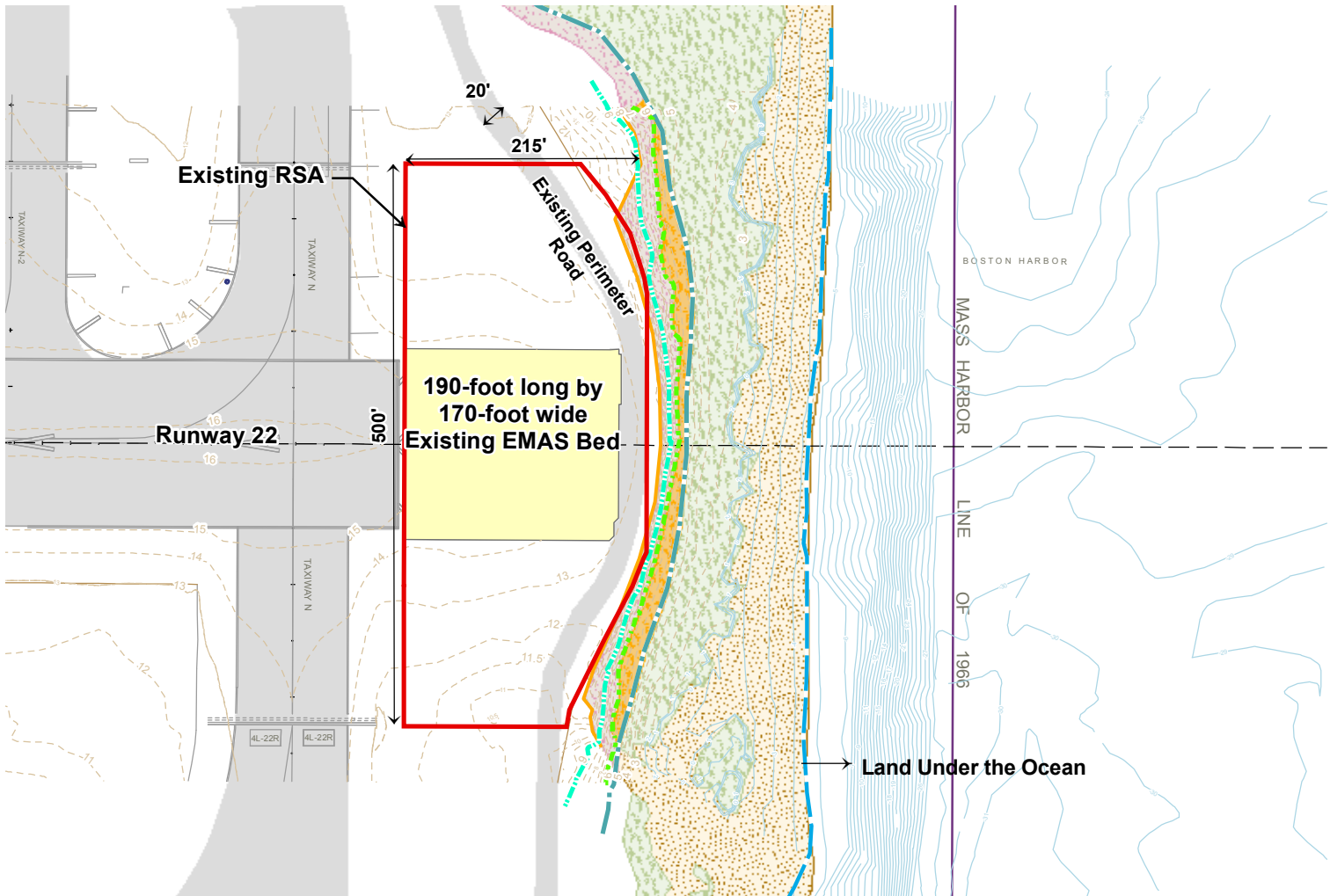
There are no eelgrass beds at the end of Runway 22R. Eelgrass beds were not observed on the Tidal Flat during field surveys conducted in June 2008 during extreme low water events and eelgrass detritus was not observed washed up on the shoreline at the end of the runway. In addition, no eelgrass was picked up in the grab when sediment samples were collected at the end of Runway 22R. Furthermore, mapping conducted in Boston Harbor by the DEP has not identified the presence of eelgrass beds at the end of Runway 22R.

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











<sup>28</sup> Vanasse Hangen Brustlin, Inc. Wetland Delineation and Shellfish Survey Results Draft Technical Memorandum, Boston Logan International Airport, East Boston, Massachusetts, September 19, 2008.



\\mawaitrev09980.00\GIS\project\EA-EIR\Chapter3\_AE\EAER\_CH3\_Runway22R\_Wetlands.mxd



**Legend**

-  Existing RSA
-  Existing EMAS Bed
-  Coastal Bank
-  Coastal Beach
-  Salt Marsh
-  Phragmites-dominated Salt Marsh
-  Existing Contour
-  Existing Bathymetric Contour
-  Highest High Water (6.49')
-  Mean High Water (4.58')
-  Mean Low Water (-4.51')
-  Top of Coastal Bank
-  Limit of Land Subject to Coastal Storm Flowage 3-30



Logan RSA

Figure 3-8

**Runway 22R Coastal Wetlands**

Source: Jacobs Edwards & Kelcey, Inc. Childs Engineering Corps. Office of Geographic and Environmental Information (2004, 2006 MassGIS)



Circulation of water at the Runway 22R end was characterized during a current measurement taken in the field. Surveys were taken in November 2009, starting about two hours before the predicted high tide and continued for two hours following the high tide. The currents were measured with a GPS-navigated ADCP (1200 kHz). In the area of Runway 22R, the mean spring tide current speed along the transect extending from Runway 22R range 0.1 to 0.31 knots (5-16 cm/s).<sup>29</sup>

### 3.5.2 Fish, Wildlife and Plants

This Section discusses fish, wildlife and plant species identified within the Runway 22R Study Area. The predominant plant species identified within the waters adjacent to the Runway 22R end include salt marsh grasses, protected under Section 404 and the MA WPA and discussed in the Coastal Wetlands section (Section 3.5.1). Primary aquatic species include soft-shelled clams, razor clam, sand shrimp, mud snails (*Ilyanassa obsoleta*), and green crab (*Carcinus maenas*), in addition to the numerous fish species found in Boston Harbor, as described in Section 3.3.4. Polychaetes (*Nereis virens*, *Pectinaria gouldii*) were also found in the Runway 22R Study Area. The intertidal mudflats surrounding Runway 22R have been designated by DMF as part of Shellfish Growing Area GBH5.2 that are available for commercial harvest on a conditionally restricted basis.

A shellfish field survey was conducted off the end of Runway 22R in June 2008 that focused on the beach/tidal flat area seaward of the salt marsh face. All of the live soft shell clams were collected in the eastern portion of the Runway 22R Study Area, at a similar elevation to that of the salt marsh. Soft shell clams were recovered at Runway 22R (Table 3.5-1). Of the seven soft shell clams collected, only two market size individuals (minimum size 2 inches) were observed.

Based on data collected, densities of soft shell clams in the eastern portion of the Runway 22R Study Area are estimated at a maximum of 28 per square meter. Most of the surveyed Study Area lacked any soft shell clams, but may support very low population densities. Only one razor clam was collected, therefore the density of razor clams in the Study Area is estimated at a maximum of 1 per square meter.

Substantial numbers of dead soft shell clam shells were also observed throughout the Runway 22R Study Area. In some areas, paired dead soft shell clam shells were typically observed sitting in the sediment in their living position and no live soft shell clams were found in the same location. Given the low density of living soft shell clams and the large number of dead shells observed in the Runway 22R Study Area, it appears that an event in the past may have caused widespread mortality of the population in this area. The habitat otherwise appears to be healthy with scyphozoans, polychaetes, gastropods, crustaceans and fish present in the Study Area and waters offshore.

No extensive mussel beds were observed in the Runway 22R Study Area, however, a low density population of ribbed mussels (*Geukensia demissa*) was observed within the salt marsh. Population densities of the ribbed

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<sup>29</sup> ASA. Results from Data Collection, Hydrodynamic Modeling and Environmental Effects Analysis for Boston-Logan International Airport Runway Improvements. April 2010.





mussels were not assessed since the mussels occur in low numbers and are not a species that is recreationally or commercially important.

Herring gulls, an American oystercatcher (*Haematopus palliatus*), and snowy egrets (*Egretta thula*) have been observed foraging on offshore bars near, but not within, the Runway 22R Study Area.

Review of the NHESP Atlas indicates there is no priority habitat in the study area for Runway 22R (Figure 3-3). Upland sandpiper (*Bartramia longicauda*), which is listed as endangered in Massachusetts, is known to occur in the large grassy uplands elsewhere in the interior of the airfield, but is not mapped within the Runway 22R Study Area.

Table 3.5-1 Results of Runway 22R Shellfish Survey - Species Observed

Species	Runway 22R Shellfish Quadrant 1	Runway 22R Shellfish Quadrant 2	Runway 22R Shellfish Quadrant 3	Runway 22R Shellfish Quadrant 4
Soft Shell Clam ( <i>Mya arenaria</i> )	0	0	0	7
Razor Clam ( <i>Ensis directus</i> )	1	0	0	0
Sand Shrimp ( <i>Crangon septempinnata</i> )	0	2	0	0
Other Species observed	Moon Jelly ( <i>Aurelia aurita</i> ) in water and stranded on beach surface; Green crab ( <i>Carcinus maenas</i> ); mud snails ( <i>Ilyanassa obsoleta</i> ) on beach surface	Moon Jelly ( <i>Aurelia aurita</i> ) in water; mud snails ( <i>Ilyanassa obsoleta</i> ) on beach surface	Polychaete ( <i>Pectinaria gouldii</i> ); young Wrymouth fish ( <i>Cryptacanthodes maculatus</i> ) observed on tidal flat; Moon Jelly ( <i>Aurelia aurita</i> ) in water; mud snails ( <i>Ilyanassa obsoleta</i> ) on beach surface	Mud snails ( <i>Ilyanassa obsoleta</i> ) on beach surface
Sediment Characteristics	Black sandy silt/clay – dead shell on surface	Black silty mud – thin oxidized layer on surface	Black silty mud – thin oxidized layer on surface	Black silty mud – thin oxidized surface layer with dead shell on surface

Source: Vanasse Hangen Brustlin, Wetland Delineation and Shellfish Survey Results Draft Technical Memorandum, Boston Logan International Airport, East Boston, Massachusetts, September 19, 2008.

### 3.5.3 Water Quality

The stormwater management system in the vicinity of Runway 22R consists of both a closed and open conveyance system. The closed system includes catch basins and pipes to convey stormwater from the perimeter roadway and taxiways to two nearby outfalls discharging Boston Harbor: Airfield Outfall A-11, west of the Runway end which drains approximately 3 acres, and Outfall A-12 which drains approximately 3.9 acres, southeast of the Runway end. These outfalls and associated drainage areas are shown in Figure 3-4. The



adjacent open stormwater system uses the airfield’s grass swales and open channels to infiltrate stormwater from the runway surface, primarily from Drainage Area A-10 and A-13. These outfalls are not monitored by Massport, and are assumed to have discharge characteristics similar to the sampled outfalls described in Table 3.3-1.

In 2008, water samples offshore were collected in conjunction with the vibracore samples off Runway 33L and Runway 22R. Vibracore sampling is a method of retrieving undisturbed samples in marine environments to evaluate sub-bottom sediments. Table 3.5-2 presents the results of the analysis of water samples that were collected at the end of Runway 22R.

**Table 3.5-2 Results of Water Quality Sampling Analysis, Runway 22R**

Station	Time	Water Temp. (°C)	pH	Turbidity (NTU)	Secchi disk depth (ft)	Depth to bottom (ft)
Runway 22R W	9:30	0.5	8.0	2.73	9.4	13.0
Runway 22R E	9:40	1.0	8.1	3.35	11.0	12.0

ntu: Nephelometric Turbidity Units.

Source: Vanasse Hangen Brustlin, Water Quality Sampling Draft Technical Memorandum, Boston Logan International Airport, East Boston, Massachusetts, September 25, 2008.

The turbidity levels ranged from 2.73 to 3.35 NTU at the end of Runway 22R. The pH levels were steady at 8.0 to 8.1 for all samples, consistent with normal pH values in sea water that are about 8.1 at the surface and decrease to about 7.7 in deep water. The Secchi disk depth ranged from 9.4 to 11.0 feet for the samples collected. As noted earlier, due to the difficulty of maintaining a constant position with the boat, the Secchi disk readings may have more variability than could be obtained from a fixed platform sampling station. Results show that turbidity levels are higher at the Runway 22R end than at the Runway 33L end, possibly causing some interference with sunlight penetration for photosynthesis and deposits of some suspended matter in fish gills and shellfish.

### 3.5.4 Light Emissions and Visual Setting

According to FAA Order 1050.1E, FAA must consider the extent to which any lighting associated with any action will create an annoyance among people in the vicinity or interfere with their normal activities.<sup>30</sup>

Runway 22R is also equipped with nav aids that include visual or electronic devices, either airborne or on the ground, which provide guidance information or position data to aircraft using the runway. At the Runway 22R end this includes High Intensity Runway Edge lights (HILRs). HILRs include two rows of lights, one row on each side approximately 10 feet from the edge of the full-strength runway paving are equally spaced along the runway.

The HILR light source does not represent a potential for annoyance unless they are unduly bright and aimed in the direction of the viewer (a glare condition), or they are flashing intermittently (causing a distraction). The lighting system described above is unobtrusive to the surrounding areas because they are located on the surface

30 Federal Aviation Administration. Order 1050.1E, Environmental Impacts: Policies and Procedures, 20 March 2006.



of the runway and would not be visible from even the closest neighborhood to the Runway, the Orient Heights residential neighborhood in East Boston across the Harbor.

The Runway 22R end is slightly elevated above sea level and is located on filled tidelands. It is visible from the Orient Heights neighborhood across the Harbor. The view looking towards the Runway 22R end from this neighborhood is of the distant low-profile shoreline, salt marsh and coastal bank.



# 4

## Environmental Consequences

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### 4.1 Introduction

The Environmental Consequences of the proposed Logan Airport Runway Safety Area (RSA) Improvements Project are documented for each applicable environmental resource category, as specified in FAA Order 1050.1E,<sup>1</sup> and as required by the Secretary's Certificate on the Environmental Notification Form (ENF). In accordance with the National Environmental Policy Act (NEPA) and Massachusetts Environmental Policy Act<sup>2</sup> (MEPA) regulations, the Build Alternatives are compared to the Future No-Action/No-Build Alternative in the same analysis year for each environmental impact category to determine the effect (beneficial or adverse) of the alternative. Direct, indirect, and construction impacts are included in the discussion of each impact category for Runway 33L (Section 4.2) and Runway 22R (Section 4.3). Cumulative impacts of the two RSA projects, in combination with other past and future reasonably foreseeable impacts, are described in Section 4.4. Where a potential impact is identified, the Draft EA/EIR provides an analysis of whether that impact is significant, in accordance with FAA guidance on impact thresholds for significant adverse effects provided in FAA Order 1050.1E.

Mitigation measures for each affected resource category are identified in Chapter 5, *Proposed Mitigation and Section 61 Findings*, of this Draft EA/EIR. Regulatory compliance of the proposed project is discussed in Chapter 6, *Regulatory Compliance*, of this Draft EA/EIR.

#### 4.1.1 Key Findings

The following sections describe the key findings with respect to environmental impacts for each runway end.

##### 4.1.1.1 Runway 33L

Key findings for the proposed Runway 33L safety improvements include:

- The proposed Runway 33L RSA improvements have been designed to avoid and minimize adverse impacts to the maximum extent practicable, but still would have unavoidable permanent impacts to coastal wetlands. The proposed pile-supported deck (approximately 470 feet long by 300 feet wide), would directly

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<sup>1</sup> FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, released March 20, 2006.

<sup>2</sup> 301 CMR 11.00: MEPA Regulations, Section 11.07: EIR Preparation and Filing.



and indirectly affect coastal wetlands resources over an area of approximately 3.65 acres. This area consists of wetlands subject to federal jurisdiction as Waters of the United States as well as the 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 3,000 square feet of Coastal Beach and Land Under the Ocean.

- The proposed Runway 33L deck would shade a portion of the eelgrass bed located in the subtidal area adjacent to the Runway 33L end, and would likely result in the direct loss or impairment of approximately 60,100 square feet and the indirect loss or impairment of approximately 6,500 square feet of the eelgrass bed. This area of approximately 66,600 square feet is approximately 3 percent of the total resource at the Runway 33L end.
- The proposed Runway 33L RSA improvements would not cause any change in wave direction or velocity or result in increased erosion or deposition in the marine environment. There would be minor scour effects in the immediate vicinity of each piling.
- Some fish and shellfish habitat would be displaced, altered or eliminated by the pilings. However, the pilings would offer new substrates for shellfish, benthic invertebrates, and algae.
- The proposed Runway 33L RSA improvements would not result in any adverse effect that would jeopardize the existence of federally-listed threatened and endangered species or adversely change their critical habitat.
- The proposed Runway 33L RSA improvements would have no 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 33L end.
- The existing navigational light system at the Runway 33L end will be upgraded. New lights would be added to the existing system near the end of the proposed deck. There would be no additional light impacts that would cause an annoyance to residential neighbors in Winthrop.
- The proposed Runway 33L RSA improvements would alter the shoreline view due to the replacement of part of the existing timber light pier by a wider pile-supported pier structure. However, at the distance the shoreline is viewed from the closest residential neighborhood, the view of the RSA would not be substantially different than the existing view.
- Construction would not result in significant impacts, but construction noise could affect fish in the immediate vicinity of the work area. Temporary discharge of sediment could affect water quality in a localized area adjacent to the proposed Runway 33L RSA improvements. Most of the construction materials, equipment and personnel would be transported by barge and would not contribute to surface traffic in the vicinity of Logan Airport. Noise generated by construction would not have an adverse effect on residential



areas, and noise levels would not exceed City of Boston criteria. Emissions of air pollutants during construction would meet the “*de minimis*” standards for general conformity with the National Ambient Air Quality Standards (NAAQS).

#### 4.1.1.2 Runway 22R

Key findings for the proposed Runway 22R Inclined Safety Area (ISA) include:

- The proposed Runway 22R ISA would have permanent impacts to coastal wetlands. The ISA, constructed with gravel fill, would replace coastal wetlands resources in an area of approximately 1.9 acres, including approximately 35,040 square feet of salt marsh. This area is subject to federal jurisdiction as Waters of the United States as well as the state-regulated resource areas Coastal Bank, Coastal Beach/Tidal Flats, Salt Marsh, Land Containing Shellfish, and Land Under the Ocean.
- The proposed Runway 22R ISA would not cause any change in wave direction or velocity or result in increased erosion or deposition in the marine environment. These findings are consistent with observations of the ISA constructed at Runway 22L in the early 1990s.
- Some fish and shellfish habitat in the intertidal zone would be displaced, altered or eliminated with the placement of gravel fill to the mean lower low water line. Within this area, some dredging or excavation would be needed to remove unsuitable substrate materials.
- The proposed Runway 22R ISA would not result in any adverse effect that would jeopardize the existence of federally-listed threatened and endangered species or adversely change their critical habitat.
- The proposed Runway 22R ISA would have no 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 22R end. As noted above, these findings are consistent with observations of the existing Runway 22L ISA.
- There are no new light sources proposed as part of the proposed Runway 22R ISA.
- The proposed Runway 22R ISA would alter the shoreline view due to the removal of vegetation and placement of gravel fill. However, at the distance the shoreline is viewed from the closest residential neighborhood, the view of the ISA would blend with the adjacent natural shoreline. The visual impact of the proposed Runway 22R ISA would be consistent with existing conditions at Runway 22L.



- Construction would not result in significant impacts. Trucks carrying construction materials, equipment and personnel would have a minimal impact on surface traffic in the vicinity of Logan Airport. Noise generated by construction would not have an adverse effect on residential areas, and noise levels would not exceed City of Boston criteria. Emissions of air pollutants during construction would meet the “*de minimis*” standards for general conformity with the NAAQS.

#### 4.1.2 Methodology

The following section describes how the environmental consequences were determined for each resource category for proposed safety improvements to both the Runway 33L RSA and Runway 22R RSA improvements.

##### 4.1.2.1 Direct Impacts

Direct impacts are caused by the proposed action and occur at the same place and at the same time. Direct impacts were determined for each runway end per resource category based on the footprint of the area altered. The list of resource categories evaluated was developed based on the FAA’s NEPA regulations (FAA *Order 1050.1E*) and the Secretary’s Certificate on the ENF. These include:

- Wetlands;
- Chapter 91 Waterways and Tidelands;
- Fish, Wildlife, and Plants;
- Threatened and Endangered Species;
- Water Quality;
- Historical, Architectural, Archaeological, and Cultural Resources;
- Solid and Hazardous Materials; and
- Light Emissions and Visual Setting.

##### 4.1.2.2 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. Indirect impacts were determined for each runway end per resource category identified in Section 4.1.3.1.

##### 4.1.2.3 Temporary Construction-Related Impacts

Temporary, construction-related impacts occur on a short-term basis during construction only based on construction methods, duration, materials, and equipment. Temporary, construction-related impacts were determined for each runway end per resource category identified in Section 4.1.3.1, and for other resource categories where there are no permanent direct or indirect impacts (Surface Transportation, Noise, and Air Quality).

##### 4.1.2.4 Cumulative Impacts

Cumulative impacts are described as the incremental impact of a proposed project when added to the past, present, and reasonably foreseeable future projects undertaken by any agency or person. The timeframe for consideration of cumulative impacts takes into account past impacts and future impacts through 2018, which is



five years from the projected completion of the proposed RSA improvements. The discussion focuses on the cumulative impacts to eelgrass, shellfish, salt marsh, water quality, essential fish habitat, and benthic organisms. Impacts of the proposed RSA Improvements Project may be insignificant by themselves, but as impacts accumulate over time, from one or more sources, the impact may become significant.

### 4.1.3 Significance Thresholds

For each environmental impact category, the Build Alternatives for Runway 33L and Runway 22R were compared to the No-Action/No-Build Alternative to determine the effect (beneficial or adverse) of the alternative on each environmental resource category. Where a reasonable alternative would result in an environmental impact, the Draft EA/EIR provides an analysis of whether that impact is significant, based on FAA guidance on impact thresholds for significant adverse effects provided in FAA Order 1050.1E, Appendix A<sup>3</sup> and summarized in Table 4.1-1. Measures proposed to avoid, reduce, and/or mitigate the potential impacts summarized in this Chapter are presented in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

**Table 4.1-1 FAA Order 1050.1E Impact Thresholds for Significant Adverse Effects**

Impact Category	Order 1050.1E Impact Threshold for Significant Adverse Effects
Noise	When an action, compared to the no action alternative for the same timeframe, would cause noise sensitive areas located at or above DNL 65 dB to experience a noise increase of at least DNL 1.5 dB.
Surface Transportation	None established. See significance threshold for social and socioeconomic issues.
Air Quality	When a project or action exceeds one or more of the National Ambient Air Quality Standards (NAAQS).
Historical, Architectural, Archaeological, and Cultural	When an action adversely affects a protected property and the responsible FAA official determines that the information from the State and/or Tribal Historic Preservation Officer addressing alternatives to avoid adverse effects and mitigation warrants further study.
Wetlands and Waterways	When an action would: <ul style="list-style-type: none"> <li>• Adversely affect a wetland's function to protect the quality or quantity of a municipal water supply, including sole source aquifers and a potable water aquifer.</li> <li>• Substantially alter the hydrology needed to sustain the affected wetland's values and functions or those of a wetland to which it is connected.</li> <li>• Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety or welfare. The last term includes cultural, recreational, and scientific public resources or property.</li> <li>• Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically-important timber, food, or fiber resources of the affected or surrounding wetlands.</li> <li>• Promote development that causes any of the above impacts.</li> <li>• Be inconsistent with applicable State wetland strategies.</li> </ul>
Water Quality	When an action would not meet water quality standards. Potential difficulty in obtaining a permit or authorization may indicate a significant impact.
Fish, Wildlife, and Plants	For Federally-listed species: When the U.S. Fish and Wildlife Service or the National Marine Fisheries Service determines a proposed action would likely jeopardize a species' continued existence or destroy or adversely affect a species' critical habitat.  For non-listed species: Consider scientific literature on and information from agencies having expertise addressing on the affected species. Consider information on: project effects on population dynamics; sustainability; reproduction rates; natural and artificial mortality (aircraft strikes); and the minimum population size needed to maintain the affected population.

<sup>3</sup> Federal Aviation Administration Order 5050.4B, National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects, Federal Aviation Administration, United States Department of Transportation, 28 April 2006, Table 7-1. Significance Thresholds.





Table 4.1-1 FAA Order 1050.1E Impact Thresholds for Significant Adverse Effects (continued)

Impact Category	Order 1050.1E Impact Threshold for Significant Adverse Effects
Floodplains	When notable adverse impacts on natural and beneficial floodplain values would occur.
Coastal Resources	None established.
Hazardous Materials and Solid Waste	When an action involves a property on or eligible for the National Priority List (NPL). Uncontaminated properties within a NPL site's boundary do not always trigger this significant impact threshold. For solid waste: None established.
Light Emissions and Visual Impact	For light emissions: When an action's light emissions create annoyance to interfere with normal activities. For visual effects: When consultation with Federal, State, or local agencies, tribes, or the public shows these effects contrast with existing environments
Construction Impacts	See significance threshold for the resource(s) construction would affect.

Note: Excludes categories not present in the Study Area.

## 4.2 Runway 33L

A pile-supported deck is proposed for the Runway 33L end as described in Chapter 2, *Alternatives*, and shown on Figure 2-5 and Figure 2-6. The five construction options are evaluated in this Chapter in order to maintain flexibility in design as the five construction options have similar impacts. The following sections describe the direct and indirect environmental consequences specific to the Runway 33L Study Area associated with the proposed pile-supported deck, based on the conceptual design. A description of the environmental consequences of the No-Action/No-Build Alternative is provided for comparison purposes. Construction-related impacts are described in detail for each resource category and for other resource categories that would be affected temporarily by construction only.

The environmental consequences of five construction options are evaluated in this section. The 600-foot long RSA would be located partly on land and partly on a 470-foot long deck approximately 300 feet wide, and would be the same size for each option, but with different sizes, numbers, and arrangements of supporting pilings. The construction options, as described in detail in Chapter 2, *Alternatives*,<sup>4</sup> are:

- Option 1: 20-inch diameter piles with 12-foot bent spacing totaling 442 vertical piles and 48 batter piles;
- Option 2: 20-inch diameter piles with 70-foot bent spacing totaling 182 vertical piles and 48 batter piles;
- Option 3: 20-inch diameter piles with 100-foot bent spacing totaling 155 vertical piles and 48 batter piles;
- Option 5: 48-inch drilled caissons with 70-foot bent spacing: totaling 112 vertical caissons; and
- Option 6: 48-inch drilled caissons with 100-foot bent spacing totaling 80 vertical caissons.

<sup>4</sup> Note Option 4 was eliminated in the alternatives screening.



All five construction options would contain the following project elements as described in more detail in Chapter 2, *Alternatives*:

- A deck approximately 470 feet long and 300 feet wide;
- An EMAS bed approximately 500 feet long by 170 feet wide located within the RSA;
- A steel sheet pile cutoff wall inshore to prevent settlement and erosion of the backland areas;
- Two emergency access ramps, one on each side of the proposed deck;
- A localizer, placed on a deck approximately 300 feet long by 60 feet wide supported by vertical and batter piles;
- Finger pier extensions on timber piles to the existing light pier to support the upgraded navigational lighting system;
- A relocated perimeter road inland of the EMAS bed; and
- A new taxiway connector (Taxiway C1 Connector) located west of Taxiway C.

The construction methods, phasing and sequencing for each construction option are also described in Section 2.2.4 of Chapter 2, *Alternatives*. Construction of any of the options would occur over three construction seasons, starting in 2011. The Massachusetts Division of Marine Fisheries (DMF) has recommended a time of year restriction extending from February 15<sup>th</sup> to June 30<sup>th</sup> for any in-water silt producing work.<sup>5</sup> The Airport relies on Runway 15R-33L primarily between November and March to accommodate wind direction during that time of year. In addition, construction associated with any runway may have to stop and start due to weather and runway use requirements. It is anticipated the target period for pile-driving is between July 1<sup>st</sup> and November 30<sup>th</sup> during 2011, 2012, and 2013. However, actual pile-driving operations could be extended beyond November should the wind and weather permit. Construction would be primarily undertaken from the water, as most of the materials would be delivered to the Project area via barge. The only materials expected to be delivered by truck are the EMAS blocks and concrete, as well as paving materials for Taxiway C1 Connector and the perimeter road.

The following sections provide descriptions of the environmental consequences of the proposed Runway 33L RSA improvements. The impacts to wetlands are described in Section 4.2.1. Section 4.2.2 is a description of the impacts to Chapter 91 waterways and tidelands. The impacts to fish, wildlife, and plants and to threatened and endangered species are described in Section 4.2.3 and Section 4.2.4, respectively. Water quality impacts are described in Section 4.2.5. Section 4.2.6 is a description of the potential impacts to historical, archaeological, and cultural resources if found in the Project area during construction. Hazardous and solid waste impacts are described in Section 4.2.7. Section 4.2.8 describes the environmental consequences of the proposed Project on light emissions and the visual setting. Other construction-related impacts to surface transportation, noise, and air quality are described in Section 4.2.9.

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<sup>5</sup> Comment Letter on the ENF received from the Massachusetts Division of Marine Fisheries, dated August 7, 2009.



#### 4.2.1 Wetlands

There are coastal wetlands present within the limits of the proposed Runway 33L RSA improvements as described in Chapter 3, *Affected Environment*. The following section describes the environmental consequences of the No-Action/No-Build Alternative and the Build Alternative, for each construction option. NEPA regulations that address wetlands are discussed in FAA Order 5050.4B and in FAA Order 1050.1E, Appendix A Section 18.3. The FAA orders identify the significant impact thresholds for wetlands and describe the requirements of the wetlands analysis to determine whether impacts on wetlands are significant. The Secretary's Certificate on the ENF required that the Draft EA/EIR include:

- An examination of whether the wetland impact can be avoided or further minimized, and whether impacts are fully mitigated (see Chapter 5, *Proposed Mitigation and Section 61 Findings*);
- A description of impacts to buffer zones;
- A discussion of sediment and current dynamics;
- A cumulative assessment of the effects of the project on the functions and values of these resources (described in Section 4.4);
- A quantification and differentiation between the anticipated impacts associated with construction and full build-out;
- A discussion of the potential impacts to eelgrass and mitigation strategies identified with the federal and state interagency eelgrass working group;
- A description of current and anticipated construction projects by Massport and others in the surrounding area that may further degrade the coastal resources (described in Section 4.4);
- Rigorous construction-period containment measures and monitoring plans (see Chapter 5, *Proposed Mitigation and Section 61 Findings*);
- A detailed wetlands replication plan that, at a minimum, includes: replication location(s) delineated on plans, elevations, typical cross sections, test pits or soil boring logs, the hydrology of areas to be altered and replicated, list of wetlands plant species of areas to be altered and the proposed wetland replication species, planned construction sequences, and a discussion of the required performance standards and monitoring of the replication areas and specifically for invasive species (see Chapter 5, *Proposed Mitigation and Section 61 Findings*);
- A discussion of the three Massachusetts Wetlands Protection Act (MA WPA) Variance criteria (see Chapter 6, *Regulatory Compliance*);



- A description of ongoing efforts to work with the local, state, and federal environmental agencies to develop mitigation and monitoring plans (see Chapter 7, *Public and Agency Involvement*);
- A detailed analysis of the on-site mitigation options and the possibility of off-site mitigation if on-site mitigation is infeasible resulting in a net benefit to affected coastal resource areas in Boston Harbor (see Chapter 5, *Proposed Mitigation and Section 61 Findings*);
- A discussion of the construction phase and post-construction monitoring plans including reporting (see Chapter 5, *Proposed Mitigation and Section 61 Findings*); and
- A discussion of contingencies to ensure that if restoration efforts fail, additional measures will be required to compensate for the loss of the resource area functions and values (see Chapter 5, *Proposed Mitigation and Section 61 Findings*).

#### 4.2.1.1 Direct Impacts

The proposed pile-supported deck would result in the alteration or loss of coastal wetland resources. A discussion regarding potential impacts from the No-Action/No-Build Alternative and Build Alternative is included below. Coastal wetland resources were identified and delineated as described in Section 3.4.1 of Chapter 3, *Affected Environment*. The wetland delineation was overlaid with the footprint of the proposed Runway 33L construction options to quantify the potential direct impacts to coastal wetlands.

##### **No-Action/No-Build Alternative**

No new impacts to coastal wetlands resources would occur under the No-Action/No-Build Alternative. There would be no change to existing wetland functions and values from the No-Action/No-Build Alternative.

##### **Build Alternative**

The following sections provide a comparison of the wetland impacts resulting from the five construction options for a pile-supported deck to be constructed at Runway 33L (Figure 4-1). Direct impacts would result from installing piles or caissons to support the deck, installing 16-inch diameter piles to support the localizer deck, installing timber piles to support the light pier extensions, and constructing two emergency access ramps. Direct impacts would also result from sediment deposition occurring during construction. Eelgrass growing under the footprint of the RSA deck could be lost due to shading, as the future light levels may be inadequate to support eelgrass. The direct impacts that result from installing piles to support the localizer deck, installing timber piles to support the light pier extensions, constructing the emergency access ramp, and shading impacts would be the same across each option. The direct impacts resulting from installing piles or caissons to support the deck and from sediment deposition vary depending on the option and are described in the sections below. Table 4.2-1 summarizes the wetland impacts by option.

##### ***Coastal Bank***

Each of the construction options would result in the unavoidable alteration of approximately 315 linear feet of the man-made Coastal Bank to install the sheet piling and fill structure that would support the approach slab and landward end of the RSA deck. An additional 80 linear feet of the riprap slope would be altered for two



emergency access ramps. This would convert the existing rip-rap bank to a sheet pile bank or crushed stone ramps, and would not affect the functions or significant interests of the Coastal Bank including storm damage prevention and flood control. The new sheet pile bank would maintain the stability of the Coastal Bank beneath the deck.

### ***Buffer Zone***

There is a state-regulated buffer zone extending 100 feet landward from the top of Coastal Bank. Work proposed within the buffer zone includes removing a segment of the existing perimeter road (which will be relocated outside of the buffer zone) and converting that area to grass. Work within the buffer zone also including reconstructing the existing EMAS bed and utility (electricity) extension to the proposed relocation localizer.

### ***Coastal Beach (Intertidal)***

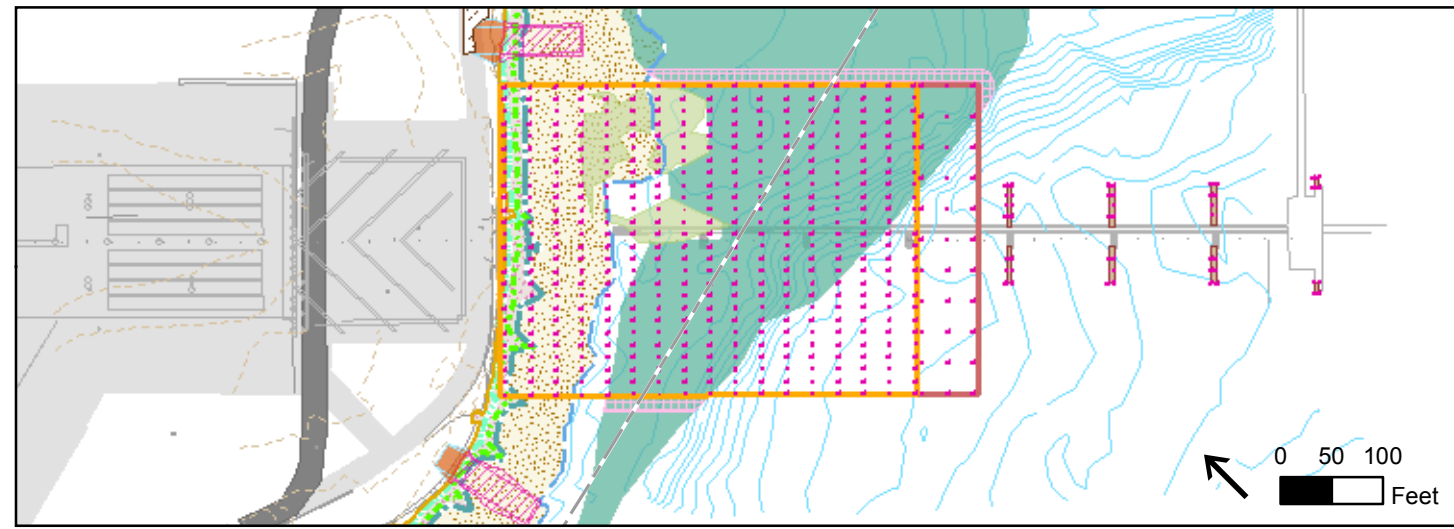
Each of the construction options would result in the alteration of Coastal Beach (the intertidal beach and mud flats) to install the fill structure that would support the approach slab and landward end of the RSA deck, and to install some of the deck pilings. An additional 4,320 square feet of Coastal Beach would be converted to form the base of the two emergency access ramps.

The proposed Runway 33L RSA improvements would not affect the interests of the MA WPA significant to Coastal Beach. The remaining Coastal Beach would continue to contribute to storm damage prevention, flood control, and the protection of wildlife habitat.

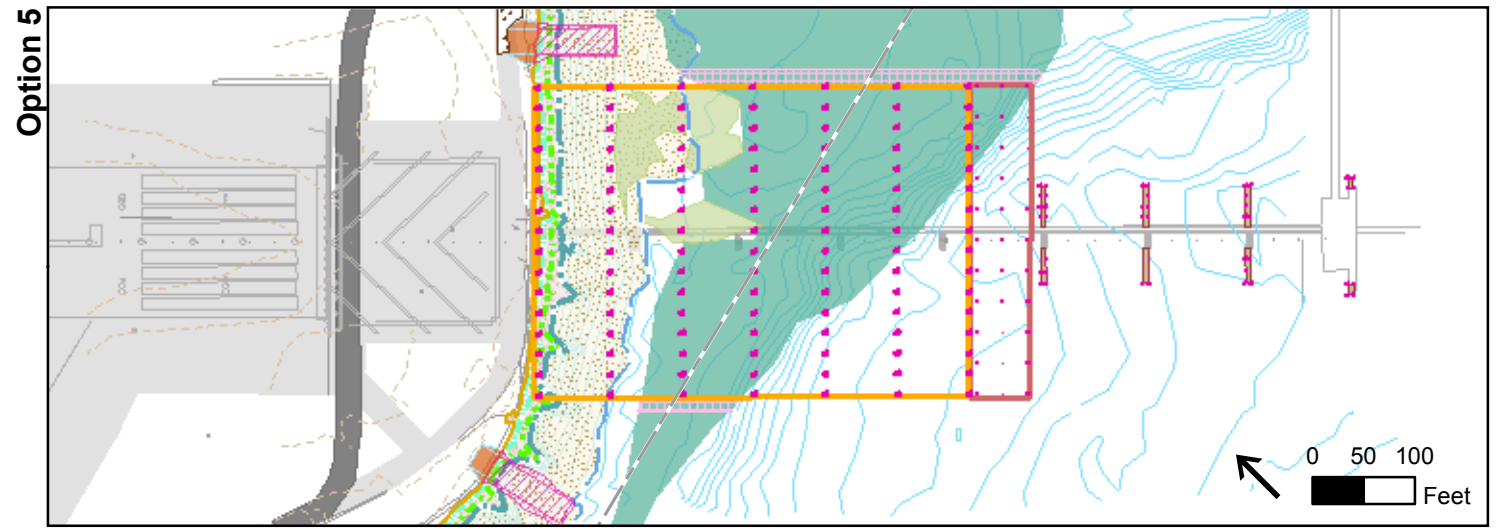
### ***Land Under the Ocean (Subtidal)***

Each of the construction options would result in the loss of Land Under the Ocean to install pilings needed to support the RSA deck (including the localizer). The area of loss is directly related to the size and number of pilings, and ranges from 395 square feet (Option 3) to 1,045 square feet (Option 5). This represents a loss of 0.25 percent to 0.65 percent of the natural substrate under the deck (a total area of 159,000 square feet) assuming that this area was currently entirely a natural substrate. This overestimates the impact of the proposed RSA improvements, as the area currently contains the timber-pile supported light pier which would be removed and replaced by the deck and pilings. The existing light pier occupies an area approximately 470 feet long by 20 feet wide (9,400 square feet).

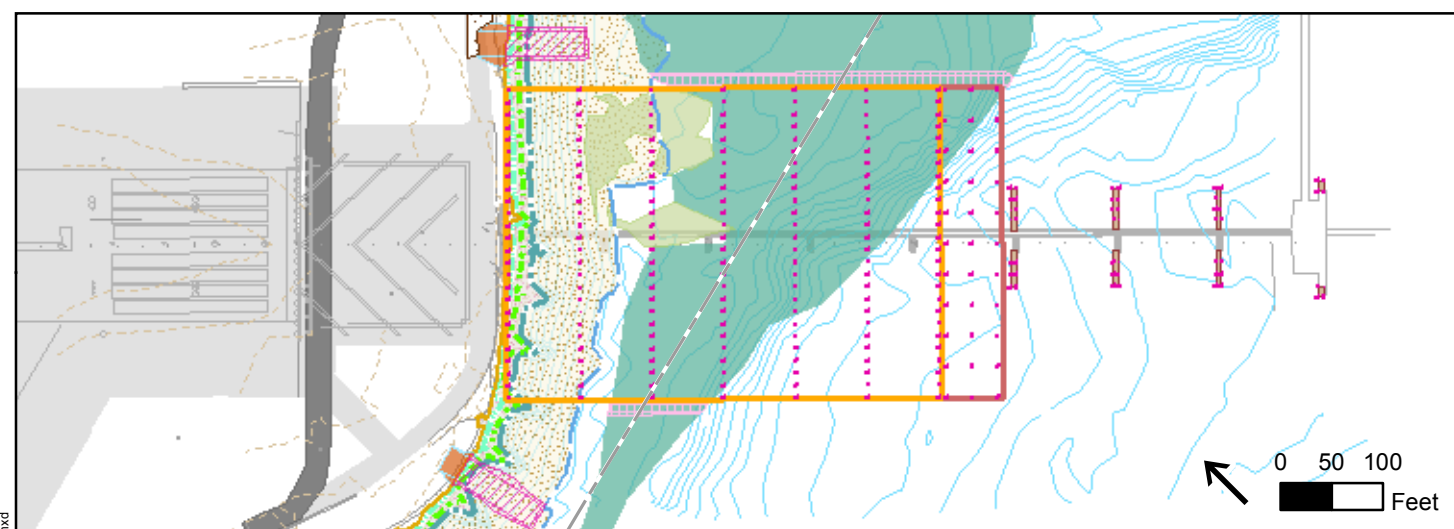
The proposed Runway 33L RSA improvements would affect the interests of the MA WPA significant to Land Under the Ocean, especially the protection of marine fisheries and wildlife habitat. The proposed Runway 33L RSA Improvements require the removal of eelgrass, which is important habitat for fish and other marine organisms. Land Under the Ocean at Runway 33L would continue to be significant to storm damage prevention and flood control.



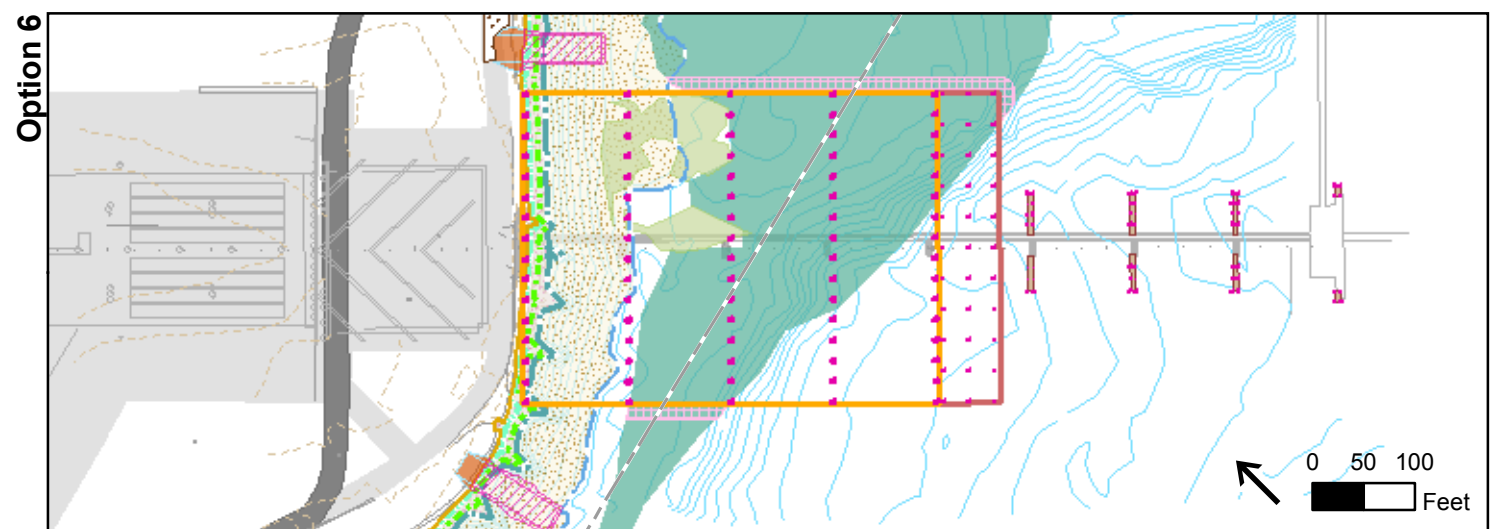
Option 1



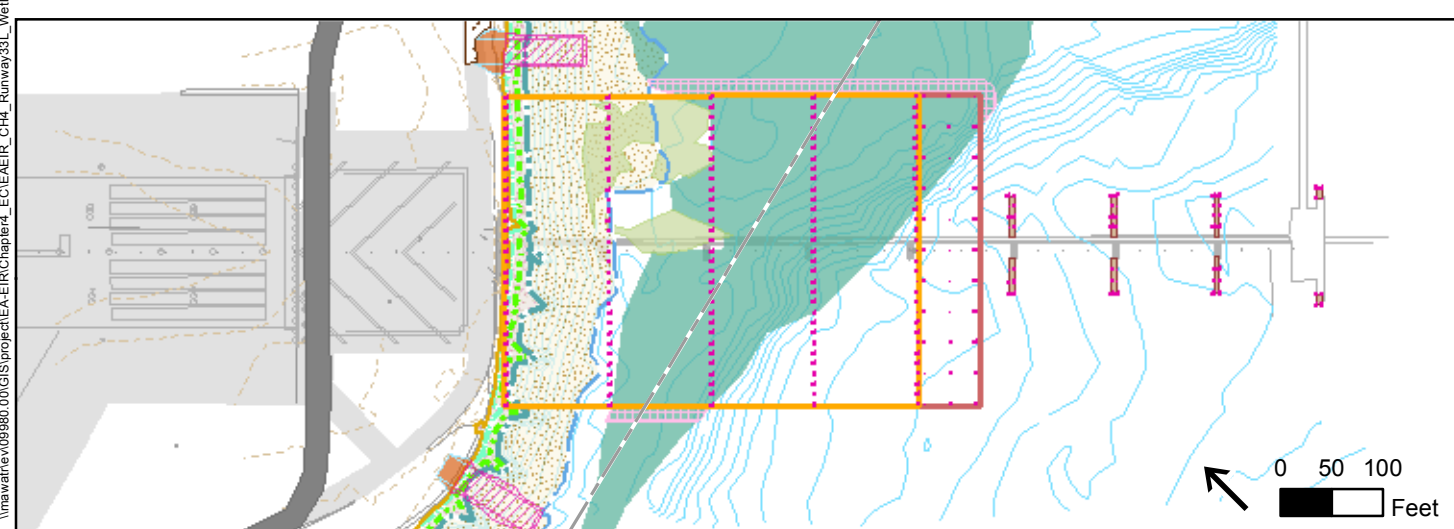
Option 5



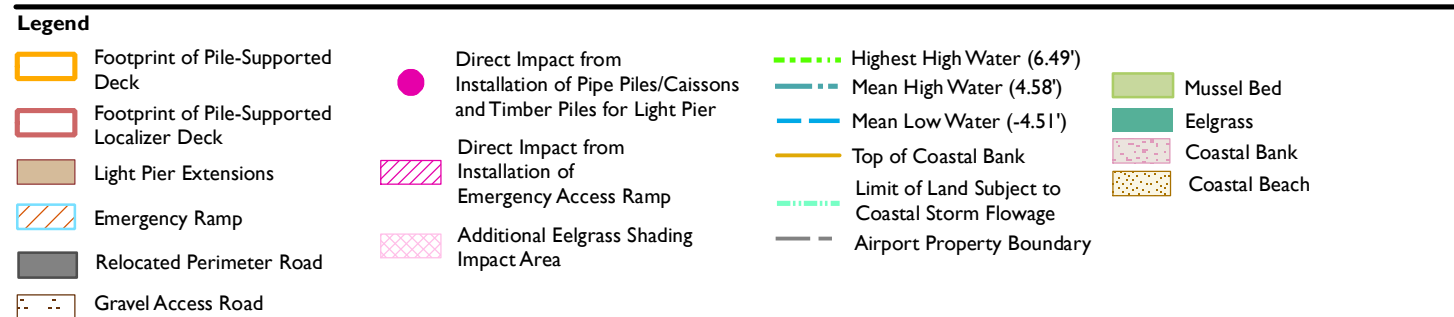
Option 2



Option 6



Option 3



Logan RSA

Figure 4-1  
Runway 33L RSA  
Coastal Wetland Impacts and  
Eelgrass Shading

Source: Applied Science Associates  
Childs Engineering Corp.  
MassGIS Aerial Imagery 2008

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**Land Containing Shellfish (intertidal and subtidal)**

Each of the construction options would result in the alteration of Land Containing Shellfish (a state-regulated resource area that overlays Coastal Beach and Land Under the Ocean) as a result of placing pilings to construct the RSA improvements. Direct impacts range from 4,780 square feet (Option 3) to 5,495 square feet (Option 5).

The proposed Runway 33L RSA improvements would affect the interests of the MA WPA significant to Land Containing Shellfish as the proposed improvements would change the distribution of sediment grain size affecting shellfish habitat. Although this area supports very low shellfish densities, the habitat would still be available and it is likely that the Land Containing Shellfish can return to its former productivity following construction.

**Eelgrass (Submerged Aquatic Vegetation)**

Eelgrass is a habitat type of the state-regulated Land Under the Ocean, and is also considered to be a Special Aquatic Site under the federal Section 404(b)(1) guidelines. This analysis assumes that all of the eelgrass bed under the RSA deck would be shaded and would no longer receive sufficient light to survive, therefore the entire eelgrass bed under the RSA deck would be lost. Each of the construction options would result in the same impacts to eelgrass, since the size of the RSA (and localizer) deck would be the same in all five construction options. The proposed Runway 33L RSA improvements are anticipated to result in the loss of 60,100 square feet of eelgrass due to shading. This somewhat overestimates the impact of the proposed RSA improvements, as the area currently contains the timber-pile supported light pier which would be removed and replaced by the deck and pilings. The light pier occupies an area approximately 470 feet long by 20 feet wide (9,400 square feet).

**Table 4.2-1 Runway 33L RSA Direct Wetland Impacts**

Wetland Resource Area	Jurisdiction	Option <sup>1</sup>	Direct Impacts				
			RSA Deck	Localizer	Light Pier Extension	Emergency Access Ramps	Total
Coastal Bank (altered)	State only	1	315 linear feet	0	0	80 linear feet	395 linear feet
		2	315 linear feet	0	0	80 linear feet	395 linear feet
		3	315 linear feet	0	0	80 linear feet	395 linear feet
		5	315 linear feet	0	0	80 linear feet	395 linear feet
		6	315 linear feet	0	0	80 linear feet	395 linear feet
Coastal Beach	State and Federal	1	250	0	0	4,320	4,570
		2	105	0	0	4,320	4,425
		3	65	0	0	4,320	4,385
		5	130	0	0	4,320	4,450
		6	110	0	0	4,320	4,430





Table 4.2-1 Runway 33L RSA Direct Wetland Impacts (continued)

Wetland			Direct Impacts				
Resource Area	Jurisdiction	Option <sup>1</sup>	RSA Deck	Localizer	Light Pier Extension	Emergency Access Ramps	Total
Land Under the Ocean	State and Federal	1	755	50	35	0	840
		2	340	50	35	0	425
		3	310	50	35	0	395
		5	960	50	35	0	1,045
		6	690	50	35	0	775
		Land Containing Shellfish <sup>2</sup>	State only	1	1,005	50	35
2	445			50	35	4,320	4,850
3	375			50	35	4,320	4,780
5	1,090			50	35	4,320	5,495
6	800			50	35	4,320	5,205
Eelgrass <sup>3</sup>	State and Federal			1	56,310	3,790	0
		2	56,310	3,790	0	0	60,100
		3	56,310	3,790	0	0	60,100
		5	56,310	3,790	0	0	60,100
		6	56,310	3,790	0	0	60,100

1 The analysis considers Options 1, 2, 3, 5 and 6. Option 4 was dismissed due to the magnitude of potential impacts as described in Chapter 2, *Alternatives*.

2 Assumes Coastal Beach and Under the Ocean are designated as Land Containing Shellfish.

3 Eelgrass impact is the area under deck or localizer or immediately adjacent that would be shaded from sunlight. This area is entirely Land Under the Ocean.

Functions and values of coastal wetlands at the Runway 33L end, regulated under Section 404 of the Clean Water Act (CWA) would be similarly affected by the proposed RSA improvements. 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 RSA improvements. Installing pilings would result in the minor loss of natural substrate, and scour could alter the relief elevation and the distribution of the sediment grain size. The pilings, by providing additional habitat for sessile benthic organisms, could increase habitat diversity.



- **Production Export:** Production export would be affected by the proposed Runway 33L RSA improvements. Currently, this area (particularly the eelgrass bed) provides food (algae and benthic macroinvertebrates) for wildlife, including birds, and marine organisms.
- **Sediment/Shoreline Stabilization:** The proposed Runway 33L RSA improvements would not adversely affect the stability of the shoreline. The proposed improvements would provide similar stability to the shoreline.
- **Wildlife Habitat:** Wildlife habitat at the Runway 33L end would be altered as eelgrass and shallow coastal beach habitats that provide habitat for a variety of wildlife species would be lost due to shading or pilings. The proposed RSA improvements would not be a barrier to movement for wildlife along the shoreline.

#### 4.2.1.2 Indirect Impacts

Indirect impacts include the potential additional loss of eelgrass or diminished growth of eelgrass due to shading from the proposed RSA deck and localizer deck, in areas near but not under the deck. This impact is considered indirect because it would occur in a different location, would occur over time, and would likely occur over a gradient. A potential effect distance of 15 feet on either side of the deck was determined based on literature study<sup>6</sup> that showed light was diminished within this 15-foot zone. The five construction options would result in the same potential perimeter shading effect on eelgrass growth, affecting approximately 6,500 square feet of eelgrass.

Indirect impacts also include scour over time resulting from water movement around the piles or caissons underneath the pier. The amount of scour (see Appendix 6C, *Coastal Processes*) is proportional to the size of the piling (20-inch or 48-inch) and the number of pilings or caissons. Similar to the existing pilings in this area, scour would change the topography (bathymetry) of the land under water (including land containing shellfish and eelgrass beds) in the immediate vicinity of the proposed RSA deck. Indirect impacts due to potential changes to currents within the project area were evaluated using a hydrodynamic model that implements an enhanced friction factor within the deck footprint to represent the impedance to flow caused by the deck support piles.<sup>7</sup> Indirect impacts due to scour were evaluated using the Federal Highway Administration's Hydraulic Engineering Circular No. 18 (HEC-18).<sup>8</sup> The HEC-18 method includes an equation for calculating maximum scour depth at circular piles. Scour length was determined based on HEC-18 guidance, which suggests that the downstream length of the scour hole is two times the maximum scour depth. The flow velocities used in the HEC-18 analysis were obtained from the hydrodynamic model, Regional Ocean Modeling System (ROMS), which simulates flow inside Boston Harbor, coupled with the wave model, Simulating WAVes Nearshore (SWAN). Sediment dispersion was also modeled at Runway 33L to determine where marine sediment introduced into the water column during construction would potentially be deposited as described in

6 Olson, A.M., B. Witherspoon, R. M. Thom, and D.K. Shreffler. 1997. Light Environment and Eelgrass Shading Around Three WSDOT Ferry Terminals. In Washington State Transportation Commission, Mitigation Between Regional Transportation Needs and Preservation of Eelgrass Beds. WA-RD 421.1, Final Report March 1997.

7 Luettich, R.A. and J.J. Westerink. 1999. Implementation of Bridge Pilings in the ADCIRC Hydrodynamic Model: Upgrade and Documentation for ADCIRC Version 34.19. Prepared for the Department of the Army, Coastal Engineering Research Center, Waterways Experiment Station, US Army Corps of Engineers, Vicksburg, MS 39180.

8 Richardson, E.V. and S.R. Davis, 2001. *Evaluating Scour at Bridges*. Fourth Edition. Publication No. FHWA NHI 01-001, May 2001. Federal Highway Administration, U.S. Department of Transportation.



Appendix 6C, *Coastal Processes*. The sediment dispersion model SSFATE<sup>9</sup> was used to simulate dispersion and deposition of sediment from construction activities based on currents.<sup>10</sup>

Sediment deposition resulting from scour would be negligible, as shown on Figure 4-2. As shown in Table 4.2-2 and Figure 4-3 the total area affected by scour around the permanent pilings would range from approximately 8,350 square feet (Option 3) to 24,750 square feet (Option 1). This change in topography could potentially affect the capacity of land containing shellfish to support mussel beds in the immediate vicinity of each piling. Scour could also affect the eelgrass bed immediately adjacent to the outer pilings, with a potential loss ranging from 90 square feet to 420 square feet. The impacts shown in the table are in addition to the direct loss due to the installation of the pile or caisson. The eelgrass impact due to scour is outside of the footprint of the deck and localizer but within the area of potential peripheral shading (within 15 feet of the deck).

Table 4.2-2 Runway 33L RSA Scour Impact (square feet)

Option <sup>1</sup>	Coastal Beach	Land Under the Ocean	Land Containing Shellfish <sup>2</sup>	Eelgrass <sup>3</sup>
Option 1	5,630	19,120	24,750	230
Option 2	1,840	8,340	10,180	110
Option 3	1,060	7,290	8,350	90
Option 5	3,920	16,350	20,270	420
Option 6	1,830	12,100	13,930	320

1 Includes the impact resulting from the deck and the localizer.

2 Assumes Coastal Beach and Land Under the Ocean are designated as Land Containing Shellfish.

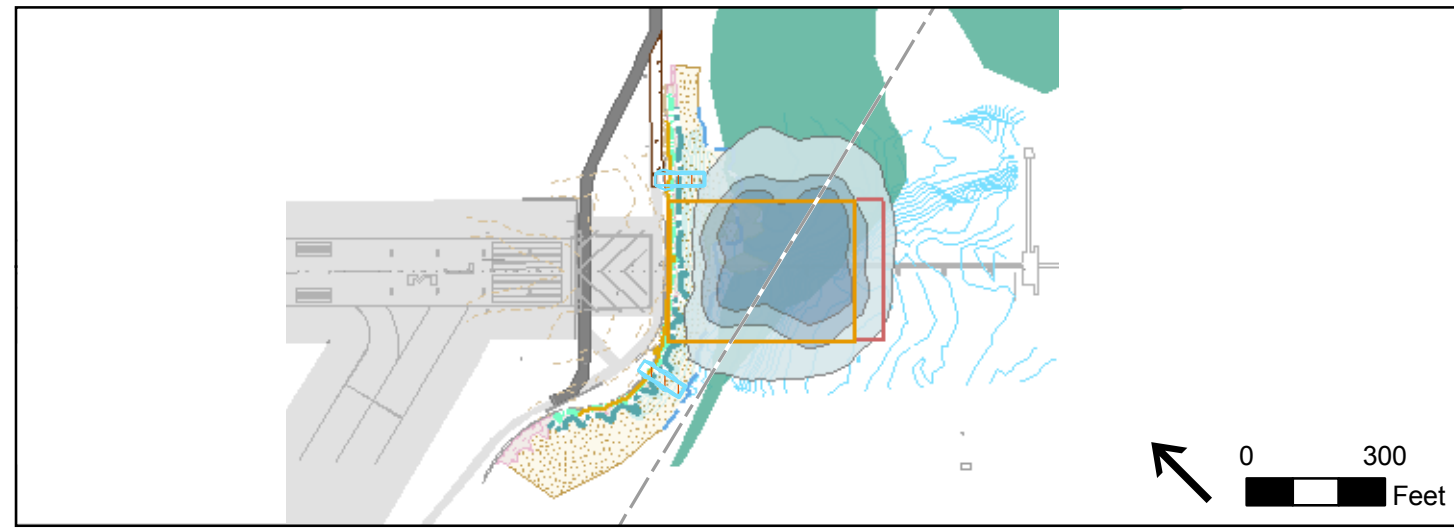
3 The Eelgrass impact is the area outside the footprint of the deck or localizer but within the area of potential peripheral shading.

The proposed Runway 33L RSA improvements would not cause the loss of other functions and values outside the footprint of the improvements, as discussed below.

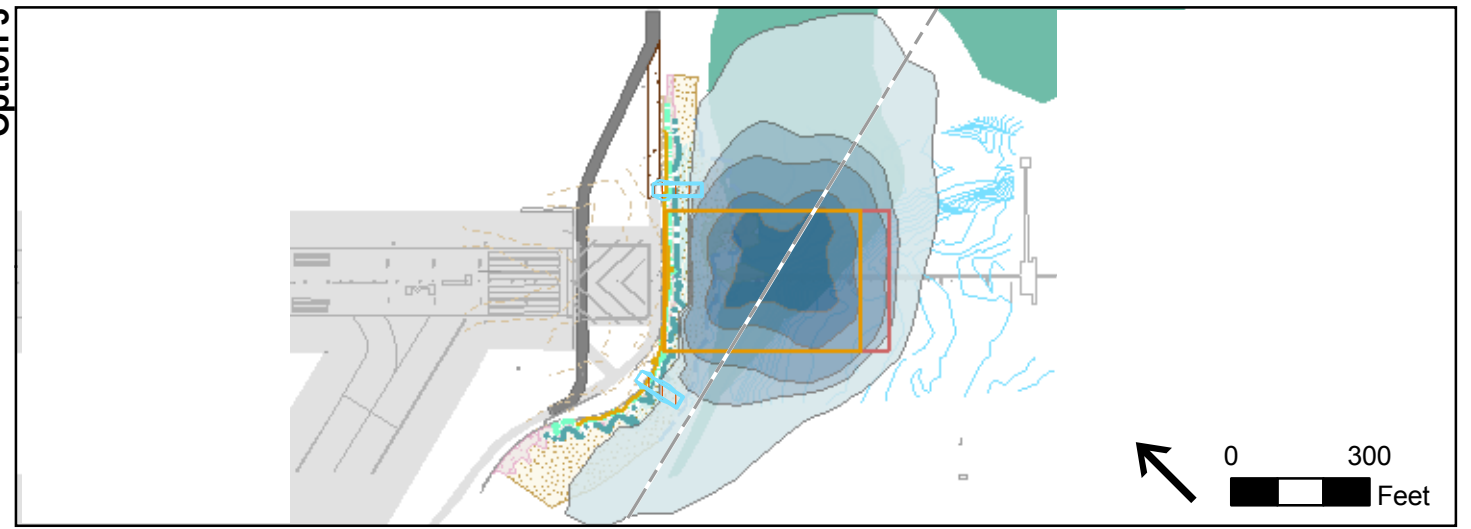
- The proposed Runway 33L RSA improvements would not affect the ability of any wetlands outside of the RSA footprint to recharge or discharge groundwater. This interest is not applicable to coastal wetlands.
- The proposed Runway 33L RSA improvements would not affect floodflow functions or the ability to reduce flood damage of wetlands outside of the RSA footprint, as it would not affect the stability of the coastal bank.

9 SSFATE (Ssuspended Sediment FATE) was jointly developed by Applied Science Associates and the USACE Environmental Research and Development Center (ERDC) to simulate the sediment suspension and deposition from dredging operations. Its use has extended to include the simulation of cable and pipeline burial operations using water jet trenchers, and mechanical plows, and to simulating the suspended sediment from anchor cable sweeps on the seafloor.

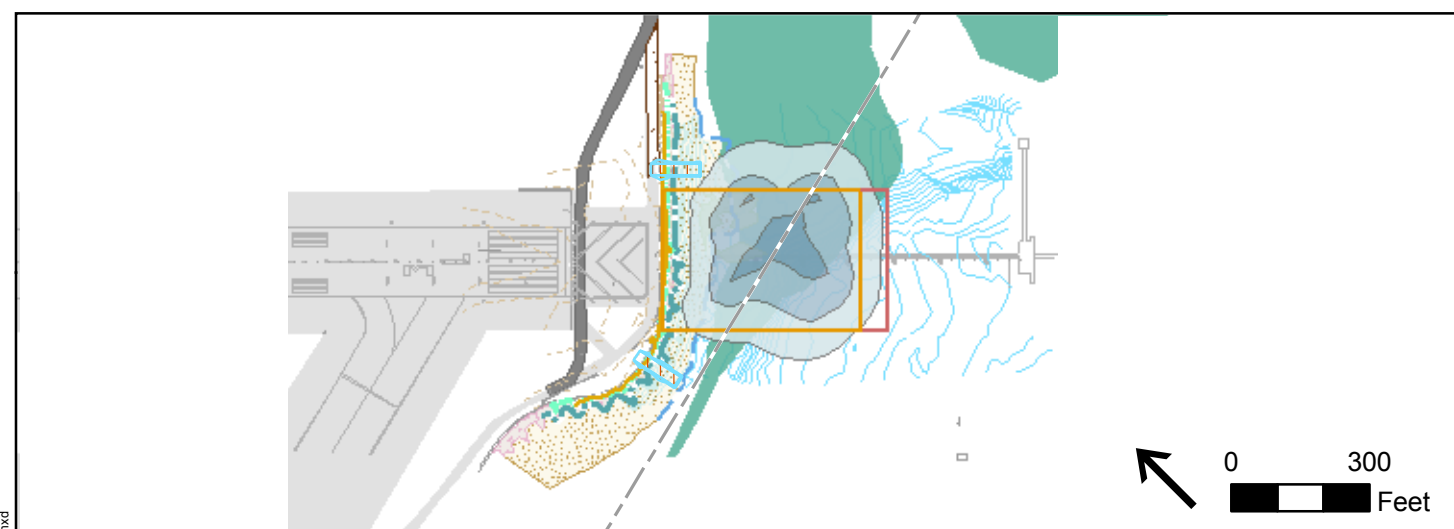
10 Olson, A.M., B. Witherspoon, R. M. Thom, and D.K. Shreffler. 1997. Light Environment and Eelgrass Shading Around Three WSDOT Ferry Terminals. In Washington State Transportation Commission, *Mitigation Between Regional Transportation Needs and Preservation of Eelgrass Beds*. WA-RD 421.1, Final Report March 1997.



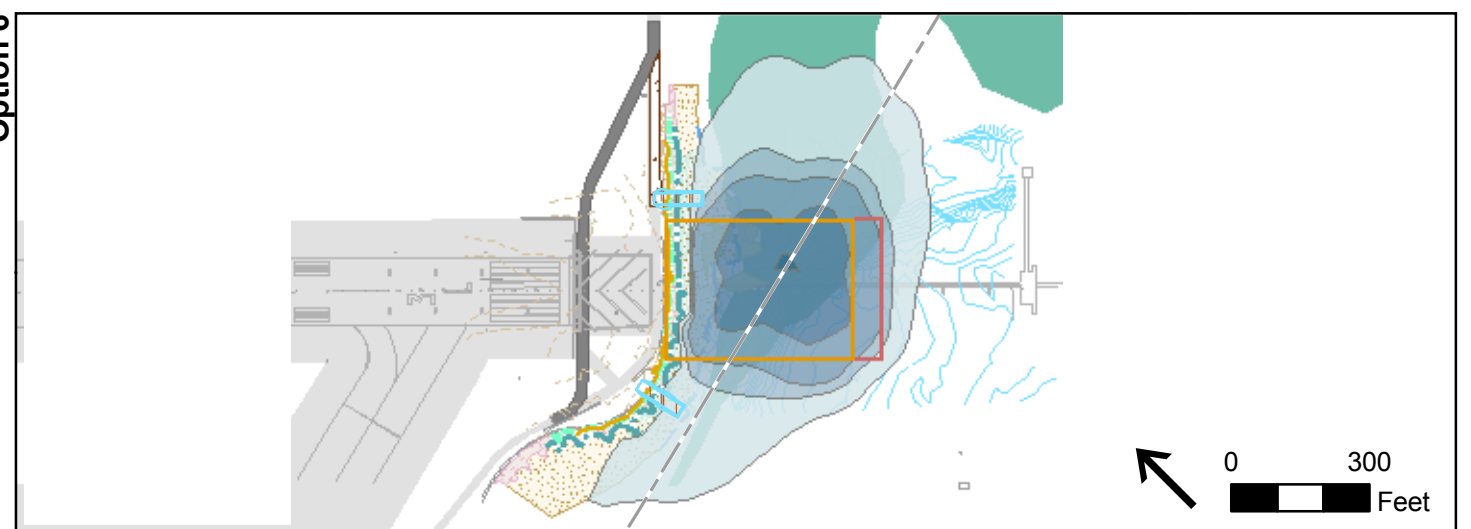
Option 1



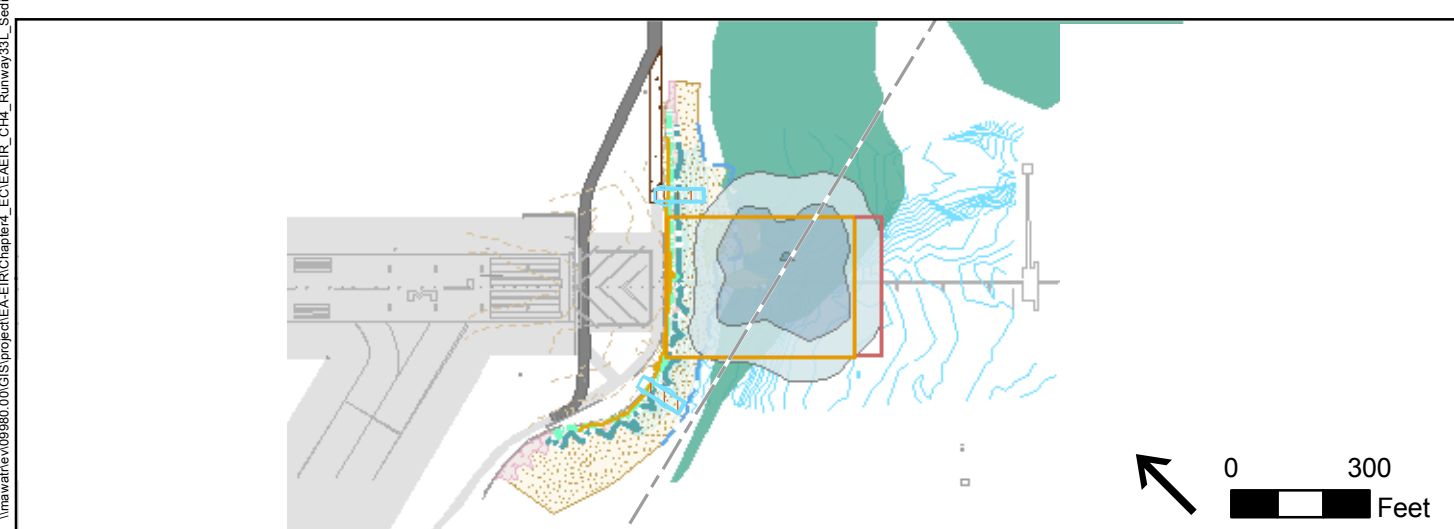
Option 5



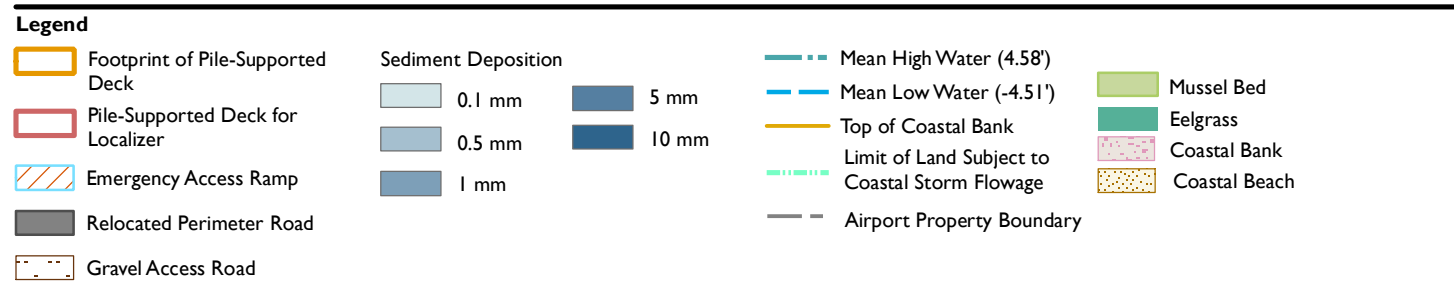
Option 2



Option 6



Option 3



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Logan RSA

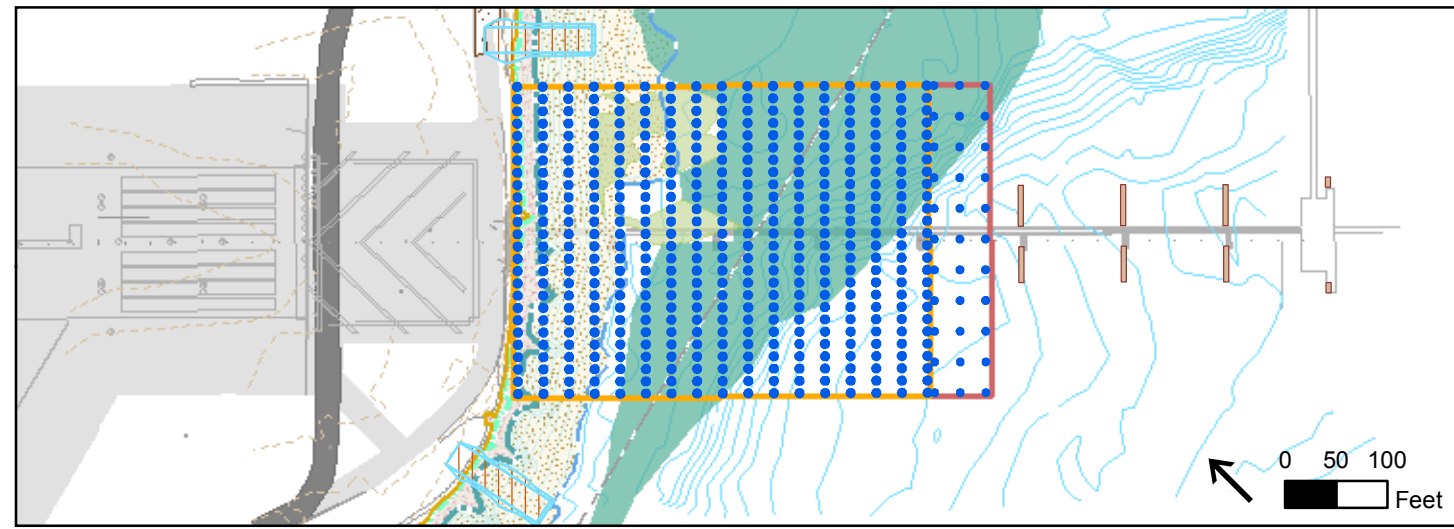
Figure 4-2

**Runway 33L RSA Sediment Deposition**

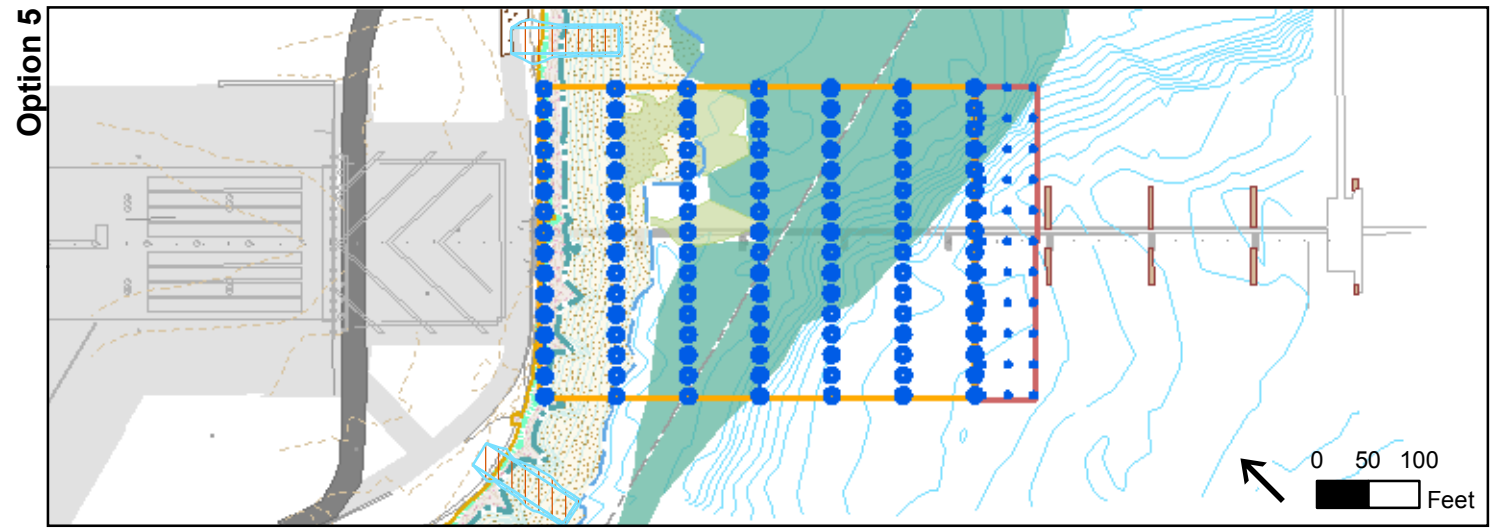
Source: Applied Science Associates  
Childs Engineering Corp.  
MassGIS Aerial Imagery 2008



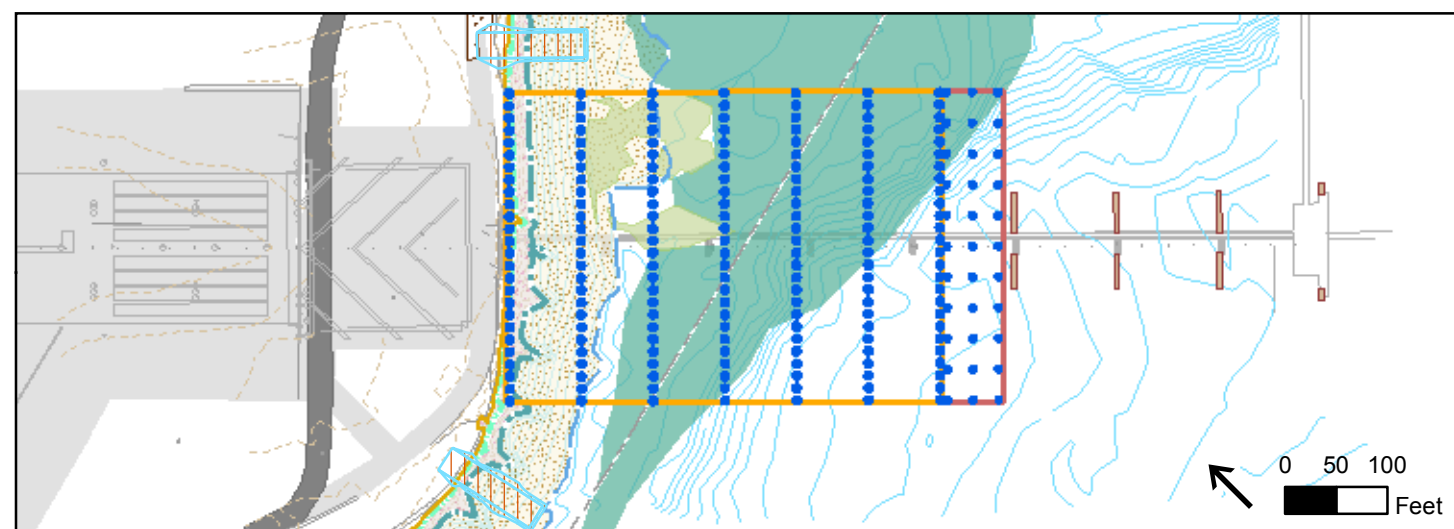
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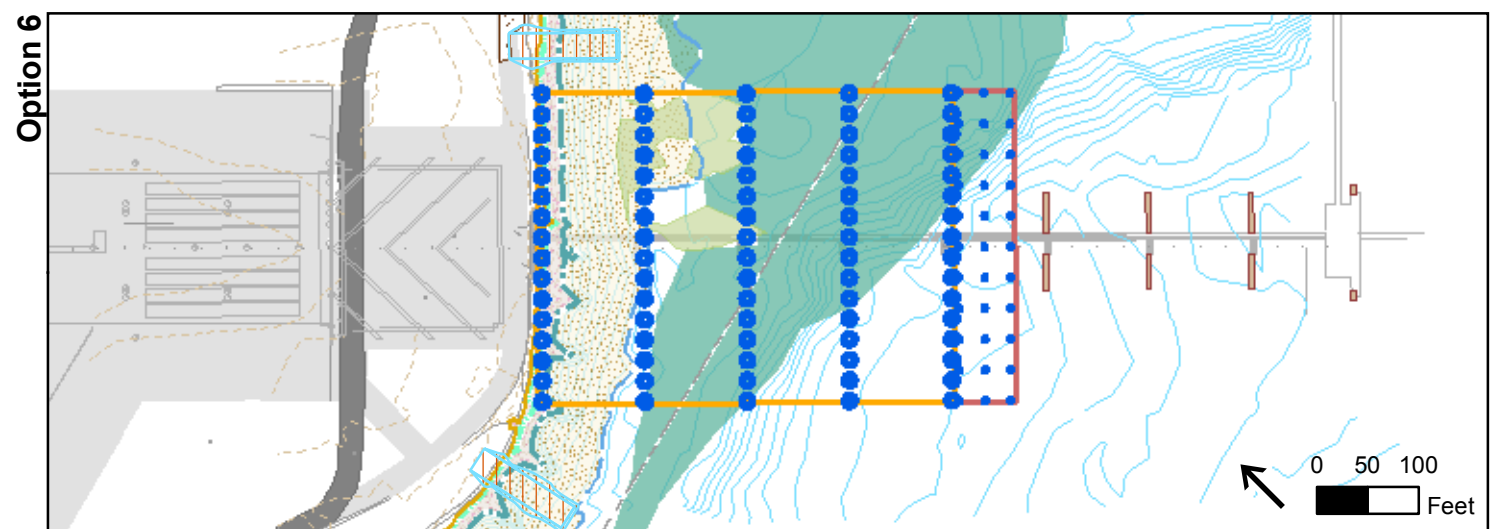
Option 1



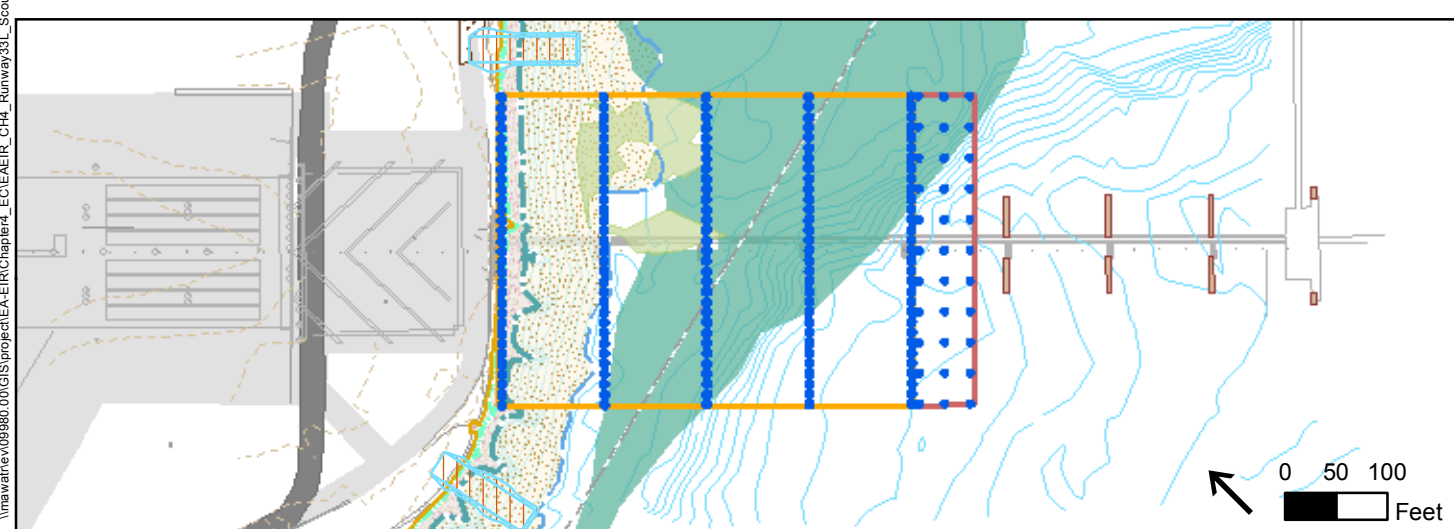
Option 5



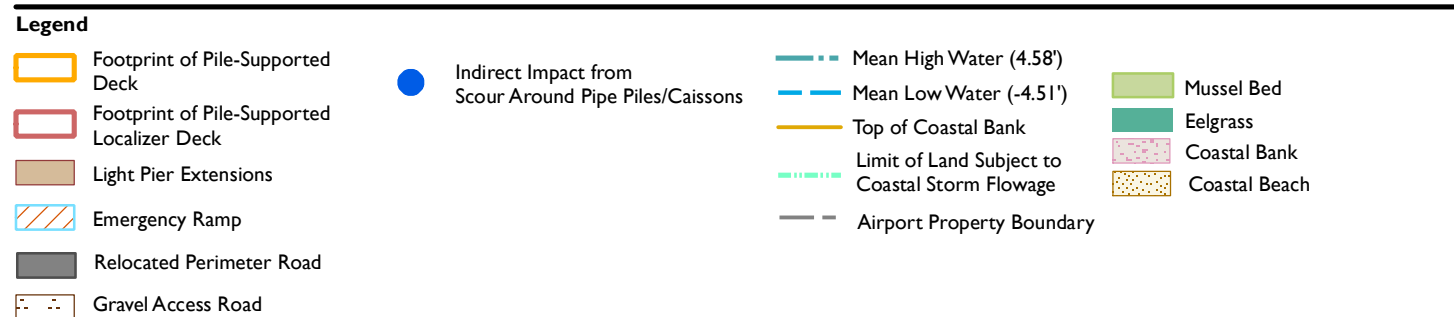
Option 2





Option 6



Option 3



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Logan RSA

Figure 4-3

**Runway 33L RSA Scour Impacts**

Source: Applied Science Associates  
Childs Engineering Corp.  
MassGIS Aerial Imagery 2008



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- The proposed Runway 33L RSA improvements do not represent a barrier to movement and would not reduce any wetland habitat functions or values outside of the RSA footprint. The RSA would not decrease the ability of other wetlands to provide wildlife, shellfish, or fish habitat.
- The proposed Runway 33L RSA improvements would not reduce the ability of wetlands outside of the footprint to remove, retain, or transform nutrients. The RSA would not change runoff patterns.
- The production export function of wetlands outside of the proposed Runway 33L RSA improvements footprint would not be affected. The RSA improvements would not cause any change to wildlife use, fish and shellfish habitat, vegetation, flushing, or other characteristics of protection export.
- The shoreline stabilization function of wetlands outside of the proposed Runway 33L RSA improvements footprint would not be affected. The proposed RSA improvements would maintain the stability of the adjacent shoreline.

#### 4.2.1.3 Temporary Construction Impacts

The proposed Runway 33L RSA improvements are anticipated to generate suspended sediment during construction as a result of driving piles or drilling caissons, as discussed on Section 2.2.4 and in Appendix 6D, *Coastal Processes*. Mooring the construction barges and use of spuds to anchor the barges at the construction site could also temporarily generate sediment and could temporarily impact benthic organisms and eelgrass. While every feasible measure will be taken to minimize the amount of sediment generated, it is likely that construction would result in the release of sediment into the water column. This sediment would be distributed by the tides and currents, and would be redeposited in the vicinity of the work area.

The sediment deposition analysis conducted for this Draft EA/EIR showed that sediment deposits generated by construction activities could range in depth from a maximum of 10 millimeters (mm), 0.4 inches, to less than 0.1 mm (0.004 inches). This deposition is not anticipated to have an adverse effect on the benthic community or shellfish beds, although sediment deposition of 0.5 mm (0.02 inches) or more is considered to have the potential to adversely affect winter flounder eggs.<sup>11</sup> Sediment deposition at the predicted depths is not anticipated to affect the ability of eelgrass to grow. As shown in Table 4.2-3, sediment deposition of 1.0 mm or more is anticipated to occur on land under the ocean in an area ranging from 0 acres (Option 3) to 3.0 acres. Sediment deposition of 5 mm would occur over an area of land under the ocean ranging from 2.0 acres (Option 5) to 0 acres (Options 1, 2, 3), and sediment deposition of 10 mm would range from 0.9 acres (Option 5) to 0 acres (Options 1, 2, 3). The areas of sediment deposition overlap with the scour impacts identified in Table 4.2-2. The areas of sediment deposition are not confined to the footprint of the deck and localizer.

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<sup>11</sup> Berry, W., E. Hinchey, N. Rubinstein, and G. Klein-McPhee. 2004. *Winter Flounder, Pseudopleuronectes americanus, Hatching Success as a Function of Burial Depth in the Laboratory*. Ninth Flatfish Biology Conference. December 2004. Northeast Fisheries Science Center Reference Document 04-13.





Table 4.2-3 Runway 33L RSA Modeled Sediment Deposition from Construction (acres)

Sediment Deposition	Option	Coastal Beach	Land Under the Ocean	Land Containing Shellfish <sup>1</sup>	Eelgrass <sup>2</sup>
10 mm (0.4 in)	1	0	0	0	0
	2	0	0	0	0
	3	0	0	0	0
	5	0	0.9	0.9	0
	6	0	0.1	0.1	0
	5 mm (0.2 in)	1	0	0	0
2		0	0	0	0
3		0	0	0	0
5		0.1	2.0	2.1	0.2
6		0.1	1.6	1.7	0.1
1 mm (0.04 in)		1	0.1	1.6	1.7
	2	0	0.4	0.4	0
	3	0	0	0	0
	5	0.4	2.8	3.2	0.6
	6	0.4	3.0	3.4	0.5
	0.5 mm (0.02 in)	1	0.2	2.4	2.6
2		0.1	1.8	1.9	0.1
3		0.1	1.5	1.6	0.1
5		0.1	3.0	3.1	0.6
6		0.1	2.9	3.0	0.5
0.1 mm (0.004 in)		1	0.4	2.6	3.0
	2	0.4	3.1	3.5	0.6
	3	0.4	3.1	3.5	0.5
	5	0.6	6.4	7.0	2.2
	6	0.5	5.3	5.8	2.0

<sup>1</sup> Assumes Coastal Beach and Land Under the Ocean are designated as Land Containing Shellfish.

<sup>2</sup> The Eelgrass construction impact is the area outside the footprint of the deck or localizer. This area is entirely in Land Under the Ocean.



#### 4.2.1.4 Findings

In accordance with FAA *Order 1050.1E*, an action would result in a significant impact to wetlands if it:

- Adversely affects a wetland's functions to protect the quality or quantity of a municipal water supply, including sole source and potable water aquifers.
- Substantially alters hydrology needed to sustain affected wetland values and functions or those of a wetland to which it is connected.
- Substantially reduces the affected wetland's ability to retain floodwater or storm runoff, thereby threatening public health, safety, or welfare.
- Adversely affects the maintenance of natural systems supporting wildlife and fish habitat or economically-important timber, food, or fiber resources in the affected or surrounding wetlands.
- Promotes development of secondary activities or services that causes any of the above impacts.
- Is inconsistent with applicable state wetland strategies.

As documented in this section, the proposed Runway 33L RSA improvements 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 Runway 33L RSA improvements would not encroach on a floodplain or affect floodplain values.

With the proposed mitigation for the loss of eelgrass and shellfish resources, the proposed Runway 33L RSA improvements would not result in a significant impact as defined at FAA *Order 1050.1E*. With mitigation, the proposed Runway 33L RSA improvements would meet the criteria for a Variance under the Wetlands Protection Act and comply with the Commonwealth's No Net Loss Policy and would, therefore, be consistent with state wetland strategies.

#### 4.2.2 Waterways and Tidelands

The proposed safety improvements were analyzed to determine potential impacts to coastal waterways and tidelands, in accordance with FAA NEPA regulations at FAA *Order 1050.1E Appendix A, Section 3.3*. The proposed Runway 33L RSA improvements require the construction of a pile-supported deck partially seaward of the mean high water line on Commonwealth tidelands, which are protected under Chapter 91 and the Massachusetts Coastal Zone Management Program. FAA regulations indicate there is no significant impact threshold identified for coastal resources. The analysis of significant impacts focuses on how a proposed project is consistent or not consistent with a state's coastal zone management program.

The Secretary's Certificate required the following information be included in the Draft EA/EIR related to these coastal resources:

- The Draft EA/EIR must address how the proposed safety improvements will meet the standards for a Chapter 91 Variance as a nonwater-dependent project (see Chapter 6, *Regulatory Compliance*);



- An assessment of alternative configurations and alignments, if any, that meet safety objectives while minimizing impacts (see Chapter 5, *Proposed Mitigation and Section 61 Findings*);
- Documentation that the Project complies with the requirements for public benefits at 301 CMR 13.00, including detailed information describing the nature of the tidelands affected by the Project and the public benefit of the project, the purpose and effect of the project, the impact on abutters and the surrounding community, enhancement to the project, benefits to the public trust rights in tidelands and other associated rights, benefits provided through previously obtained municipal permits, environmental protection and preservation, public health and safety, and the general welfare (see Chapter 5, *Proposed Mitigation and Section 61 Findings*); and
- A description of appropriate mitigation measures for environmental and tidelands impacts (see Chapter 5, *Proposed Mitigation and Section 61 Findings*).

Discussions of how the Project meets the standards for a Chapter 91 Variance and a Public Benefits Determination are included in Chapter 6, *Regulatory Compliance*. Mitigation is discussed in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

#### 4.2.2.1 Direct Impacts

The five construction options would result in direct impacts to tidelands. 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.

#### No-Action/No-Build Alternative

There would be no impacts due to the No-Action/No-Build Alternative, as there would be no changes in the existing conditions other than ongoing natural processes.

#### Build Alternative

The proposed Runway 33L RSA improvements would have permanent impacts to Chapter 91 waterways and tidelands as described below. Although the physical loss of tideland (based on the footprint of the area of natural substrate replaced by pilings) varies among the options, the options would result in the same deck footprint. The impact to Chapter 91 resources is therefore considered to be the area of the deck footprint seaward of the mean high tide line, approximately 159,000 square feet (3.65 acres) and extending approximately 450 feet seaward of the high tide line. A portion of this (approximately 2,800 square feet) is currently occupied by the timber-pile supported light pier, which restricts public access out to 2,400 feet from the shoreline. The entire project area is within Logan Airport's 500-foot Security Zone as established by Massachusetts General Law (M.G.L.) Chapter 90, Section 61 and described in Section 3.3.3 of Chapter 3, *Affected Environment*.

As documented in Section 3.3.3 of Chapter 3, *Affected Environment*, the only interests currently provided by the proposed RSA area are limited shellfishing, living marine resources, and water quality. The proposed Runway 33L RSA improvements would eliminate the limited shellfishing within the area occupied by the pilings, and would eliminate or reduce the ability of the area to support eelgrass. The proposed RSA deck



would not affect the ability of the onshore areas to protect water quality, as further discussed in Section 4.2.5. The existing timber light pier, which will continue to extend approximately 1,930 feet seaward of the end of the proposed deck, eliminates any public use of this area for navigation, as does the legislated security restriction.

#### 4.2.2.2 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 Runway 33L RSA improvements do not require closing tidelands elsewhere in Boston Harbor.

#### 4.2.2.3 Temporary Construction Impacts

Temporary construction-related impacts to tidelands and waterways would be limited to temporary occupancy of a portion of the tidelands by construction barges. As described in Chapter 2, *Alternatives*, 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 near the construction area. The proposed mooring areas are within shallow on-shore waters and within Logan Airport's Security Zone.

#### 4.2.2.4 Findings

Chapter 91 Waterways and Tidelands are a state-regulated resource with no comparable federal regulated resource. There are no FAA NEPA criteria for significant impacts. As documented in this section, the proposed Runway 33L RSA improvements would not affect the public's interests in tidelands.

### 4.2.3 Fish, Wildlife and Plants

The following sections include a discussion of the environmental consequences of the proposed Runway 33L RSA improvements and the No-Action/No-Build Alternative on fish, wildlife, and plants. NEPA regulations that address fish, wildlife, and plants are discussed in FAA *Order 5050.4B* and in FAA *Order 1050.1E*. FAA *Order 1050.1E Appendix A, Section 8.3*, identifies the significant impact thresholds related to fish, wildlife, and plants.

The Secretary's Certificate requires the Draft EA/EIR to evaluate the following:

- A summary of the project site's habitat assessment (see Chapter 3, *Affected Environment*);
- Identification of any impacts to state-listed threatened or endangered species and any monitoring, documentation procedures, and habitat enhancements;
- A discussion of any impacts to land containing shellfish and resultant impacts to shellfishermen due to the construction of the RSA;
- A discussion of the potential impacts to eelgrass and mitigation strategies identified with the federal and state eelgrass working group (see Chapter 5, *Proposed Mitigation and Section 61 Findings*); and



- A discussion of the species for which Essential Fish Habitat (EFH) has been established by the National Marine Fisheries Services (NMFS) and how these species will be protected during construction.

Potential shellfish and eelgrass mitigation measures are identified in Chapter 5, *Proposed Mitigation and Section 61 Findings*. A description of the ongoing coordination with the Eelgrass Working Group is provided in Chapter 5, *Proposed Mitigation and Section 61 Findings*, and in Chapter 7, *Public and Agency Involvement*.

#### 4.2.3.1 Direct Impacts

Section 3.3.4 of Chapter 3, *Affected Environment*, describes the existing fish, wildlife and plants found in the vicinity of the proposed Runway 33L RSA improvements. Direct impacts were determined to be the loss of these resources within the footprint of the proposed pile-supported deck. Constructing the pile-supported deck would result in direct impacts to fish, wildlife and plants, as discussed below.

#### No-Action/No-Build Alternative

There would be no impacts to fish, wildlife, and plants as a result of the No-Action/No-Build Alternative. There would be no change to the physical environment at the Runway 33L end.

#### Build Alternative

There would be permanent impacts to fish, wildlife, and plants as a result of the proposed Runway 33L RSA improvements. The construction of the pile-supported deck requires installing piles and/or caissons, which would result in the loss of habitat for fish and benthic organisms (shellfish, crabs, and other invertebrates) as well as plants.

#### *Fish*

A small amount of habitat that could be used by fish species (approximately 3.65 acres), including the 18 species for which Boston Harbor is designated as EFH, would be altered by the proposed pilings and shaded by the deck. The DMF has recommended a time of year restriction for in-water, silt producing work extending from February 15<sup>th</sup> through June 30<sup>th</sup> for the protection of winter flounder (*Pseudopleuronectes americanus*) using near-shore areas for spawning, larval settlement, and juvenile development.<sup>12</sup> Winter flounder is one of the fish species for which Boston Harbor is designated as EFH. These changes are not anticipated to have permanent effects on fish habitat at the Runway 33L end, and there are no anticipated permanent effects on EFH.

#### *Wildlife*

The proposed Runway 33L RSA improvements would replace a portion of the Coastal Beach/Tidal Flat present at Runway 33L with pilings. This would eliminate habitat for certain benthic organisms such as soft-shelled clams (*Mya arenaria*), razor clam (*Ensis directus*), sand shrimp (*Crangon septemspinsa*), mud snails (*Ilyanassa obsoleta*), green crab (*Carcinus maenas*), and polychaetes (*Nereis virens*, *Pectinaria gouldii*). However, the pilings could provide attachment substrate for other benthic organisms. The proposed structure would not be a barrier to movement along the shoreline. The small amount of habitat lost due to deck construction is minor, and there is available habitat elsewhere on Airport property and throughout Boston Harbor.

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<sup>12</sup> Comment Letter on the ENF received from the Massachusetts Division of Marine Fisheries, dated August 7, 2009.



As documented in Section 4.2.1, the loss of subtidal substrate would be small in comparison to the available substrate in the immediate area, with the loss of 395 square feet (Option 3) to 1,045 square feet (Option 5). This represents a loss of 0.25 percent to 0.65 percent of the natural substrate under the deck (a total area of 159,000 square feet). The fish, shellfish, and wildlife species that are common to the habitat at the Runway 33L end could utilize similar habitat on Airport property and elsewhere in Boston Harbor. Like the existing pier, the new pilings will provide a substrate that is suitable for some benthic organisms (mussels, anemones, sponges, barnacles, etc) and could provide a habitat enhancement for these species.

There would be limited impacts to shellfish resources resulting from the proposed Runway 33L RSA improvements. As described in Chapter 3, *Affected Environment*, the densities of soft-shell clams at the Runway 33L end are very low and this area is not known to be harvested. Based on these findings, the population of harvestable soft shell clams is small and the resulting impacts to shellfish harvesting would not be significant. The shellfish mitigation strategy is planned to be similar to the mitigation performed by Massport for the Runway 22L ISA, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

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 construction of Taxiway C1 Connector would occur within the periphery of the mapped habitat of the upland sandpiper (*Bartramia longicauda*), the Massachusetts-listed endangered species known to occur at locations within the grassy interior of the airfield. The Massachusetts Natural Heritage and Endangered Species Program (NHESP) indicated that the proposed Project would not adversely affect the actual resource area habitat for the state-protected species.<sup>13</sup> The minor loss of aquatic habitat is not anticipated to affect shorebirds or waterfowl. Although eelgrass beds in intertidal areas may serve as an important food resource for brant, waterfowl use of the eelgrass beds at the Runway 33L end is considered a wildlife hazard.

### ***Plants***

The proposed Runway 33L RSA improvements would not affect any terrestrial vegetation other than mowed grasses. Impacts to plants would include the loss of habitat (Coastal Beach and Land Under the Ocean) for marine alga. As described above, this is a negligible loss of habitat and would not adversely impact the local population of these species in Boston Harbor. The loss of eelgrass is described in Section 4.2.1. The affected area (approximately 60,100 square feet of direct impact plus an additional potential 6,500 square feet with reduced growth due to peripheral shading for a total of 66,600 square feet) represents approximately 3 percent of the total eelgrass bed (54 acres) present off of Logan Airport. This loss of a portion of the eelgrass bed is not anticipated to have further impacts on the health or long-term viability of this eelgrass bed, which has been documented to have increased substantially in extent over the last decade (see Section 3.4.1 of Chapter 3, *Affected Environment*).

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<sup>13</sup> Letter received from the Massachusetts Natural Heritage and Endangered Species Program dated March 26, 2010.



#### 4.2.3.2 Indirect Impacts

Indirect impacts are the potential effects of the structure on the movement of wildlife, population effects due to changes in food sources, and other potential changes that would affect fish or wildlife populations in the vicinity of Logan Airport.

Indirect impacts to fish could result from the loss of a portion of the eelgrass bed due to shading. As discussed in Section 3.3.4 of Chapter 3, *Affected Environment*, eelgrass beds provide important fish habitat, particularly for larval and juvenile stages. Boston Harbor is designated as Essential Fish Habitat for the larval and juvenile stages of several fish species, including haddock, pollock, whiting, red hake, white hake, winter flounder, yellowtail flounder, windowpane flounder, and American plaice. Eelgrass beds potentially provide shelter from predators and provide food sources. The loss of part of the extensive eelgrass bed between Logan Airport and Deer Island would incrementally reduce the amount of available habitat for these fish species. However, the proposed RSA improvements are not anticipated to affect the persistence of these fish populations in Boston Harbor.

#### 4.2.3.3 Temporary Construction Impacts

Construction could result in temporary impacts to fish, benthic invertebrates, and plants as a result of several activities. As discussed in Section 4.2.1, construction is anticipated to generate suspended sediment which would, after a short time in the water column, settle on the bottom at depths up to 10 mm (0.4 inches) over a small area. This sediment could clog the gills of fish and benthic invertebrates, affecting their respiratory function. Sediment could also settle on blades of eelgrass, affecting their ability to photosynthesize and grow. 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.<sup>14</sup>

Construction equipment (barges, cranes, pile-driving, etc.) would result in activity and noise in the vicinity of Runway 33L. The resulting activity and noise would likely cause fish to avoid the work area. Construction, particularly pile-driving, can generate high noise levels underwater that could potentially harm fish species in close proximity, as discussed below and in Appendix 7, *Assessment of Construction Sound Effects on Fish within Boston Harbor Technical Memorandum*.

Fish species are sometimes injured or killed by the impact sounds generated by high-intensity sources such as pile driving.<sup>15</sup> 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 (e.g., hearing generalist or specialists), fish size, environmental setting, and many other factors. The fish species affected depend on the location of the operation, and the habitat types. The sounds from pile driving result from the impact of the hard surface of the hammer with that of the pile.

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<sup>14</sup> *Magnuson-Stevens Fishery Conservation and Management Act*, Public Law 94-265, as amended through October 11, 1996 (<http://www.nmfs.noaa.gov/sfa/magact/>)

<sup>15</sup> A. N. Popper, and Hastings M. C. 2009. *The effects of human-generated sound on fish* (Review paper). *Integrative Zoology* 2009; 4: 43-52.



Typically, pile-driving sounds underwater are short, sharp and often very high in amplitude. They are repeated, usually at intervals greater than one second, for some minutes and/or hours.

Sound levels often are expressed in decibels (dB) which is commonly used to describe the magnitude of a sound pressure. NMFS and USFWS note that sound pressure levels in excess of 150 dB<sub>RMS</sub> can cause temporary behavioral changes (startle and stress) that could decrease a fish's ability to avoid predators.<sup>16</sup> To determine the potential impacts to fish from pile-driving, the Draft EA/EIR analysis used the California, Oregon, and Washington Departments of Transportation (DOT) fish noise exposure criteria from pile-driving activities, which is based on a 2008 multiagency agreement that included key technical and policy staff, and national experts on sound propagation activities that affect fish and wildlife species of concern.<sup>17</sup>

For all of the Construction Options, underwater noise levels within 20 meters (66 feet) of the construction activity could affect the behavior of fish, likely causing fish to avoid the construction area during pile-driving activities. Although Options 1, 2 and 3 (20-inch steel piles installed using an impact hammer) would exceed the injury threshold for fish (205 dB) within 10 meters (33 feet) of pile driving activities, fish are not likely to be within this close proximity to the pile-driving because the lower noise levels farther away from the activity would cause fish to avoid the area. Options 5 and 6 (48-inch drilled caissons, advanced using a vibratory hammer) would not exceed the injury thresholds for peak or cumulative noise levels.

#### 4.2.3.4 Findings

While there is no specific significance threshold established for species not protected under the federal Endangered Species Act, FAA *Order 1050.1E* requires the FAA to consider the project's effects on non-listed species population dynamics, sustainability, reproduction rates, natural and artificial mortality (aircraft strikes), and the minimum population size needed to maintain the affected population.

The analysis in this section shows that the proposed Runway 33L RSA improvements would not significantly impact biodiversity because the alternatives would not reduce the habitat size below the level sufficient to sustain species commonly found in the affected area or adversely impact sensitive habitat supporting floral or faunal species not commonly occurring in the affected area.

#### 4.2.4 Federally-Listed Threatened and Endangered Species

The following section describes environmental consequences of the proposed Project on federally-listed threatened or endangered species that may occur in the vicinity of the proposed Runway 33L RSA improvements. NEPA regulations that address threatened and endangered species are discussed in the FAA *Order 5050.4B* and in FAA *Order 1050.1E*. FAA *Order 1050.1E Appendix A, Section 8.3*, identifies the significant impact thresholds related to federally-listed threatened or endangered species. There is no significant impact as

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16 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. Website: [http://www.dot.ca.gov/hq/env/bio/files/Guidance\\_Manual\\_2\\_09.pdf](http://www.dot.ca.gov/hq/env/bio/files/Guidance_Manual_2_09.pdf)

17 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. Website: [http://www.wsdot.wa.gov/NR/rdonlyres/4019ED62-B403-489C-AF05-5F4713D663C9/0/BA\\_InterimCriteriaAgreee.pdf](http://www.wsdot.wa.gov/NR/rdonlyres/4019ED62-B403-489C-AF05-5F4713D663C9/0/BA_InterimCriteriaAgreee.pdf)





the proposed Runway 33L RSA improvements would not adversely affect any federally-listed threatened or endangered species according to FAA *Order 1050.1E*.

The U.S. Fish and Wildlife Service (USFWS) indicated that there are no federally-listed threatened or endangered species under their jurisdiction within the Project area.<sup>18</sup> The National Marine Fisheries Service (NMFS) has indicated that sea turtles, protected under the Endangered Species Act (ESA) may occur within Boston Harbor and requested that the FAA undertake an ESA Section 7 Consultation.<sup>19</sup> 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 NMFS.<sup>20, 21</sup> The Secretary's Certificate requires that Massport continue to coordinate with the USFWS and NMFS to identify other protected species that may occur in the vicinity of Runway 33L and include the results of these discussions in the Draft EA/EIR.

#### 4.2.4.1 Direct Impacts

Literature on habitat requirements and stranding observations were reviewed to determine whether there would be any impacts to federally-listed threatened or endangered species, specifically for whales and sea turtles. Direct effects would include the loss of critical habitat or incidental mortality of individuals. The 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.

There would be no permanent adverse impacts to federally-listed species resulting from the construction of the pile-supported deck, as discussed below. As documented in Chapter 3, *Affected Environment*, there is no designated critical habitat within Boston Harbor.

#### No-Action/No-Build Alternative

There would be no impacts to federally-listed threatened or endangered species as a result of the No-Action/No-Build Alternative. There would be no change to the environment at the Runway 33L end.

#### Build Alternative

Although sea turtles have not been observed in Boston Harbor, the pile-supported deck could impact habitat potentially able to be used by sea turtles, but would not result in an adverse effect that would jeopardize the continued existence of these species or adversely change their critical habitat in Boston Harbor. There would be no direct impacts to listed species. The proposed Runway 33L RSA improvements are not likely to affect federally-listed whale species, including the North Atlantic right, the humpback, the fin, the sei, and the sperm whales, as the proposed RSA would be constructed in an area too shallow to be used by whales. NMFS has

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<sup>18</sup> Letter received from the United States Fish and Wildlife Service, New England Field Office, dated December 19, 2007.

<sup>19</sup> Letter received from the National Marine Fisheries Service, dated March 24, 2010.

<sup>20</sup> Letter to National Marine Fisheries Service from the Federal Aviation Administration, dated March 22, 2010.

<sup>21</sup> Vanasse Hangen Brustlin, Inc. Assessment of Sea Turtles and Whale Presence within the Boston Harbor Technical Memorandum, dated February 12, 2010.



concluded with this assessment. The five construction options would have a similar effect on eelgrass and therefore on sea turtle habitats.

#### 4.2.4.2 Indirect Impacts

Indirect effects to sea turtles, if present, could include effects on population persistence or stability due to the loss of food sources, and could potentially include health effects due to underwater construction noise. Indirect impacts to sea turtles could result from the loss of a portion of the eelgrass bed due to shading. As discussed in Section 3.4.1 of Chapter 3, *Affected Environment*, eelgrass beds provide important habitat for benthic macroinvertebrates and for larval and juvenile stages of fish, which may serve as food sources for sea turtles that wander into Boston Harbor. Loss of part of the existing eelgrass bed between Logan Airport and Deer Island would incrementally reduce the amount of available habitat for turtle food sources. However, this is not anticipated to affect the persistence of sea turtles in Boston Harbor or elsewhere.

#### 4.2.4.3 Temporary Construction Impacts

Construction could result in temporary impacts to sea turtle habitat as a result of several activities. As discussed in Section 4.2.1, construction is anticipated to generate suspended sediment which would, after a short time in the water column, settle on the bottom at depths up to 10 mm (0.4 inches). Sediment could settle on blades of eelgrass, affecting their ability to photosynthesize and grow and support populations of prey species. These impacts would be short-term and are not anticipated to result in any long-term disruption of growth or population dynamics of sea turtles.

Construction equipment (barges, cranes, pile-driving, etc.) would result in activity and noise in the vicinity of Runway 33L, as shown in Table 4.2-4. This would likely cause turtles 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 turtles. 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, turtles (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 a short time in 2011, and throughout the 2012 construction season (July through November).

#### 4.2.4.4 Findings

FAA *Order 1050.1E* defines a significant impact for endangered species as one when the USFWS or NMFS determines a proposed action would likely jeopardize a species' continued existence or destroy or adversely affect a species' critical habitat.

As documented in this section, the FAA has determined, and NMFS has concurred, that the proposed Runway 33L RSA improvements would have an effect, but not an adverse effect, on the habitat of sea turtles. These safety improvements would not have a significant effect on endangered species.



#### 4.2.5 Water Quality

Evaluating water quality is a necessary component of the National Environmental Policy Act (NEPA) review as required by the FAA NEPA regulations. NEPA regulations that address water quality are discussed in FAA Order 5050.4B and in FAA Order 1050.1E. FAA Order 1050.1E Appendix A, Section 17.3, identifies the significant impact thresholds related to water quality.

The Secretary's Certificate required that the Draft EA/EIR evaluate impacts to water quality and drainage resulting from the proposed Project. Specifically, the Certificate requires the Draft EA/EIR to:

- Evaluate the effects of stormwater drainage on wetlands;
- Demonstrate that the proposed RSA enhancement would not increase pollutant loading to Boston Harbor;
- Demonstrate that the proposed project will be designed to comply with applicable Stormwater Policy Standards (see Chapter 6, *Regulatory Compliance*);
- Explain how water quality and quantity impacts would be controlled in conformance with the stormwater regulations and the NPDES permit (see Chapter 6, *Regulatory Compliance*);
- Describe proposed mitigation measures to protect water quality during the construction period and, if required, post-construction (see Chapter 5, *Proposed Mitigation and Section 61 Findings*);
- Evaluate stormwater runoff impacts during construction and post-construction;
- Demonstrate that source controls, pollution prevention measures, erosion and sediment controls, and the post-development drainage system will be designed in compliance with the Massachusetts Stormwater Management regulations (301 Code of Massachusetts Regulations (CMR) 10.00) (see Chapter 6, *Regulatory Compliance*); and
- Discuss the potential temporary increase in suspended sediments in the area of Boston Harbor in the immediate vicinity of the proposed work, as a result of short-term construction activities such as dredging to remove unsuitable substrate materials.

A discussion of the proposed Runway 33L RSA improvement's regulatory compliance with water quality regulations, including the Massachusetts Stormwater Management regulations, and the applicable Stormwater Policy Standards is provided in Chapter 6, *Regulatory Compliance*. Mitigation measures to protect water quality during construction and post-construction are presented in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

##### 4.2.5.1 Direct Impacts

Direct impacts to water quality result from the changes to hydrology and any new pollutant loading that may occur as a result of the proposed Runway 33L RSA improvements. Potential impacts to water quality are closely



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 must consider increases in stormwater runoff, decreases in infiltration, and changes in the concentrations of constituents contained within the runoff. Impervious surfaces such as runways, perimeter roadways, and RSAs 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 as long as stormwater outfalls are designed to manage discharges without causing erosion. Changes to infiltration and recharge are not 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 33L RSA improvements. Construction period impacts resulting from sediment disturbances due to construction activities were also evaluated using the SSFATE model. This analysis determined the suspended sediment contours for a single caisson auguring event under all possible tide conditions as a worst-case scenario.

The proposed improvements would occur in developed portions of the airfield near the end of Runway 33L and undeveloped intertidal and subtidal areas within Boston Harbor. Because airport operations will not change as a result of the proposed project, direct impacts to water quality are potentially associated only with stormwater management practices on RSA deck and changes to currents and sediment transport within near-shore waters adjacent to the deck.

#### **No-Action/No-Build Alternative**

Under the No-Action/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.

#### **Build Alternative**

All of the proposed construction options would have the same water quality impacts. The differences between the piling configurations, which are unique to each option, would have negligible impact on water quality.

#### ***Proposed Drainage System***

The five construction options would have the same drainage system and potential effects on stormwater in the vicinity of Runway 33L (see Table 4.2-4). The Airport's existing drainage areas and associated stormwater outfalls would not be affected by the construction of the proposed Runway 33L RSA improvements.



Table 4.2-4 Proposed Runway 33L RSA Stormwater Management

Element	Existing Cover Type	New Impervious Area	Stormwater Management
RSA Deck	Open Water	3.4 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 rip rap slope	0.2 acres	Drains to Boston Harbor via overland flow
Taxiway C1 Connector	Grass Infield	1.3 acres	Existing infield catch basins and new stormwater management treatment device collect stormwater runoff and discharge to Boston Harbor via Outfalls A-31 and A-32

The proposed relocated perimeter roadway and Taxiway C1 Connector are in upland portions of the airport. The existing closed drainage system in this area consists of a series of catchbasins and pipes, which discharge at the perimeter outfalls. Outfall A-29 is east of Runway 33L and discharges stormwater flows from a portion of the runway and from other paved surfaces east of the runway. Outfall A-30 is west of Runway 33L and discharges stormwater flows from a portion of the runway and from other paved surfaces west of the runway. Outfalls A-31 and A-32 discharge runoff from portions of the airfield west of Runway 33L, including runoff associated with Taxiway C1 Connector. These two outfalls would discharge additional stormwater flows associated with the proposed changes to Taxiway C1 Connector. All outfalls would continue to be regulated under the Airport’s existing NPDES permit, as described in Chapter 3, *Affected 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 rip rap at these outfalls prevents erosion and sedimentation as the result of stormwater discharges. A new stormwater treatment inlet (Stormceptor or equivalent) would be installed at Outfall A-30 or A-31 to treat runoff from the relocated perimeter road and Taxiway C1 Connector.

Runoff from the perimeter roadway and portions of the existing 33L RSA do not enter the closed drainage system and sheet flow across the rip rap slope into Boston Harbor. Overland sheet flow from the RSA and adjacent areas do not constitute regulated discharges under the NPDES permit. The construction of the upland portion of the Runway 33L RSA would result in changes to stormwater runoff in by adding impervious areas in currently grassed uplands. The proposed Runway 33L RSA improvements have been designed so that these stormwater changes will not impact wetland resources.

Runoff from the landside (airfield) portion of the Runway 33L RSA project area will continue to drain via overland flow into Boston Harbor. The shoreline in this location is protected from erosion with poured cement and stone rip rap. Rain that falls on the surface of the deck-based portion of the RSA will not be detained and will be discharged at several locations in order to prevent erosive forces associated with concentrated flow from disturbing sediment and affecting the receiving water. Stormwater runoff from the deck will be discharged via scuppers located beneath the deck. Runoff from portions of the deck located within the intertidal zone (landward of mean low water) will be collected in a separate piped drainage system and discharged at a location seaward of mean low water. Runoff from portions of the deck located seaward of mean low water will



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 will be distributed and will only occur at locations that are inundated throughout the tidal cycle.

### *Pollutant Loading*

As described in Chapter 3, *Affected Environment*, 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 and maintenance equipment. Due to its composition, the existing and proposed EMAS bed would not be accessed by vehicles other than during an emergency. 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 33L RSA improvements. The majority of the increase in pavement will occur as the result of the construction of the deck. Under existing conditions, this 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 will be deposited and potentially captured by the deck. These pollutants will be washed off of 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. 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). Prior to 2009, a sand mixture was used for traction control and de-icing on the perimeter roadways. This practice ended after the 2008-2009 winter season and has been replaced with the application of sodium acetate (NaAc). 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 bed, snow removal from the existing EMAS bed, if needed, is performed with a snow blower. This equipment would also be used to remove snow from the proposed EMAS bed 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 result in negligible impacts to water quality and are performed in accordance with the Airport Stormwater Pollution Prevention Plan (SWPPP) and the NPDES discharge permit.

The sampling data collected under the NPDES permit<sup>22</sup> and previously described in Chapter 3, *Affected Environment*, demonstrate that discharges from the airfield outfalls contain lower concentrations of contaminants than would be expected from a similar combination of grassed and paved surfaces in typical

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<sup>22</sup> Massachusetts Port Authority. *Logan Airport 2008 Environmental Data Report, Appendix J, Water Quality/ Environmental Compliance and Management*. EOE #3247, September 2009.



urban areas. 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 significantly 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 roads are swept frequently (at least weekly) thereby further reducing the quantity of pollutants that are available for washoff by stormwater flows.

#### *Massachusetts Stormwater Regulations*

As shown above, water quality monitoring data demonstrates that runoff from the airfield does not contain significant quantities of contaminants under existing conditions. Because the existing stormwater management practices (street sweeping and catch basins) are able to achieve acceptable water quality, it is not warranted to install advanced stormwater management measures for the proposed Runway 33L RSA improvements. A new stormwater treatment inlet (Stormceptor or equivalent) would, however, be installed at Outfall A-30 or A-31 to treat runoff from the relocated perimeter road and Taxiway C1 Connector. The Stormwater Management Regulations are discussed in Chapter 6, *Regulatory Compliance*.

#### **4.2.5.2 Indirect Impacts**

Indirect impacts of the RSA improvements on water quality potentially include additional turbidity and/or pollutant loading elsewhere in Boston Harbor. The SSFATE (Ssuspended Sediment FATE) model was utilized to predict the water column concentration and deposition of sediment disturbed during pile-driving, auguring, barge deployments and drilling mud overflows. SSFATE addresses the short term movement of sediment that is introduced into the water column and predicts the path and fate of the sediment particles using three-dimensional currents in estuaries and oceans. SSFATE was jointly developed by ASA, Inc. and the U.S. Army Corps of Engineers (USACE) Environmental Research and Development Center (ERDC) to simulate the sediment suspension and deposition from dredging operations. The results of the modeling are included in Appendix 6C, *Coastal Processes*.

The RSA would be constructed on a pile- or caisson-supported deck that would not generate pollutants that could be released into the Harbor, nor would it receive significant vehicle traffic or other sources of potential pollutants. As described in the coastal processes modeling report included in Appendix 6C, *Coastal Processes*, limited amounts of erosion would occur as a result of scour at the bottom of the pilings or caissons and currents in the vicinity of the deck would not be significantly altered. The proposed Runway 33L 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 of the runway end. The proposed Runway 33L 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.

#### **4.2.5.3 Temporary Construction Impacts**

Potential construction impacts associated with the construction of the Runway 33L RSA improvements 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 will be deployed in order to prevent pollution from construction equipment or material. Protective measures, such as silt curtains and silt fencing, will be deployed throughout the construction phase in order to prevent sediment from affecting water quality at the construction site. Construction of the airfield portion of the RSA, perimeter road, and Taxiway C1 Connector improvements will utilize best management practices to prevent erosion of sediment that could impact water quality during the construction period.

The majority of the proposed Runway 33L RSA improvements would be constructed from barges and other water-based craft. The use of this equipment will limit the amount of disturbance to the areas immediately affected by the insertion of driven piles or installation of caissons. The spuds that barges deploy while operating would release benthic sediments in the water column and increase turbidity in the vicinity of operations (all construction options). Installation and subsequent removal of the temporary piles used to hold templates for pile-driving operations similarly release sediments (Options 1, 2, and 3). Auguring caissons releases a percentage of the excavated sediments and releases a negligible amount of the drilling mud used during the drilling process (Options 5 and 6). Prior to construction of the RSA deck, a portion of the existing light pier must be removed and a temporary lighting system installed. These activities may result in additional sediment disturbance during the removal of the existing timber deck and piles. Analysis of potential environmental impacts related to construction activities was modeled and the results are included in Appendix 6D, *Coastal Processes*. This 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 (Option 1) would also result in negligible sediment discharges.

The suspended sediment concentrations resulting from auguring the caissons and from the loss of drilling fluid used in the auguring process for construction Options 5 and 6 were calculated using the SSFATE model. It is expected to take 15 minutes to augur a single caisson with a 60-minute period where equipment is repositioned and set up to augur the next caisson. This would result in a continuous release over a 15-minute period of 0.63 yd<sup>3</sup> of marine sediment and drilling mud followed by a 60-minute period of no discharge. To simulate this release of sediment and drilling fluid, a single caisson auguring event was modeled for the marine sediment release and one for the drilling fluid release. The results from these simulations are presented as the area covered by a suspended sediment plume of different concentration over different time intervals. As shown in Table 4.2-5 and Figures 4-4 and 4-5, installing caissons for construction Options 2, 3, 5 and 6 would generate a small localized plume for each piling, which would dissipate rapidly. The maximum anticipated suspended sediment concentration (100 mg/L) would occur close to the caisson. The maximum distance that the plume would extend (at a concentration of 5 mg/L) is approximately 650 feet from the caisson.





Previous studies (see Appendix 6, *Coastal Processes*, indicate that these localized values, are substantially lower than TSS measured in the vicinity of previous Boston Harbor dredging, which ranged from 105 to 455 mg/L, and are comparable to the effects of sediment suspended by ship propellers of deep-draft vessels (40 mg/L).

Table 4.2-5 Runway 33L RSA Predicted Suspended Sediment Plumes

Concentration (mg/L)	Caisson Auguring (acres)	Drilling Fluid Loss (acres)
5	3.0	6.4
10	0.7	2.5
20	0.3	1.4
50	0.2	0.5
100	0.05	0.17
200	< 0.01	< 0.01

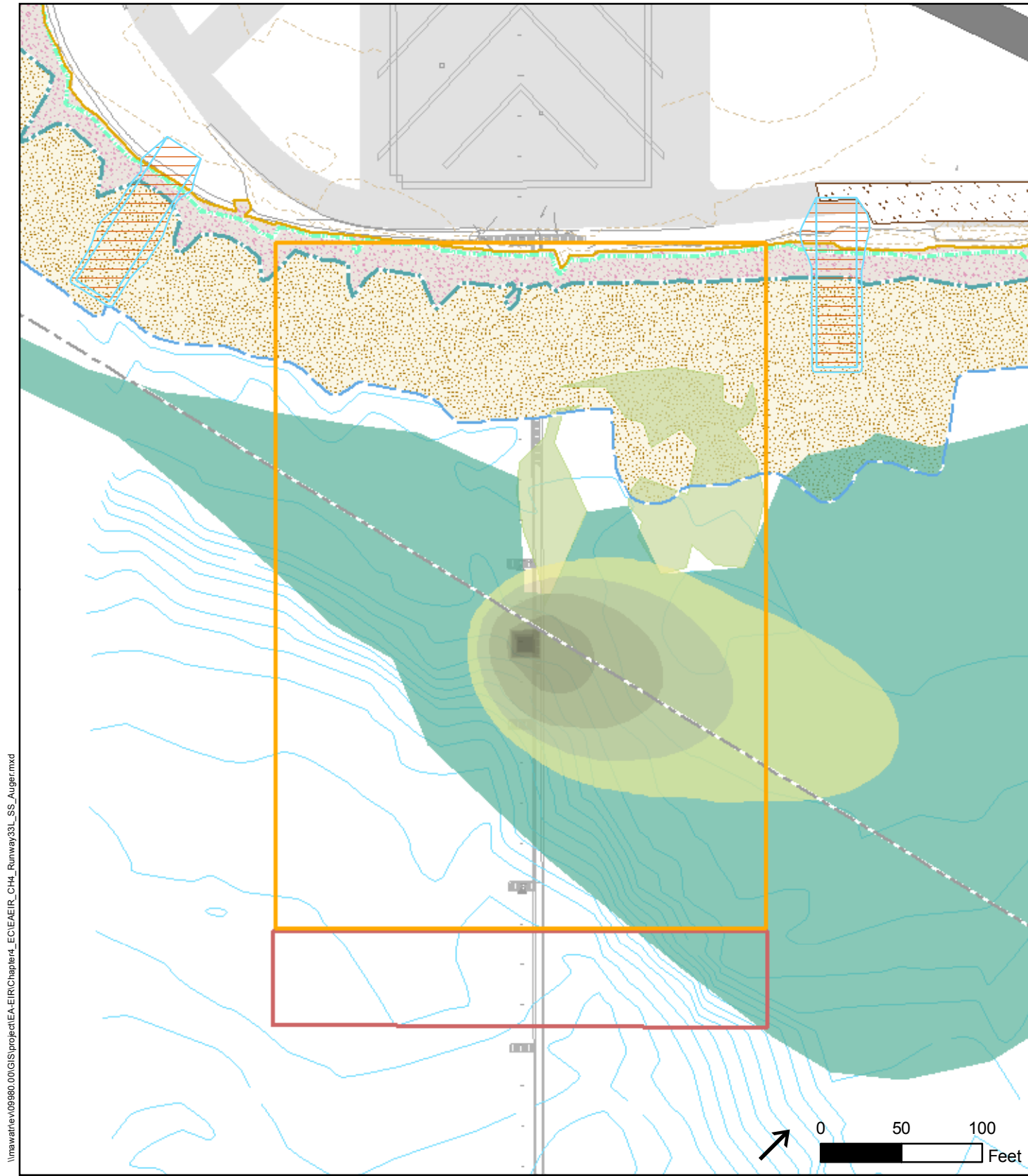
Source: ASA, 2010 (see Appendix 6D, *Coastal Processes*)

The proposed project is anticipated to comply with all state water quality standards for Class SB waters, as described in Chapter 6, *Regulatory Compliance*. These standards (310 CMR 9.07) require that the resuspension of fine particulate matter shall be minimized to protect aquatic life and other existing and designated uses of the waters. For the Boston Harbor Navigation Improvement Project (a joint project of the U.S. Army Corps of Engineers and Massport), the Water Quality Certificate established a performance standard of a maximum concentration of 200 mg/L measured at 500 feet from the activity. As shown in Table 4.2-5 and on Figure 4-4 and Figure 4-5, the anticipated sediment plume from construction of any of the Runway 33L RSA construction options would meet this standard.

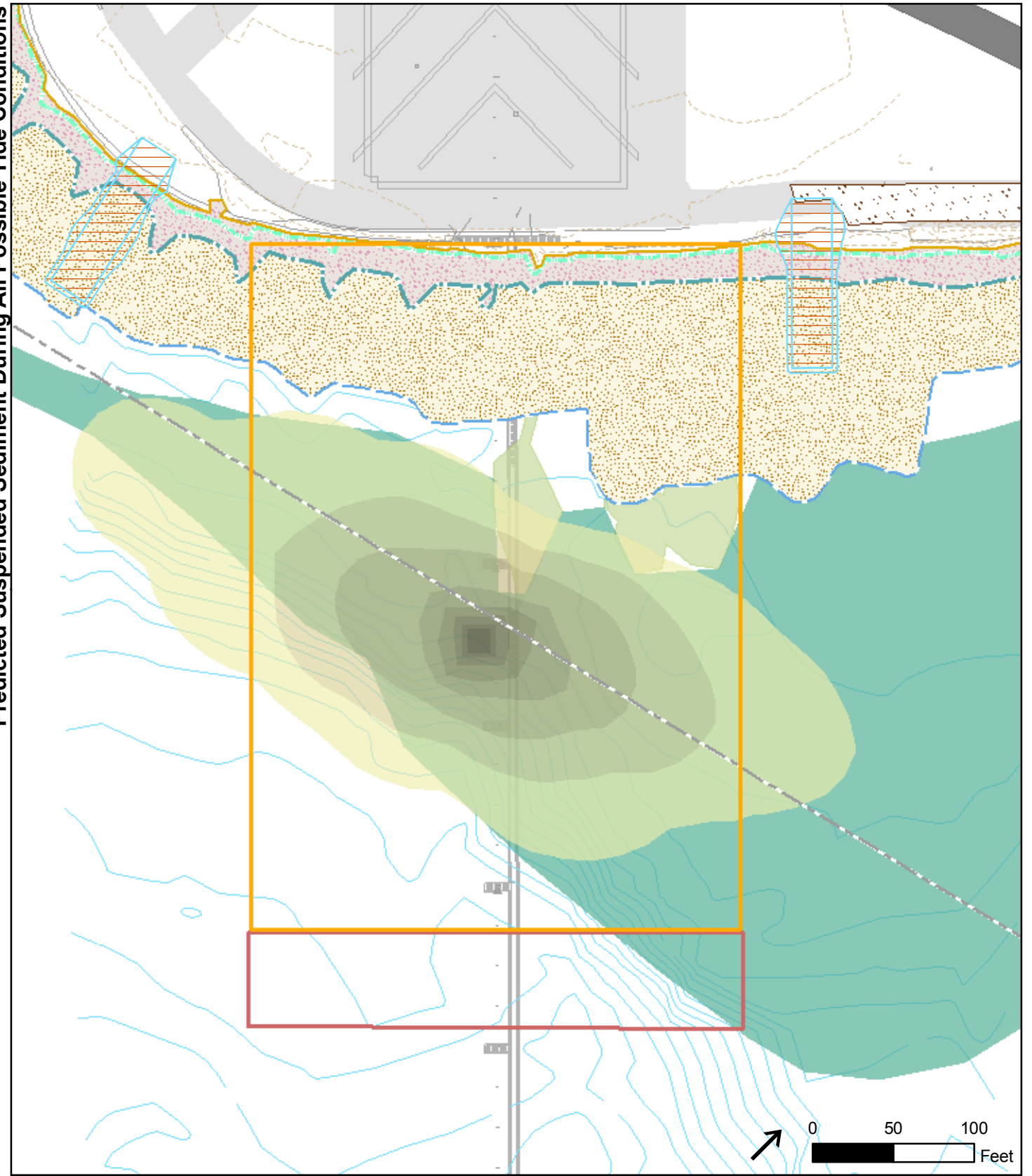
#### 4.2.5.4 Findings

FAA *Order 1050.1E* defines a significant impact for water quality as one where an action would not meet water quality standards. Potential difficulty in obtaining a permit or authorization may indicate a significant impact.

As documented in this section and in Chapter 6, *Regulatory Compliance*, the proposed Runway 33L RSA improvements would be designed to meet all relevant state water quality standards and would not have a significant impact on water quality.



Predicted Suspended Sediment During a Flood Tide



Predicted Suspended Sediment During All Possible Tide Conditions

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**Legend**

- |                                   |         |            |  |               |
|-----------------------------------|---------|------------|--|---------------|
| Footprint of Pile-Supported Deck  | 5 mg/L  | 100 mg/L   | Mean High Water (4.58')                        | Mussel Bed    |
| Pile-Supported Deck for Localizer | 10 mg/L | 200 mg/L   | Mean Low Water (-4.51')                        | Eelgrass      |
| Relocated Perimeter Road          | 20 mg/L | 500 mg/L   | Top of Coastal Bank                            | Coastal Bank  |
| Emergency Access Ramp             | 50 mg/L | 1,000 mg/L | Limit of Land Subject to Coastal Storm Flowage | Coastal Beach |
| Gravel Access Road                |         |            | Airport Property Boundary                      |               |



Logan RSA

Figure 4-4

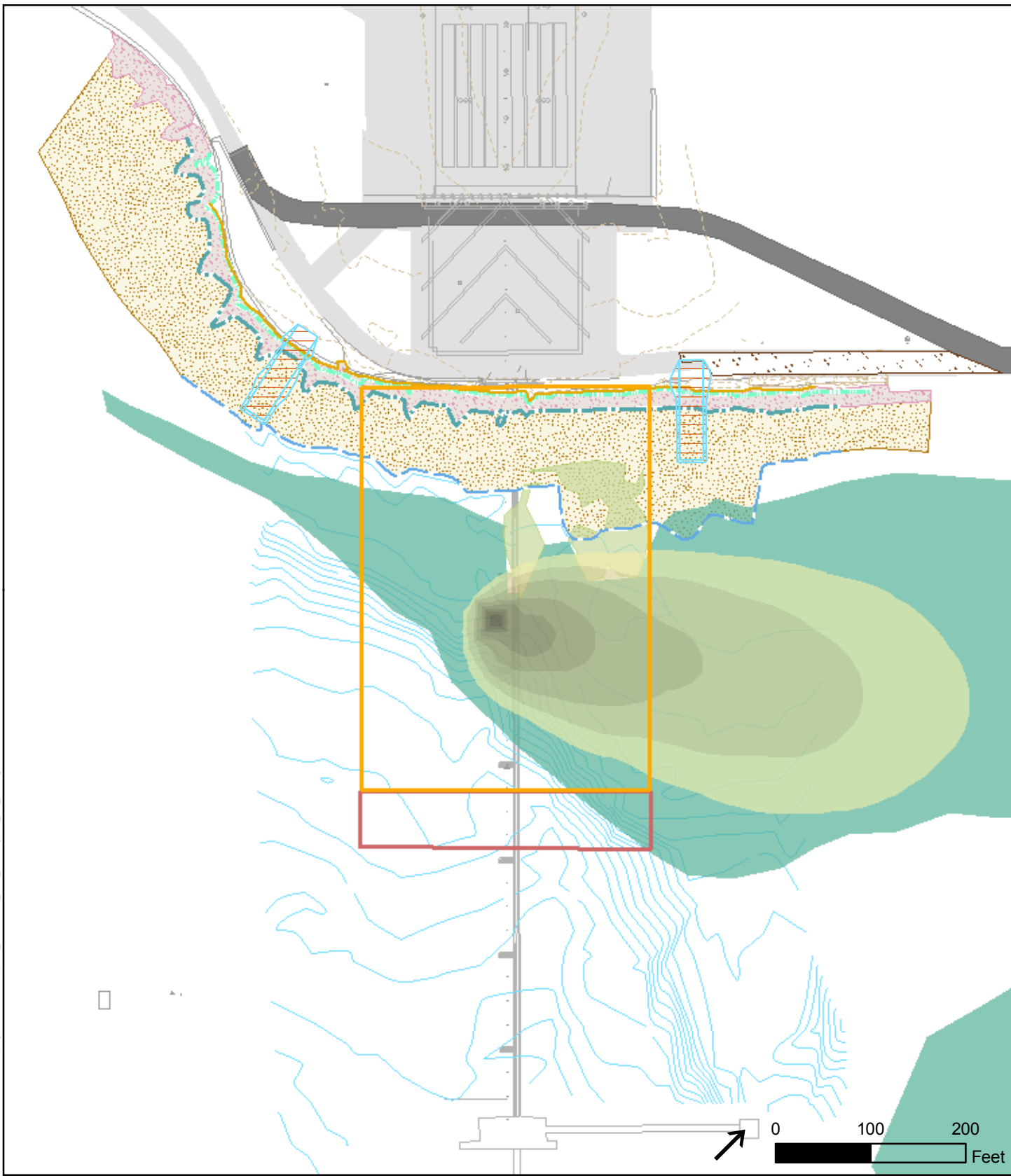
**Runway 33L RSA  
Suspended Sediment Plume Resulting  
from Auguring a Single Caisson**

Source: Applied Science Associates  
Childs Engineering Corp.  
MassGIS Aerial Imagery 2008

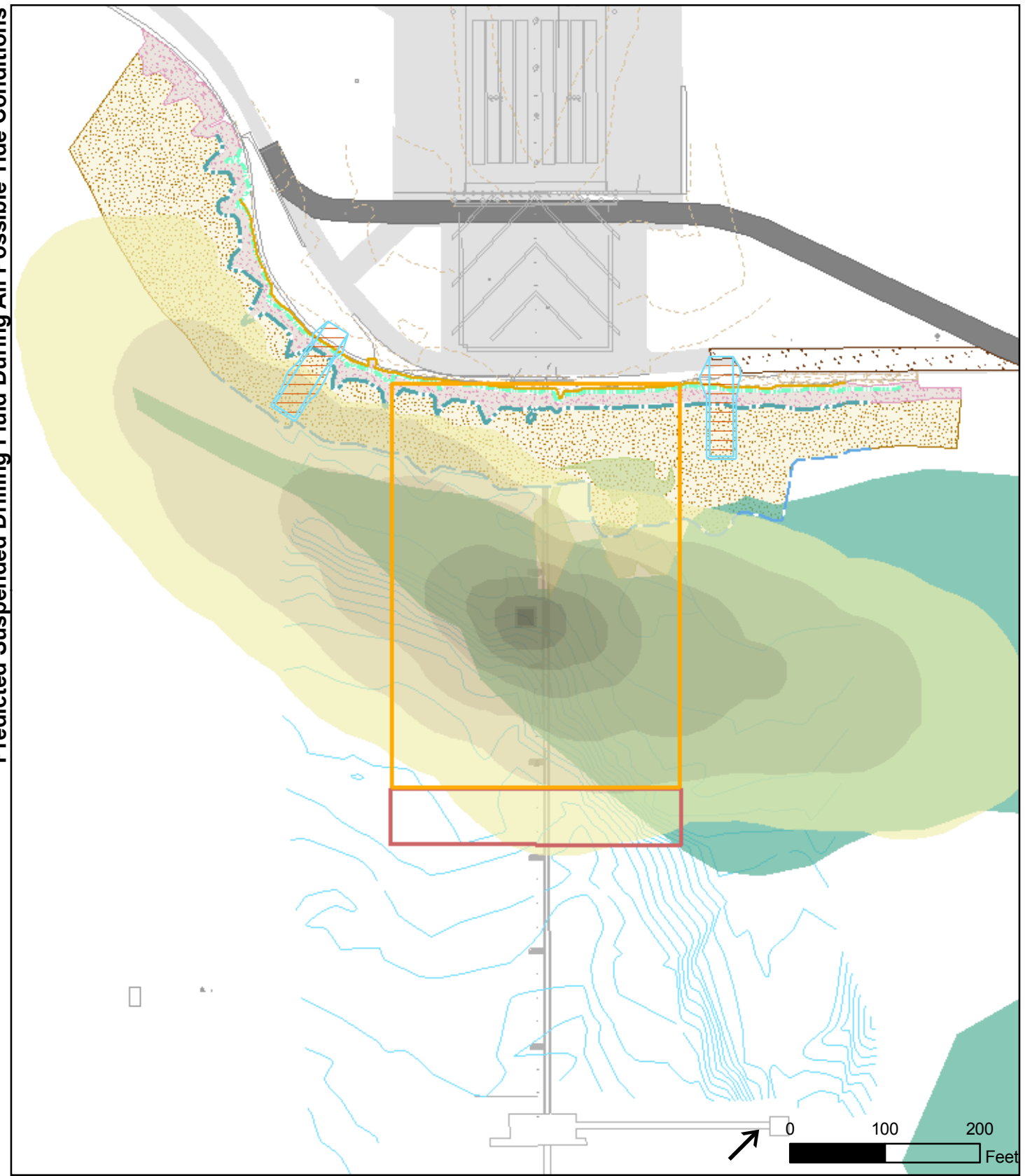


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Predicted Suspended Drilling Fluid During a Flood Tide



Predicted Suspended Drilling Fluid During All Possible Tide Conditions

**Legend**

- |                                   |                      |  |               |
|-----------------------------------|----------------------|--|---------------|
| Footprint of Pile-Supported Deck  | <b>Concentration</b> | Mean High Water (4.58')                        | Mussel Bed    |
| Pile-Supported Deck for Localizer | 5 mg/L               | Mean Low Water (-4.51')                        | Eelgrass      |
| Relocated Perimeter Road          | 10 mg/L              | Top of Coastal Bank                            | Coastal Bank  |
| Emergency Access Ramp             | 20 mg/L              | Limit of Land Subject to Coastal Storm Flowage | Coastal Beach |
| Gravel Access Road                | 50 mg/L              | Airport Property Boundary                      |               |
|                                   | 100 mg/L             |  |               |
|                                   | 200 mg/L             |  |               |
|                                   | 500 mg/L             |  |               |
|                                   | 1,000 mg/L           |  |               |



Logan RSA

Figure 4-5

**Runway 33L RSA  
Suspended Drilling Fluid Plume Resulting  
from Auguring a Single Caisson**

Source: Applied Science Associates  
Childs Engineering Corp.  
MassGIS Aerial Imagery 2008



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#### 4.2.6 Historical, Archaeological, and Cultural Resources

The following section describes the potential environmental consequences of the proposed Runway 33L RSA improvements on underwater archaeological resources that may occur in the project area. There are no other historical, architectural, or cultural resources in the project area, as described in Chapter 3, *Affected Environment*.

NEPA regulations that address historical, archaeological, and cultural resources are discussed in FAA *Order 5050.4B* and FAA *Order 1050.1E*. FAA *Order 1050.1E Appendix E, Section 11.3*, identifies the significant impact thresholds related to historical, archaeological, and cultural resources. Based on FAA *Order 1050.1E*, there would be no significant impact as the proposed action would not adversely affect a property on or eligible for the National Register of Historic Places and protected under Section 106 of the National Historic Preservation Act.

The Secretary's Certificate requires that the Draft EA/EIR address the potential for occurrences of submerged archaeological resources and discuss steps that would be taken if a submerged resource is found during construction of the proposed Runway 33L RSA improvements.

The potential consequences to historic, archaeological, and cultural resources were determined by contacting the State Historic Preservation Office, the Massachusetts Historical Commission, for any information regarding historic, archaeological, or cultural resources that are within or nearby the Project area.

##### 4.2.6.1 Direct Impacts

Direct effects to historic or archaeological resources would include the loss of or damage to a resource. There are no impacts from the No-Action/No-Build Alternative or the Build Alternative as there are no historical, archaeological, or cultural resources protected under Section 106 in the vicinity of Runway 33L.<sup>23</sup> Although the Massachusetts Board of Underwater Archaeological Resources does not have a record of underwater archaeological resources in the project area, it is possible that a resource could be found during construction.<sup>24</sup>

##### No-Action/No-Build Alternative

There would be no change to the Runway 33L end that would lead to a discovery of a previously unrecorded resource.

##### Build Alternative

As documented in Chapter 3, *Affected Environment*, there are no historic resources directly adjacent to the proposed Runway 33L RSA. The Build Alternative would not impact any known historic or archaeological resources.

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<sup>23</sup> Letter received from the Massachusetts Historical Commission, dated December 7, 2007.

<sup>24</sup> Comment Letter on the ENF received from the Massachusetts Board of Underwater Archaeological Resources, dated July 27, 2009.



#### 4.2.6.2 Indirect Impacts

Indirect effects would include alterations to the setting of a resource that would affect its historic integrity such as changes in the landscape or changes in noise. These effects were evaluated by considering the footprint of the proposed pile-supported deck, changes in the visual setting, and changes in the noise environment. Indirect impacts also potentially include affecting the characteristics of a historic, archaeological, or cultural resource elsewhere in the Boston Harbor. As documented in Chapter 3, *Affected Environment*, there are no historic resources directly adjacent to the proposed Runway 33L RSA improvements. The proposed RSA improvements will not affect the characteristics of a historic, archaeological, or culture resource elsewhere in the Boston Harbor. There would be no changes in the visual setting, lighting, air quality, or noise elements that would affect a historic, archaeological, or cultural resource (see Section 4.2.8).

#### 4.2.6.3 Temporary Construction Impacts

The effects of previous construction activities and the nature of the construction of the proposed Runway 33L RSA improvements may lessen the likelihood of impacts to any underwater historic, archaeological, or cultural resources. The proposed pile-supported deck would be in an area filled in the 1960s to construct Logan Airport. However, in order to mitigate for any unintended consequences during construction, an Unanticipated Discovery Plan would be developed by Massport and implemented during construction. Massport would coordinate with the Federal Aviation Administration, the Massachusetts Historical Commission, Tribal Historic Preservation Officer(s), and the Board of Underwater Archaeological Resources to determine the protocol should an unanticipated discovery be made during construction in accordance with the Board of Underwater Archaeological Resources *Policy Guidance for the Discovery of Unanticipated Underwater Archaeological Resources*, September 2006.

#### 4.2.6.4 Findings

As stated in FAA *Order 1050.1E, Appendix A*, significant impacts to Section 106 resources are determined through the Section 106 consultation process. The FAA has made a determination that the proposed Runway 33L RSA improvements would not have an effect on Section 106 resources, and the SHPO has concurred with this finding.<sup>25</sup>

#### 4.2.7 Solid and Hazardous Waste

The following section describes the potential solid and hazardous waste environmental consequences of the proposed Project and the No-Action/No-Build Alternative. NEPA regulations that address hazardous materials, pollution prevention, and solid waste are discussed in FAA *Order 5050.4B* and FAA *Order 1050.1E*. FAA *Order 1050.1E Appendix A, Section 10.3*, identifies the significant impact thresholds related to hazardous materials, pollution prevention, and solid waste. There is no significant impact to hazardous materials, pollution prevention, and solid waste according to FAA *Order 1050.1E* because the Airport is not listed on or eligible for listing on the National Priorities List (NPL).

The Secretary's Certificate did not require specific information on Solid and Hazardous Waste for the proposed Runway 33L RSA improvements.

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<sup>25</sup> Letter received from the Massachusetts Historical Commission, dated December 7, 2007.





#### 4.2.7.1 Direct Impacts

The environmental consequences of the proposed Project on solid and hazardous waste were determined by reviewing the NPL and other materials provided by Massport to determine if there is any potential for discovering solid or hazardous waste during construction. Direct impacts would include the potential for the proposed project to result in the discharge of hazardous material. There are no direct impacts anticipated from the No-Action/No-Build Alternative and the Build Alternative.

#### No-Action/No-Build Alternative

There would be no change to the Runway 33L end that may cause a release of hazardous materials and no solid waste would be generated.

#### Build Alternative

There would be no change to the Runway 33L end that may cause a release of hazardous materials. Removing the timber pilings of the existing light pier (approximately the first 500 feet) will generate solid waste to be disposed of off-site. The timber pilings are coated with creosote and would be treated as special waste and disposed of in accordance with DEP guidance and regulations. Removing part of the perimeter road would also generate solid waste (asphalt).

#### 4.2.7.2 Indirect Impacts

Indirect impacts would include the effects of releasing contaminated sediments in the water column, or transporting hazardous materials off-site. Indirect impacts of the proposed action 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 project area. The proposed pile-supported deck may have indirect impacts to landfills if off-site disposal of dredged or excavated materials is required, as well as disposal of timber pilings.

#### 4.2.7.3 Temporary Construction Impacts

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. Construction Options 5 and 6, which use drilled caissons, are expected to generate excavated sediment and use drilling fluid. The drill or auger will excavate the inside of the casing down through the clay and into the rock below. This process will result in the removal of sediment from the inside of the casing which will be placed on the deck of the barge for disposal off site at an approved facility. There may be a need to use drilling fluid inside the caisson to prevent the walls from collapsing. The drilling fluid could be Bentonite slurry or a polymer fluid. Placement of concrete in the caisson will be by tremie method in the drilling fluid. As the concrete is pumped in the drilling fluid will be displaced up and out of the steel casing. The drilling fluid will be collected and filtered/de-sanded for reuse. No construction impacts on solid or hazardous wastes are anticipated.

#### 4.2.7.4 Findings

FAA *Order 1050.1E* defines a significant impact for hazardous materials, pollution prevention, and solid waste as one where an action involves a property on or eligible for the NPL. Uncontaminated properties within a NPL site's boundary do not always trigger this significant threshold. As documented in Chapter 3, *Affected Environment*, there are no sites in the Runway 33L Study Area that are listed on the USEPA's NPL. Therefore





there are no significant impacts in the category of Hazardous Materials, Solid Waste, and Pollution Prevention as a result of the proposed Runway 33L RSA improvements.

#### **4.2.8 Light Emissions and Visual Setting**

The following sections are a discussion of the environmental consequences of the proposed Runway 33L RSA improvements and the No-Action/No-Build Alternative. NEPA regulations that address light emissions and the visual setting are discussed in FAA *Order 5050.4B* and FAA *Order 1050.1E*. FAA *Order 1050.1E Appendix A, Section 12.3*, identifies the significant impact thresholds related to light emissions and the visual setting. The lighting system at Runway 33L would be upgraded, but there is no significant impact to light emissions or the visual setting according to FAA *Order 1050.1E* because there is no net gain of lights of a different color or at a different intensity or frequency. The additional lights required for the Category III Instrument Landing System (Cat III ILS) and a High-intensity Approach Lighting System with Sequenced Flashing Lights (ALSF-2) would be on existing light bars and would be the same color, intensity, and frequency as the existing lights. The addition of the pile-supported deck to the Runway 33L does not affect the visual setting and does not have a significant impact. The Secretary's Certificate required no specific information on light emissions and visual setting.

##### **4.2.8.1 Direct Impacts**

The proposed Runway 33L RSA improvements impact on light emissions was determined based on a review of the proposed lighting systems. Potential impacts to airport neighbors were evaluated on a qualitative basis. Impacts to the visual setting were determined through photographic documentation taken from the nearby neighborhood (Point Shirley, Winthrop, and Deer Island). The proposed RSA improvements were superimposed on the photographs to determine the new visual setting.

There would be minor impacts to light emissions resulting from the Build Alternative due to addition of more lights to upgrade the navigational light system. The proposed pile-supported deck, the Build Alternative, would permanently alter the visual setting, but these impacts are not adverse or significant according to FAA *Order 1050.1E*.

##### **No-Action/No-Build Alternative**

Under the No-Action/No-Build Alternative, no impacts to light emissions and visual setting are expected. There are no changes to the runway or the runway safety area, and therefore, no changes to the lighting system.

##### **Build Alternative**

The Build Alternative would have no impacts to light emissions or visual setting (see Figure 4-6). The existing MALSR lighting system would be upgraded to a Cat III ILS and ALSF-2, which requires adding lights to the proposed pier extensions on the existing Runway 33L light pier. These lights would be at the same elevation as the existing lights, and would be distant (approximately 5,000 feet) from any residential receptors within the Point Shirley neighborhood of Winthrop.



Runway 33L Proposed Deck





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The proposed Runway 33L RSA improvements would have a negligible change on the view of the Airport from the nearest neighborhood of Point Shirley and Deer Island. As noted in Chapter 3, *Affected Environment*, the existing view is a low-profile shoreline, the coastal bank, and the existing 2,400-foot timber light pier. The proposed RSA improvements would be viewed from a distance and, because of its low profile, would blend in with the existing shoreline as seen on Figure 4-6, and would appear similar to the existing light pier. There are no structures proposed to be added to the runway end that could significantly change the view. The only change that may be noticeable is the change in the density of the pilings in the nearshore end of the pier (see Figure 4-6).

#### 4.2.8.2 Indirect Impacts

The proposed RSA would not have any indirect effects on views of the airport.

#### 4.2.8.3 Temporary Construction Impacts

There would be minor temporary construction-related impacts to the visual setting associated with the construction of the pile-supported deck. Construction equipment (barges, cranes, trucks, etc.) would be visible from Deer Island and from the Port Shirley neighborhood in Winthrop. However, as there is constant activity at the airport, visible construction equipment would not disrupt the view from either of these locations. No construction would take place overnight, so there would be no construction-related light emissions.

#### 4.2.8.4 Findings

FAA *Order 1050.1E* defines a significant impact for light emissions as one where an action's light emissions create annoyance to interfere with normal activities, and a significant impact for visual impacts as one when consultation with Federal, State, or local agencies, tribes, or the public shows the visual effects contrast with existing environments and the effect is objectionable.

As documented in this section, the proposed Runway 33L RSA improvements would not have a significant effect on light emissions or the visual environment. The proposed RSA improvements would not change existing light emissions and would not create annoyance. The visual effects would be consistent with the existing environment.

#### 4.2.9 Other Construction Impacts

Although there are no permanent impacts to these categories, construction activities may have an effect on traffic and the transportation network in the vicinity of Logan Airport, may cause noise that would affect area residents, and may result in the emission of air pollutants during the construction period. This section examines the potential effects of construction activities on these resources, in response to the requirements of the Secretary's Certificate and NEPA requirements at FAA *Order 1050.1E*; *Appendix A, Section 3*.

The Secretary's Certificate required that the Draft EA/EIR:

- Present a discussion of construction-period impacts (including but not limited to noise, dust, blasting, wetlands, and traffic maintenance) and analyze feasible measures that can avoid or eliminate these impacts;
- Evaluate construction noise and potential nighttime light pollution;



- Discuss any airfield operational impacts of the construction;
- Estimate the construction schedule and hours of construction;
- Discuss air quality impacts from construction traffic and fugitive dust and noise;
- Present a draft construction management plan;
- Address the concerns raised in the Boston Transportation Department's comment letter requesting a transportation access plan to keep construction traffic out of the neighborhoods surrounding Logan Airport.

The construction schedule and potential airfield operational impacts are discussed in Chapter 2, *Alternatives*. The construction-period impacts to wetlands, water quality, and potential nighttime light pollution are described in other portions of Section 4.2. This section addresses the potential construction-period impacts associated with construction traffic, air quality, and noise.

#### 4.2.9.1 Surface Transportation

Construction of the proposed Runway 33L RSA improvements would be primarily undertaken from the water, as most of the materials and workers would be delivered to the Runway 33L 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 not be allowed to drive or park at the Airport with the exception of limited supervisory personnel. The majority of workers would be transported to the site by barge.

##### Truck Traffic

The estimated number of pieces of construction equipment associated with each of the five construction options are provided in Appendix 8, *Traffic Analysis*, for each quarter from 2011 through 2013. Based on these equipment schedules, estimates of the types and numbers of pieces of heavy equipment required for the proposed Runway 33L RSA improvements construction per work shift were developed for each construction option.

These tables, provided in Appendix 8, *Traffic Analysis*, present the types and number of construction equipment for each quarter from 2011 through 2013 that are anticipated to operate from the land. The peak quarter for construction activity is anticipated to occur during the third quarter of 2011, generally associated with overlapping activities including pile-driving, perimeter road and Taxiway C1 Connector and rip-rap installation activities. Each of the construction options are estimated to use between 33 and 44 pieces of construction equipment each day during the third quarter of 2011, with Option 1 requiring the highest total amount of equipment arriving by land. Details regarding construction traffic for Option 1 are presented in this section to provide a conservative estimate of construction traffic for the Runway 33L RSA improvements. Table 4.2-6 provides the complete list of landside-based construction equipment required by Option 1. Construction truck trips for the remaining construction options will be less than or equal to the estimates for Option 1.



Table 4.2-6 Runway 33L RSA Construction Option 1 Landside Equipment Requirements by Quarter

Equipment Estimate	2011				2012				2013			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Excavator	-	1	2	-	-	-	-	2	-	-	-	1
Loader	-	-	1	-	-	-	-	-	-	-	-	-
Bulldozer	-	1	2	-	-	-	-	1	-	-	-	-
Truck 1	-	-	1	-	-	-	-	-	-	-	-	-
Truck 2	-	-	1	-	-	-	-	-	-	-	-	-
Vibro	-	-	1	-	-	-	-	-	-	-	-	-
Welder	-	-	1	-	-	-	-	-	-	-	-	-
Compressor	-	-	1	-	-	-	-	-	-	-	-	-
Vibro (2)	-	-	2	2	-	-	-	-	-	-	-	-
Impact (2)	-	-	2	2	-	-	-	-	-	-	-	-
Welders (3)	-	-	6	6	-	3	3	3	-	-	-	-
Compressors(3)	-	-	6	7	-	4	4	4	-	1	1	-
Concrete Pump	-	-	2	2	-	2	2	2	-	1	1	-
RT Crane	-	-	1	1	-	1	1	1	-	1	1	-
Finishing Machine	-	-	-	1	-	1	1	1	-	1	1	-
Concrete Transit Mixer	-	1	5	4	-	4	4	2	-	4	2	-
Pickup Trucks (3)	-	3	3	3	-	3	3	3	-	3	3	-
Escort Vehicles (3)	-	3	3	3	-	3	3	3	-	3	3	-
Mechanics Truck	-	1	1	1	-	1	1	1	-	1	1	-
Dump Trucks	-	10	10	-	-	-	-	10	-	-	-	5
Grader	-	1	1	-	-	-	-	1	-	-	-	-
Roller -Earth	-	1	1	-	-	-	-	1	-	-	-	-
Paver	-	1	1	-	-	-	-	1	-	-	-	-
Roller - Pavement	-	3	3	-	-	-	-	3	-	-	-	-
Loader	-	1	-	-	-	-	-	-	-	-	-	-
Fork Lift	-	-	-	-	-	-	-	-	-	-	-	4
Utility Truck	-	3	4	-	-	-	-	2	-	-	-	4
Road Tractor	-	-	-	-	-	-	-	-	-	-	-	1
Concrete Transit Mixer	-	-	-	-	-	-	-	1	-	-	-	1

Note: Numbers denote average equipment per daily shift



Most of the heavy construction equipment not being operated from barges, including some rubber-tire cranes, excavators, concrete pump trucks, pavers and miscellaneous equipment (welders, compressors, vibro-compactors) would be stored on the Airport during non-work hours. This equipment would be used during most workdays, however this 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:

- Concrete Transit Mixer
- Dump Truck
- Pick-up Truck
- Escort Truck
- Flatbed Truck
- Utility Truck

The projected daily need for these types of heavy and light trucks were used to estimate the daily number of truck arrivals and total truck trips (arrivals plus departures) to the airport as presented in Table 4.2-7. The proposed Runway 33L RSA improvements construction would generate approximately 18 to 56 total truck trips per weekday.

Table 4.2-7 Runway 33L RSA Daily Construction Trips - Option 1<sup>1</sup>

Year	2011				2012				2013			
	Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Total Daily Arrivals	0	21	28	11	0	11	11	22	0	11	9	15
Total Daily Trips	0	42	56	22	0	22	22	44	0	22	18	30

<sup>1</sup> Option 1 creates the highest number of daily trips out of the 5 options

It is expected that construction would take place primarily during the day shift, approximately 7 AM to 7 PM. Thus, the daily truck volume to and from the site would be the number of truck trips per work shift. It was assumed that most light duty trucks, such as escort trucks and pick-up trucks associated with supervisory workers, would all arrive to the project site during the morning peak hour and exit during the evening peak hour. No work would occur during the night hours. The majority of construction workers would be shuttled to the project site via personnel barges each workday. Table 4.2-8 presents the peak hour construction trip estimates for Option 1.





Table 4.2-8 Runway 33L RSA Peak Hour Construction Trips - Option 1

Year Quarter	2011				2012				2013			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
AM Peak Entering	0	11	13	8	0	8	8	12	0	8	8	6
AM Peak Exiting	0	5	7	2	0	2	2	6	0	2	2	6
<b>AM Peak Hour Total</b>	<b>0</b>	<b>16</b>	<b>20</b>	<b>10</b>	<b>0</b>	<b>10</b>	<b>10</b>	<b>18</b>	<b>0</b>	<b>10</b>	<b>10</b>	<b>12</b>
PM Peak Entering	0	5	7	2	0	2	2	6	0	2	2	6
PM Peak Exiting	0	11	13	8	0	8	8	12	0	8	8	6
<b>PM Peak Hour Total</b>	<b>0</b>	<b>16</b>	<b>20</b>	<b>10</b>	<b>0</b>	<b>10</b>	<b>10</b>	<b>18</b>	<b>0</b>	<b>10</b>	<b>10</b>	<b>12</b>

**Truck Route**

Massport’s agreement with the Contractor would specify that direct construction truck traffic access to the Runway 33L RSA improvements construction site be through the airport’s North Gate for the duration of construction (Figure 4-7). In addition, the agreement would limit Airport access by the Contractor to federal or State highways, restricting any use of East Boston roadways by construction vehicles. Truck trips directly to the project site are anticipated to come from all directions and would be routed in any of the following ways (Figure 4-7):

- Access via McClellan Highway (Route 1A) southbound, Harborside Drive, Hotel Drive, Service Road (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.

**Traffic Maintenance**

Vehicular traffic flow on the Airport roadway network during construction will be managed so that the quality of traffic flow would not deteriorate to unacceptable levels of service. If necessary, Massport has the ability modify contractor schedules and access routes to minimize impacts. In addition, three planned transportation infrastructure projects by Massport that will improve traffic flow along the construction truck routes will be in place before Project construction begins:

- Traffic signal improvements along Frankfort Street at Dave’s Way and Lovell Street will be constructed in 2010 by the South West Service Area (SWSA) Redevelopment Project. The project will install a new traffic signal system at the Frankfort Street and Lovell Street intersection and provide signal coordination between this location and the nearby Frankfort Street and Dave’s Way intersection. Another planned improvement included in the SWSA Redevelopment Project includes consolidating two Hotel Drive intersections into a





single traffic signal. By the end of 2010, roadway and traffic signal improvements will create a new Hotel Drive and SR-2/Ramp D-S intersection and a temporary location for Logan Airport's Cell Phone Lot.

- Prescott Street will be reconstructed in late 2010 as part of the Economy Parking Structure Project. The reconstruction will include an additional right-turn lane and left-lane channelization to Prescott Street at its intersection with SR-2.

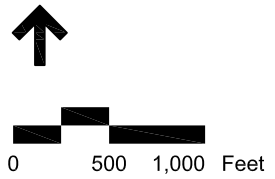
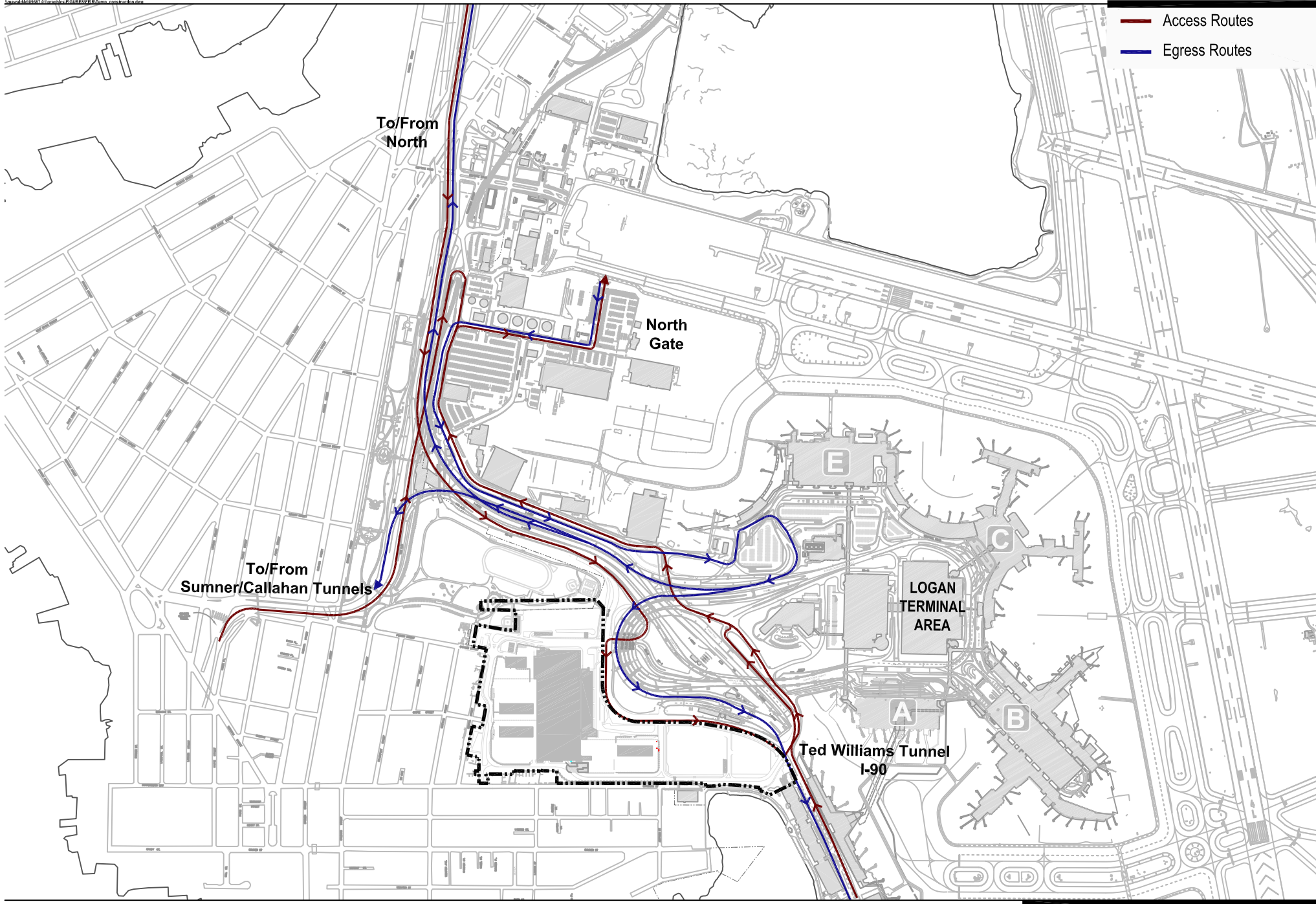
Based on the maximum of 20 total construction truck trips in the peak hour periods and the access restrictions and infrastructure improvements described above, the Runway 33L RSA improvements construction would have minimal impact on airport or regional roadways. The airport roadway infrastructure accommodates over 119,000 daily trips each weekday and can accommodate the anticipated 56 additional daily construction truck trips associated with the proposed Runway 33L RSA improvements construction without causing capacity or delay problems.

#### **Noise**

The proposed Runway 33L RSA improvements project would generate noise associated with construction activities. Construction equipment is expected to be used consistently throughout the Runway 33L RSA improvements construction phase to install the pile-supported deck. The construction phase of the RSA improvements is expected to occur only during daytime hours (7 AM to 7 PM). Normal flight operations will continue to function during construction of the Project. The following sections describe the construction-phase noise effects.

#### **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.





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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. Table 4.2-9 presents a list of common indoor and outdoor sound levels. The duration characteristics of sound account for the time-varying nature of sound sources.

**Table 4.2-9 Typical Indoor and Outdoor Sound Levels**

Outdoor Sound Levels	Sound Pressure (μPa)		Sound Level (dBA)	Indoor Sound Levels
	3,324,555	-	110	Rock Band at 5 m
Jet Over-Flight at 300 m		-	105	
	2,000,000	-	100	Inside New York Subway Train
Gas Lawn Mower at 1 m		-	95	
	632,456	-	90	Food Blender at 1 m
Diesel Truck at 15 m		-	85	
Noisy Urban Area—Daytime	200,000	-	80	Garbage Disposal at 1 m
		-	75	Shouting at 1 m
Gas Lawn Mower at 30 m	63,246	-	70	Vacuum Cleaner at 3 m
Suburban Commercial Area		-	65	Normal Speech at 1 m
	20,000	-	60	
Quiet Urban Area—Daytime		-	55	Quiet Conversation at 1 m
	6,325	-	50	Dishwasher Next Room
Quiet Urban Area—Nighttime		-	45	
	2,000	-	40	Empty Theater or Library
Quiet Suburb—Nighttime		-	35	
	632	-	30	Quiet Bedroom at Night
Quiet Rural Area—Nighttime		-	25	Empty Concert Hall
Rustling Leaves	200	-	20	
		-	15	Broadcast and Recording Studios
	63	-	10	
		-	5	
Reference Pressure Level	20	-	0	Threshold of Hearing

μPA MicroPascals describe pressure. The pressure level is what sound level monitors measure.

dBA A-weighted decibels describe pressure logarithmically with respect to 20 μPa (the reference pressure level).

Source: Highway Noise Fundamentals, Federal Highway Administration, September 1980.



Sound level data can be presented in statistical terms to help describe the noise environment. The following is a list of other sound level descriptors.

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

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.

#### **Municipal Construction Noise Criteria**

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 Chapter 40, Section 21 of the General Laws of the Commonwealth of Massachusetts, 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 L10 sound levels shown in Table 4.2-10.

**Table 4.2-10 City of Boston Construction Noise Limits (dBA)**

Land Use	L10 Sound Level	Lmax 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.

If the existing background L10 sound level already exceeds the limits referenced in Table 4.2-11, the L10 sound level during construction must not exceed the background L10 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 fifty (50) feet from the device.

The Town of Winthrop’s municipal code does not contain noise criteria associated with construction activities. Therefore, the City of Boston noise regulations were also used as the basis for determining compliance for receptor locations located in the Town of Winthrop.

**Methodology**

The construction noise analysis used the Federal Highway Administration’s (FHWA) Roadway Construction Noise Model 1.1 (RCNM)<sup>26</sup> to calculate the sound levels associated with the construction equipment at the closest receptor locations, typically residential areas. The existing sound levels were established based upon Massport’s continuous 24-hour monitoring data. The noise analysis presents conservative results because it assumes that all of the construction equipment, regardless of the construction phase it actually will be used, is operating at the same time.

The noise analysis evaluated sound levels of construction activities associated with the construction of the proposed Runway 33L RSA improvements. Construction activities would include various construction vehicles and mechanical equipment. The existing sound levels were based on measured Ldn sound levels from various noise monitoring stations located in communities surrounding Logan Airport. These 30 noise monitoring stations, operated by Massport, collect continuous 24-hour data through-out the year. The Ldn sound levels were converted into daytime L10 sound levels for the purpose of comparison to the City of Boston’s noise criteria, which are presented in metrics of L10.

Construction sound levels are a function of the types of equipment being used, the number of each type of equipment, and the distances between the construction equipment and the sensitive receptor locations. Overall construction sound levels are governed primarily by the noisiest pieces of equipment operating at a given time.

26 FHWA Roadway Construction Noise Model (RCNM): User’s Guide Federal Highway Administration, FHWA-HEP-05-054, January 2006.



Table 4.2-12 provides typical maximum sound levels associated with the various types of construction equipment expected to be used at the Project site during the construction phase. During any particular activity phase, multiple pieces of equipment may operate simultaneously and for various durations throughout the construction period. The noise analysis assumed a worst-case condition, which is having all the construction equipment operating simultaneously.

The FHWA’s RCNM construction model calculated the sound levels associated with various construction equipments expected to be used during the construction of the runway safety area. The FHWA’s RCNM construction model is a national model used for the prediction of construction noise that is based on the construction noise prediction methodology developed for the Central Artery/Tunnel (CA/T) Project in Boston, Massachusetts. The CA/T Project had one of the most comprehensive noise control specification ever developed in the United States. The FHWA RCNM construction model incorporates the CA/T Project's noise limit criteria (City of Boston) and extensive construction equipment noise database. The model is capable of analyzing multiple pieces of equipment simultaneously at multiple receptor locations, taking into account 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, mostly water, and the acoustical propagation over distances.

The type and units for each piece of equipment vary depending on the construction option. During any particular activity, multiple pieces of equipment may operate simultaneously and for various durations throughout the construction period. While the noise analysis was conservative and assumed that all of the construction equipment was operating at the same time, regardless of the phase, the construction equipment changed for each option. Table 4.2-11 presents the construction equipment for each option and the reference sound levels associated with each type of construction equipment.

**Table 4.2-11 Runway 33L RSA Construction Equipment Reference Sound Levels**

Activity	Equipment	Lmax at 50 feet (dBA) <sup>1</sup>	Unit per day				
			Option 1	Option 2	Option 3	Option 5	Option 6
Approach Slab	Excavator	85	1	1	1	1	1
	Loader	80	1	1	1	1	1
	Dozer	85	1	1	1	1	1
	Truck <sup>2</sup>	84	2	2	2	2	2
	RT Crane	85	1	1	1	1	1
	Vibratory Pile Driver	101	1	1	1	1	1
	Welder	74	1	1	1	1	1
	Compressor	80	1	1	1	1	1



Table 4.2-11 Runway 33L RSA Construction Equipment Reference Sound Levels (continued)

Activity	Equipment	Lmax at 50 feet (dBA) <sup>1</sup>	Unit per day				
			Option 1	Option 1	Option 1	Option 1	Option 1
Caisson	Drill Rig & Barge	85	--	--	--	2	2
	220 ton Crane & Barge	85	--	--	--	1	1
	150 ton Crane & Barge	85	--	--	--	1	1
	Loader	80	--	--	--	2	2
	Vibratory Pile Driver	101	--	--	--	2	2
	Welder	74	--	--	--	4	4
	Compressor	80	--	--	--	4	4
	Work Boat <sup>3</sup>	80	--	--	--	4	4
	Spoil Barge <sup>10</sup>	--	--	--	--	1	1
	Concrete Pump	82	--	--	--	1	1
Pile Driving	220 ton Crane & Barge	85	2	1	1	1	1
	150 ton Crane & Barge	85	1	1	1	1	1
	Vibratory Pile Driver	101	2	2	1	2	2
	Impact Pile Driver	101	2	1	1	1	1
	Welder	74	3	2	1	2	2
	Compressor	80	3	2	1	2	2
	Work Boat <sup>3</sup>	80	3	2	1	2	2
	Concrete Pump	82	1	1	1	--	1
Pile Caps	220 ton Crane & Barge	85	1	1	1	1	1
	150 ton Crane & Barge	85	2	1	1	1	1
	Welder	74	3	1	1	2	2
	Compressor	80	3	2	1	2	2
	Concrete Pump	82	1	1	1	1	1
	Work Boat	80	3	2	1	2	1
PC Planks	220 ton Crane & Barge	85	1	1	1	1	1





Table 4.2-11 Runway 33L RSA Construction Equipment Reference Sound Levels (continued)

Activity	Equipment	Lmax at 50 feet (dBA) <sup>1</sup>	Unit Per Day				
			Option 1	Option 2	Option 3	Option 5	Option 6
Deck Overlay	RT Crane	85	1	1	1	1	--
	Finishing Machine <sup>4</sup>	85	1	1	1	1	1
	Compressor	80	1	2	1	3	3
	Concrete Pump	82	1	1	1	1	1
Logistics	Concrete Transit Mixer	85	5	4	4	6	6
	Pickup Truck	75	3	3	3	3	3
	Escort Vehicle <sup>5</sup>	75	3	3	3	3	3
	Mechanics Truck <sup>6</sup>	84	1	1	1	1	1
	Material Barge <sup>10</sup>	--	3	3	3	3	3
	Tug Boat <sup>7</sup>	80	2	2	2	2	2
Civil - Perimeter Rd, TWC, Loc, ALS, EMAS	Excavator	85	1	1	1	1	1
	Bulldozer	85	1	1	1	1	1
	Dump Truck	84	10	10	10	10	10
	Grader	85	1	1	1	1	1
	Roller -Earth	85	1	1	1	1	1
	Paver	85	1	1	1	1	1
	Roller - Pavement	85	3	3	3	3	3
	Utility Truck <sup>9</sup>	84	4	4	4	4	4

1 FHA, Roadway Construction Noise Model, Version 1.0 February 2006.

2 Assumed truck sound level is equivalent to a flatbed truck sound level.

3 Assume work boat sound level is equivalent to a compressor sound level.

4 Assume finishing machine sound level is equivalent to a paver sound level.

5 Assume escort vehicle sound level is equivalent to a pickup truck sound level.

6 Assume mechanics truck sound level is equivalent to a flatbed truck sound level.

7 Assume tug boat sound level is equivalent to a compressor sound level.

8 Assume personnel vessel sound level is equivalent a compressor sound level.

9 Assume utility truck sound level is equivalent to a flatbed truck.

10 Assume barges will be pushed into place by tug boats.



Runway use at Logan Airport is based upon wind and weather conditions. The Airport relies on Runway 15R-33L primarily between November and March, to accommodate wind direction during that time of year. Runway 15R also needs to be available at night during the year. It is anticipated the target period for pile-driving is between July 1<sup>st</sup> and November 30<sup>th</sup> during 2011, 2012, and 2013. However, actual pile-driving operations could be extended beyond November should the wind and weather permit but is restricted between February 15<sup>th</sup> and June 30<sup>th</sup> to avoid the most sensitive period for fisheries, particularly winter flounder. On-site work is assumed to occur seven days a week between the hours of 7 AM and 7 PM.

### Receptor Locations

The area in the vicinity of the proposed Runway 33L RSA improvements was evaluated to identify areas that potentially are sensitive to construction activities associated with the project. The noise analysis identified nine sensitive receptor locations in the vicinity of the project. These receptor locations include one location to the southwest, four locations to the north, three locations to the east, and one location located on-airport. These receptor locations (see Figure 4-8) include:

- Receptor 1 – Grand View Avenue between Bay View Avenue and Billows Street;
- Receptor 2 – Shirley Street, Pebble Avenue, and Otis Street;
- Receptor 3 – Townsend Street and Maryland Avenue;
- Receptor 4 – Frances Street and Pico Avenue;
- Receptor 5 – Woodside Park, Baker Road, and Bartlett Parkway;
- Receptor 6 – Johnson Avenue between Bellevue Avenue and Sargent Street;
- Receptor 7 – Court Road between Sargent Street and Albert Avenue;
- Receptor 8 – Fort Independence Park; and
- Receptor 9 – Logan Airport Southwest Service Area.

The receptor locations are made up of predominately residential buildings. These receptor locations were selected based on land use considerations, and represent the most sensitive locations in the study area that are likely to experience changes in sound levels due to the proposed construction.

### Existing Sound Levels

The noise analysis developed existing sound levels using noise monitoring. Scattered across the Boston Metropolitan area are 30 noise monitoring stations that gather noise data. Massport uses these data to minimize the noise impacts, associated with activities that Logan Airport generates, to the community. Daily readings are taken from the noise monitors through-out 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.



**Legend**

- 1 Receptor Area Number
- Receptor Areas
- Monitoring Locations
- M4** Monitoring Location Number

Note: Monitoring Locations are existing monitoring locations previously established by Massport.



Logan RSA

**Figure 4-8**  
**Runway 33L**  
**Noise Monitoring Locations**  
**and Receptors**

Data Sources:  
 MassGIS 2008 (Aerial Photography)  
 VHB



The existing sound levels were based on measured L<sub>dn</sub> sound levels from the various noise monitoring stations located in communities surrounding Logan Airport. In order to compare to the City of Boston’s noise criteria, the L<sub>dn</sub> sound levels were converted into daytime (7 AM to 7 PM) L<sub>10</sub> sound levels. The daytime sound levels were based on the overall L<sub>dn</sub> measured value, which includes both aircraft and community noise. The conversion process was based upon the RCNM construction model and the Federal Transit Authority’s Transit Noise and Vibration Impact Assessment<sup>27</sup> document. Table 4.2-12 provides a summary of the existing sound levels.

**Table 4.2-12 Runway 33L RSA Existing Sound Levels (dBA)**

Monitoring Station	Monitoring Location	L <sub>dn</sub>	Daytime L <sub>10</sub> (7AM-7PM) <sup>1</sup>
3	Day Boulevard near Farragut Road – Boston	65	70
4	Bay View Ave and Grand View Avenue – Winthrop	74	79
6	Somerset Ave near Johnson Ave ue – Winthrop	68	73
14	Jeffries Point Yacht Club – Boston	64	69

Source: Logan International Airport Environmental Data Report, 2005. The daytime background sound levels represent both community and aircraft noise sources. 2005 data were used because it was the last year that EDR noise monitoring data was presented for both community and aircraft noise sources.

<sup>1</sup> Calculated based on L<sub>dn</sub> = L<sub>eq</sub> - 2 and L<sub>10</sub> = L<sub>eq</sub> + 3.

### Project Sound Levels

The proposed Runway 33L RSA improvements construction is expected to generate typical sound levels associated with construction activities, including use of heavy equipment operations for excavation, material transport, pile-driving, and installation of concrete deck. Heavy machinery would be used intermittently throughout construction and these activities would occur during normal weekday working hours.

Several methods of constructing the proposed Runway 33L RSA improvements are being evaluated. Even though several methods are evaluated, the construction phases would be relatively the same for all options. The type of equipment and unit of equipment will vary between the different construction options. The results for each option are shown on Tables 4.2-13 and 4.2-14 and discussed below.

<sup>27</sup> Transit Noise and Vibration Impact Assessment, Federal Transit Authority, FTA-VA-90-1003-06, May 2006.



Table 4.2-13 Runway 33L RSA Construction Sound Levels (L<sub>10</sub>, dBA)

Receptor	Location <sup>2</sup>	Project Sound Levels					City of Boston Criterion <sup>1</sup>
		Option 1	Option 2	Option 3	Option 5	Option 6	L <sub>10</sub> <sup>3</sup>
1	Grand View Ave between Bay View Ave/Billows St	71	70	69	72	72	75
2	Shirley Street, Pebble Avenue, and Otis Street	65	64	63	69	66	75
3	Townsend Street and Maryland Avenue	65	64	63	68	67	75
4	Frances Street and Pico Avenue	64	63	62	67	64	75
5	Woodside Park, Baker Road, and Bartlett Parkway	64	63	62	68	65	75
6	Johnson Avenue between Bellevue Ave/Sargent St	64	63	62	67	65	75
7	Court Road between Sargent St/Albert Ave	63	62	61	66	64	75
8	Fort Independence Park	61	60	59	65	62	75
9	Logan Airport Consolidated Rental Car Center Project Site	59	58	57	62	59	75

1 City of Boston's noise criterion for residential use.  
 2 See Figure 4-8  
 3 L<sub>10</sub> represents total sound level of all equipment.

As shown in Table 4.2-13, the L<sub>10</sub> sound levels at all receptors would be below the City of Boston's residential criterion of 75 dBA. Sound levels from construction would be similar for all of the construction options, and would range from 59 dBA (Fort Independence Park) to 72 dBA (Grand View Avenue). Table 4.2-14 shows that the L<sub>max</sub> sound levels at all receptors would be below the City's residential criterion of 86 dBA for all construction options. The predicted construction sound levels would range from 58 dBA (Fort Independence Park) to 72 dBA (Grand View Avenue). These sound levels would not result in significant noise impacts at any off-airport location.



Table 4.2-14 Runway 33L RSA Construction Sound Levels (Lmax, dBA)

Receptor Location	Project Sound Levels					City of Boston Criterion <sup>1</sup>
	Option 1	Option 2	Option 3	Option 5	Option 6	L <sub>max</sub> <sup>2</sup>
1 Grand View Ave between Bay View Ave/Billows St	62	62	62	72	62	86
2 Shirley Street, Pebble Avenue, and Otis Street	62	62	62	69	62	86
3 Townsend Street and Maryland Avenue	61	61	61	68	61	86
4 Frances Street and Pico Avenue	60	60	60	67	60	86
5 Woodside Park, Baker Road, and Bartlett Parkway	61	61	61	68	60	86
6 Johnson Avenue between Bellevue Ave/Sargent St	61	61	61	67	61	86
7 Court Road between Sargent St/Albert Ave	60	50	60	66	60	86
8 Fort Independence Park	58	58	58	65	58	86
9 Logan Airport Consolidated Rental Car Center Project Site	55	55	55	62	55	86

1 City of Boston's noise criterion for residential use.  
 2 L<sub>max</sub> represents sound level of noisiest piece of equipment.

#### 4.2.9.2 Air Quality

The construction-phase air quality impacts associated with the proposed Runway 33L RSA improvements were assessed for each of the construction options. The proposed construction would not change the operational levels at Logan Airport nor alter ground-based aircraft movements (i.e., aircraft taxi and delay periods). 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. Existing air quality conditions pertinent to this assessment, the assessment methodology and emissions analysis results are discussed in further detail below.



## Existing Conditions

The federal Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards (NAAQS) for pollutants thought to have negative impacts on human health and environmental welfare. The NAAQS represent threshold levels of these pollutants in the ambient (i.e. "outdoor") air over which these negative impacts are expected to occur. USEPA has established NAAQS for the following pollutants: Carbon Monoxide (CO), Lead (Pb), Nitrogen Dioxide (NO<sub>2</sub>), Ozone (O<sub>3</sub>), Particulate Matter measuring 10 micrometers or less in diameter (PM<sub>10</sub>), Particulate Matter measuring 2.5 micrometers or less in diameter (PM<sub>2.5</sub>) and Sulfur Dioxide (SO<sub>2</sub>). The Massachusetts Department of Environmental Protection (MaDEP) has adopted these same standards. Areas possessing pollutant concentrations in excess of the NAAQS for that pollutant are considered to be "non-attainment" of that NAAQS; areas with concentrations below the NAAQS are designated "attainment".

The General Conformity Rule of the CAA requires that federal actions occurring in non-attainment areas do not cause or contribute to continued violations of the NAAQS. To satisfy this requirement, all direct and indirect emissions associated with the action must be quantified and compared against the General Conformity "*de minimis*" thresholds for any applicable pollutant(s). If the emissions exceed the *de minimis* thresholds the action must demonstrate that it conforms to the area's State Implementation Plan (SIP) designed to bring the area back into attainment of the NAAQS by USEPA's prescribed deadline. If the emissions are within the *de minimis* thresholds, the action is considered a *de minimis* action and conforms to the SIP. Logan Airport is located in Suffolk County, Massachusetts, which is currently designated "moderate" non-attainment of the 1997 8-hour O<sub>3</sub> NAAQS, and "maintenance" for the CO NAAQS. Accordingly, the project-related emissions of CO, as well as the O<sub>3</sub> precursor compounds NO<sub>x</sub> and VOC, are assessed for the applicable *de minimis* thresholds to determine compliance with the General Conformity Regulations.<sup>28</sup> Table 4.2-15 below summarizes the NAAQS, indicates Suffolk County's attainment status, and describes any applicable *de minimis* thresholds employed in this assessment.

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<sup>28</sup> O<sub>3</sub> is not directly assessed with respect to the General Conformity Rule. Instead, O<sub>3</sub> conformity is determined based on the emissions of O<sub>3</sub> precursors Oxides of Nitrogen (NO<sub>x</sub>) and Volatile Organic Compounds (VOC). In the presence of sunlight and at ground level, these precursors react with oxygen to form O<sub>3</sub>.





Table 4.2-15 National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary Standards		Secondary Standards		Attainment Status	De minimis Threshold (tpy)
	Level	Averaging Time	Level	Averaging Time		
Carbon Monoxide (CO)	9 ppm (10 mg/m <sup>3</sup> )	8-hour <sup>1</sup>	None		Maintenance	100
	35 ppm (40 mg/m <sup>3</sup> )	1-hour <sup>1</sup>	None		Maintenance	
Lead (Pb)	0.15 µg/m <sup>3</sup> <sup>2</sup>	Rolling 3-Month Average	Same as Primary		Attainment	N/A
Nitrogen Dioxide (NO <sub>2</sub> )	0.053 ppm (100 µg/m <sup>3</sup> )	Annual (Arithmetic Mean)	Same as Primary		Attainment	N/A
	0.100 ppm	1-hour <sup>3</sup>	None		Pending	N/A
Ozone (O <sub>3</sub> )	0.075 ppm (2008 std)	8-hour <sup>7</sup>	Same as Primary		Pending	N/A
	0.08 ppm (1997 std)	8-hour <sup>8</sup>	Same as Primary		Moderate	NOx: 100 VOC: 50
	0.12 ppm	1-hour <sup>9</sup>	Same as Primary		N/A	N/A
Particulate Matter (PM <sub>10</sub> )	150 µg/m <sup>3</sup>	24-hour <sup>4</sup>	Same as Primary		Attainment	N/A
Particulate Matter (PM <sub>2.5</sub> )	15.0 µg/m <sup>3</sup>	Annual (Arithmetic Mean) <sup>5</sup>	Same as Primary		Attainment	N/A
	35 µg/m <sup>3</sup>	24-hour <sup>6</sup>	Same as Primary		Attainment	N/A
Sulfur Dioxide (SO <sub>2</sub> )	0.03 ppm	Annual (Arithmetic Mean)	0.5 ppm (1300 µg/m <sup>3</sup> )	3-hour <sup>1</sup>	Attainment	N/A
	0.14 ppm	24-hour <sup>1</sup>				N/A

Source: USEPA, 2010.

<sup>1</sup> Not to be exceeded more than once per year.

<sup>2</sup> Final rule signed October 15, 2008.

<sup>3</sup> To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010).

<sup>4</sup> Not to be exceeded more than once per year on average over 3 years.

<sup>5</sup> To attain this standard, the 3-year average of the weighted annual mean PM<sub>2.5</sub> concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m<sup>3</sup>.

<sup>6</sup> To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m<sup>3</sup> (effective December 17, 2006).

<sup>7</sup> To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)

<sup>8</sup> (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as USEPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.

(c) USEPA is in the process of reconsidering these standards (set in March 2008).

<sup>9</sup> (a) USEPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding").

(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is < 1.





### 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 USEPA-approved emissions models MOBILE6.2 and NONROAD2008a, respectively, and applied to the anticipated levels of activity identified in the RSA project construction schedule. Marine vessel emissions were quantified according to separate guidance published by USEPA and also incorporated usage and travel estimates contained within the construction schedule.<sup>29</sup> Asphalt paving and fugitive dust emissions factors were obtained from AP-42<sup>30</sup> and other relevant publications and were applied to estimated project areas to be paved and/or disturbed by the construction activities. Appendix 10, *Air Quality Analysis*, contains more detailed data and assumptions used in the air quality analysis.

### Construction Emissions Analysis Results

Table 4.2-16 presents the emissions inventory results for the proposed Runway 33L RSA construction period by construction option and year of construction (i.e., 2011, 2012, 2013). For ease of comparison, the applicable General Conformity Rule *de minimis* levels are also shown. As shown, VOC, NO<sub>x</sub> and CO project emissions are well below the applicable *de minimis* thresholds for all construction options considered. Accordingly, all of the Runway 33L RSA construction options are considered to be compliant with respect to the General Conformity Rule.

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<sup>29</sup> *Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories* - Final Report, April 2009

<sup>30</sup> *Compilation of Air Pollutant Emissions Factors (AP-42)*, Fifth Edition, 1995.



Table 4.2-16 Runway 33L RSA Construction Emissions Inventory

Option	2011	2012	2013	<i>De Minimis</i>	Option	2011	2012	2013	<i>De Minimis</i>
<b>VOC Emissions (tons)</b>					<b>CO Emissions (tons)</b>				
1	1.71	1.37	0.67	Yes	1	9.86	7.81	4.49	Yes
2	1.32	0.94	0.22	Yes	2	7.51	5.49	1.45	Yes
3	1.41	1.08	0.22	Yes	3	8.01	6.29	1.45	Yes
5	1.17	0.65	0.28	Yes	5	6.77	3.99	1.92	Yes
6	1.15	0.54	0.28	Yes	6	6.66	3.34	1.92	Yes
<i>De Minimus</i> Level	50	50	50		<i>De Minimus</i> Level	100	100	100	
<b>NO<sub>x</sub> Emissions (tons)</b>					<b>SO<sub>2</sub> Emissions (tons)</b>				
1	36.96	33.67	18.39	Yes	1	0.04	0.04	0.02	N/A
2	25.60	24.35	1.88	Yes	2	0.03	0.03	0.01	N/A
3	29.05	29.40	1.88	Yes	3	0.04	0.03	0.01	N/A
5	18.60	11.84	2.69	Yes	5	0.03	0.02	0.01	N/A
6	17.87	10.02	2.69	Yes	6	0.03	0.02	0.01	N/A
<i>De Minimus</i> Level	100	100	100						
<b>PM<sub>10</sub> Emissions (tons)</b>					<b>PM<sub>2.5</sub> Emissions (tons)</b>				
1	18.8	18.5	12.0	N/A	1	3.64	3.36	1.86	N/A
2	15.4	15.0	10.5	N/A	2	2.79	2.43	1.21	N/A
3	19.5	13.2	10.2	N/A	3	3.24	2.40	1.18	N/A
5	18.1	11.9	10.6	N/A	5	2.99	1.90	1.28	N/A
6	15.9	15.2	10.2	N/A	6	2.72	2.01	1.25	N/A

Source: KB Environmental Sciences, Inc. 2010

#### 4.2.9.3 Findings

FAA Order 1050.1E notes that “construction impacts alone are rarely significant pursuant to NEPA” and refers to the relevant impact categories to assess the significance of potential construction impacts.

For traffic, FAA Order 1050.1E, Appendix A Paragraph 16.3(c) (3) defines a significant impact as “disruptions of local traffic patterns that substantially reduce the levels of service of the roads serving the airport and its surrounding communities.” The analysis provided in this section shows that the proposed Runway 33L RSA improvements construction traffic will be minimal and can be accommodated on the Airport access road system without disrupting traffic patterns or affecting the level of service.



For noise, FAA Order 1050.1E does not establish significance standards for construction-related noise. There would be no significant impact from noise because the proposed Runway 33L RSA improvements would not change the daily aircraft operations, type of aircraft, or location in which aircraft operate. The construction noise, as documented in this section, would comply with relevant municipal noise ordinances and therefore would not constitute a significant impact.

FAA Order 1050.1E defines the significance threshold for air quality as exceeding one or more of the NAAQS. As documented in this section, the proposed Runway 33L RSA improvements would meet the *de minimis* thresholds under the NAAQS and would comply with the General Conformity Rule. There would be no construction-related significant impacts to air quality.

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### 4.3 Runway 22R

Constructing the proposed Runway 22R Inclined Safety Area (ISA) could potentially have direct and indirect, short- or long-term impacts to wetland resource areas; Chapter 91 waterways or tidelands; fish, wildlife and plants; federal threatened or endangered species; and water quality. The following sections describe those potential impacts.

A gravel-surfaced ISA is proposed for the Runway 22R end as described in Chapter 2, *Alternatives*, and shown on Figure 2-12. The ISA portion of the safety area would be approximately 130 feet long by 500 feet wide. Similar to the Runway 22L ISA, gabions<sup>31</sup> wrapped with filter fabric would be installed around the perimeter of the ISA to minimize gravel and sediment dispersion. Excavation and dredging would remove approximately 8,450 cubic yards of material to the mean lower low elevation<sup>32</sup> in order to install the ISA. Gravel fill would be placed for a distance of approximately 130 feet north from the existing EMAS bed and would be graded over the full width of the new safety area down to the mean lower low water elevation. Chapter 3, *Affected Environment*, provides a description of the existing conditions at Runway 22R.

As specified by the Secretary's Certificate, only the ISA Build Alternative is evaluated in this section. A description of the environmental consequences of the No-Action/No-Build Alternative is provided for comparison purposes. The following sections describe the anticipated direct and indirect environmental consequences based on the conceptual design of the ISA. Construction-related impacts are described for each resource category including resources (surface transportation, noise, air quality) that would only be affected temporarily by construction.

The impacts to wetlands are described in Section 4.3.1. Section 4.3.2 is a description of the environmental consequences affecting waterways and tidelands protected under M.G.L. Chapter 91. The impacts to fish, wildlife, and plants and to threatened and endangered species are described in Section 4.3.3 and Section 4.3.4, respectively. Water quality impacts resulting from the proposed ISA are described in Section 4.3.5. Section 4.3.6

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<sup>31</sup> A gabion is a rectangular galvanized wire basket filled with stone.

<sup>32</sup> Mean Lower Low Water (MLLW) = the average daily lower water level of the tide at a location. Some locations have diurnal tides – one high tide and one low tide per day. At most locations, there are semidiurnal tides – the tide cycles through a high and low twice each day, with one of the two high tides being higher than the other and one of the two low tides being lower than the other.



is a description of the potential impacts to historical, archaeological, and cultural resources that potentially may be found in the Project area. Hazardous and solid waste impacts associated with the proposed ISA are described in Section 4.3.7. Section 4.3.8 describes the environmental consequences of the proposed ISA on light emissions and the visual setting. Other construction-related impacts to surface transportation, noise, and air quality are described in Section 4.3.9.

#### 4.3.1 Wetlands

As described in Chapter 3, *Affected Environment*, of this Draft EA/EIR, there are coastal wetlands present within the limits of the proposed Runway 22R RSA improvements. The following section describes the environmental consequences of the No-Action/No-Build Alternative and the Build Alternative (the ISA). NEPA regulations that address wetlands are discussed in the FAA *Order 5050.4B* and in FAA *Order 1050.1E, Appendix A Section 18.3*. FAA *Order 5050.4B* identifies the significant impact thresholds for wetlands and describes the requirements of the wetlands analysis to determine whether impacts on wetlands are significant.

The Secretary's Certificate requires that the Draft EA/EIR include:

- An examination of whether the placement of fill at Runway 22R can be avoided or further minimized, and whether impacts are fully mitigated (see Chapter 5, *Proposed Mitigation and Section 61 Findings*);
- A description of impacts to buffer zones;
- A discussion of sediment and current dynamics;
- A cumulative assessment of the effects of the project on the functions and values of these resources (described in Section 4.4);
- A quantification and differentiation between the anticipated impacts associated with construction and full build-out;
- A description of current and anticipated construction projects by Massport and others in the surrounding area that may further degrade the coastal resources (described in Section 4.4); and
- Rigorous construction-period containment measures and monitoring plans (see Chapter 5, *Proposed Mitigation and Section 61 Findings*).

The Secretary's Certificate also requires a discussion of the mitigation proposed for the Project, which is provided in Chapter 5, *Proposed Mitigation and Section 61 Findings*. Construction-period containment measures and monitoring plans are also described in Chapter 5. The Certificate requires an analysis of options to avoid and minimize wetland alteration, a description of on-site and off-site mitigation sites, and a detailed wetlands replication plan which is described in Chapter 5 as well. A discussion of the MA WPA Variance requirements is provided in Chapter 6, *Regulatory Compliance*, and a description of the ongoing coordination with the Eelgrass and Salt Marsh Working Groups is provided in Chapter 5 and in Chapter 7, *Public and Agency Involvement*.



**4.3.1.1 Direct Impacts**

Coastal wetland resources were identified and delineated as described in Section 3.5.1 of Chapter 3, *Affected Environment*. The wetland delineation was overlaid with the footprint of the proposed Runway 22R ISA to quantify the direct impacts to coastal wetlands. The proposed ISA would result in the alteration or loss of coastal wetland resources. A discussion regarding potential impacts from the No-Action/No-Build and Build Alternative is included below.

**No-Action/No-Build Alternative**

No new impacts to coastal wetlands resources are expected under the No-Action/No-Build Alternative. However, the salt marsh at the Runway 22R end is naturally eroding and is expected to continue to erode under the No-Action/No-Build Alternative. There would be no additional loss of existing wetland function and values from the No-Action/No-Build Alternative.

**Build Alternative**

The proposed Runway 22R ISA would result in permanent impacts to Coastal Bank, Salt Marsh, Coastal Beach, Land Under the Ocean, Land Containing Shellfish, and Land Subject to Coastal Storm Flowage. A portion of this area is also defined as waters of the United States, and is subject to federal jurisdiction. There is a state-jurisdictional buffer zone extending 100 feet landward from the top of Coastal Bank. There are no permanent impacts to this buffer zone, which contains the perimeter road and a portion of the existing Runway 22R EMAS bed. Table 4.3-1 lists the direct impacts to each coastal wetland resource area and Figure 4-9 shows the location of these wetland resources.

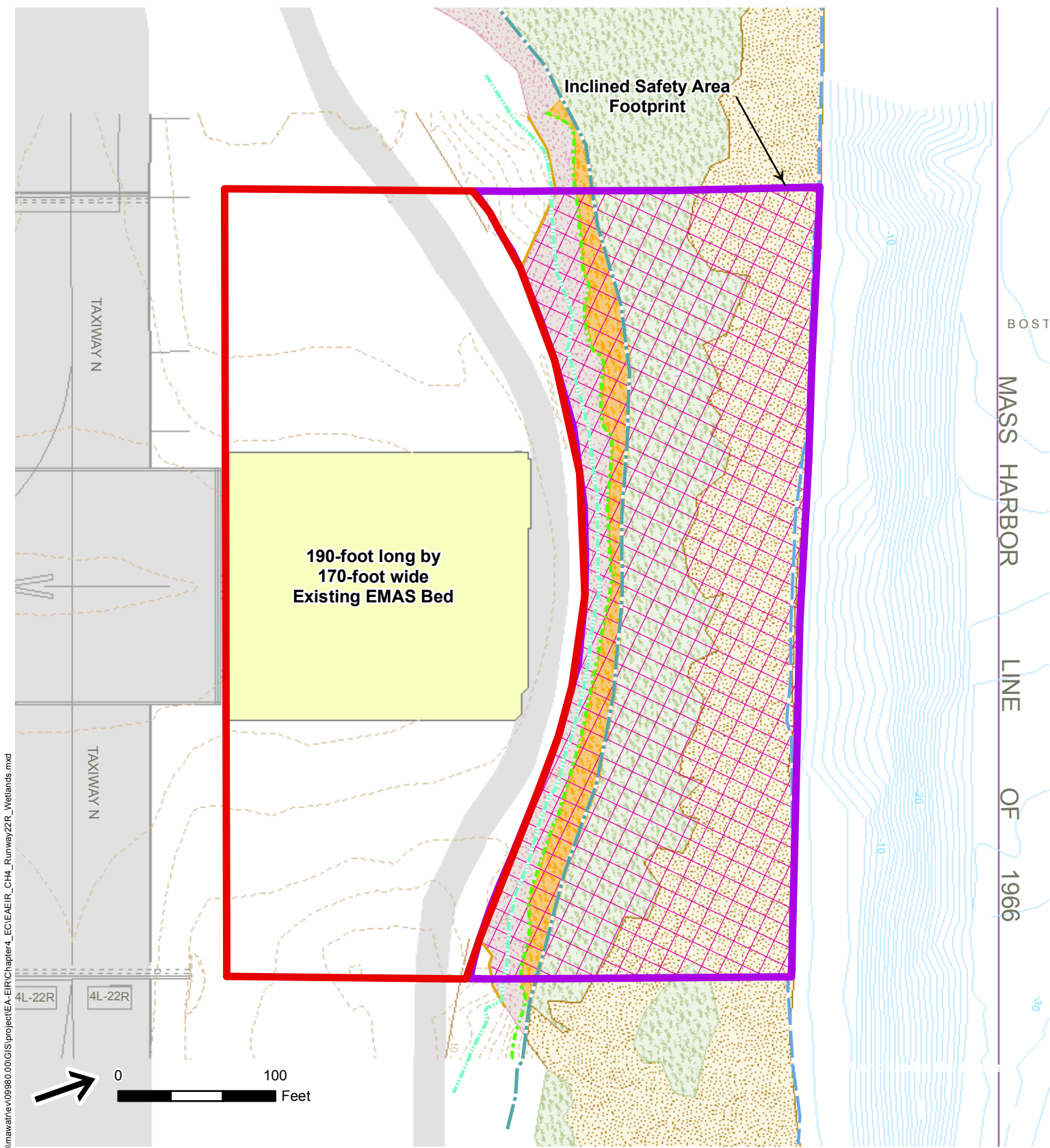
**Table 4.3-1 Runway 22R ISA Direct Wetland Impacts**

Wetland Resource Area	Jurisdiction	Direct Impacts (loss)	Direct Impact (Sediment) <sup>1</sup>
Coastal Bank	State only	530 linear feet (altered)	0
Salt Marsh	State and Federal	35,040 square feet (7,110 square feet is <i>Phragmites</i> -dominated Salt Marsh)	0
Coastal Beach	State and Federal	26,630 square feet	40 square feet
Land Under the Ocean	State and Federal	700 square feet	52,710 square feet
Land Containing Shellfish <sup>2</sup>	State only	62,370 square feet	52,750 square feet

<sup>1</sup> Sediment deposition approximately 0.1 mm thick

<sup>2</sup> Assumes Coastal Beach, Salt Marsh, and Land Under the Ocean are designated as Land Containing Shellfish.

Approximately 8,450 cubic yards of material would be excavated or dredged from Runway 22R end in order to construct the ISA. Even implementing best management practices, it is expected that some amount of material (approximately 1 percent or 85 cubic yards) would be lost to the water column and transported from the immediate construction area.



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- Legend**
- Existing EMAS Bed
  - Existing RSA
  - ISA Footprint
  - Direct Wetlands Impact
  - Coastal Bank
  - Coastal Beach
  - Salt Marsh
  - Phragmites-dominated Salt Marsh
  - Highest High Water (6.49')
  - Mean High Water (4.58')
  - Mean Low Water (-4.51')
  - Top of Coastal Bank
  - Limit of Land Subject to Coastal Storm Flowage



Logan RSA

**Figure 4-9**  
**Runway 22R ISA**  
**Coastal Wetlands Impacts**

Source: Jacobs Edwards & Kelcey, Inc.  
Childs Engineering Corps.  
Vanasse Hangen Brustlin, Inc.



The area covered by the sediment deposit represents a worse-case scenario over the course of the entire construction period which assumes that none of the proposed mitigation, such as silt curtains, are in place to protect the adjacent waters from sedimentation. Based on the conservative sediment dispersion modeling described in Section 4.3.1.1, a sediment deposit less than 0.1 millimeters (0.04 inches) thick would cover approximately 1.2 acres of Coastal Beach and Land Under the Ocean as shown on Figure 4-10 (Table 4.3-1). The impact represents the worst-case scenario of sediment dispersion without sedimentation controls, such as silt curtains. Sediment deposition of less than 0.1 mm is negligible and would not have significant adverse effects on benthic organisms that may be found in that area (see Appendix 6C, *Coastal Processes*).

The effect of the proposed Runway 22R ISA on coastal processes was analyzed to determine if there would be any change to the current velocity and sediment erosion potential in the area. The analysis showed that, based on the spring tide velocity at Runway 22R of 0.31 knots (16 centimeters per second) and the proposed footprint of the ISA, the velocity would increase to 0.32 knots.<sup>33</sup> This increase would not be significant and would not change the sediment erosion potential at Runway 22R (see Appendix 6C, *Coastal Processes*). The ISA is not expected to change wave direction or velocity or to result in increased erosion or deposition because of its orientation. It is not expected to cause scour or erosion to salt marsh adjacent to the project area due to currents. These findings are consistent with Massport's experience at the existing Runway 22L ISA.

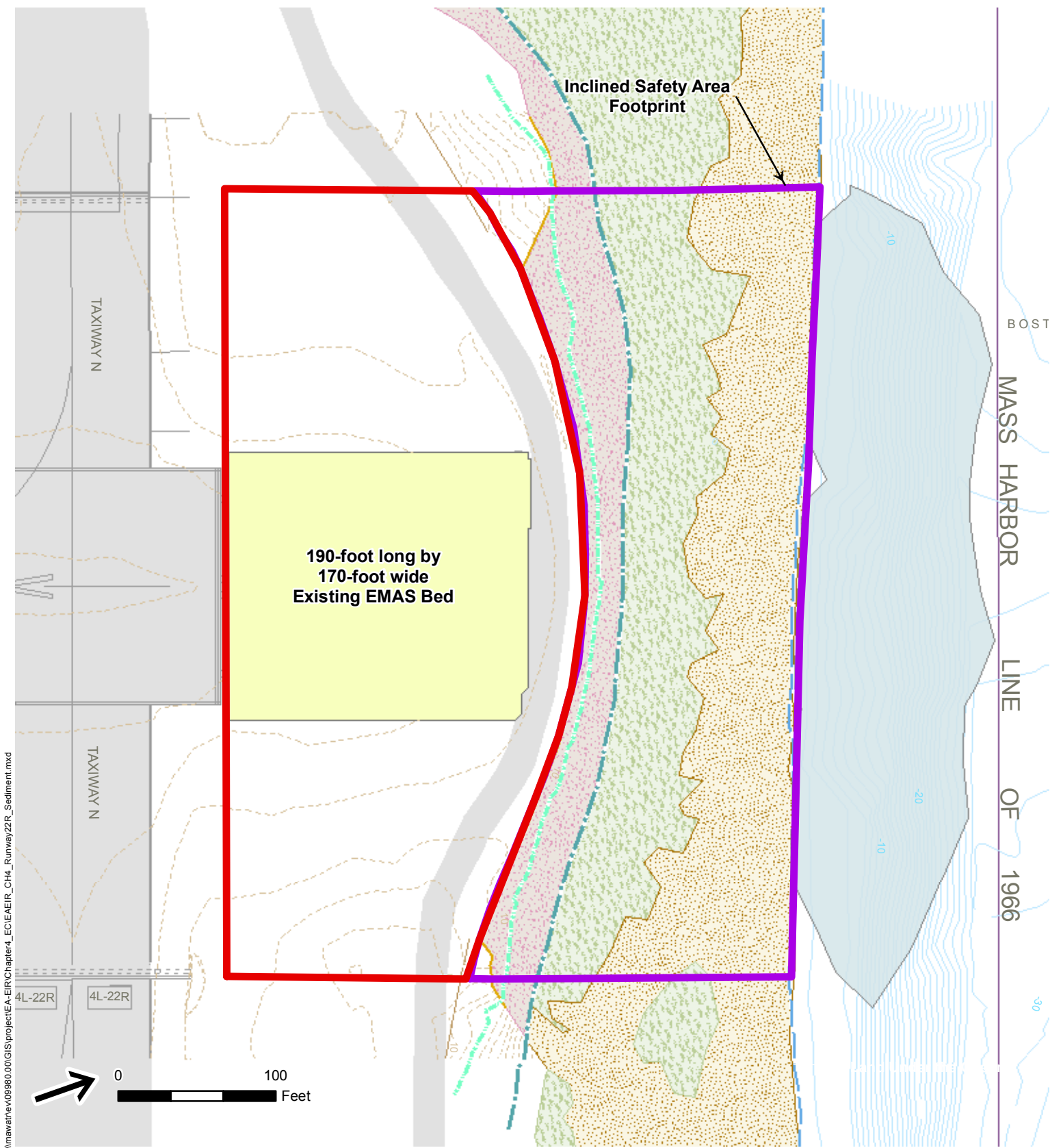
The proposed Runway 22R ISA would not affect the interests protected by the MA WPA that are significant to Coastal Bank, Coastal Beach, and Land Under the Ocean. The Coastal Bank at Runway 22R is not significant to storm damage prevention or flood control because it does not supply sediment to coastal beaches, coastal dunes or barrier beaches. The ISA is not expected to change wave direction or velocity or to result in increased erosion or deposition because of its orientation. It is not likely to impact any adjacent or downdrift Coastal Beach and will not interfere with littoral drift. The ISA would also maintain the stability of the shoreline, which over time, may have reduced stability due to the Runway 22R salt marsh erosion. The proposed Runway 22R RSA improvements would have no adverse effects on marine fisheries and wildlife habitat protected by Land Under the Ocean, as high densities of polychaetes, mollusks, or macrophytic algae are not present in the vicinity of Runway 22R. The proposed project will not introduce any pollutants to the marine environment that would affect the water quality in the vicinity of Runway 22R.

The proposed Runway 22R ISA would, however, impact the interests significant to Salt Marsh and Land Containing Shellfish. The Project requires a MA WPA Variance because work does not meet the regulatory performance standards described in the MA WPA. Chapter 6, *Regulatory Compliance*, describes the proposed Runway 22R ISA's consistency with the MA WPA Variance requirements.

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<sup>33</sup> Applied Science Associates. *Results from Data Collection, Hydrodynamic Modeling and Environmental Effects Analysis for Boston-Logan International Airport Runway Improvements*. March 11, 2010.





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- Legend**
- Existing EMAS Bed
  - Existing RSA
  - ISA Footprint
  - Sediment Dispersion
  - 0.1 mm
  - Mean High Water (4.58')
  - Mean Low Water (-4.51')
  - Top of Coastal Bank
  - Limit of Land Subject to Coastal Storm Flowage
  - Coastal Bank
  - Coastal Beach
  - Salt Marsh



Logan RSA

**Figure 4-10**  
**Runway 22R ISA Sediment Deposition**

Source: Jacobs Edwards & Kelcey, Inc.  
Childs Engineering Corps.  
Vanassee Hangen Brustlin, Inc.





Salt Marsh is assumed to be significant to the protection of marine fisheries, wildlife habitat, to the protection of land containing shellfish where there is shellfish, the prevention of pollution, and is likely to be significant to storm damage prevention and ground water supply as defined by the MA WPA. The dense vegetation growth of the Salt Marsh is an important factor contributing to the significant interests of the MA WPA: it provides habitat for wildlife and marine species and exports organic matter as the basis of the food web; the vegetation roots assist in the removal of pollutants from surrounding waters by binding sediments together; and, the vegetation and underlying peat reduces wave damage by creating a buffer that dissipates wave energy. Removal of Salt Marsh is an unavoidable impact and has been minimized to the extent practicable, as discussed in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

Land Containing Shellfish is assumed to be significant to the protection of marine fisheries as well as shellfish. According to the MA WPA, the following factors are critical to the protection of those interests: shellfish, water quality, water circulation, and the natural relief. The proposed Project would not affect water quality and water circulation. The construction of the proposed Runway 22R ISA would alter the natural relief and substrate characteristics and would reduce the area of habitat available to shellfish and benthic macroinvertebrates. The gravel fill would not present a barrier to fish or wildlife movement and would provide an attachment substrate for some shellfish and benthic organisms.

Functions and values of coastal wetlands at the Runway 22R end, regulated under Section 404 of the Clean Water Act (CWA) would be affected by the proposed ISA. 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 ISA. Gravel fill would be placed to the mean lower low water line and dredging and excavation would alter intertidal fish habitat at Runway 22R. Shellfish habitat would also be altered by replacing the natural substrate with gravel fill. The proposed ISA would alter the relief elevation and the distribution of the sediment grain size.
- **Production Export:** Production export would be affected by the proposed Runway 22R ISA. Currently, this area provides food (algae and benthic macroinvertebrates) for wildlife, including birds, and marine organisms. The existing Salt Marsh and Coastal Beach/Tidal Flat provides habitat for food sources, and the alteration of these areas would reduce the function of the overall wetland, which extends from Runway 22L into Wood Island Bay. The ISA would provide habitat interspersed in the gravel, although at a more limited scale than the existing conditions.
- **Sediment/Shoreline Stabilization:** The proposed Runway 22R ISA would not adversely affect the stability of the shoreline. The proposed improvements would maintain or improve stability of the shoreline.
- **Wildlife Habitat:** Wildlife habitat at the Runway 22R end would be altered as salt marsh and bank vegetation that provides habitat for a variety of wildlife species would be removed and replaced with gravel fill. The proposed ISA would not be a barrier to movement for wildlife along the shoreline. Eliminating wildlife habitat at the runway end is a benefit with regard to the project safety purpose.



The construction of the proposed Runway 22R ISA and resulting removal of salt marsh and coastal bank vegetation has benefits to aircraft safety. *Phragmites* stands are potential roosting for starlings and red-winged blackbirds, and salt marsh is potential habitat for shorebirds, brant (*Branta bernicla*), and seagulls. The removal of *Phragmites* on the Coastal Bank and salt marsh vegetation eliminate areas of potential wildlife hazards and is beneficial with respect to the project's purpose and need.

#### 4.3.1.2 Indirect Impacts

Indirect impacts of the proposed Runway 22R ISA on coastal wetlands potentially include erosion or sedimentation of coastal wetlands or habitat outside of the RSA footprint. Indirect impacts to tide current velocities at the Runway 22R end were determined based on changes in existing spring tide current resulting from the proposed ISA. The measurements of currents were completed in the field during a spring tide. Sediment dispersion was also modeled at Runway 22R to determine where marine sediment introduced into the water column during construction would potentially be deposited outside of the proposed ISA footprint. The sediment dispersion model SSFATE<sup>34</sup> was used to simulate dispersion and deposition of sediment from construction activities based on currents. Section 4.2.1.1 provides a more expanded description of the methodology used to determine impacts to wetlands.

The proposed Runway 22R ISA would not cause erosion or sedimentation of coastal wetlands because the ISA is not predicted to change wave direction or velocity or to result in increased erosion or deposition because of its orientation. As has been the experience with the existing Runway 22L ISA, proposed safety improvements at Runway 22R are not expected to cause scour or erosion to salt marsh adjacent to the construction area due to currents. The proposed Runway 22R ISA would not cause any indirect impacts to coastal wetlands, including loss of functions and values outside of the ISA footprint, as discussed below.

- The proposed Runway 22R ISA would not affect the ability of any wetlands outside of the RSA footprint to recharge or discharge groundwater. At this coastal location, wetlands outside of the RSA footprint are unlikely to recharge or discharge groundwater.
- The proposed Runway 22R ISA would not affect floodflow alteration functions or the ability to reduce flood damage of wetlands outside of the ISA footprint. The ISA would not affect floodplains as there are none at the Project area.
- The proposed Runway 22R ISA does not represent a barrier to movement and would not reduce or fragment any wetland habitat functions or values outside of the ISA footprint. The ISA would not decrease the ability of other wetlands to provide wildlife, shellfish, or fish habitat.
- The gravel fill will be contained within the footprint of the proposed Runway 22R ISA due to the gabions wrapped with filter fabric installed at the perimeter and the stabilized rock surface. These features will

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<sup>34</sup> SSFATE (Suspended Sediment FATE) was jointly developed by Applied Science Associates and the USACE Environmental Research and Development Center (ERDC) to simulate the sediment suspension and deposition from dredging operations. Its use has extended to include the simulation of cable and pipeline burial operations using water jet trenchers, and mechanical plows, and to simulating the suspended sediment from anchor cable sweeps on the seafloor.



minimize any sediment dispersion that may affect wetland functions and values outside of the ISA footprint after the ISA is fully constructed. The ISA would not increase sediment, toxics, or pathogens.

- The proposed Runway 22R ISA would not reduce the ability of wetlands outside of the footprint to remove, retain, or transform nutrients. The ISA would not change runoff patterns.
- The production export function of wetlands outside of the proposed Runway 22R ISA footprint would not be affected. The ISA would not cause any change to wildlife use, fish and shellfish habitat, vegetation, flushing, or other characteristics of protection export.
- The shoreline stabilization function of wetlands outside of the proposed Runway 22R ISA footprint would not be affected. The ISA would provide additional stability to the shoreline.

#### 4.3.1.3 Temporary Construction Impacts

There would be no short-term construction-related impacts to coastal wetland resources other than the dispersal of sediment. Construction staging would take place outside of coastal wetlands within adjacent uplands. Some construction equipment may be located within the 100-foot buffer to Coastal Bank. Excavation and dredging to remove unsuitable substrate materials could temporarily impact water quality. These activities could result in a temporary increase in suspended sediments in the immediate vicinity of the proposed work. As discussed in Section 4.3.5, *Water Quality*, the tides will quickly disperse any sediment; therefore, this short-term impact would be negligible. All construction would follow a comprehensive Soil Erosion and Sediment Control Plan to minimize temporary impacts as discussed in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

Excavation and dredging to remove unsuitable substrate materials may also result in a temporary increase in suspended sediments causing turbidity in the immediate vicinity of the proposed work. Appropriate controls to reduce or avoid disturbance to fish and shellfish habitat will be utilized such as silt curtains that would reduce turbidity outside of the construction area. The gabions wrapped with filter fabric installed during the initial construction would also act as a barrier to any sediment releases and resulting turbidity.

Construction would not temporarily impact coastal processes, such as waves, currents, or other hydrodynamics, as all excavation and dredging would take place from the land, and there would be no structures or equipment in the water.

#### 4.3.1.4 Findings

In accordance with the FAA *Order 1050.1E*, an action would result in a significant impact to wetlands if it:

- Adversely affects a wetland's functions to protect the quality or quantity of a municipal water supply, including sole source and potable water aquifers.
- Substantially alters hydrology needed to sustain affected wetland values and functions or those of a wetland to which it is connected.



- Substantially reduces the affected wetland's ability to retain floodwater or storm runoff, thereby threatening public health, safety, or welfare.
- Adversely affects the maintenance of natural systems supporting wildlife and fish habitat or economically-important timber, food, or fiber resources in the affected or surrounding wetlands.
- Promotes development of secondary activities or services that causes any of the above impacts.
- Is inconsistent with applicable state wetland strategies.

As documented in this section, the proposed Runway 22R ISA 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 Runway 22R ISA would not encroach on a floodplain or affect any floodplain values, since this is a tidal environment.

The proposed Runway 22R RSA improvements would not result in a significant impact as defined at FAA *Order 1050.1E*, with the proposed mitigation for the loss of salt marsh and shellfish resources. With mitigation, the proposed Runway 22R RSA improvements would meet the criteria for a Variance under the Wetlands Protection Act and comply with the Commonwealth's No Net Loss Policy and would therefore be consistent with state wetland strategies.

#### 4.3.2 Waterways and Tidelands

The proposed Runway 22R ISA was analyzed to determine potential effects on coastal waterways and tidelands. The majority of the proposed Runway 22R ISA is located seaward of the mean high water line on areas subject to Chapter 91 and the Massachusetts Coastal Zone Management Program. FAA *Order 5050.4B* and FAA *Order 1050.1E Appendix A, Section 3.3*, indicate there is no significant impact threshold identified for coastal resources. The analysis of significant impacts focuses on how a proposed project is consistent or not consistent with a state's coastal zone management program (see Chapter 6, *Regulatory Compliance*).

The Secretary's Certificate required the following information be included in the Draft EA/EIR related to these coastal resources:

- The Draft EA/EIR must address how the proposed safety improvements will meet the standards for a Chapter 91 Variance as a nonwater-dependent project (see Chapter 6, *Regulatory Compliance*);
- An examination of whether there are alternatives to placement of fill for the Runway 22R project, and whether the amount of fill can be reduced (see Chapter 5, *Proposed Mitigation and Section 61 Findings*);
- An assessment of alternative configurations and alignments, if any, that meet safety objectives while minimizing impacts (see Chapter 5, *Proposed Mitigation and Section 61 Findings*);



- Documentation that the project complies with the requirements for public benefits at 301 CMR 13.00, including detailed information describing the nature of the tidelands affected by the Project and the public benefit of the project, the purpose and effect of the project, the impact on abutters and the surrounding community, enhancement to the project, benefits to the public trust rights in tidelands and other associated rights, benefits provided through previously obtained municipal permits, environmental protection and preservation, public health and safety, and the general welfare;
- A description of appropriate mitigation measures for environmental and tidelands impacts (see Chapter 5, *Proposed Mitigation and Section 61 Findings*).

Discussions of how the Project meets the standards for a Chapter 91 Variance and a Public Benefits Determination are included in Chapter 6, *Regulatory Compliance*. Mitigation is discussed in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

#### 4.3.2.1 Direct Impacts

Direct impacts are the result of placing fill within the waterways and tidelands subject to Chapter 91 jurisdiction, and include the loss of the resource. The proposed Runway 22R ISA would result in direct impacts to tidelands.

#### No-Action/No-Build Alternative

There would be no impacts due to the No-Action/No-Build Alternative, as there would be no changes in the existing conditions other than ongoing natural processes.

#### Build Alternative

The Build Alternative would have permanent impacts to waterways and tidelands as described below. An area of approximately 1.4 acres below the mean high water line would be affected due to the construction of the ISA, a nonwater-dependent use. This alteration requires a Chapter 91 Variance because no fill is allowed in tidelands below the mean high water line without a variance if the proposed project is nonwater-dependent. A description of the proposed Runway 22R ISA's compliance with the criteria for a Chapter 91 Variance is provided in Chapter 6, *Regulatory Compliance*. Alternatives evaluated to avoid or minimize this impact are described in Section 2.3.2 of Chapter 2, *Alternatives*, and Appendix 3, *Alternatives Analysis and FAA Determinations*. Avoidance and minimization methods are described in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

Chapter 91 does not apply to any of the previously filled tidelands within the geographical boundary of Logan Airport [310 CMR 9.03(3)], therefore this evaluation only looks at the areas that are subject to jurisdiction: below the high tide line. The waters adjacent to Logan Airport, extending 500 feet seaward of the mean high water line, are designated as the Logan Airport Security Zone under M.G.L. Chapter 90 Section 61. As described in Section 3.3.3.2 above, all activities, including boating, fishing, hunting, shellfishing, and swimming are prohibited or greatly curtailed within this zone except by special permit. Boats may travel within the outer 250 feet of this area, within navigable waters, without a special permit.



The only interests within this area are limited shellfishing, living marine resources, and water quality. No public access is provided in the Project area due to Airport security requirements. The construction of the ISA would alter an area that supports shellfish. However, as described in Chapter 3, *Affected Environment*, the densities of soft-shell clams is low and concentrated in the eastern portion of the ISA and only two market size individuals (minimum size 2 inches) were observed in a survey. No blue mussels (*Mytilus edulis*) were observed at Runway 22R. Based on these findings, the population of harvestable soft shell clams is small and the resulting impacts would be minimal.

#### 4.3.2.2 Indirect Impacts

Impacts were assessed based on the footprint of the filled area on Chapter 91 tidelands, in the context of the public uses adjacent to Logan Airport.

No indirect impacts to waterways or tidelands are anticipated. The proposed Runway 22R ISA 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.

#### 4.3.2.3 Temporary Construction Impacts

There are no temporary construction-related impacts to tidelands and waterways or coastal processes resulting from the Runway 22R ISA construction. No public access is allowed on tidelands within the Airport Security Zone without prior Massport approval. Use of tidelands and waterways outside of the security zone would not be affected during construction.

#### 4.3.2.4 Findings

Chapter 91 Waterways and Tidelands are a state-regulated resource with no comparable federal regulated resource. There are no FAA NEPA criteria for significant impacts. As documented in this section, the proposed Runway 22R ISA would not affect the public's interests in tidelands.

### 4.3.3 Fish, Wildlife and Plants

The following sections include a discussion of the environmental consequences of the proposed safety improvements and the No-Action/No-Build Alternative on fish, wildlife, and plants. NEPA regulations that address fish, wildlife, and plants are discussed in the FAA *Order 5050.4B* and in FAA *Order 1050.1E*. FAA *Order 1050.1E Appendix A, Section 8.3*, identifies the significant impact thresholds related to fish, wildlife, and plants. There is no significant impact as the proposed Project would not affect any non-listed threatened or endangered species according to FAA *Order 1050.1E*.

The Secretary's Certificate requires the Draft EA/EIR to evaluate the following:

- A summary of the project site's habitat assessment (see Chapter 3, *Affected Environment*);
- Identification of any impacts to state-listed threatened or endangered species and any monitoring, documentation procedures, and habitat enhancements;



- A discussion of any impacts to land containing shellfish and resultant impacts to shellfishermen due to the construction of the ISA.

Potential shellfish mitigation measures are identified in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

#### 4.3.3.1 Direct Impacts

Section 3.5.2 of Chapter 3, *Affected Environment*, describes the existing fish, wildlife and plants found in the Runway 22R Study Area. Direct impacts were determined to be the loss of these resources within the footprint of the proposed Runway 22R ISA. Constructing the proposed ISA would result in minor direct impacts to fish, wildlife and plants, as discussed below.

#### No-Action/No-Build Alternative

There would be no impacts to fish, wildlife, and plants as a result of the No-Action/No-Build Alternative. There would be no change to the environment at the Runway 22R end.

#### Build Alternative

There would be permanent changes to fish habitat, wildlife, and plants as a result of the proposed Runway 22R ISA. The construction of the proposed ISA requires placing gravel fill within the RSA to create a gradual slope from the existing runway end to the water. The amount of habitat loss for fish and wildlife is minor. The fish, shellfish, and wildlife species that are common to the habitat at the Runway 22R end could utilize similar habitat on Airport property and elsewhere in Boston Harbor.

#### *Fish*

The proposed Runway 22R ISA would replace a portion of the Coastal Beach/Tidal Flat present at Runway 22R with a stone substrate. This would eliminate habitat for certain benthic organisms such as soft-shelled clams, razor clam, sand shrimp, mud snails, green crab, and polychaetes. However, the gravel fill could provide attachment substrate for some of these other benthic organisms. The proposed ISA would not be a barrier to movement along the shoreline. The small amount of habitat lost due to construction of the proposed ISA is minor, and there is available habitat elsewhere on Airport property and throughout Boston Harbor.

There would be limited impacts to shellfish habitat resulting from the proposed project. As described in Chapter 3, *Affected Environment*, and Section 4.3.2.2, the population of harvestable soft shell clams is of low density and therefore the resulting impacts to shellfish harvesting would not be significant. However, Massport will continue to develop options for shellfish mitigation with the DMF. Shellfish mitigation is anticipated to be similar to the mitigation performed by Massport for Runway 22L, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

A small amount of intertidal habitat that could be used by fish species (approximately 1.4 acres, including salt marsh and coastal beach), including the 18 species for which Boston Harbor is designated as EFH, would be altered. The DMF has recommended a time of year restriction for in-water, silt producing work extending from February 15<sup>th</sup> through June 30<sup>th</sup> for the protection of winter flounder, one of the fish species for which Boston



Harbor is designed as EFH, using near-shore areas for spawning, larval settlement, and juvenile development.<sup>35</sup> The proposed ISA extends to mean lower low water elevation. This will permanently alter 700 square feet of subtidal habitat at Runway 22R, but this area provides low habitat value and there is abundant EFH for each of the fish species in the adjacent waters and elsewhere in Boston Harbor. These changes are not anticipated to have permanent or significant impacts to fish or EFH at the Runway 22R end due to the minor loss of salt marsh and intertidal habitat.

### **Wildlife**

There are no anticipated permanent impacts to wildlife as a result of the conversion and loss of a small segment of coastal bank and of salt marsh. Wildlife can use similar habitat on Airport property or elsewhere in Boston Harbor. There would be no permanent impacts to the upland sandpiper (*Bartramia longicauda*), the Massachusetts-listed endangered species known to occur within the grassy interior of the airfield. There is no work proposed within mapped upland sandpiper habitat. The NHESP indicated that the proposed Project would not adversely affect the actual resource area habitat for the state-protected species.<sup>36</sup>

### **Plants**

The proposed Runway 22R ISA would require the removal of vegetation. The salt marsh grasses (*Spartina alterniflora* and *S. patens*) and common glasswort (*Salicornia europaea*) at the end of Runway 22R would be replaced with gravel fill. A stand of *Phragmites* at the Runway 22R end would also be removed. The vegetation does not provide important wildlife value, although starlings and red-winged blackbirds have been observed in this area. These tall grasses represent a potential wildlife hazard to aircraft utilizing Runway 4L-22R as they attract avian species which could interfere with aircraft operations. *Phragmites* is a non-native invasive species that will edge out native species if not controlled or removed, and the removal would benefit the native vegetation adjacent to the proposed ISA. There are no unique plant communities at the Runway 22R end.

#### **4.3.3.2 Indirect Impacts**

Indirect impacts of the proposed Runway 22R ISA on fish, wildlife, and plants potentially include changes to the population sizes, persistence, or diversity of fish, wildlife or plants within Boston Harbor. Indirect impacts are the potential effects of the proposed Runway 22R ISA on the movement of wildlife, population effects due to changes in food sources, and other potential changes that would affect fish or wildlife populations in the vicinity of Logan Airport. There would be no indirect impacts to fish population sizes, persistence, or diversity as the proposed ISA would not change water quality, salinity, or temperature. There would be no change to the vegetation community that provides habitat for wildlife indirectly affecting wildlife population sizes, persistence, or diversity. There is no change to air quality, temperature, sunlight, or water quality that may indirectly affect plant population size, persistence, or diversity.

#### **4.3.3.3 Temporary Construction Impacts**

Temporary construction impacts may include noise, turbidity, and disruption of terrestrial and aquatic plants and wildlife. Temporary construction impacts to water quality may occur during the placement of the gravel fill and dredging. Increased sedimentation could affect the respiration and reproduction of benthic organisms, and

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<sup>35</sup> Comment Letter on the ENF received from the Massachusetts Division of Marine Fisheries, dated August 7, 2009.

<sup>36</sup> Letter received from the Massachusetts Natural Heritage and Endangered Species Program dated March 26, 2010.





could cause damage to the gills, scales, and eggs of fish. However, the estimated amount of sediment deposition (less than 0.1 mm) would occur over a small area and would have a negligible effect on benthic organisms. The recommended time of year restrictions will avoid impacts to fish development and designated EFH. Controls for water pollution and soil erosion, such as using a siltation curtain and a debris boom to contain and minimize any siltation or debris, would be implemented during construction to minimize impacts. An approved Soil Erosion and Sediment Control Plan would be implemented during construction and is described further in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

#### 4.3.3.4 Findings

While there is no specific significance threshold established for non-listed species, FAA *Order 1050.1E* requires that the FAA consider the project's effects on non-listed species population dynamics, sustainability, reproduction rates, natural and artificial mortality (aircraft strikes), and the minimum population size needed to maintain the affected population.

The analysis in this section shows that the proposed Runway 22R RSA improvements would not significantly affect biodiversity because the alternatives would not reduce the habitat size below the level sufficient to sustain species commonly found in the affected area or adversely impact sensitive habitat supporting plant or animal species not commonly occurring in the affected area.

#### 4.3.4 Federally-Listed Threatened and Endangered Species

The following section describes environmental consequences of the proposed Runway 22R ISA on federally-listed threatened or endangered species that may occur within the Project area. NEPA regulations that address threatened and endangered species are discussed in FAA *Order 5050.4B* and in FAA *Order 1050.1E*. FAA *Order 1050.1E Appendix A, Section 8.3*, identifies the significant impact thresholds related to federally-listed threatened or endangered species.

The USFWS indicated that there are no federally-listed threatened or endangered species under its jurisdiction within the Project area.<sup>37</sup> The NMFS has indicated that sea turtles, protected under the ESA may occur within Boston Harbor and requested that the FAA undertake ESA Section 7 Consultation.<sup>38</sup> The FAA has made a preliminary determination that the proposed ISA is not likely to adversely affect any threatened or endangered species listed under the jurisdiction of NMFS.<sup>39, 40</sup> The Secretary's Certificate requires that Massport continue to coordinate with the USFWS and NMFS to identify other protected species that may occur in the Project area and include the results of these discussions in the Draft EA/EIR.

##### 4.3.4.1 Direct Impacts

There would be no permanent adverse impacts to federally-listed species resulting from the construction of the proposed Runway 22R ISA, as discussed below. As documented in Chapter 3, *Affected Environment*, there is no designated critical habitat within Boston Harbor. Literature on habitat requirements and stranding observations

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37 Letter received from the United States Fish and Wildlife Service, New England Field Office, dated December 19, 2007.

38 Letter received from the National Marine Fisheries Service, dated March 24, 2010.

39 Letter to National Marine Fisheries Service from the Federal Aviation Administration, dated March 22, 2010.

40 Vanasse Hangen Brustlin, Inc. Assessment of Sea Turtles and Whale Presence within the Boston Harbor Technical Memorandum, dated February 12, 2010.



were reviewed to determine whether there would be any impacts to federally-listed threatened or endangered species, specifically for whales and sea turtles. Indirect effects could include effects on population persistence or stability due to the loss of food sources, and could potentially include health effects due to underwater construction noise.

#### **No-Action/No-Build Alternative**

There would be no impacts to federally-listed threatened or endangered species as a result of the No-Action/No-Build Alternative. There would be no change to the environment at the Runway 22R end.

#### **Build Alternative**

Although no sea turtles have been observed in Boston Harbor, the proposed Runway 22R ISA could impact habitat potentially used by sea turtles but would not result in an adverse effect that would jeopardize the continued existence of these species or adversely change their critical habitat. The proposed ISA is not likely to affect federally-listed whale species, as the proposed ISA would only extend to the low water mark, an area too shallow to be used by whales. NMFS has concurred with this assessment.

The proposed Runway 22R ISA would result in the loss of approximately 1.4 acres of intertidal habitat and 700 square feet of subtidal habitat that could potentially be used by sea turtles. Although sea turtles have never been reported in Boston Harbor, NMFS considers that sea turtles may be found seasonally in Boston Harbor. Shellfish, mollusks, benthic organisms, and jellyfish found at the Runway 22R end are potential food sources for sea turtles. The impact area is minor, and there is similar habitat and substrate in the areas adjacent to the Project area. The potential food sources at the Runway 22R end in the area of the proposed ISA could move to adjacent, similar habitat or attach to the proposed ISA providing food sources and habitat for sea turtles.

#### **4.3.4.2 Indirect Impacts**

The proposed Runway 22R ISA would not impact population sizes or critical habitat indirectly because the proposed ISA would not cause any change to water temperature, water quality, or other habitat-defining characteristics.

#### **4.3.4.3 Temporary Construction Impacts**

Temporary construction noise and turbidity are not anticipated to affect sea turtles, in the event that any sea turtles were present in Boston Harbor. Temporary construction impacts to water quality may occur during the placement of the gravel fill and dredging or excavation. Controls for water pollution and soil erosion, such as using a siltation curtain and a debris boom to contain and minimize any siltation or debris, would be implemented during construction to minimize impacts as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*. These controls would also act as a barrier to keep sea turtles out of the construction area, avoiding any incidental mortality. Placing fill in the proposed ISA would not result in underwater noise impacts that could potentially affect marine wildlife.



#### 4.3.4.4 Findings

FAA *Order 1050.1E* defines a significant impact for endangered species as one when the FWS or the National Marine Fisheries Service determines a proposed action would likely jeopardize a species' continued existence or destroy or adversely affect a species' critical habitat.

As documented in this section, the FAA has determined, and NMFS has concurred, that the proposed Runway 22R RSA improvements would have an effect, but not an adverse effect, on the habitat of sea turtles. Accordingly, these safety improvements would not have a significant impact on endangered species

#### 4.3.5 Water Quality

Evaluating water quality is a necessary component of the NEPA review as required by the FAA NEPA regulations. NEPA regulations that address water quality are discussed in the FAA *Airport Environmental Handbook (Order 5050.4B)* and in the FAA *Environmental Impacts: Policies and Procedures (Order 1050.1E)*. FAA *Order 1050.1E Appendix A, Section 17.3*, identifies the significant impact thresholds related to water quality.

The Secretary's Certificate required that the Draft EA/EIR evaluate impacts to water quality and drainage resulting from the proposed Project. Specifically, the Certificate requires the Draft EA/EIR to:

- Evaluate the effects of stormwater drainage on wetlands;
- Demonstrate that the proposed RSA enhancement would not increase pollutant loading to Boston Harbor;
- Describe water quality sampling during dredging, dredge material sampling, handling, reuse/disposal requirements, and dredging performance standard;
- Demonstrate that the proposed project will be designed to comply with applicable Stormwater Policy Standards;
- Explain how water quality and quantity impacts would be controlled in conformance with the stormwater regulations and the NPDES permit (see Chapter 6, *Regulatory Compliance*);
- Describe proposed mitigation measures to protect water quality during the construction period and, if required, post-construction (see Chapter 5, *Proposed Mitigation and Section 61 Findings*);
- Evaluate stormwater runoff impacts during construction and post-construction; and
- Demonstrate that source controls, pollution prevention measures, erosion and sediment controls, and the post-development drainage system will be designed in compliance with the Massachusetts Stormwater Management regulations (301 Code of Massachusetts Regulations (CMR) 10.00);



- Discuss the potential temporary increase in suspended sediments in the area of Boston Harbor in the immediate vicinity of the proposed work, as a result of short-term construction activities such as dredging to remove unsuitable substrate materials.

As described in the following sections, the proposed Runway 22R ISA would be in compliance with the applicable water quality standards since it would be designed to meet state and federal requirements and there would not be a significant impact related to water quality.

A discussion of the proposed Runway 22R ISA's regulatory compliance with water quality regulations, including the Massachusetts Stormwater Management regulations, and the applicable Stormwater Policy Standards is provided in Chapter 6, *Regulatory Compliance*. Mitigation measures to protect water quality during construction and post-construction are presented in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

#### 4.3.5.1 Direct Impacts

The following sections include a discussion of the environmental consequences of the proposed safety improvements and the No-Action/No-Build Alternative on water quality. Potential impacts to water quality are closely 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 must consider increases in stormwater runoff, decreases in infiltration, and changes in the concentrations of constituents contained within the runoff. Impervious surfaces such as runways, perimeter roadways, and safety areas 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 as long as stormwater outfalls are designed to manage discharges without causing erosion. Changes to infiltration and recharge are not 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 22R ISA.

#### No-Action/No-Build Alternative

The No-Action/No-Build Alternative requires no changes to the existing conditions. However, the No-Action/No-Build Alternative would have impacts to the water quality in the adjacent waters of Boston Harbor. Outfall A-12, located southeast of the Runway 22R end, has deteriorated over time. The concrete outfall has crumbled away and does not direct discharges appropriately causing erosion to the shoreline. The No-Action/No-Build Alternative assumes that Massport would repair Outfall A-12, with minor beneficial effects on water quality.

#### Build Alternative

The proposed Runway 22R ISA would have no permanent impacts to water quality. No vehicles would operate on the proposed ISA, no new impervious surfaces and no new stormwater conveyance systems would be created and the proposed ISA would not result in any new discharge of untreated stormwater. There would be no change to the quality and quantity of stormwater runoff resulting because the proposed ISA is not an area with higher pollutant loading and would not generate permanent changes in total suspended solids (TSS). The



proposed project would be in compliance with the Massachusetts Stormwater Management regulations and the existing NPDES permit as explained in Chapter 6, *Regulatory Compliance*.

The gradual slope and surface of the proposed Runway 22R ISA would prevent scouring by stormwater runoff. Runoff would flow down the slope of the proposed ISA to mean lower low water and would not erode the existing mud flat, as demonstrated by the adjacent ISA for Runway 22L. The existing Outfall A-12, southeast of the proposed ISA, would be stabilized as part of the proposed Runway 22R improvements, as discussed further in Chapter 5, *Proposed Mitigation and Section 61 Findings*. This upgrade would eliminate a source of sediment in the adjacent waters and improve conditions in adjacent coastal wetlands and waterways.

#### 4.3.5.2 Indirect Impacts

The analysis of indirect and temporary effects to water quality also evaluated the potential effects of sedimentation caused by changes in tidal currents, as well as the effects of sediment discharged during excavation or placing fill to construct the proposed ISA. The ISA would not increase pollutant loading in Boston Harbor because it is not a source of new pollutant loading as described in Section 4.3.1.2. The proposed Runway 22R ISA 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.

#### 4.3.5.3 Temporary Construction Impacts

Water quality in the vicinity of the proposed Runway 22R ISA could be temporarily affected by short-term construction activities, particularly due to the excavation and dredging required to remove unsuitable substrate materials and to place new stone fill. These activities may result in a temporary increase in suspended sediments and increased turbidity in the immediate vicinity of the proposed work. Any turbidity created would be quickly dispersed by the tides; therefore, the effects from temporary construction-related turbidity are negligible. Any construction completed at the Runway 22R end would follow a comprehensive Soil Erosion and Sediment Control Plan to minimize temporary impacts. The gabions wrapped with filter fabric installed during the construction would also act as a construction-phase and permanent barrier to any sediment releases and resulting turbidity. Chapter 5, *Proposed Mitigation and Section 61 Findings*, describe the Soil Erosion and Sediment Control Plan, including the construction sequence that will be followed to minimize impacts.

In order to reduce the potential for any impact to water quality during dredging or excavation, the soils to be excavated and placed would both be pre-characterized through soil sampling. Massport has identified three licensed disposal facilities where the materials can be taken based on the pre-characterization. Material would be dredged or excavated from the shoreline and placed directly in trucks that would take the materials to one of the disposal facilities. There would be no storage of materials at the project site. If the pre-characterization shows that additional preventative measures need to be taken to minimize any potential for a pollution release during construction or excavation or for pollutants reentering the water column, those measures will be in accordance with the NPDES permit process under the CWA, RCRA, OSHA) regulations, and the MCP. Only clean fill would be approved for placement.



#### 4.3.5.4 Findings

FAA *Order 1050.1E* defines a significant impact for water quality as one where an action would not meet water quality standards. Potential difficulty in obtaining a permit or authorization may indicate a significant impact.

As documented in this section and in Chapter 6, *Regulatory Compliance*, the proposed Runway 22R RSA improvements would be designed to meet all relevant state water quality standards and, therefore, would not have a significant impact on water quality.

#### 4.3.6 Historical, Archaeological, and Cultural Resources

NEPA regulations that address historical, archaeological, and cultural resources are discussed in FAA *Order 5050.4B* and FAA *Order 1050.1E*. FAA *Order 1050.1E Appendix E, Section 11.3*, identifies the significant impact thresholds related to historical, archaeological, and cultural resources.

The Secretary's Certificate requires that the Draft EA/EIR address the potential for occurrences of submerged resources and discuss steps that would be taken if a submerged resource is found during the course of the proposed Project.

There are no other historical, architectural, or cultural resources in the project area that are on or eligible for the National Register of Historic Places or that are protected under Section 106 of the National Historic Preservation Act, as described in Chapter 3, *Affected Environment*.

##### 4.3.6.1 Direct Impacts

There are no permanent impacts anticipated from the No-Action/No-Build Alternative and the Build Alternative as there are no Section 106 historical, archaeological, or cultural resources in the proposed project area.<sup>41</sup> Although the Massachusetts Board of Underwater Archaeological Resources does not have record of underwater archaeological resources in the project area, it is highly unlikely that a resource would be found during construction, as the entire construction area was created by placing fill in the 1960s. The construction is not anticipated to require excavation below the depth of this fill and would not encounter underwater archaeological resources.

##### 4.3.6.2 Indirect Impacts

Indirect impacts of the proposed Runway 22R ISA on historic, archaeological, or cultural resources potentially include affecting the characteristics of a historic, archaeological, or cultural resource elsewhere in the Boston Harbor. As documented in Chapter 3, *Affected Environment*, there are no historic resources directly adjacent to the proposed Runway 22R ISA. The proposed project will not affect the characteristics of a historic, archaeological, or culture resource elsewhere in the Boston Harbor. There would be no changes in the visual setting, lighting, air quality, or noise elements that would affect a historic, archaeological, or cultural resource (see Section 4.3.8).

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<sup>41</sup> Letter received from the Massachusetts Historical Commission, dated December 7, 2007.



#### 4.3.6.3 Temporary Construction Impacts

The effects of previous construction activities and the limited nature of the proposed Runway 22R ISA construction at Runway 22R may lessen the likelihood of impacts to underwater historic, archaeological, or cultural resources. The proposed Runway 22R ISA would be in an area filled in the 1960s to construct Logan Airport. However, in order to mitigate for any unintended consequences during construction, an Unanticipated Discovery Plan would be developed by Massport and implemented during construction. Massport would coordinate with the Federal Aviation Administration, the Massachusetts Historical Commission, Tribal Historic Preservation Officer(s), and the Board of Underwater Archaeological Resources to determine the protocol should an unanticipated discovery be made during construction of the ISA in accordance with the Board of Underwater Archaeological Resources *Policy Guidance for the Discovery of Unanticipated Underwater Archaeological Resources*, September 2006.

#### 4.3.6.4 Findings

As stated in FAA *Order 1050.1E, Appendix A*, significant impacts to Section 106 resources are determined through the Section 106 consultation process. The FAA has made a determination that the proposed Runway 22R RSA improvements would not have an effect on Section 106 resources, and the SHPO has concurred with this finding (see Appendix 4, *Agency Correspondence*).

### 4.3.7 Solid and Hazardous Waste

The following section describes the potential solid and hazardous waste environmental consequences of the proposed Runway 22R ISA and the No-Action/No-Build Alternative. NEPA regulations that address hazardous materials, pollution prevention, and solid waste are discussed in FAA *Order 5050.4B* and FAA *Order 1050.1E*. FAA *Order 1050.1E Appendix A, Section 10.3*, identifies the significant impact thresholds related to hazardous materials, pollution prevention, and solid waste.

The Secretary's Certificate requires a description of the dredge material sampling, handling, reuse/disposal requirements, and dredging performance standards.

#### 4.3.7.1 Direct Impacts

The environmental consequences of the proposed Runway 22R ISA on solid and hazardous waste were determined by reviewing available databases and other materials provided by Massport to determine if there is any potential for discovering solid or hazardous waste during construction. Direct impacts would include the potential for the proposed project to result in the discharge of hazardous material.

#### No-Action/No-Build Alternative

There would be no change to the Runway 22R end that may cause a release of hazardous materials and no solid waste would be generated.

#### Build Alternative

There would be no anticipated impacts to hazardous materials and solid waste as a result of the Build Alternative. There would be no change to the Runway 22R end that may cause a release of hazardous



materials and no solid waste would be generated excepted for a small quantity of dredged or excavated material.

#### 4.3.7.2 Indirect Impacts

Indirect impacts of the proposed Runway 22R ISA 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 project area. Indirect impacts would include the effects of releasing contaminated sediments in the water column, or transporting hazardous materials off-site. The proposed Runway 22R ISA would not have any indirect impacts to landfills or other areas as the dredged and excavated materials will be sent to an approved facility that is capable of handling the project material that is disposed of at the facility.

#### 4.3.7.3 Temporary Construction Impacts

In order to construct the proposed Runway 22R ISA, some material (approximately 8,450 cubic yards) would have to be removed from the intertidal and subtidal area off of Runway 22R. It is anticipated that this material would be dredged or excavated. The sediments in this area were sampled and subjected to both physical and chemical analysis in accordance with the Massachusetts Water Quality Certification Regulations and compared to NOAA's Sediment Quality Guidelines. The analysis showed that the sediments in the Runway 22R area are a silty sand with a low organic content (less than 6 percent), and that concentrations of metals and organic compounds are well below the DEP and NOAA standards. The sediments are therefore not anticipated to contain hazardous materials. However, in order to reduce the potential for any hazardous material to be released during dredging or excavation, the soils would be further pre-characterized through soil sampling. If the pre-characterization indicates that the materials require further investigation and containment, appropriate measures would be taken based on the applicable federal and state regulations. If the pre-characterization indicates that the materials can be disposed of properly, Massport has identified three licensed disposal facilities where the materials can be taken. Based on the pre-characterization of the materials, one of three facilities would be chosen based on what can be accepted. Material would be dredged or excavated from the shoreline and placed in trucks that would bring the materials to one of the disposal facilities. There would be no storage of materials onsite.

Sediment control measures, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*, would be used to minimize the discharge of contaminated sediments into the water column. Excavation of these materials would be done, to the extent practicable, during low-tide conditions to avoid discharge, and the area would be enclosed in silt fabric-wrapped stone gabions to minimize any effects outside of the construction area.

#### 4.3.7.4 Findings

FAA *Order 1050.1E* defines a significant impact for hazardous materials, pollution prevention, and solid waste as one where an action involves a property on or eligible for the National Priority List (NPL). As documented in Chapter 3, *Affected Environment*, there are no sites in the Runway 22R Study Area that are listed on the USEPA's NPL. Therefore there are no significant impacts in the category of Hazardous Materials, Solid Waste, and Pollution Prevention as a result of the proposed Runway 22R RSA improvements.





#### 4.3.8 Light Emissions and Visual Setting

The following sections are a discussion of the environmental consequences of the proposed Runway 22R RSA improvements and the No-Action/No-Build Alternative.

NEPA regulations that address light emissions and the visual setting are discussed in FAA *Order 5050.4B* and FAA *Order 1050.1E*. FAA *Order 1050.1E Appendix A, Section 12.3*, identifies the significant impact thresholds related to light emissions and the visual setting. There is no significant impact to light emissions or the visual setting according to FAA *Order 1050.1E* because there are no lights proposed at the Runway 22R project area that could cause an annoyance and there are no changes to the runway end that would affect the visual setting. The Secretary's Certificate required no specific information on light emissions and visual setting.

##### 4.3.8.1 Direct Impacts

The proposed Runway 22R ISA's impact on light emissions was determined based on a review of the proposed lighting system. Potential impacts to airport neighbors were evaluated on a qualitative basis. Impacts to the visual setting were determined through photographic documentation taken from the nearby neighborhood (Bayswater Street, East Boston). The proposed runway safety area improvements were superimposed on the photographs to determine the new visual setting (Figure 4-11).

There would be no change in light emissions resulting from either the No-Action/No-Build Alternative or the Build Alternative, since no new lighting is proposed at this location. The proposed Runway 22R ISA, the Build Alternative, would have permanent impacts on the visual setting, but these impacts are not adverse or significant according to FAA *Order 1050.1E*.

##### No-Action/No-Build Alternative

Under the No-Action/No-Build Alternative, there are no changes to the runway or the runway safety area, and therefore, no changes to the lighting system.

##### Build Alternative

The proposed safety enhancements at this location would not require changes to the lighting system at Runway 22R. The proposed Runway 22R ISA does not require the addition of any other nav aids that emit light or any changes to the existing runway lights.

The ISA would have a negligible change on the view of Runway 22R from the East Boston neighborhood of Orient Heights, particularly along Bayswater Street, and from Constitution Beach, a public beach also in Orient Heights. As noted in Chapter 3, *Affected Environment*, the existing view from both Bayswater Street and Constitution Beach is a low-profile shoreline, salt marsh vegetation, and the coastal bank. The view from Constitution Beach to the end of Runway 22R tends to blend with the shoreline. The proposed Runway 22R ISA would be viewed from a distance and, because of its low profile, would blend in with the existing shoreline as seen on Figure 4-11, and would appear similar to the adjacent Runway 22L ISA.





Proposed Runway 22R Inclined Safety Area



Logan RSA

Figure 4-11

Runway 22R ISA  
Visual Impact from Bayswater Street  
Looking Southwest

Illustrative purposes only





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The proposed Runway 22R ISA would be most visible from Bayswater Street, which is lined with private residences, and the Orient Heights Yacht Club. The view from these homes is characterized by harbor in the foreground, the shoreline of the airport in the near field, and the airport facilities and the Boston skyline in the far field. The visual change would be similar to what is seen from Constitution Beach of a distant, low-profile shoreline. There are no structures proposed to be added to the runway end that could significantly change the view. The only change that may be noticeable is the removal of the *Phragmites* stand would be replaced with stone consistent with the view of Runway 22L. For properties along Bayswater Street, with the runway shoreline at a distance of approximately 1,500 feet from the neighborhood, the distinguishing features of the ISA would blend in with the adjacent natural shoreline (see Figure 4-11).

#### 4.3.8.2 Indirect Impacts

There would be no indirect impacts on light emissions as there is no need to install additional lights in the airfield or in the adjacent communities. The proposed Runway 22R ISA is not a structure that would need to be lighted in order to enhance aircraft safety, and it does not change the configuration of the runway that would require additional lights elsewhere in the airfield, such as at the Runway 4L end, or in the nearby communities. The ISA would not require any visual change elsewhere in the airfield or in the nearby communities.

#### 4.3.8.3 Temporary Construction Impacts

There would be minor temporary construction-related changes to the visual setting associated with the construction of the proposed Runway 22R ISA. Construction equipment (trucks, excavators, etc.) would be visible from Constitution Beach and from the Bayswater Street neighborhood in Orient Heights. No construction would take place overnight, so there would be no construction-related light emissions.

#### 4.3.8.4 Findings

FAA *Order 1050.1E* defines a significant impact for light emissions as one where an action's light emissions create annoyance to interfere with normal activities, and a significant impact for visual impacts as one when consultation with Federal, State, or local agencies, tribes, or the public shows the visual effects contrast with existing environments and the effect is objectionable.

As documented in this section, the proposed Runway 22R RSA improvements would not change existing light emissions and would not create annoyance. The visual effects would be consistent with the existing environment, including the Runway 22L ISA, and would not have a significant effect on light emissions or the visual environment.

#### 4.3.9 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 and NEPA requirements at FAA *Order 1050.1E, Appendix A, Section 3*.



The Secretary's Certificate required that the Draft EA/EIR:

- Present a discussion of construction-period impacts (including but not limited to noise, dust, blasting, wetlands, and traffic maintenance) and analyze feasible measures that can avoid or eliminate these impacts;
- Evaluate construction noise and potential nighttime light pollution;
- Discuss any airfield operational impacts of the construction;
- Estimate the construction schedule and hours of construction;
- Discuss air quality impacts from construction traffic and fugitive dust and noise;
- Present a draft construction management plan;
- Address the concerns raised in the Boston Transportation Department's comment letter requesting a transportation access plan to keep construction traffic out of the neighborhoods surrounding Logan Airport.

The construction schedule and potential airfield operational impacts are discussed in Chapter 2, *Alternatives*. Construction-period impacts to wetlands, water quality, and potential nighttime light pollution are described in other portions of Section 4.3. This section addresses the potential construction-period impacts associated with construction traffic, air quality, and noise.

#### 4.3.9.1 Surface Transportation

Unlike Runway 33L, construction of the proposed Runway 22R ISA would be primarily undertaken from the landside, as most of the materials and workers would be delivered to the Project area by truck. Materials to be delivered by truck to and from the airport are the excavated material, backfill and gabion material. Construction workers would not be allowed to drive or park at the project area with the exception of limited supervisory personnel. The majority of workers would be transported to the site by shuttle bus.

#### Truck Traffic

The estimated schedule of construction equipment related to the Runway 22R ISA construction is provided in Table 4.3-2 for each quarter of 2011. Based on this equipment schedules, estimates of the types and numbers of pieces of heavy equipment required by the Project per work shift were developed for each construction option. For the purposes of this analysis, the equipment schedule assumes that the entirety of construction of the Runway 22R ISA is anticipated to occur during the third quarter of 2011.



Table 4.3-2 Runway 22R ISA Construction Equipment Requirements by Quarter

Equipment Estimate	2011			
	Q1	Q2	Q3	Q4
Crane-Truck (25 ton)	-	-	1	-
Hydraulic Excavator (3.5 cubic ft)	-	-	1	-
Loaders	-	-	1	-
Truck-Flatbed	-	-	13	-
Utility Truck	-	-	1	-
12 cubic yard dump truck (400 hp)	-	-	40	-
Escort Vehicles (3)	-	-	3	-
Worker Shuttle (1)	-	-	1	-

Note: Numbers denote average equipment per shift

Most of the heavy construction equipment, including cranes, excavators and loaders would be stored on the airport during non-work hours. This equipment would be used during most workdays, however this equipment would not enter or leave the airport as a daily construction trip. The following types of equipment would enter and leave the site for each work shift:

- Dump Truck
- Escort Truck
- Flatbed Truck
- Utility Truck
- Worker Shuttle

The projected daily need for these types of heavy and light trucks were used to estimate the daily number of truck arrivals and total truck trips (arrivals plus departures) to the airport are presented in Table 4.3-3. The proposed Runway 22R ISA construction would generate approximately 114 total truck trips per weekday.

Table 4.3-3 Runway 22R ISA Daily Construction Truck Trips

Year	2011			
	Q1	Q2	Q3	Q4
Total Daily Arrivals	0	0	57	0
Total Daily Trips	0	0	114	0



It is expected that construction would take place primarily during the day shift, approximately 7 AM to 7 PM. Thus, the daily truck volume to and from the site would be the number of truck trips per work shift. It was assumed that most light duty trucks, such as escort trucks, would all arrive to the project site during the morning peak hour and exit during the evening peak hour. The majority of construction workers would be shuttled to the project site via van or shuttle bus each workday. Table 4.3-4 shows the peak hour construction trip estimates for the Runway 22R ISA construction.

**Table 4.3-4 Runway 22R ISA Peak Hour Construction Truck Trips**

Year	2011			
	Q1	Q2	Q3	Q4
AM Peak Entering	0	0	12	0
AM Peak Exiting	0	0	9	0
<b>AM Peak Hour Total</b>	0	0	21	0
PM Peak Entering	0	0	9	0
PM Peak Exiting	0	0	12	0
<b>PM Peak Hour Total</b>	0	0	21	0

**Truck Route**

The Contractor for the proposed Runway 22R ISA would be under the same access restrictions for direct construction truck traffic access as the Runway 33L construction (see Section 4.2.9). As shown in Figure 4-7, construction access from the three airport gateways to the North Gate will use three airport roadways: Hotel Drive, SR-2 and Prescott Street.

**Traffic Maintenance**

Vehicular traffic flow on the airport roadway network during construction will be managed so that the quality of traffic flow would not deteriorate to unacceptable levels of service. If necessary, Massport has the ability modify contractor schedules and access routes to minimize impacts. As described in Section 4.2.9, three planned transportation infrastructure projects by Massport that will improve traffic flow along the construction truck routes will be in place before the Runway 22R ISA construction begins. The maximum of 21 total construction truck trips in the peak hour periods related to the Runway 22R ISA project would have minimal impact on airport roadways. It should be noted that this analysis assumes that the peak construction quarters for the Runway 33L RSA and Runway 22R ISA projects are the same (third quarter, 2011); however, runway operational restrictions will not allow both locations to be under construction at the same time.



#### 4.3.9.2 Noise

The noise analysis evaluated sound levels of construction activities associated with the construction of the Runway 22R ISA. Construction activities would include various construction vehicles and mechanical equipment. The existing sound levels were based on measured  $L_{dn}$  sound levels from various noise monitoring stations located in communities surrounding Logan Airport. These 30 noise monitoring stations, operated by Massport, collect continuous 24-hour data throughout the year. The  $L_{dn}$  sound levels were converted into daytime  $L_{10}$  sound levels for the purpose of comparison to the City of Boston's noise criteria, which are presented in metrics of  $L_{10}$ .

Construction sound levels are a function of the types of equipment being used, the number of each type of equipment, and the distances between the construction equipment and the sensitive receptor locations. Overall construction sound levels are governed primarily by the noisiest pieces of equipment operating at a given time. Table 4.2-9 in Section 4.2.9.2 provides typical maximum sound levels associated with the various types of construction equipment expected to be used at the project site during the construction phase. During any particular activity phase, multiple pieces of equipment may operate simultaneously and for various durations throughout the construction period. The noise analysis assumed a worst-case condition, which is having all the construction equipment operating simultaneously.

#### Methodology

The noise analysis used the Federal Highway Administration's (FHWA) Roadway Construction Noise Model 1.1 (RCNM)<sup>42</sup> to calculate the sound levels associated with the construction equipment at the closest receptor locations, typically residential areas. The existing sound levels were established based upon Massport's continuous 24-hour monitoring data. The noise analysis presents conservative results because it assumes that all of the construction equipment, regardless of the construction phase it actually will be used, is operating at the same time.

The noise analysis evaluated sound levels of construction activities associated with the construction of the proposed Runway 22R ISA. Construction activities would include various construction vehicles and mechanical equipment. The existing sound levels were based on measured  $L_{dn}$  sound levels from various noise monitoring stations located in communities surrounding Logan Airport. These 30 noise monitoring stations, operated by Massport, collect continuous 24-hour data throughout the year. The  $L_{dn}$  sound levels were converted into daytime  $L_{10}$  sound levels for the purpose of comparison to the City of Boston's noise criteria, which are presented in metrics of  $L_{10}$ .

Construction sound levels are a function of the types of equipment being used, the number of each type of equipment, and the distances between the construction equipment and the sensitive receptor locations. Overall construction sound levels are governed primarily by the noisiest pieces of equipment operating at a given time. Table 4.3-5 provides typical maximum sound levels associated with the various types of construction equipment expected to be used at the project site during the construction phase. During any particular activity phase, multiple pieces of equipment may operate simultaneously and for various durations throughout the

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<sup>42</sup> FHWA Roadway Construction Noise Model (RCNM): User's Guide Federal Highway Administration, FHWA-HEP-05-054, January 2006.





construction period. The noise analysis assumed a worst-case condition, which is having all the construction equipment operating simultaneously.

Table 4.3-5 Runway 22R ISA Construction Equipment Reference Sound Levels

Equipment	Lmax at 50 feet (dBA)	Units per day
Crane	85	1
Excavator	85	1
Front End Loader	80	1
Flatbed Truck	84	13
Utility Truck <sup>1</sup>	84	1
Dump Truck	84	40

Source: Federal Highway Administration, Roadway Construction Noise Model, Version 1.0, February 2006.

<sup>1</sup> Assumed utility truck sound level is equivalent to a flatbed truck sound level.

### Receptor Locations

The study area was evaluated to identify areas that are sensitive to construction activities associated with the Runway 22R ISA. The noise analysis identified ten sensitive receptor locations in the vicinity of the Runway 22R ISA. These receptor locations include one location to the west, four locations to the north, four locations to the east, and one on-airport receptor location. These receptor locations included;

- Receptor 1 – East Boston Yacht Club/Coleridge Street;
- Receptor 2 – Baywater Street between Thurston Street and St. Edward Road;
- Receptor 3 – Baywater Street between St. Edward Road and Shawsheen Road;
- Receptor 4 – Baywater Street between Shawsheen Road and Teregram Street;
- Receptor 5 – Baywater Street between Teregram Street and Annavoy Street;
- Receptor 6 – Pleasant Street between Main Street and Lincoln Street;
- Receptor 7 – Pleasant Street between Lincoln Street and Court Road;
- Receptor 8 – Court Road between Pleasant Street and Loring Road;
- Receptor 9 – Court Road between Loring Road and Albert Avenue; and
- Receptor 10 – Logan Airport Southwest Service Area.

The receptor locations are made up of predominately residential areas. These receptor locations were selected based on land use considerations, and represent the most sensitive locations in the study area that are likely to experience changes in sound levels due to the proposed project. Figure 4-12 shows the receptor locations used in the noise analysis.



**Legend**

- 1 Receptor Area Number
- Receptor Areas
- Monitoring Locations
- M10** Monitoring Location Number

Note: Monitoring Locations are existing monitoring locations previously established by Massport.



Logan RSA

**Figure 4-12**  
**Runway 22R**  
**Noise Monitoring Locations**  
**and Receptors**

Data Sources:  
 MassGIS 2008 (Aerial Photography)  
 VHB



### Existing Sound Levels

The noise analysis developed existing sound levels for each receptor location using noise monitoring data. Scattered across the Boston Metropolitan area are 30 noise monitoring stations that gather continuous sound level data. Massport uses this data to evaluate and minimize the noise impacts, associated with activities that Logan Airport generates, to the community. Daily readings are taken from the noise monitors through-out the year. The detailed data can be separated into two categories, community and aircraft noise.

The existing sound levels were based on measured  $L_{dn}$  sound levels from the various noise monitoring stations located in communities surrounding Logan Airport. In order 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 RCNM construction model and the Federal Transit Authority’s Transit Noise and Vibration Impact Assessment<sup>43</sup> document. Table 4.3-6 provides a summary of the existing sound levels.

Table 4.3-6 Runway 22R ISA Existing Sound Levels (dBA)

Monitoring Station	Monitoring Location <sup>2</sup>	$L_{dn}$	Daytime $L_{10}$ (7AM-7PM) <sup>1</sup>
7	Loring Road near Court Road – Winthrop	69	74
8	Morton Street and Amelia Avenue – Winthrop	64	69
9	Baywater Street near Annavoy Street – Boston	71	76
10	Baywater Street near Shawsheen Road – Boston	67	72
12	East Boston Yacht Club – Boston	70	75
14	Jeffries Point Yacht Club – Boston	64	69

Source: Logan International Airport Environmental Data Report, 2005. The daytime background sound levels represent both community and aircraft noise sources. 2005 data were used because it was the last year that EDR noise monitoring data was presented for both community and aircraft noise sources.

1 Calculated based on  $L_{dn} = L_{eq} - 2$  and  $L_{10} = L_{eq} + 3$ .

2 See Figure 4-12

### Project Sound Levels

The Project is expected to generate typical sound levels associated with construction activities, including use of equipment for excavation and material transport. This equipment would be used intermittently throughout construction and these activities would occur during normal weekday working hours, typically 7 AM to 7 PM.

Sound levels are reduced as they travel over distances. The construction activities associated with the Runway 22R ISA would occur between 1,500 and 2,000 feet away from the nearest receptor locations. As shown in Table 4.3-7, the  $L_{10}$  sound levels would range from 62 to 70 dBA. All of these sound levels are below the City of Boston’s construction noise impact criteria of an  $L_{10}$  sound level of 75 dBA. The  $L_{max}$  sound levels at each receptor would range from 42 to 54 dBA. All of these sound levels are below the City of Boston’s  $L_{max}$  criteria of 86 dBA, and would not result in significant noise impacts.

43 Transit Noise and Vibration Impact Assessment, Federal Transit Authority, FTA-VA-90-1003-06, May 2006.



Table 4.3-7 Runway 22R ISA Construction Sound Levels (dBA)

Receptor Location <sup>2</sup>	Project Sound Levels		City of Boston Criteria <sup>1</sup>	
	L10 <sup>3</sup>	Lmax <sup>4</sup>	L10	Lmax
1 East Boston Yacht Club/Coleridge Street	68	53	75	86
2 Bayswater St between Thurston St and St. Edward Rd	68	53	75	86
3 Bayswater St between St. Edward Rd and Shawsheen Rd	70	54	75	86
4 Bayswater St between Shawsheen Rd and Teregram St	70	54	75	86
5 Bayswater St between Teregram St and Annavoy St	70	54	75	86
6 Pleasant St between Main St and Lincoln St	70	54	75	86
7 Pleasant St between Main St and Lincoln St	65	49	75	86
8 Court Rd between Pleasant St and Loring Rd	62	49	75	86
9 Court Rd between Loring Rd and Albert Ave	66	51	75	86
10 Logan Airport Southwest Service Area	66	51	75	86
11 East Boston Yacht Club/Coleridge Street	66	42	75	86

1 City of Boston's noise criteria for residential use.

2 See Figure 4-12

3 L10 represents total sound level of all equipment.

4 Lmax represents sound level of noisiest piece of equipment.

#### 4.3.9.3 Air Quality

The air quality impacts expected to occur with the proposed Runway 22R ISA construction were assessed using the methodology described in Section 4.2.9. The proposed action is not expected to cause an increase in the operational levels at Logan Airport nor alter ground-based aircraft movements (i.e., aircraft taxi and delay periods). Therefore, operational emissions are not expected to change. However, the action is expected to generate short-term construction-related air emissions, including exhaust emissions from on-road construction vehicles and off-road construction equipment.

Table 4.3-8 shows the emissions inventory results for the Runway 22R ISA construction period, estimated to occur in 2011 for a conservative analysis of maximum cumulative emissions. For ease of comparison, the applicable General Conformity Rule *de minimis* levels are also shown. As shown, VOC, NOx and CO project emissions are well below the applicable *de minimis* thresholds for all construction options considered. Accordingly, the Runway 22R ISA is considered to be compliant with respect to the General Conformity Rule.





Table 4.3-8 Runway 22R ISA Construction Emissions Inventory (2011)

	VOC (tons)	CO (tons)	NO <sub>x</sub> (tons)	SO <sub>2</sub> (tons)	PM <sub>10</sub> (tons)	PM <sub>2.5</sub> (tons)
Emissions	0.18	0.31	0.86	0.00	2.54	0.29
<i>De minimis</i> level	50	100	100	N/A	N/A	N/A
<i>De minimis</i> ?	Yes	Yes	Yes			

Source: KB Environmental Sciences, Inc. 2010

#### 4.3.9.4 Findings

FAA Order 1050.1E notes that “construction impacts alone are rarely significant pursuant to NEPA” and refers to the relevant impact categories to assess the significance of potential construction impacts.

For traffic, FAA Order 1050.1E, Appendix A Paragraph 16.3(c) (3) defines a significant impact as “disruptions of local traffic patterns that substantially reduce the levels of service of the roads serving the airport and its surrounding communities.” The analysis provided in this section shows that the proposed Runway 22R RSA improvements construction traffic will be minimal and can be accommodated on the Airport access road system without disrupting traffic patterns or affecting the level of service.

For noise, FAA Order 1050.1E does not establish significance standards for construction-related noise. Based on the significance standards in this Order, there would be no significant impact from noise because the proposed Runway 22R ISA would not change the daily aircraft operations, type of aircraft, or location in which aircraft operate. The construction noise, as documented in this section, would comply with relevant municipal noise ordinances and therefore would not constitute a significant impact.

FAA Order 1050.1E defines the significance threshold for air quality as exceeding one or more of the NAAQS. As documented in this section, the proposed Runway 22R RSA improvements would meet the *de minimis* thresholds under the NAAQS and would comply with the General Conformity Rule; therefore there would be no construction-related significant impacts to air quality.

## 4.4 Cumulative Impacts

The NEPA definition of a cumulative impact comes from the Council on Environmental Quality (CEQ), which defines a cumulative impact as:

“... impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.”<sup>44</sup>

<sup>44</sup> 40 CFR § 1508.7



This Draft EA/EIR considers the potential for the proposed RSA improvements, in the context of recent or anticipated projects, to adversely affect the natural environment or the social environment. The analysis was developed following guidance issued by the CEQ. FAA *Order 1050.1E (paragraph 500c)* notes that “if the proposed action causes the cumulative impacts of these non-project actions to exceed an applicable significant threshold, then the proposed action would be the one causing the significant impact.”

Specific requirements of the Secretary’s Certificate pertaining to the analysis of cumulative impacts include:

- The Draft EA/EIR should contain a cumulative assessment of the effects of the project on the functions and values of coastal wetland resources within Boston Harbor.
- The Draft EA/EIR should include current and anticipated construction projects by Massport and others in the surrounding area that may further degrade the coastal environment.

#### 4.4.1 Methodology

This section examines the cumulative impact of the proposed RSA Improvements Projects considered with the impacts of other past, present and reasonably foreseeable future actions. The analysis of cumulative effects considers “whether the combination of the action’s impacts with other impacts will result in a serious deterioration of environmental functions.”<sup>45</sup> Consistent with the CEQ guidance, the analysis determined whether the resource, ecosystem, or human community would sustain its structure and function when the effects of the alternatives under consideration are added to the effects of other past and future actions. The analysis of cumulative impacts for each affected resource shows whether the incremental effect of the proposed RSA Improvements Project would result in a serious deterioration of the resource, cause the cumulative effect to exceed any regulatory threshold or threshold of significant adverse effect, or affect the structure or function of the human community within the study area. Only those resources or categories that are adversely affected by the proposed RSA Improvements Project are considered in this analysis.

#### 4.4.2 Wetlands

The evaluation of cumulative impacts to wetlands protected under the MA WPA and the federal Section 10 and Section 404 regulations focuses on impacts to salt marsh and submerged aquatic vegetation (eelgrass beds), the two coastal wetland resource types that are considered most sensitive and that have historically been most affected by human activities.

##### 4.4.2.1 Trends and Past Effects

In 2005, the Massachusetts Office of Coastal Zone Management and others documented *100 Years of Estuarine Marsh Trends in Massachusetts (1893 to 1995)*.<sup>46</sup> This report documents the following trends—losses, gains, and changes—of salt marshes that occurred within Boston Harbor.

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<sup>45</sup> *Consideration of Cumulative Impacts in EPA Review of NEPA Documents*. EPA 315-R-99-002, United States Environmental Protection Agency, Office of Federal Activities, May 1999.

<sup>46</sup> Carlisle, B.K., R.W. Tiner, M. Carullo, I.K. Huber, T. Nuerminger, C. Polzen, and M. Shaffer. 2005. *100 Years of Estuarine Marsh Trends in Massachusetts (1893 to 1995)*: Boston Harbor, Cape Cod, Nantucket, Martha’s Vineyard, and the Elizabeth Islands. Massachusetts Office of Coastal Zone Management, Boston, MA; U.S. Fish and Wildlife Service, Hadley, MA; and University of Massachusetts, Amherst, MA. Cooperative Report.



- About 5,326 acres of salt marsh are estimated to have existed in the Boston Harbor region in 1893. However, no documentation is available to quantify the large areas of salt marsh and inter-tidal flats that were filled in metro Boston prior to 1893, including the Back Bay, South Boston, East Boston, Cambridge, and Charlestown.
- From 1893 to 1952, salt marsh areas gained 482 acres and lost 2,988 acres, a net loss of approximately 2,506 acres. This period includes dramatic increases in industry and technology, and a rapidly increasing population. There was a high demand for areas to support residential and commercial development and transportation infrastructure (e.g., roads and airport). The filling, diking, and draining of salt marshes went largely unchecked.
- From 1952 to 1971, salt marshes gained 250 acres and lost 1,030 acres, a net loss of approximately 780 acres. This period includes a continued high demand for areas to support commercial and residential development, and regulatory protection was limited. Approximately 65 percent of the losses were due to development.
- From 1971 to 1995, salt marshes gained 158 acres and lost 197 acres, a net loss of approximately 38 acres. This period includes the establishment of wetlands regulatory protection programs, and losses that still occurred were offset in some part by natural gains. Approximately 59 percent of the losses were due to conversion to open water, and approximately 23 percent and 18 percent were due to loss to development and undeveloped filled/drained areas.
- Activities at Logan Airport have affected salt marshes in Boston Harbor, both beneficially and adversely. Construction of Runway 15R-33L, in the 1960s, altered tidal flushing and resulted in greater than 120 acres of salt marsh establishment in Wood Island Bay. With the construction of the Runway 22L ISA in the mid-1990s, Massport was permitted to fill 0.2 acres of salt marsh. More than 1 acre of replacement salt marsh was created.
- From 1995 to present, demand for waterfront properties in coastal communities continues to be high. However, the values of wetlands have become better appreciated with the federal government and state taking stronger positions in protecting wetlands such as the Massachusetts Wetland Protection Act of 1972 and the Federal Clean Water Act of 1972. Therefore, through current regulatory and land conservation/restoration efforts the total net loss of salt marshes has been decreasing as the wetland restoration is increasing. To date (as of May 2008) the Department of Fish and Game, Division of Ecological Restoration (DER; formerly Massachusetts Office of Coastal Zone Management, Wetlands Restoration Program) has completed more than 57 restoration projects in Massachusetts, with about 721 acres of wetlands under restoration. Some of these restoration projects are within the Boston Harbor.

Eelgrass has also declined throughout its range. According to the DEP, eelgrass in Boston Harbor has decreased by 85 acres between 1996 and 2006, a decline of 4 percent per year. This trend has been documented throughout Massachusetts, where DEP estimates losses range from 20 percent to 100 percent in most bays and estuaries. In New Hampshire, losses were documented at 58 percent of all monitored sites since the 1970s. The decline of



eelgrass has been attributed to increasing eutrophication (increased nitrogen loading and decreased water clarity), metabolic stress, physical disturbance, and wasting disease. Although eelgrass beds in some areas have shown recovery, particularly in parts of Boston Harbor (the Governors Island Flats area adjacent to Runway 33L) where water quality has improved dramatically since completion of the Massachusetts Water Resources Authority (MWRA) Deer Island sewage treatment plant and offshore outfall, the habitat statewide is considered to be declining.

#### 4.4.2.2 Project Impacts

As documented in Table 4.4-1, the proposed RSA improvements would result in the further loss of 27,820 square feet (0.64 acres) of salt marsh, and 60,100 square feet (1.38 acres) of eelgrass beds. The loss of eelgrass would be approximately 3 percent of the total size of the Governors Island Flats bed (54 acres). The salt marsh loss would be approximately 0.5 percent of the 120 acres of salt marsh surrounding Logan Airport and including the Wood Island Bay Marsh. As described in Chapter 5, *Proposed Mitigation and Section 61 Findings*, these impacts would be mitigated by replacing lost areas and functions of salt marsh and eelgrass within the Boston area.

**Table 4.4-1 Cumulative Direct and Indirect Impacts to Coastal Wetland Resources (Loss or Impairment due to Project)**

Resource Area	Runway 33L RSA <sup>1</sup>	Runway 22R ISA	Total
Coastal Bank	355 linear feet (altered)	530 linear feet (altered)	885 linear feet (altered)
Coastal Beach	2,080 square feet	26,630 square feet	28,710 square feet
Salt Marsh	0	35,040 square feet <sup>5</sup>	35,040 square feet
Land Under the Ocean	1,045 square feet	700 square feet	1,745 square feet
Land Containing Shellfish <sup>2</sup>	1,175 square feet	67,990 square feet	69,165 square feet
Eelgrass (Submerged Aquatic Vegetation) <sup>3</sup>	66,600 square feet <sup>4</sup>	0	66,600 square feet

- 1 Maximum impact considering 5 construction options
- 2 Land Containing Shellfish overlays Coastal Beach and Land under the Ocean and is not a separate geographic area
- 3 Eelgrass (SAV) overlays Land Under the Ocean and is not a separate geographic area
- 4 Impact includes direct and indirect shading from deck.
- 5 Approximately 7,110 square feet is *Phragmites*-dominated Salt Marsh.

#### 4.4.2.3 Cumulative Impacts

This section evaluates the potential future cumulative impacts of the proposed project and other reasonably foreseeable changes to salt marsh and eelgrass resources within Boston Harbor, in comparison to the No-Action/No-Build Alternative.

In the absence of the proposed RSA Improvements Project, salt marsh resources in and around Boston Harbor are anticipated to increase in area and functionality as the result of ongoing salt marsh restoration projects in the Neponset River estuary, Belle Isle Marsh, and Rumney Marsh. The cumulative effect of the proposed RSA improvements at Runway 22R is expected to contribute to this trend by restoring additional salt marsh areas in excess of the area lost. No cumulative adverse effects to salt marsh distribution, health or functions are





anticipated. However, over the next century, predicted sea level rise is anticipated to have an adverse effect on many salt marshes where there is insufficient upland area available to allow the marshes to migrate to higher elevations. In the light of climate change and sea level rise, it is likely that much of the salt marsh surrounding Logan Airport would be lost. The proposed salt marsh restoration areas, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*, would be designed to allow the off-site restored salt marsh to migrate and adapt to a higher sea level and persist.

Trends in the abundance and health of eelgrass resources in and around Boston Harbor are difficult to forecast. While the improved water quality in parts of Boston Harbor is anticipated to result in larger and more robust eelgrass beds, bed in other portions of the harbor are not yet showing this recovery trend. Wasting disease could potentially have adverse effects even on healthy beds, continuing the trends observed by DEP prior to 2006. One future, reasonably-foreseeable project to be undertaken by Massport is to replace the existing timber-pile light pier at Runway 33L with a new concrete-piling structure. This activity would be outside of the eelgrass bed, but would likely generate small quantities of suspended sediment during pile removal and installation. The minor loss of eelgrass as a result of the proposed Runway 33L RSA improvements and other future actions at Logan is insignificant in light of the overall statewide trends, and would be compensated for by the proposed mitigation measures outlined in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

#### 4.4.3 Waterways and Tidelands

Cumulative impacts to Chapter 91 waterways and tidelands, evaluated in this section, focus on changes to the public's interests in the Commonwealth's tidelands.

##### 4.4.3.1 Trends and Past Effects

Massachusetts General Law (M.G.L.) Chapter 91 and the Massachusetts Waterways Regulations (collectively Chapter 91) are the modern codification of a series of laws beginning with the Massachusetts Bay Colonial Ordinances of 1641-1647 intended to protect the public's rights to use of tidelands and waterways. Since the state program was founded by the Public Waterfront Act in 1866, the Commonwealth has licensed the placement of fill or structures within tidal waters extending landward to the historic high water mark.

Within Boston Harbor, the decline of the shipping industry since the early 1900s decreased public access to the waterfront as docks and shipping facilities were closed or converted to private uses. The purpose of the Chapter 91 is to preserve public uses and access to the waterfront and preserves the capacity for water-dependent uses. Public uses are most frequently maintained by reserving access corridors across private development, creation of public parks and a Harborwalk providing formal access along the developed Boston waterfront.

##### 4.4.3.2 Project Impacts

The proposed safety improvements, as summarized in Table 4.4-2, are considered nonwater-dependent uses of tidelands subject to Chapter 91 but would have a negligible impact on shellfishing and no impact to public access by the general public. The shoreline and near-shore areas of Logan Airport are not available for public use due to security restrictions (except for limited shellfishing, by special permit). Construction of the RSA Improvements Project would have a significant public safety benefit without adversely affecting public uses of tidelands.



Table 4.4-2 Cumulative Impacts to Chapter 91 Waterways and Tidelands (Loss due to Project)

Resource Area	Runway 33L RSA <sup>1</sup>	Runway 22R ISA	Total
Chapter 91 Tidelands <sup>2</sup>	2,780 square feet	62,370 square feet	65,150 square feet
Public Interests	Shellfishing	Shellfishing	

1 Maximum impact considering 5 construction options evaluated for Runway 33L.

2 Below mean low water.

The potential impact to shellfish at the site is limited to an extremely small portion of the productive shellfish beds. As described in Chapter 5, *Proposed Mitigation and Section 61 Findings*, loss of shellfish habitat would be mitigated.

#### 4.4.3.3 Cumulative Impacts

This section evaluates the potential future cumulative impacts of the proposed RSA improvements and other reasonably foreseeable changes to Chapter 91 resources within Boston Harbor, in comparison to the No-Action/No-Build Alternative. The proposed RSA improvements, while they would result in the conversion of public tidelands to an Inclined Safety Area (Runway 22R) and a pile-supported deck (Runway 33L), would not adversely affect the public’s interests in tidelands, nor would it affect the trend of increasing public access to the waterfront within Boston Harbor.

#### 4.4.4 Fish, Wildlife and Plants

This section considers the potential cumulative impacts of the proposed project on fish (particularly EFH), other wildlife species, and plants.

##### 4.4.4.1 Trends

Boston Harbor, as described in Chapter 3, *Affected Environment*, provides habitat for numerous fish species, including 18 species for which NMFS has designated EFH within Boston Harbor. Marine fish depend on healthy habitats to survive and reproduce. Throughout their lives fish use many types of habitats including seagrass, salt marsh, and rocky intertidal areas among others. Various activities on land and in the water constantly threaten to alter, damage, or destroy these habitats. NMFS, regional Fishery Management Councils, and Federal and state agencies work together to address these threats by identifying EFH for each federally managed fish species and developing conservation measures to protect and enhance these habitats.

Boston Harbor also provides habitat for wildlife species, including seabirds, migratory shorebirds, birds of prey, and harbor seals. Many of these species have experienced population increases in the late twentieth century as a result of decreased hunting pressure, improved water quality, and other factors. In particular, peregrine falcons have been successfully breeding in Boston and frequently hunt on the periphery of Logan Airport. Harbor seals have also become common.

Trends in plants, particularly salt marsh and eelgrass were discussed in Section 4.4.1. Invasive plant species have become established in many areas adjacent to Boston Harbor, in salt marshes and disturbed uplands adjacent to salt marshes. These invasive species, particularly common reed (*Phragmites australis*), provide



low-quality wildlife habitat, reduce the diversity of native plant species, and adversely affect the function of wetland communities. Common reed has become the dominant plant species on portions of the Coastal Bank at Logan Airport where it is considered a wildlife hazard because of its potential to provide a roosting site for flocking birds such as starlings or red-winged blackbirds.

#### 4.4.4.2 Project Impacts

The proposed RSA Improvements Projects are anticipated to have minor impacts on fisheries habitat and EFH. In-water construction would not occur during the critical time period for protected fish (winter flounder), from February 15 through June 30. Sediment control measures would be used to reduce the concentration and extent of suspended sediments during construction, which could have adverse impacts on fish respiration. The minor loss of habitat potentially used by juvenile fish (salt marsh and eelgrass beds) would represent a small percent of the available habitat in Boston Harbor and would not have an adverse effect on the local populations of fish species either through habitat loss or decrease in the availability of prey species.

The state-regulated resource, Land Containing Shellfish, has been identified at both the Runway 22R and Runway 33L ends, based on the presence of soft-shell clams and blue mussels. Constructing the Runway 22R ISA would eliminate approximately 62,370 square feet of low-density soft-shell clam beds. Constructing the Runway 33L RSA would eliminate approximately 1,175 square feet of blue mussel bed, with additional areas potentially affected by scour around the pilings. The pilings, following construction, would provide suitable attachment substrate for mussels and are anticipated to increase the mussel population. Neither blue mussels nor soft-shell clams are declining or threatened, and are actively harvested throughout Boston Harbor.

The proposed RSA improvements are not anticipated to have an adverse effect on wildlife or plants, and would not alter or destroy any critical habitat used by bird or mammal species. Converting the Coastal Bank at Runway 22R from common reed to a stone slope would eliminate a wildlife hazard and would be a safety improvement.

#### 4.4.4.3 Cumulative Impacts

This section evaluates the potential future cumulative impacts of the proposed project and other reasonably foreseeable changes to fish, wildlife and plants within Boston Harbor, in comparison to the No-Action/No-Build Alternative. The proposed RSA improvements, while they would result in the minor loss of potential fish habitat and shellfish beds, would not adversely affect EFH, the populations of managed fish species or shellfish within Boston Harbor, and would not affect other wildlife species or plants. Other reasonably foreseeable future impacts to these resources are beneficial (salt marsh restoration, improved water quality, eelgrass restoration). Potential future adverse effects to essential fish habitat could occur from planned dredging projects in Boston Harbor, which would temporarily alter benthic substrates and temporarily affect water quality in fish habitats. There would be no increased cumulative effects of the proposed RSA Improvements Project when considered in addition to these future projects.



#### 4.4.5 Water Quality

This section considers the potential cumulative impacts of the proposed project on water quality in Boston Harbor.

##### 4.4.5.1 Trends

Water quality in Boston Harbor has been steadily improving since the completion of the MWRA Deer Island treatment plant and offshore sewage outfall tunnel in 2006. As documented by the MWRA, nutrient (nitrogen, phosphorus) levels have decreased, dissolved oxygen levels have increased, and water clarity has improved. Other water quality improvements in Boston Harbor (eliminating combined sewer overflows, installing stormwater treatment systems, reducing non-point pollutant contributions) have occurred as a result of actions by the MWRA, implementing the DEP Stormwater Policy, and implementing the USEPA NPDES Construction Permit program, among others.

##### 4.4.5.2 Project Impacts

The proposed RSA improvements would be constructed to comply with DEP's Stormwater Regulations and would not result in an increased discharge of contaminants to Boston Harbor. The proposed RSA improvements would be designed and constructed to comply with state Water Quality Standards.

Temporary, short-term discharges of sediment could result from dredging (to construct the Runway 22R ISA) or pile-driving (to construct the Runway 33L pier). As documented in Section 4.2.5 and Section 4.3.5, these discharges would be localized and largely contained by silt curtains and other mitigation measures. There would be no change in Boston Harbor water quality during construction except in the localized area of construction activities.

##### 4.4.5.3 Cumulative Impacts

This section evaluates the potential future cumulative impacts of the proposed RSA improvements and other reasonably foreseeable actions on water quality within Boston Harbor, in comparison to the No-Action/No-Build Alternative. Other reasonably foreseeable actions that may affect water quality include proposed dredging programs to be undertaken by the USACE and Massport, to maintain shipping channels. These activities could result in temporary discharges of sediment during dredging, but are anticipated to have only localized effects on water quality. Any dredging would be carried out in compliance with the performance standards and conditions of permits issued by the USACE and the DEP Water Quality Certification. The minor and limited discharge of sediment from the proposed RSA improvements, in combination with other projects potentially underway at the same time, would not have a cumulative adverse effect on water quality in Boston Harbor.

#### 4.4.6 Construction

Cumulative impacts of temporary, construction-period activities were evaluated for surface transportation, noise, and air quality. While the proposed RSA Improvements Project would have no permanent impacts to these resources, the short-term impacts, in combination with other planned and reasonably foreseeable activities by Massport in the project area, could potentially result in significant adverse impacts as determined by FAA criteria (*Order 1050.1E, Appendix A*).



#### 4.4.6.1 Surface Transportation

Cumulative effects to surface transportation were assessed to determine if construction-period traffic for the proposed project, in combination with reasonably foreseeable construction projects at Logan Airport, could result in adverse impacts to local traffic conditions that would not occur if these projects were considered independently.

At any point in time, Massport has numerous airside and landside capital improvement projects ongoing at Logan Airport. The following section identifies the other capital improvement projects scheduled to under construction during the RSA Improvements construction timeframe (2011-2013) and describes any potential overlaps with construction truck access.

- The construction of the Robie Parcel parking structure is planned to relocate approximately 2,000 commercial parking spaces on Logan Airport at the Robie Parcel (an airside parcel slated for future aviation activity for the long-term). This work is proposed to be complete in early 2011 and trucking activity would not overlap with the RSA Improvements Project.
- It is anticipated that Terminal B garage structural repairs would be ongoing from 2010 through 2014, which overlaps with the peak quarter of RSA Improvements Project construction activity. Because the Terminal B work is reconstruction of an active passenger terminal facility that requires minimal operational changes, the bulk of the work and associated construction truck activity is expected to occur during the off-peak and overnight hours, while the RSA Improvements Project is expected to be day shift work. Airside access for the Terminal B garage repairs will not be required. Thus, minimal conflict in trucking activity between the two projects is anticipated.
- The construction of the proposed Green Bus Depot in the North Service Area (NSA) is anticipated to occur from 2011 to 2012 following MEPA/NEPA review and associated permitting. With a site location in the NSA and a small amount of oversized construction vehicles anticipated, construction truck routes would likely be restricted to Frankfort Street and SR-2 resulting in minimal overlap with RSA construction traffic along SR-2. No airside access or use of the North Gate for the Bus Maintenance Facility construction is required.
- The Southwest Service Area (SWSA) Redevelopment Program, scheduled to begin construction later in 2010 with an end date of late 2015, would also occur during the RSA Improvements Project's construction timeframe. The SWSA Redevelopment includes the consolidation of airport-related rental car operations and facilities into one efficient, integrated facility, focused within a new 1.3 million square-foot garage structure. The project includes construction of new taxi, limousine and bus pools and improved roadway, bicycle and pedestrian infrastructure. Some early enabling construction, to relocate some existing SWSA land uses, will result in construction activity in the SR-2 and Hotel Drive areas, but that work is scheduled to be completed by early 2011 before the RSA Improvements Project is slated to begin. Construction materials will be delivered directly to the SWSA from off-airport locations via construction routes that do not overlap with the proposed RSA Improvements Project construction routes.



- The paving rehabilitation of Runway 15R-33L is scheduled to occur between 2011 and 2014. While this project will require off-airport delivery of materials to the airside through the North Gate during daytime hours, the work will not overlap with the construction of the Runway 22R ISA or the peak construction periods of the Runway 33L RSA improvements.
- Two additional capital improvement projects that will require airside access, Terminal C check point and terminal renovations (2010-2011) and renovations and upgrade of American Airlines / former Northwest Airlines hangars (2011-2014), are scheduled to overlap with the RSA Improvements Project's construction timeframe. Because the Terminal C work is reconstruction of an active passenger terminal facility that requires minimal operational changes, the bulk of the work and associated construction truck activity is expected to occur during the off-peak and overnight hours that do not conflict with the RSA Improvements Project day shift work. It is unclear whether operational restrictions of an active aircraft maintenance area will impact the work hours for the Hangar Upgrades Project, but construction access requirements will be coordinated with the Contractor for this project, the RSA Improvements Project's Contractor and Massport.

In summary, the cumulative effects of construction traffic for the Runway 22R and Runway 33L RSA improvements, in combination with other reasonably foreseeable projects, would not adversely affect roadways or traffic conditions in the vicinity of Logan Airport.

#### 4.4.6.2 Noise

The noise analysis evaluated the cumulative impacts of the construction activities associated with the RSA Improvements Project and other Logan Airport construction projects that are expected to be occurring simultaneously with the proposed improvements.

#### Southwest Service Area Redevelopment Program

Construction of the SWSA redevelopment project is expected to occur during the same period as the construction of the Runway 22R ISA. While the specific construction equipment for the SWSA redevelopment project is unknown at this time, it is reasonable to assume that they would be similar to the proposed RSA improvements. As discussed above, sound levels are reduced as they travel over distances. The construction activities associated with the SWSA redevelopment project will occur over 5,000 feet away from the nearest receptor locations. Therefore, it can be concluded that the SWSA redevelopment project's construction sound levels will be substantially below the RSA project's sound levels and will not increase sound levels.

#### Runway 15R-33L Repaving Project

Repaving Runway 15R-33L will include construction equipment. The noise analysis added the construction equipment from the repaving of Runway 15R-33L project to the proposed RSA improvements project sound levels. The L10 sound levels were increased from 0 to 3 dBA. None of the sound levels exceeded the City of Boston's noise impact criteria. This indicates that the repaving Runway 15R-33L project will not result in cumulative sound levels exceeding the City of Boston's noise impact criteria.



#### 4.4.6.3 Air Quality

The air quality analysis evaluated the cumulative impacts of the construction activities associated with the RSA Improvements Project and other Logan Airport construction projects that are expected to be occurring simultaneously with the proposed RSA improvements. Other short-term construction projects are planned at Logan and will overlap with the proposed RSA improvements in select future years. These are shown in Table 4.4-3 and the anticipated durations of all projects, including the RSA improvements are also indicated.

**Table 4.4-3 Concurrent Logan Airport Improvement Projects**

Project	2010	2011	2012	2013	2014	2015
Runway 33L and Runway 22R RSA Improvements		X	X	X		
Runway 15R- 33L Paving		X	X			
Green Bus Depot		X	X			
Robie Parce; Parking Structure		X				
Hangar Upgrades		X	X	X	X	
Southwest Service Area Redevelopment	X	X	X	X	X	X
Terminal B Garage Repairs	X	X	X			
Terminal C Checkpoint and Terminal Renovations	X	X				

Although these projects occur concurrently with RSA improvements, they are considered unrelated actions, and air quality impacts have been separately assessed in previous studies. Based upon the information summarized in Table 4.4-3, 2011 is considered to represent the worst-case air quality conditions due to construction activities at Logan, including emissions from the construction sources described above. However and as previously indicated, the air quality impacts associated with these projects are considered to be temporary and short-term, and are not expected to require additional quantitative assessment. Moreover, the General Conformity Rule of the federal CAA does not require that unrelated concurrent actions be evaluated for cumulative impacts. Nonetheless, it is unlikely that these airport improvement projects, evaluated jointly, would contribute to violations of the applicable NAAQS in the Boston area.

#### 4.4.7 Findings

FAA *Order 1050.1E* does not directly address the analysis and evaluation of cumulative impacts. FAA’s *Environmental Desk Reference for Airports Actions* notes that cumulative impacts should be compared against the applicable significance threshold for the resource analyzed, and that the responsible FAA official should determine if project impacts added to those of the past, present and reasonably foreseeable future actions trigger the significance threshold for the resource analyzed.



As documented in this section, the proposed Logan Airport RSA Improvements Project (including both the Runway 33L RSA improvements and the Runway 22R ISA) would not result in significant impacts to environmental resources when considered in combination with past, present and reasonably foreseeable future actions.

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## 4.5 Summary

The following sections provide a summary of the impacts associated with each of the proposed RSA Improvement Projects.

### 4.5.1 Runway 33L

The proposed RSA improvements would have direct impacts to coastal wetlands, waterways and tidelands, and fish, wildlife, and plants, as a result of constructing a new pile-supported deck. The RSA would not permanently affect coastal processes, such as waves, currents, or other hydrodynamics but would result in the loss of habitat, such as eelgrass, which supports shellfish and other wildlife.

There are potentially significant impacts to wetlands according to FAA *Order 1050.1E* as described in Table 4.5-1, as the proposed RSA cannot be constructed in compliance with the Massachusetts Wetlands Protection Act Regulations and would require a Variance. With the proposed mitigation measures, impacts would be fully mitigated and would be in compliance with the Variance criteria. Unavoidable impacts to eelgrass would be mitigated to comply with the Massachusetts Coastal Zone Management Plan's Habitat Policy 1. Mitigation measures for these impacts are proposed in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

As documented in Section 4.2.9, construction would result in minor increases to truck traffic, noise, and emissions of air quality pollutants. However, these increases would not adversely affect the roadway system or local traffic conditions, would not exceed applicable noise impact criteria, and would constitute a *de minimis* impact and in compliance with the Clean Air Act General Conformity regulations.





Table 4.5-1 Runway 33L RSA Significant Impacts

Impact Category	Significant Adverse Effect (yes/no)
Noise	No. There is no change to airport operations or to the runway.
Surface Transportation	No. The proposed project does not affect the roadway network or increase traffic.
Air Quality	No. There is no change to airport operations or to the runway.
Historical, Architectural, Archaeological, and Cultural	No. There are no historic or archaeological resources within the project area.
Wetlands and Waterways	No (with mitigation). Mitigation would be provided consistent with state and federal requirements.
Water Quality	No. The proposed project is in compliance with water quality standards.
Fish, Wildlife, and Plants	No. There is no adverse impact to state-listed threatened or endangered species under NHESP jurisdiction or other fish, wildlife, and plant species.
Federally-Listed Threatened or Endangered Species	No. There is no adverse impact to federally-listed threatened or endangered species under USFWS jurisdiction. Consultation with NMFS is ongoing. The proposed project is not likely to adversely affect any threatened or endangered species.
Floodplains	No. There are no floodplains present at the project site.
Coastal Resources	No (with mitigation). Mitigation will be provided to achieve consistency with the Massachusetts Coastal Zone Management Plan Habitat Policy 1.
Hazardous Materials and Solid Waste	No. The proposed project does not involve a project on or eligible for the National Priority List.
Light Emissions and Visual Impact	No. There are no new light emissions at the project area (although the approach light system will be upgraded). There are no visual impacts to the existing environment.
Construction Impacts	No. Construction would not result in significant traffic, noise, air quality, or water quality impacts.

#### 4.5.2 Runway 22R

The proposed Runway 22R ISA would have direct impacts to coastal wetlands, waterways and tidelands, and fish, wildlife, and plants, as a result of placing fill along the shoreline to create the ISA. The ISA would not permanently affect coastal processes, such as waves, currents, or other hydrodynamics but would result in the loss of habitat, such as salt marsh, which supports shellfish and other wildlife. However, the impacts to fish and wildlife habitat are not significant as there is abundant similar habitat outside the ISA footprint, elsewhere on Airport property, and elsewhere in Boston Harbor.

There are potentially significant impacts to wetlands according to FAA *Order 1050.1E* as described in Table 4.5-2, as the proposed ISA cannot be constructed in compliance with the Wetlands Protection Act Regulations and would require a Variance. With the proposed mitigation measures, impacts would be fully mitigated and would be in compliance with the Variance criteria. Unavoidable impacts to salt marsh would be mitigated to achieve consistency with the Massachusetts Coastal Zone Management Plan Habitat Policy 1 (see Chapter 5, *Proposed Mitigation and Section 61 Findings*).



As documented in Section 4.3.9, construction would result in minor increases to truck traffic, noise, and emissions of air quality pollutants, and would generate suspended sediment. However, these increases would not adversely affect the roadway system or local traffic conditions, would not exceed applicable noise impact criteria, and would constitute a *de minimis* impact and in compliance with the Clean Air Act General Conformity regulations. Discharges of sediment would be mitigated through silt curtains, booms, and other construction methods.

**Table 4.5-2 Runway 22R ISA Significant Impacts**

<b>Impact Category</b>	<b>Significant Adverse Effect (yes/no)</b>
Noise	No. There is no change to airport operations or to the runway.
Surface Transportation	No. The proposed project does not affect the roadway network or increase traffic.
Air Quality	No. There is no change to airport operations or to the runway.
Historical, Architectural, Archaeological, and Cultural	No. There are no historic or archaeological resources within the project area.
Wetlands and Waterways	No (with mitigation). Mitigation would be provided consistent with state and federal requirements.
Water Quality	No. The proposed project is in compliance with water quality standards.
Fish, Wildlife, and Plants	No. There is no adverse impact to state-listed threatened or endangered species under NHESP jurisdiction or other fish, wildlife, and plant species.
Federally-Listed Threatened or Endangered Species	No. There is no adverse impact to federally-listed threatened or endangered species under USFWS jurisdiction. Consultation with NMFS is ongoing. The proposed project is not likely to adversely affect any threatened or endangered species.
Floodplains	No. There are no floodplains present at the project site.
Coastal Resources	No (with mitigation). Mitigation will be provided to achieve consistency with the Massachusetts Coastal Zone Management Plan Habitat Policy 1.
Hazardous Materials and Solid Waste	No. The proposed project does not involve a project on or eligible for the National Priority List.
Light Emissions and Visual Impact	No. There are no light emissions at the project area. There are no visual impacts to the existing environment.
Construction Impacts	No. Construction would not result in significant traffic, noise, air quality, or water quality impacts.



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# 5

## Proposed Mitigation and Section 61 Findings

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### 5.1 Introduction

According to the Council on Environmental Quality (CEQ) Regulations for Implementing the National Environmental Policy Act (NEPA) (40 CFR 1500.2(f)), project proponents shall, to the fullest extent possible:

“Use all practicable means consistent with the requirements of the Act and other essential considerations of nation policy, to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions on the quality of the human environment.”<sup>1</sup>

In accordance with the NEPA regulations, this chapter identifies and evaluates measures that would avoid impacts. Measures to minimize impacts by limiting the degree or magnitude of the proposed RSA Improvements Project and its implementation are also included. As documented in this chapter, impacts to environmental resources are unavoidable due to the location of the existing RSAs, therefore measures that minimize adverse impacts have been identified. A detailed analysis of proposed compensatory mitigation measures is included for areas in which replacing lost resources is necessary.

The Massachusetts Environmental Policy Act (MEPA) regulations, at 301 CMR 11.07(j), also 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 ENF for the RSA Improvements Project included requirements for the scope of the Draft EA/EIR. The Certificate required that the Draft EA/EIR include a mitigation chapter that:

- Includes proposed Massachusetts General Law (M.G.L.) Chapter 30, Section 61<sup>2</sup> findings for all state permits with a clear commitment to mitigation, an estimate of the individual costs of the proposed mitigation and the identification of the parties responsible for implementing the mitigation; and

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<sup>1</sup> Council on Environmental Quality, Regulations for Implementing the National Environmental Policy Act (40 CFR 1500), [http://ceq.hss.doe.gov/nepa/regs/ceq/toc\\_ceq.htm](http://ceq.hss.doe.gov/nepa/regs/ceq/toc_ceq.htm).



- Includes a schedule for the implementation of mitigation that will identify deadlines by which mitigation measures will be completed.

This chapter provides a description of Massport's proposed commitments to mitigation during construction, for compensatory mitigation for impacts to salt marsh, eelgrass, and Land Containing Shellfish, draft Section 61 findings, and information requested in the MEPA Certificate, as well as a description of consultation with federal and state agencies pertaining to mitigation.

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## 5.2 Project Mitigation Commitments

As described throughout this Draft EA/EIR, from project inception, Massport and FAA have strived to meet the critical aviation safety need of the project, appropriately balancing the direct and indirect natural resources impacts of the safety improvements, and seek innovative and effective mitigation strategies. This has been an ongoing iterative process that 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 meet the project purpose, as demonstrated in Chapter 2, *Alternatives*, of this Draft EA/EIR. For both Runway 22R and Runway 33L, the evaluation of alternatives has focused on options that minimize these unavoidable impacts to coastal wetlands and waters to the extent practicable.

This section describes the proposed mitigation for unavoidable impacts to salt marsh (Section 5.2.1), eelgrass (Section 5.2.2), Land Containing Shellfish (Section 5.2.3.), and water quality (Section 5.2.4), as requested by the Certificate. For each resource, the analysis describes efforts to avoid impacts, minimize impacts, and provide compensatory mitigation.

### 5.2.1 Salt Marsh

The proposed safety improvements would affect salt marsh at the Runway 22R end. Approximately 35,040 square feet of salt marsh (including 7,110 square feet of *Phragmites*-dominated Salt Marsh) would be lost. There is no salt marsh in the Runway 33L RSA improvements project area. Based on input from the federal and state resource agencies participating in the Salt Marsh Mitigation Working Group, a 2:1 mitigation goal would likely be required by Massachusetts Department of Environmental Protection (DEP)<sup>3</sup> and U.S. Army Corps of Engineers (USACE),<sup>4</sup> which would total approximately 123,340 square feet (3 acres) for mitigation of salt marsh and associated mudflat (26,630 square feet).

The MEPA Certificate included a number of specific requirements for wetland (salt marsh) mitigation to be addressed in the Draft EA/EIR. These requirements include:

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<sup>2</sup> Massachusetts General Law, Chapter 30, Section 61: *Determination of Impact by Agencies; Damages to Environment; Prevention or Minimization; Foreseeable Climate Change Impacts*. <http://www.mass.gov/legis/laws/mgl/30-61.htm>.  
<sup>3</sup> Massachusetts Department of Environmental Protection, Bureau of Resource Protection, Wetlands and Waterways Program: Massachusetts Inland Wetland Replication Guidelines, March 2002.  
<sup>4</sup> U.S. Army Corps of Engineers, Addendum to New England District Compensatory Mitigation Guidance: Compensation for Impacted Aquatic Resource Functions, File No. NAE-2006-3648, December 18, 2007.



- Provide a detailed wetlands replication plan that, at a minimum, includes: replication location(s) delineated on plans, elevations, typical cross sections, test pits or soil boring logs, the hydrology of areas to be altered and replicated, list of wetlands plant species of areas to be altered and the proposed wetland replication species, planned construction sequence, and a discussion of the required performance standards and monitoring;
- Include monitoring plans for and the management of any invasive species that may begin to grow in the replication area;
- Develop mitigation and monitoring plans by working closely with local, state and federal environmental agencies;
- Include a detailed analysis of the on-site mitigation options as requested in the City of Boston's comment letter and address the possibility of off-site mitigation if on-site mitigation is infeasible;
- Makes every effort to ensure that coastal wetland resource restoration and mitigation are conducted in Boston Harbor;
- Assess existing, degraded areas of salt marsh, eelgrass and shellfish beds for purposes of rehabilitation and review recently restored areas such as the salt marsh in Chelsea Creek off of Condor Street in East Boston;
- Design the scope and extent of mitigation and restoration efforts to result in a net benefit to affected coastal resource areas in the Harbor;
- Discuss proposals to conduct restoration and mitigation outside of the affected resource in the context of clear facts demonstrating that they cannot be accomplished in the Harbor or other nearby areas in Boston;
- Establish a reporting procedure to assess the health of existing and restored resource areas; and
- Provide contingencies to ensure that if restoration efforts fail, additional measures will be required to compensate for the loss of the resource area functions and values.

As described in other chapters, Massport established an interagency Working Group composed of local, state and federal resource agency representatives to guide development of the Runway 22R RSA salt marsh mitigation strategy. This process has resulted in the identification of a range of viable mitigation opportunities. Once agency consensus is reached on mitigation site(s), detailed wetlands replication plans will be provided in the Final EA/EIR. DEP, in its letter dated June 22, 2010 (see Appendix 4, Agency Correspondence), provided a detailed list of information required in the final salt marsh mitigation plan. Massport will develop this information once a site is selected and provide it in the detailed mitigation plan provided in the permit applications and final EA/EIR.

The following sections include a discussion on avoidance and minimization measures and a description of the compensatory mitigation goals, site selection, and a conceptual salt marsh restoration plan. It also includes a summary of the mitigation costs and the next steps to be taken in the salt marsh mitigation process.



#### 5.2.1.1 Avoidance

As noted above, Massport and FAA undertook an extensive alternatives analysis to select a recommended Runway 22R safety project to be analyzed initially in the ENF and in this Draft EA/EIR, as described in Chapter 2, *Alternatives* and Appendix 3, *Alternatives Analysis and FAA Determinations*. Because of the proximity of the salt marsh to the existing runway end, the only Runway 22R safety alternative that would avoid wetland impacts without further reducing safety at Logan Airport is the No-Action Alternative. The No-Action/No-Build Alternative does not, however, meet the project's Basic Project Purpose of enhancing safety.

The EMAS bed installed by Massport at the end of Runway 22R in 2005 provides the minimum level of safety consistent with FAA standards. The Runway 22R EMAS bed does not, however, provide the maximum level of safety for the aircraft fleet mix that utilizes Runway 4L-22R. The existing EMAS configuration does not provide the opportunity for an aircraft to safely transition in the event the aircraft exits the EMAS bed and enters the harbor. The existing RSA configuration is also a barrier to providing emergency vehicles easy or safe access to or from the water. As a condition to the installation of the EMAS bed, the FAA required Massport to examine opportunities to increase the level of safety at the Runway 22R end. The No-Action/No-Build Alternative would not increase the safety of the Runway 22R end and would not meet Massport or FAA's safety goals and the project Purpose and Need.

#### 5.2.1.2 Minimization

Throughout the concept design process, Massport and FAA have evaluated opportunities to minimize impacts to the extent practicable, and will continue to work to minimize these impacts as the design of the safety improvements and agency review progresses. The Secretary's Certificate required that Massport continue to evaluate design modifications to further minimize impacts. The Certificate specifically directed Massport to consider a pile-supported structure for Runway 22R, like that proposed for the Runway 33L safety enhancements, as an approach to reducing impacts to salt marsh. After initial consideration, this concept was dismissed since the deck would substantially impair salt marsh due to shading and therefore would not avoid or minimize key impacts.

As discussed in Chapter 2, *Alternatives*, the proposed Inclined Safety Area (ISA) for Runway 22R cannot be constructed on pilings because it would exceed the FAA's cost limits in all events and would not eliminate the salt marsh or other coastal resources impacts. Two other minimization options were evaluated during preparation of this Draft EA/EIR, as described below and in Chapter 2, *Alternatives*.

- Reduce the width of the ISA from 500 feet to 300 feet. This concept was evaluated but rejected by FAA as being incompatible with the safety objectives of the proposed project. The existing RSA at the Runway 22R end is 500 feet wide. This provides a safe width to allow aircraft that leave the runway to come to a stop. The ISA needs to be the same width as the RSA so that aircraft, should they leave the runway and miss the existing 170-foot wide EMAS bed, can safely transition into the water. A 500-foot wide ISA is required at the Runway 22R end because there are no navigational aids at this location that would help a pilot remain on the runway centerline in the event of an overshoot.
- Reduce the length of the fill. The proposed ISA provides a 12.3 percent slope from the existing RSA to the water. A steeper slope of the ISA would not be consistent with the safety objectives of the proposed project, since reducing the length of the fill would increase the risk of damage to an aircraft, and would be too steep.



for emergency response personnel or vehicles to reach an aircraft on the ISA or in the water. This alternative also would not avoid salt marsh impacts.

### 5.2.1.3 Compensatory Mitigation

As described above, because of the proximity of the salt marsh resources to the existing runway end, there are no practicable alternatives to construct safety enhancements at this location without directly affecting salt marsh resources. Accordingly, this section includes a summary of the compensatory mitigation goals, an overview of the salt marsh status and restoration efforts within Boston Harbor, and a description of the site selection criteria, evaluation and recommendations.

#### Mitigation Goals

The proposed Runway 22R ISA would affect approximately 35,040 square feet of salt marsh and 26,630 square feet of intertidal mudflat. A 2:1 mitigation goal would total approximately 123,340 square feet (3 acres) for mitigation (as restoration or creation).

The USACE rules for compensatory wetland mitigation (33 CFR Parts 325 and 332, 10 April 2008) emphasize a watershed approach to selecting compensatory mitigation measures and locations. Four types of compensatory mitigation are recognized:

- Restoration/re-establishment of previously existing wetlands or other aquatic sites (this should be considered the first option) (2:1 recommended ratio for emergent wetlands);
- Enhancement/rehabilitation of an existing aquatic site's functions and values (3:1 to 10:1 ratio for emergent wetlands);
- Creation/establishment of a new wetland or aquatic site (2:1 to 3:1 ratio for emergent wetlands); or
- Preservation/protection of land that serves to protect aquatic resources by providing a buffer or corridor between aquatic resources (15:1 ratio).

Wetland mitigation banks, where available, and in-lieu fee programs, where available, may also be used to mitigate for unavoidable impacts. Wetland mitigation banks, and in-lieu fee programs are not available in Massachusetts. The regulations recognize that mitigation may be located on-site (at or adjacent to the impact site) or off-site (at another location in the same watershed).

These regulations also recognize that compensatory mitigation must be commensurate with the amount and type of impact, and requires that the USACE determine what is practicable and capable of compensating for the aquatic resource functions that would be lost, and what is environmentally preferable. Considerations include:

- The likelihood for ecological success;
- The location relative to the impact site;
- The significance within the watershed; and
- The costs of the compensatory mitigation project.





The regulations require a watershed-based approach, ideally based on an existing watershed plan that provides information on the land uses, natural habitats, water quality, and aquatic resources within a watershed. The goal of using a watershed approach is to maintain and improve the quality and quantity of aquatic resources within a watershed, by strategically locating compensatory mitigation sites. The USACE rules also note that compensatory projects should not be located where they will increase the risks to aviation by attracting wildlife near airports.

The DEP has historically required 2:1 replacement/creation on similar safety projects as part of a Massachusetts Wetlands Protection Act (MA WPA) variance and references this mitigation ratio in its June 22, 2010 letter. The DEP typically seeks strict replication by requiring mitigation sites to be on-site or adjacent to the affected site, in the same watershed, and in-kind with the same elevation, habitat type, hydrological connection, ecological functions, and other key characteristics. Higher ratios tend to be required for restoration, enhancement, or preservation.

Therefore, based on current guidance, USACE and DEP would require a mitigation goal of 2:1 replacement of filled wetland if the mitigation method were restoration (of formerly filled salt marsh) or creation (of salt marsh in uplands). If the selected mitigation method was enhancement of existing salt marsh, a higher mitigation ratio (up to 10:1) could be required. However, enhancement as a stand-alone mitigation option may not satisfy the No-Net-Loss Policies of the DEP or the USACE.

## Overview

Within Boston Harbor, similar to other coastal regions of Massachusetts, there is a need to bring back the wetlands values and functions that have been lost due to historic anthropogenic impacts. This can be completed through salt marsh/wetland restoration site identification and evaluation and setting habitat area goals for protection, restoration, and conservation of salt marshes/wetlands. Salt marshes and other wetland resources provide invaluable functions including water quality improvement, flood storage and flood protection, fish, shellfish, and wildlife habitat. Public benefits include recreational opportunities, visual and aesthetic enhancement, fire safety, and mosquito control. Degraded coastal wetlands have a reduced capacity to assimilate pollutants, buffer storm damage, support native biota, provide opportunities for human use and enjoyment, and respond to sea level rise.

## Historic Distribution

In 2005, the Massachusetts Office of Coastal Zone Management and others documented *100 Years of Estuarine Marsh Trends in Massachusetts (1893 to 1995)*.<sup>5</sup> This report documents the trends - losses, gains, and changes - of salt marshes that occurred within Boston Harbor.

Approximately 5,326 acres of salt marsh existed in the Boston Harbor region in 1893. However, no documentation is available to quantify the large areas of salt marsh and inter-tidal flats that were filled in metro Boston prior to 1893, including the Back Bay, South Boston, East Boston, Cambridge, and Charlestown.

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<sup>5</sup> Carlisle, B.K., R.W. Tiner, M. Carullo, I.K. Huber, T. Nuerminger, C. Polzen, and M. Shaffer. 2005. *100 Years of Estuarine Marsh Trends in Massachusetts (1893 to 1995)*: Boston Harbor, Cape Cod, Nantucket, Martha's Vineyard, and the Elizabeth Islands. Massachusetts Office of Coastal Zone Management, Boston, MA; U.S. Fish and Wildlife Service, Hadley, MA; and University of Massachusetts, Amherst, MA. Cooperative Report.



There were approximately 2,819 acres of salt marsh in 1952, approximately 2,039 acres in 1971, and approximately 2,000 acres in 1995. From 1995 to the present the total net loss of salt marshes has been decreasing due to current regulatory and land conservation and wetland restoration efforts. As of May 2008, the Department of Fish and Game, Division of Ecological Restoration (DER; formerly Massachusetts Office of Coastal Zone Management, Wetlands Restoration Program) has completed more than 57 restoration projects in Massachusetts, with about 721 acres of wetlands under restoration. Some of these restoration projects are within Boston Harbor.

### Salt Marsh Mitigation Working Group

To mitigate for unavoidable impacts, Massport developed and proposed a salt marsh mitigation process in consultation with the Salt Marsh Working Group, as described in Chapter 6, *Regulatory Compliance*. The Salt Marsh Working Group is comprised of representatives of the following agencies: Federal Aviation Administration (FAA), USACE, U.S. Environmental Protection Agency (USEPA), Massachusetts Office of Coastal Zone Management (CZM), DEP, Massachusetts Department of Conservation and Recreation (DCR), Massachusetts Department of Fish and Game Division of Ecological Restoration (DER, formerly CZM WRP), and the Boston Environment Department. The mitigation process includes the following steps:

- **Identify Goals**—Quantify unavoidable loss of salt marsh and intertidal beach, establish area and elevation goals; determine geographic extent of study area, and develop base map of study area.
- **Establish Watershed Needs**—Summarize available information on Boston Harbor salt marshes, trends, values, needs.
- **Seek expert panel input**—Meet with Salt Marsh Working Group, and develop working list of potential sites, projects.
- **Identify and evaluate potential sites**—Develop complete map of potential sites based on Working Group input, GIS analysis, and aerial photo interpretation. Evaluate each site based on location, ownership, constructability, functions, and prepare preliminary evaluation for Salt Marsh Working Group.
- **Develop a short list of sites for Draft EA/EIR**—Screen sites with Salt Marsh Working Group, develop draft report identifying range of reasonable mitigation sites, and incorporate findings in the Draft EA/EIR.

On October 23, 2009, February 22, 2010, and June 9, 2010, Massport met with the Logan RSA Salt Marsh Working Group to review mitigation goals, establish site selection criteria, and evaluate potential mitigation sites.

### Preliminary Site Identification

In February 2010, Massport's project team conducted a GIS analysis and aerial photo interpretation to identify potential mitigation sites within the study area. The study area includes most of the area within the Boston Harbor and other areas depicted in the Salt Marsh Mitigation Study Area (Figure 5-1). The preliminary site selection criteria helped select potential sites and exclude sites that would not fit the mitigation requirements.



The site identification criteria considered FAA's requirements for wildlife hazards. FAA Advisory Circular (AC) 150/5200-33B, *Hazardous Wildlife Attractants on or Near Airports* (August 28, 2007) provides standards, practices and recommendations to assist airports to comply with the wildlife hazard management requirements of Title 14 CFR Part 139, *Certification of Airports*.

As the AC notes, wildlife-aircraft strikes have resulted in the loss of hundreds of lives worldwide as well as billions of dollars in aircraft damage. Wildlife hazards are constructed or natural areas that encourage wildlife to enter an airport's approach or departure airspace and present potential hazards to aviation. The AC establishes a minimum separation distance of 10,000 feet between an airport's Aircraft Operating Area (AOA), the ground surface on which airport operate, and any hazardous wildlife attractant. The AC further recommends a 5-mile separation between the airport and a hazardous wildlife attractant on the approach and departure paths. Section 2-4 of the AC specifically addresses wetlands. Paragraph (c) notes that mitigation for wetland impacts from airport projects must be designed so it does not create a wildlife hazard. FAA recommends that wetland mitigation projects that may attract hazardous wildlife be outside of the separation distances (10,000 feet and 5 miles) unless the wetlands provide unique functions that must remain on-site. The FAA and the USACE have signed a Memorandum of Agreement concerning the implementation of the AC with regard to Section 404 permits.



The preliminary site selection criteria included:

- **Location**— identification of sites in three zones—(1) within the Airport Boundary/Wildlife Hazard Area (WHA), (2) within the City of Boston, and (3) within the Boston Harbor, but outside the WHA. Increasing salt marsh within the WHA could constitute an increase in wildlife habitat. Specific locations chosen within the WHA would need to be evaluated with regard to the likelihood of attracting wildlife in proximity to runway ends.
- **Size**— potential mitigation sites at least 1 acre in size. The total required mitigation needs to be a minimum of 3 acres based on the 2:1 ratio, and could be accomplished at one or several sites.
- **Status**— sites that have been identified by agencies (DER, USEPA, and/or USACE) as priority, potential, and/or future mitigation sites. DER priority mitigation projects include projects identified and evaluated by a review team to receive DER funding, technical assistance, and coordination of restoration activities from start to finish.
- **Land Use**— overlap/proximity of sites to existing salt marsh sites (1999 dataset) and/or historic salt marsh sites (1971 dataset).
- **Open Space**— sites that are currently within an open space layer and/or are not developed.
- **Other**— Other site selection criteria that will be later used to evaluate and screen the sites identified in this report includes ownership, management of the site, nearest distance to airport boundary and whether the potential mitigation areas within the 10,000-foot WHA increases hazardous wildlife attractants.



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- Legend**
-  Wildlife Hazard Area
  -  Existing and Recently Restored Salt Marshes
  -  Coastal Beach
  -  Tidal Flat
  -  Protected Public and Open Space

-  Town Boundaries
-  Open Water



Logan RSA

**Figure 5-1**  
**Salt Marsh Mitigation Study Area**

Source: MassGIS  
 Vanasse Hangen Brustlin, Inc.



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Table 5.2-1 and Figure 5-2 include a list of potential sites with a summary of the GIS analysis for each of the sites. A total of 40 potential sites, including 32 main sites and eight sub-sites/polygons (a, b, and/or c) located next to the main sites, were identified. Sixteen of these potential sites were identified by USEPA, three by DER, and one by USACE. A total of twelve sites were identified by the consultant team (two are within the airport boundary or owned by Massport, which were ultimately dismissed due to proximity to active runway surfaces).

On October 23, 2009, Massport met with the Logan RSA Salt Marsh Working Group to solicit input on potential mitigation sites identified through the GIS analysis and aerial photo interpretation. On February 22, 2010 Massport met with the Salt Marsh Working Group to receive feedback on the list of 40 identified sites (Table 5.2-1). The group generally agreed that small sites (less than 1 acre) were low priorities for mitigation, as were isolated sites where mitigation (enhancement) would require culvert or tidegate modifications. The results of this analysis are summarized in Table 5.2-1.

**Table 5.2-1 List of Potential Salt Marsh Mitigation Sites**

Site #	Site Name	Town	Acres	Sites Advanced/Low Priority/Dismissed <sup>2</sup>
USACE-1	Broad Meadows Marsh	Quincy	5.82	Additional Information needed
CZM-1	Mill Creek (Revere Beach Parkway)	Revere, Chelsea	5.49	Dismissed <sup>a</sup>
CZM-2	Parkhurst Marsh	Quincy	3.34	Dismissed <sup>b</sup>
CZM-3	Broad Cove	Hingham	1.55	Low Priority
EPA-1	Rumney Marsh Reservation (I-95 Salt Marsh Rest. Area 6)	Saugus	7.03	Advanced to field reconnaissance
EPA-2	Rumney Marsh Reservation (I-95 Salt Marsh Rest. Area 5)	Saugus	1.30	Advanced to field reconnaissance
EPA-3	Rumney Marsh Reservation (I-95 Salt Marsh Rest. Area 4)	Saugus	3.56	Advanced to field reconnaissance
EPA-4	Rumney Marsh Reservation (I-95 Salt Marsh Rest. Area 3)	Saugus	4.74	Advanced to field reconnaissance
EPA-5	Rumney Marsh Reservation (I-95 Salt Marsh Rest. Area 2)	Saugus	3.33	Advanced to field reconnaissance
EPA-6	Rumney Marsh Reservation (I-95 Salt Marsh Rest. Area 1)	Saugus	3.48	Advanced to field reconnaissance
EPA-7	Rumney Marsh Reservation (DCR Salt Marsh Rest. Area 2)	Revere	0.78	Low Priority
EPA-8	Rumney Marsh Reservation (DCR Salt Marsh Rest. Area)	Saugus	3.52	Dismissed <sup>c</sup>
EPA-9	Rumney Marsh Reservation (Crescent Marsh)	Saugus	22.81	Advanced to field reconnaissance
EPA-10A	Seagirt Ave Marsh	Saugus	0.20	Low Priority
EPA-10B	Seagirt Ave Marsh	Saugus	3.43	Low Priority
EPA-11A	Rumney Marsh Reservation (Ballard St Phase I Restoration)	Saugus	17.93	Additional Information needed
EPA-11B	Rumney Marsh Reservation (Ballard St Phase I Restoration)	Saugus	8.25	Additional Information needed



Table 5.2-1 List of Potential Salt Marsh Mitigation Sites (continued)

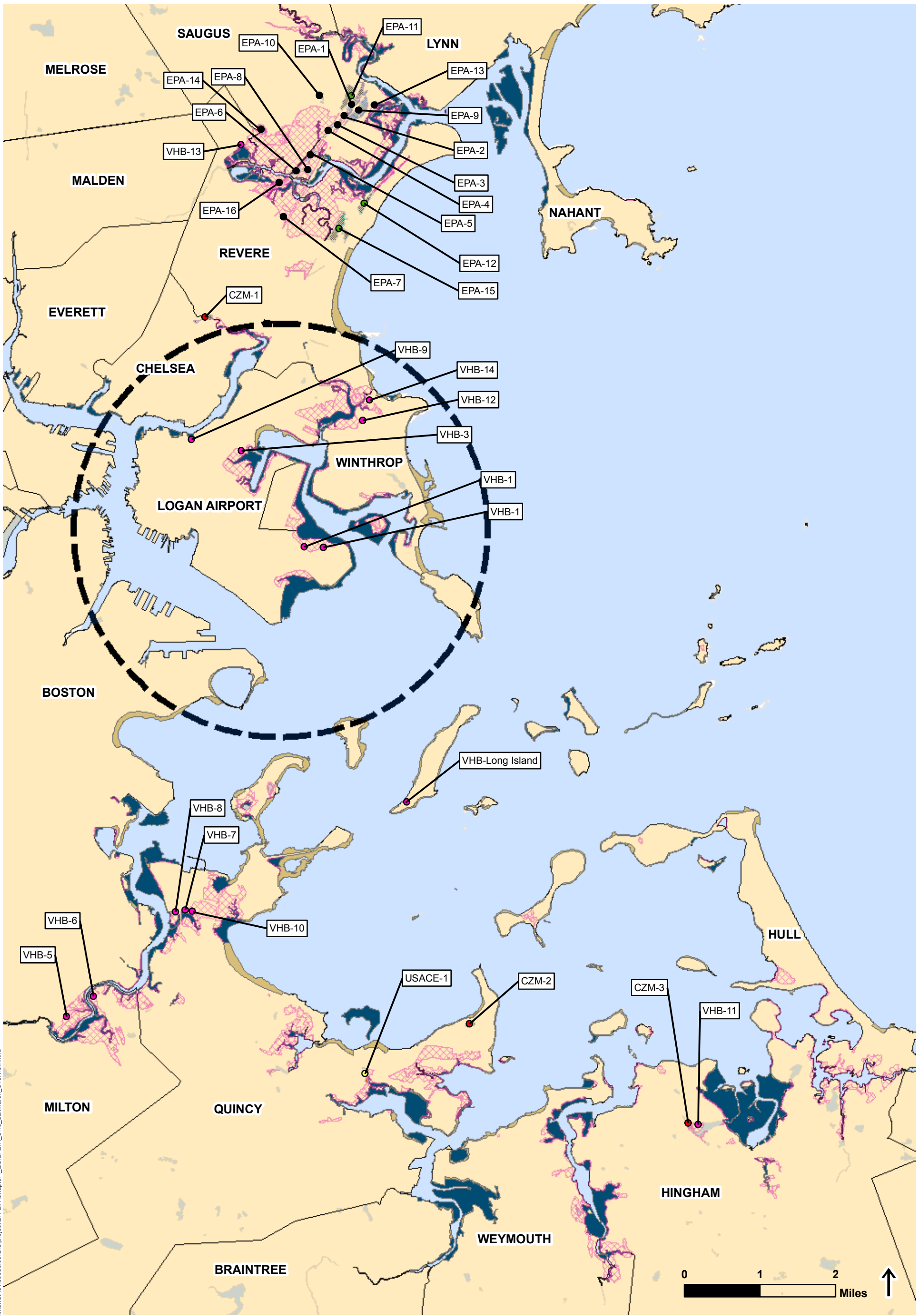
Site #	Site Name	Town	Acres	Sites Advanced/Low Priority/Dismissed <sup>2</sup>
EPA-11C	Rumney Marsh Reservation (Ballard St Phase I Restoration)	Saugus	2.17	Additional Information needed
EPA-12	Route 1a Tidegates #5-6 Marsh	Revere	9.50	Dismissed <sup>a</sup>
EPA-13	Rumney Marsh Reservation (Resco Salt Marsh Restoration)	Saugus	0.99	Low Priority
EPA-14A	Rumney Marsh Reservation (Park Street Fill Areas)	Saugus	0.27	Dismissed <sup>d</sup>
EPA-14B	Rumney Marsh Reservation (Park Street Fill Areas)	Saugus	0.55	Dismissed <sup>d</sup>
EPA-15A	Oak Island Marsh Restoration	Revere	5.44	Dismissed <sup>a,b</sup>
EPA-15B	Rumney Marsh Reservation - Oak Island Marsh Restoration	Revere	19.18	Dismissed <sup>a,b</sup>
EPA-16	No Man's Land	Revere	1.51	Advanced to field reconnaissance
VHB-1A	Logan Airport - North of Fire Training Station	Boston	2.15	Low Priority
VHB-1B	Logan Airport - North of Fire Training Station	Boston	0.98	Low Priority
VHB-3	Undeveloped Site adjacent to Logan Airport	Boston	2.76	Low Priority
VHB-5	Neponset River Reservation	Boston	5.68	Additional Information needed
VHB-6	Neponset River Watershed	Milton	8.66	Advanced to field reconnaissance
VHB-7	Neponset River Watershed	Quincy	1.12	Additional Information needed
VHB-8	Neponset River Watershed	Quincy	3.62	Additional Information needed
VHB-9	Condor Street Beach	Boston	3.65	Additional Information needed
VHB-10	Neponset River Watershed	Quincy	2.42	Additional Information needed
VHB-11	Broad Cove	Hingham	2.64	Low Priority
VHB-12A	Parking Lot	Winthrop	1.87	Low Priority
VHB-12B	Undeveloped Site	Winthrop	0.62	Low Priority
VHB-13A	Rumney Marsh Reservation	Revere	0.34	Low Priority
VHB-13B	Rumney Marsh Reservation	Revere	0.21	Low Priority
VHB-14	Belle Isle Marsh Reservation - Undeveloped Site	Winthrop	11.68	Advanced to field reconnaissance

1 Mass GIS Protected and Recreation Open Space data description and land ownership data use disclaimer: "These data are very useful for most statewide and regional planning purposes. However, they are not a legal record of ownership, and the user should understand that parcel representations are generally not based on property surveys." (<http://www.mass.gov/mgis/osp.htm>)

2 Reasons for site dismissal:






- a Site is an existing salt marsh with poor tidal circulation due to culvert restriction. Rejected because it would be only provide opportunity for enhancement and not restoration.
- b Site is isolated, land-locked, with tidal restriction provided by restricted culvert. There is low probability of restoration success.
- c Restoration of the site is currently being undertaken/ funded by another agency.
- d Site is too small.





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- Legend**
-  Wildlife Hazard Area
  -  Existing and Recently Restored Salt Marshes
  -  Coastal Beach
  -  Tidal Flat
  -  Town Boundaries
  -  Open Water

- Salt Marsh Mitigation Sites Types**
-  USACE (Potential)
  -  CZM (Priority)
  -  EPA (Future)
  -  EPA (Potential)
  -  VHB (Potential)



Logan RSA

Figure 5-2

**Potential Salt Marsh Mitigation Sites**

Source: MassGIS  
Vanasse Hangen Brustlin, Inc.





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## Site Evaluation

The site evaluations included field reconnaissance, used objective evaluation criteria, and other input from agencies. Of the 40 sites identified, only a shortlist of sites (ten sites) was advanced to field reconnaissance. The ten sites were advanced based on the preliminary screening criteria and on additional feedback received from the Salt Marsh Working Group during the February 22, 2010 meeting. These sites included:

- EPA-1, Rumney Marsh Area 6
- EPA-2, Rumney Marsh Area 5
- EPA-3, Rumney Marsh Area 4
- EPA-4, Rumney Marsh Area 3
- EPA-5, Rumney Marsh Area 2
- EPA-6, Rumney Marsh Area 1
- EPA-9, Rumney Marsh – Crescent Marsh
- EPA-16, No Man’s Land
- VHB-6, Neponset River
- VHB-14, Belle Isle Marsh Winthrop

Two additional sites were added after consultation with the Neponset River Watershed Association (NepRWA) and the National Park Service. Additional information was provided by the NepRWA for sites identified within the Neponset River Watershed as having several opportunities for mitigation (i.e., VHB-5, VHB-7, VHB-8, and VHB-10). NepRWA recommended the Granite Avenue site (portions of VHB-5 and areas just southwest and northeast outside the boundary) as the site with the highest restoration potential out of the possible Neponset River Watershed sites. The City of Boston’s Long Island (within the Boston Harbor Islands National Recreation Area) contains an additional potential mitigation site that was identified as a response to Boston Conservation Commission’s request for mitigation in Boston. For the rest of the sites, additional information was not acquired since the ten sites advanced to field reconnaissance initially appear to provide enough area for mitigation and potential for successful restoration.

## Evaluation Criteria

A set of evaluation criteria was developed based on feedback received from the Salt Marsh Working Group and observations made in the field. These criteria were used to rank various potential restoration site constraints ranging from ownership, costs to restore, and apparent risks of mitigation failure. The scores ranged from one to three (preferred condition = 1, intermediate condition = 2, and potentially severe constraint = 3) depending on ownership, thickness of fill, fill material, tidal restriction, costal dynamics, habitat continuity, and wildlife hazards potential. For all criteria categories, the sites with the lowest scores would be the preferred sites. These criteria and their overall ranking include:



- **Ownership** evaluates the opportunity and costs for acquiring land rights to restore and preserve a particular site.
  - Public - available = Score 1
  - Private - would need to be acquired = Score 2
  - Public - not available = Score 3
- **Thickness of Fill** - thickness of marsh fill reflects earthwork costs to restore a unit area of marsh to the correct intertidal elevation (fill thickness was estimated using elevations above the adjacent marsh, even though these materials likely extend well below the original marsh surface).
  - 0 to 5 feet = Score 1
  - 5- 10 feet = Score 2
  - > 10 feet = Score 3
- **Fill Materials** were broadly classified to reflect potential costs of disposal based on limited investigations with a hand auger.
  - Clean bank run sand and gravel = Score 1
  - Dredge material = Score 2
  - Trash/solid waste = Score 2
  - Demolition and solid waste = Score 3
  - Presence of pollutant sources and/or contaminated fill = Score 4
- **Tidal Restrictions** were classified based on the complexity of modeling the tidal exchange to a restoration site and/or potential costs required to introduce/enhance tidal flow.
  - No restriction = Score 1
  - Restricted culvert/narrow tidal ditch/creek = Score 2
  - No connection to tides = Score 3
- **Coastal Dynamics** assessed the potential of a restoration site to be subject to erosion by tidal currents or wind driven waves based on field observations.
  - Site protected from erosion = Score 1
  - Site exposed to erosion = Score 2
  - Nearby an eroding marsh/beach = Score 3
- **Habitat Continuity** assessed the potential wildlife habitat value of a restored marsh. Also, restoration sites situated next to healthy salt marsh habitat are likely to benefit from rapid recruitment of marsh plant and animal species. Scores are based on whether a site is adjacent to:
  - Salt marsh/native upland vegetation = Score 1
  - *Phragmites* dominated wetland/upland with invasive species = Score 2
  - Developed site = Score 3



- **Wildlife Hazard** assessed the risk of a restored site increasing opportunities for bird collisions with aircraft. Scores are based on whether a site is:
  - $\geq 10,000$  ft, not in runway centerline = Score 1
  - $\leq 10,000$  ft, not in runway centerline = Score 2
  - $< 10,000$  ft, on runway centerline = Score 3

### Summary of Recommendations and Amount of Potential Mitigation Sites

A total of 10 potential salt marsh mitigation sites were assessed in the field; all are within DCR properties, eight were within the Rumney Marsh Reservation, one within the Belle Island Marsh Reservation, and one within the Neponset River Reservation. Based on this field reconnaissance and consultation with NepWRA and the National Park Service (NPS), Massport recommends that two of these 10 sites and an additional two sites recommended by NepRWA and the NPS be advanced for further evaluation, as documented in Table 5.2-2:

- EPA 4, Rumney Marsh Reservation (4.7 acres available)
- EPA 5, Rumney Marsh Reservation (3.3 acres available)
- VHB-5, Neponset River Reservation (5.7 acres available)
- Long Island (4 acres available)

### *Rumney Marsh Sites*

All sites visited within the Rumney Marsh are fill areas identified by USEPA as potential restoration sites (see Figure 5-2). These sites are located on the eastern and western sides of a large fill section through the Rumney Marsh originally constructed as the alignment for Route I-95; a project which was later abandoned without being completed. The abandoned I-95 alignment is owned by DCR and used as a recreational site, especially for walking (e.g., dog walking) and operating all-terrain vehicles (ATVs). Several ad hoc trails crisscross areas within and adjacent to the potential restoration sites. A recreational model aircraft facility is maintained on two acres of I-95 fill approximately 800 feet north of the Pines River.

**EPA-4:** This site is a fill area of approximately 4 to 5 feet above the adjacent marsh elevation; however there are smaller areas as much as 18 feet above the marsh elevation. The site is poorly vegetated, and there would be minor existing habitat loss if converted. There is a large channel cut through the marsh adjacent to the restoration site. The site evaluation score was 7. The recommendation is to advance the site because it is protected from high energy tide channels and wave erosion by the existing marsh. There is a long fetch across the Rumney Marsh during high tides, therefore the size/number of the opening to the larger marsh needs to be taken into consideration. It is an ideal site for restoration

**EPA-5:** This site is proximate and very similar to EPA-4. The site evaluation score was 7. The recommendation is to advance the site because is very similar to EPA-4. These two sites appear to offer the best opportunities for successful marsh restoration.



**Neponset River Reservation Site (VHB-5):** This site is located in Boston near Granite Avenue (portions of VHB-5 and areas just southwest and northeast outside the boundary).<sup>6</sup> These areas of salt marsh have been raised above the elevation of tides by the disposal of dredge spoils. The NepRWA believes that the Granite Avenue site (portions of VHB-5 and areas just southwest and northeast outside the boundary) appears to be the best restoration option amongst the proposed Neponset River Watershed sites for the following reasons:

- The restoration of this site has been designed.
- The first phase of the project has already been successfully constructed, providing greater confidence that the second phase would be successful.

**Long Island:** The Long Island site is located in Boston within the Boston Harbor Islands National Recreation Area. The island contains a marsh on the southwest side, which is approximately 4 acres in size. The marsh appears to be dominated by common reed (*Phragmites australis*) and lacks a direct tidal connection, but could provide an opportunity for salt marsh mitigation.

Two sites (EPA-6 and EPA-16, adjacent to the Pines River) are in a higher-energy environment but could be suitable restoration sites if the sites listed above could not be constructed.

The requirements for replacing lost salt marsh could also be partially met by participating in DCR's restoration of another site within the Rumney Marsh system (designated as "DCR Mitigation Area"). This salt marsh restoration is being undertaken by DCR as partial mitigation for impacts associated with the Nahant Beach Reservation Rehabilitation Project. As designed, the mitigation area is approximately 1 acre larger than the required amount of mitigation. DCR may not have sufficient funds available to restore the entire area. If this were acceptable to the resource agencies, Massport could provide the funds needed to restore 1 acre of salt marsh at this location.

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<sup>6</sup> Information based on personal communication (phone conversations dated March 18 and 22, 2010) between Julie Conroy, VHB and Ian Cooke, Neponset River Watershed Association.



Table 5.2-2 Summary of Salt Marsh Mitigation Site Evaluation Criteria and Recommendations

Site	Town	Acres	Evaluation Criteria Scores							Total Score	Recommendations
			Ownership	Thickness of Fill	Fill Material	Tidal Restriction	Connectivity Habitat	Wildlife Hazards	Coastal Dynamics		
EPA-1	Saugus	7.0	1	3	2	3	2	1	1	13	Dismiss— Requires Ballard Street mitigation areas completed, excess fill removal required
EPA-2	Saugus	1.3	1	1	3	2	2	1	1	11	Dismiss— Requires Ballard Street mitigation areas completed
EPA-3	Saugus	3.6	1	3	2	2	1	1	1	11	Dismiss— Substantial fill removal, tidal connection potentially not adequate
EPA-4	Saugus	4.7	1	1	1	1	1	1	1	7	Advance
EPA-5	Saugus	3.3	1	1	1	1	1	1	1	7	Advance
EPA-6	Saugus	3.5	1	1	2	1	1	1	2	9	Dismiss— high energy site, erosion, could be suitable if riprap retained
EPA-9	Saugus	22.8	1	1	2	3	2	1	1	11	Dismiss— Mass DOT <sup>1</sup> is expected to replace culvert, site is not available to Massport
EPA-16	Revere	1.5	1	1	1	1	1	1	3	9	Dismiss— high energy site, erosion, could be suitable if riprap retained
VHB-6	Milton	8.7	1	1	2	1	1	1	1	8	Dismiss— currently salt marsh
VHB-14	Winthrop	11.7	1	3	3	1	1	2	1	12	Dismiss—substantial fill removal required, site is within WHA
VHB-5 and adjacent areas (Granite Ave)	Boston	>5.7	1	1	Unknown	1	1	1	1	-	Advance— but needs to be field assessed
Long Island	Boston	4	1	Unknown	Unknown	3	2	1	2	--	Advance— but needs to be field assessed. Dominated by <i>Phragmites</i> and lacks a direct tidal connection

<sup>1</sup> Massachusetts Department of Transportation

Salt marsh restoration at Logan Airport is not recommended because increasing salt marsh within the Wildlife Hazard Area (WHA) could constitute an increase in wildlife habitat which has the potential to create or exacerbate bird hazards at low tide (feeding by brant, Canada geese, or other waterfowl). The FAA Wildlife Hazard Guidance specifies a separation distance of 10,000 feet from aircraft movement areas (runways, taxiways) to hazardous wildlife attractants.<sup>7</sup> VHB-5 and Long Island sites are two sites located in Boston that are still under consideration.

<sup>7</sup> U.S. Department of Transportation, Federal Aviation Administration. Airport Design Advisory Circular No 150/5200-33B. August, 2007.



As part of the mitigation planning effort, at FAA's request, Massport has initiated coordination with the USDA, Animal & Plant Health Inspection Service, Wildlife Services. USDA will assist in the final screening of salt marsh and eelgrass mitigation strategies by reviewing the alternatives for consistency with FAA Advisory Circular AC 150/5200-33B "Hazardous Wildlife Attractants on or near Airports" and to determine compatibility with safe airport operations.

#### 5.2.1.4 Salt Marsh Restoration Plan

The following is a summary of description of the conceptual salt marsh restoration plan that would be implemented at the selected mitigation site(s). This plan was required in the Secretary's Certificate and will be developed in detail in the Final EA/EIR, once agency consensus is reached on the site(s). It will be based on DEP<sup>8</sup> and USACE<sup>9</sup> mitigation guidance. The plan includes:

- Erosion controls;
- Grading;
- Soils;
- Planting;
- Invasive species control;
- Wildlife habitat features;
- Monitoring; and
- A conceptual grading and planting plan.

#### Erosion Controls

An erosion and sedimentation control program will be implemented to minimize temporary impacts to wetland resource areas. The program incorporates Best Management Practices (BMPs) specified in guidelines developed by the DEP<sup>10</sup> and the USEPA.<sup>11</sup>

Temporary devices and structures to control erosion and sedimentation in and around mitigation sites shall be properly maintained at all times. The devices and structures shall be disassembled and properly disposed of as soon as the site is stable. Sediment collected by these devices will be removed and placed upland in a manner that prevents its erosion and transport to a waterway or wetland.

#### Grading

Creation of the salt marsh mitigation sites will require excavation of fill and grading to match the adjacent existing salt marsh elevations. It will also require excavating/creating an additional section as 'future marsh' to be approximately 3 feet above the existing marsh due to future estimates of sea level rises. Over the next century, predicted sea level rise is anticipated to have an adverse effect on many salt marshes where there is

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8 Massachusetts Department of Environmental Protection, Bureau of Resource Protection, Wetlands and Waterways Program: Massachusetts Inland Wetland Replication Guidelines, March 2002.

9 U.S. Army Corps of Engineers, Addendum to New England District Compensatory Mitigation Guidance: Compensation for Impacted Aquatic Resource Functions, File No. NAE-2006-3648, December 18, 2007.

10 DEP, 1997. Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas: A Guide for Planners, Designers, and Municipal Officials.

11 EPA, 1992. Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices. Office of Water Report EPA 832-R-92-005.



insufficient upland area available to allow the marshes to migrate to higher elevations. In the light of climate change and sea level rise, it is likely that much of the salt marsh surrounding Logan Airport would be lost. The proposed salt marsh restoration areas will be designed to allow the off-site restored salt marsh to migrate and adapt to a higher sea level and persist. This additional area would be in excess of the required mitigation area.

The finished grade of the salt marsh mitigation areas will be at an elevation that provides a hydrologic connection (tidal flow) between the restoration area and the adjacent/reference marsh wetland. There will be a need to verify where tidal flow can be accessed and to model the tidal prism to determine if it is adequate to support proposed marsh restoration area. The correct elevation is critical to achieving the proper tidal flooding characteristics for the desired vegetation community type (e.g., *Spartina alterniflora*, low marsh). Grading will be designed to provide surface irregularities (shallow pools, channels) to enhance habitat functions. The final grading of the marsh soils will result in no breaks in the elevation upon removal of siltation barriers and other erosion control devices.

### Soils

Following the removal of dredged material or upland fill, new soils can be placed on the site and graded to the proper marsh elevations. Soil organic matter content and grain size should match that of adjacent/reference marshes. In cases where organic matter content of new soil is low, organic matter (usually terrestrial vegetation mulch) can be added to enhance soil quality. However, *Spartina* species are well-adapted to sandy, low-nutrient soils, and is relatively easy to propagate upon properly prepared restoration sites.<sup>12</sup>

### Planting

Each mitigation site would be vegetated with native wetland species in accordance with MA DEP and USACE guidance. Salt marshes are characterized by plants that are well adapted to or prefer living in, saline soils. Two dominant salt marshes plants that would be planted within the restoration sites include the salt meadow cord grass (*Spartina patens*) and salt marsh cord grass (*Spartina alterniflora*). Salt marsh plantings can be obtained from local and regional nurseries that specialize in products for wetland restoration and creation projects.<sup>13</sup>

### Invasive Species Control

Some of the mitigation sites are surrounded by or contain several invasive species, especially common reed (*Phragmites australis*). Tidal restriction due to dikes, levees, and poorly designed water-control structures leads to a reduction or loss in water salinity, and in marsh surface elevation which favors the establishment of *Phragmites*. Restoration projects completed to date have relied on the increase in flooding with saline tidewaters to help eliminate *Phragmites*. This process can take up to several years.<sup>14</sup> *Phragmites* could also be eradicated using herbicides, burning, and manual removal. Tall pepperweed (*Lepidium latifolium*) is a new salt marsh exotic invasive species that may be present in the surrounding landscape and colonize mitigation areas.

To protect the functions and integrity of the mitigation areas, each mitigation area will be inspected in the early growing season of each monitoring year. If feasible, any exotic invasives will be pulled by hand and/or

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12 Rhode Island Habitat Restoration Portal. Restoring Coastal Habitats for Rhode Island's Future. Salt Marsh Restoration Methods. Website: [http://www.edc.uri.edu/restoration/html/tech\\_sci/restsalt.htm](http://www.edc.uri.edu/restoration/html/tech_sci/restsalt.htm)

13 *ibid.*

14 *ibid.*





controlled using herbicides. A licensed pesticide applicator will be contracted to spray plants with the appropriate herbicide. Spraying will be done using a backpack unit and dye mixed with the liquid herbicide to minimize overspray and damage to native wetland species.

### Wildlife /Fishery Habitat Features

A salt marsh and adjacent mud flats may contain tidal creeks, ditches and pools that provide habitat for wildlife species. Wildlife habitat can be restored and improved within salt marshes by reestablishing open water habitat and controlling invasive species such as *Phragmites australis*. Adding rocks and driftwood would also improve wildlife habitat by providing perches and shelter.

To improve wildlife habitat features within restored salt marsh, open-water marsh management (OWMM), a habitat restoration and mosquito control technique, could be used as feasible to recreate natural flow patterns. This can be accomplished by plugging or abandoning existing drainage ditches and by reconnecting natural tidal creeks to excavated ponds in the upper intertidal marsh. This allows fish which prey on mosquito larvae to reestablish populations in pools and creeks in high marsh areas which were previously inaccessible to them.<sup>15</sup>

### Monitoring

To help determine and measure restoration success, salt marsh restoration sites would be compared with adjacent and/or "undisturbed" reference wetlands for monitoring. Reference sites should be similar to restoration sites in terms of geomorphology, tidal range, and elevation. As determined appropriate, the parameters that would be monitored at salt marsh restoration and reference sites include:<sup>16</sup>

- Surface topography and elevation
- Tidal creek cross-sections
- Water table depth
- Surface water level changes
- Soil organic matter
- Sediment accretion rates
- Plant species distribution and cover
- Benthic invertebrate communities
- Utilization of the marsh by finfish and crustaceans
- Utilization of the marsh by wildlife

The duration and frequency of monitoring must be sufficient to determine if the restoration site is functioning similarly as the reference sites. The recommended monitoring duration of salt marsh restoration projects are at one year, two years, and three to five years post-restoration (Neckles and Dionne, 1999).<sup>17</sup>

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15 Rhode Island Habitat Restoration Portal. Restoring Coastal Habitats for Rhode Island's Future. Salt Marsh Restoration Methods. Website: [http://www.edc.uri.edu/restoration/html/tech\\_sci/restsalt.htm](http://www.edc.uri.edu/restoration/html/tech_sci/restsalt.htm)

16 Rhode Island Habitat Restoration Portal. Restoring Coastal Habitats for Rhode Island's Future. Habitat Monitoring Protocols. Website: [http://www.edc.uri.edu/restoration/html/tech\\_sci/habsalt.htm](http://www.edc.uri.edu/restoration/html/tech_sci/habsalt.htm)

17 Rhode Island Habitat Restoration Portal. Restoring Coastal Habitats for Rhode Island's Future. Habitat Monitoring Protocols. Website: [http://www.edc.uri.edu/restoration/html/tech\\_sci/habsalt.htm](http://www.edc.uri.edu/restoration/html/tech_sci/habsalt.htm)



Following construction of the mitigation sites, the sites will be monitored and monitoring reports will be prepared in the format required by the USACE Mitigation Guidance. Observations will occur at least two times during the growing season (in late spring/early summer and again in late summer/early fall). Each annual monitoring report will be submitted to the USACE, Policy Analysis and Technical Support Branch, no later than December 15 of the year being monitored. Failure to perform the monitoring and submit a monitoring report constitutes permit non-compliance. A self-certification form will be completed, and signed as the transmittal coversheet for each annual monitoring report and will indicate the permit number and the report number. The reports will address the following success standards in the summary data section and will address the additional items noted in the monitoring report requirements, in the appropriate section. The reports will also include the monitoring report appendices listed below. The first year of monitoring will be the first year that the site has been through a full growing season after completion of construction and planting. For these special conditions, a growing season starts no later than May 31. However, if there are problems that need to be addressed and if the measures to correct them require prior approval from the agencies, Massport will contact the agencies as soon as the need for corrective action is discovered.

Remedial measures will be implemented prior to the completion of the monitoring period to attain the agreed-on success standards. Measures requiring earth movement or changes in hydrology will not be implemented without written approval from the USACE and DEP. At least one reference site adjacent to or near each mitigation sites will be described and shown on a locus map.

#### 5.2.1.5 Mitigation Costs

Assuming land acquisition is not required, salt marsh mitigation would require excavation of soils, planting, and monitoring for approximately 3 acres, estimated at approximately \$600,000 to \$1,100,000.

#### 5.2.1.6 Next Steps

The next steps to be taken to complete the mitigation of the salt marsh sites include:

- Narrowing sites to one to two preferred sites in coordination with the Salt Marsh Working Group;
- Obtaining detailed site-specific info (topography, soils, hydrology, hazardous materials);
- Developing conceptual grading and planting plans; and
- Developing final cost estimates.

#### 5.2.2 Eelgrass

Approximately 60,100 square feet of eelgrass (*Zostera marina*) beneath the footprint of the proposed pile-supported deck for the proposed Runway 33L RSA improvements is assumed to be lost or altered due to shading even though some eelgrass at the edge of the deck would still receive sunlight penetration for parts of the day. An additional area outside of the deck, approximately 6,500 s.f. in size, could be affected by shading, however these impacts are less certain and area not included in the mitigation estimates.

The MEPA Certificate for the RSA Improvements Project included a number of specific requirements for eelgrass mitigation to be addressed in the Draft EA/EIR. These requirements include:



- Assess existing, degraded areas of eelgrass beds for purposes of rehabilitation and recently restored areas;
- Include updates on the continued dialogue with resource agencies to discuss the possibilities for mitigation of eelgrass impacts through possible direct plantings as well as alternative strategies;
- Incorporate the Hubline study findings in the development of a mitigation plan for the proposed eelgrass impacts; and
- Describe consultation with state and federal regulatory agencies regarding the scope for the research of other suitable eelgrass-related alternative mitigation strategies if the Hubline study<sup>18</sup> is unable to define suitable sites for eelgrass mitigation for this project.

This following sections describe how impacts from the proposed Runway 33L RSA improvements were avoided and/or minimized, consultation with the agencies, and proposed compensatory mitigation measures for unavoidable impacts to eelgrass, as requested by the Certificate.

#### 5.2.2.1 Avoidance

An extensive alternatives analysis was undertaken, as described in Chapter 2, *Alternatives*, of this Draft EA/EIR and in Appendix 3, *Alternatives Analysis and FAA Determinations*. The only alternative that would not impact wetlands or further reduce safety at Logan Airport is the No-Action Alternative. The No-Action Alternative is not an acceptable alternative because it does not meet the requirements of the 2005 federal mandate to increase the safety of RSAs at Logan Airport by 2015. Leaving the Runway 33L RSA in its current configuration does not increase the safety for aircraft and their passengers in emergency situations such as an overrun or undershoot situation.

As described in Chapter 2, *Alternatives*, several avoidance alternatives were evaluated and dismissed because they would not meet the project purpose or were not practicable. Runway 15R-33L, the longest runway at Logan Airport, is essential to the airport's role as the long-haul gateway for New England. The runway cannot be reduced in length because this would reduce utility, with a significant adverse impact on Logan Airport operations, particularly during less-than-ideal weather conditions where Runway 15R-33L provides the runway length needed for safe aircraft operations. Other avoidance alternatives were considered and dismissed that because of potential noise impacts to adjacent East Boston neighborhoods, impacts to other runways at Logan Airport, or increased penetrations to the Runway 15R approach surface and the Runway 33L departure surface. An alternative that meets the RSA safety goal must not do so by reducing the safety margin elsewhere.

#### 5.2.2.2 Minimization

The alternatives analysis screened alternatives that would provide a standard RSA in compliance with FAA guidance. The current design guidelines allow for a standard RSA that is 1,000 feet long and 500 feet wide at each runway end, where the RSA is cleared and graded with no potentially hazardous ruts, humps, depressions, or other surface variations. At airports where space is limited and land is not available to accommodate the standard 1,000-foot long by 500-foot wide RSAs, the FAA has approved the use of EMAS to provide overrun protection.

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18 Leschen, Alison S. Kessler, Ross K. Estrella, Bruce T. *Eelgrass Restoration Project. (July 1, 2004-October 31, 2007)*



Potential wetlands impacts have been significantly minimized through the alternatives analysis by:

- Utilizing EMAS rather than a full 1,000-foot long RSA;
- Selecting a deck and pile-supported structure rather than a solid fill structure that would have significant direct impacts to coastal wetlands;
- Minimizing the width of the RSA from 500 to 300 feet on the deck, in compliance with FAA guidelines; and
- Minimizing construction impacts due to barges by restricting barge movements to designated construction corridors.

The alternatives analysis incrementally reduced the wetlands impact potentially resulting from the construction of a RSA at Runway 33L. The alternatives analysis considered both the standard 1,000-foot long and 500-foot wide RSA and smaller RSA footprints utilizing EMAS. Alternative 1 has the largest footprint at 1,000 feet by 500 feet. It would be a solid fill structure, and had the largest wetlands impact. Alternative 2 and Alternative 3 reduced the footprint through the use of EMAS, but still had large wetlands impacts. Alternative 2 also considered different design options such as filled structures and pile-supported decks but both had constructability issues. Alternative 4 has the smallest footprint on a pile-supported deck. This alternative (Alternative 4; the Proposed Action) has the smallest RSA footprint on a pile-supported deck that still provides the degree of safety consistent with the FAA guidelines.

The environmental consequences of five construction options were evaluated in Chapter 4, *Environmental Consequences*. The deck would be the same size (approximately 300 feet wide and 470 feet long) for each option, but with different sizes, numbers and arrangements of supporting pilings. Each of the five construction options would result in the same impacts to eelgrass, since the size of the RSA (and localizer) deck would be the same in all five construction options. The proposed Runway 33L RSA improvements are anticipated to result in the loss of 60,100 square feet of eelgrass due to shading. Table 5.2-3 illustrates how impacts to Submerged Aquatic Vegetation (eelgrass beds) have been reduced in the second screening of alternatives. The most significant minimization strategy is the elimination of a solid fill structure and enhancing the existing EMAS bed which has the result of reducing the footprint and the resultant direct wetlands impacts.



Table 5.2-3 Runway 33L RSA Eelgrass Minimization Alternatives

Preliminary Alternative <sup>1</sup>	Submerged Aquatic Vegetation (sq. ft. of shading)
Alternative 1 – 1,000 –foot long by 500-foot wide RSA on Solid Fill	129,930
Alternative 2 – 600-foot long by 500-foot wide RSA with EMAS on Solid Fill	87,450
Alternative 3 – 600-foot long by 400-foot wide RSA with EMAS on Deck	71,420
Alternative 4 – 600-foot long by 300-foot wide RSA with EMAS on Deck	60,100

<sup>1</sup> The alternatives analysis reviewed different design options for each alternative. The largest area of wetlands impact of those design options is displayed in the table.

### 5.2.2.3 Compensatory Mitigation

Impacts to Submerged Aquatic Vegetation (eelgrass) are the same for all proposed Runway 33L construction options. Shoreline structures built over the water, such as the proposed deck structure, prevent eelgrass from getting enough light for growth. Approximately 60,100 square feet of eelgrass bed would be lost or altered due to the proposed deck RSA improvement feature at the Runway 33L end. Based on the initial survey results, the eelgrass within this area varies in density from 5 percent to less than 40 percent. Approximately an additional 400 square feet of eelgrass would be adversely affected due to scour created by the proposed pilings (for all piling options). Additional loss of eelgrass could be caused by the barges used in construction activities. These areas would be re-planted with eelgrass at the completion of construction. Massport will conduct a post-construction survey to assess the actual area of eelgrass impacts and will re-evaluate the mitigation goals at that time.

This section describes the federal and state mitigation goals and an overview of the status of proposed mitigation planning for context in evaluating mitigation strategies. An overview of the status eelgrass in New England, Massachusetts and Boston Harbor is provided. Eelgrass trends, losses, gains, and changes within Boston Harbor, as well as limiting factors to its survival, are provided as context for mitigation needs. This section also provides a summary of agency restoration efforts, current limitations and unknowns in the evolving science of eelgrass restoration, and the proposed mitigation commitments, potential sites, and restoration techniques.

### Mitigation Goals

The proposed Runway 33L RSA improvements does not meet the thresholds for coverage under the Massachusetts General Permit for activities in waters of the United States (U.S.) therefore, an Individual Section 10/404 permit from the USACE must be sought. The Addendum to the New England District Compensatory Mitigation Guidance provides a recommended compensatory mitigation ratio of 3:1 to 5:1 for Submerged Aquatic Vegetation.<sup>19</sup> These ratios provide guidance for all compensatory aquatic resource

<sup>19</sup> U.S. Army Corps of Engineers, Addendum to New England District Compensatory Mitigation Guidance: Compensation for Impacted Aquatic Resource Functions, File No. NAE-2006-3648, December 18, 2007.



mitigation required by New England District. At the state level, DEP indicates that damage to eelgrass habitats must be mitigated at a ratio greater than 1:1. Based on this guidance, the mitigation goal for the Runway 33L RSA improvements is 3:1, approximately 4.2 acres (60,100 square feet x 3 = 4.2 acres).

There are three primary mechanisms supported by the USACE and the USEPA for permittees to meet their compensatory mitigation obligations:

- Permittee-responsible mitigation,
- Purchasing credits from a mitigation bank, or
- Making a payment to an approved in-lieu fee mitigation sponsor.

The USACE developed a *Massachusetts In-Lieu Fee Mitigation Program Fact Sheet*,<sup>20</sup> which defined in-lieu fee as “mitigation that occurs in circumstances where a permittee provides funds to an in-lieu-fee sponsor instead of either completing project-specific mitigation or purchasing credits from a mitigation bank approved under the Banking Guidance.” The Guidance outlines the requirements and specifications of the In-Lieu Fee Program (ILF). ILF mitigation may be used as compensatory mitigation for impacts from selected projects that are eligible (Category 2) for the Massachusetts General Permit (MGP). Projects that do not meet all criteria of the MGP but have impacts within the applicable size limits of the MGP are eligible. The USACE recognizes the Massachusetts Department of Fish and Wildlife, Division of Marine Fisheries (DMF) trust as the in-lieu fee sponsor. DEP does not have an in-lieu fee program; however, there are no mitigation requirements or standards for a Wetlands Variance more specific than the general requirement that “mitigation measures are proposed that will allow the project to be conditioned so as to contribute to the protection of the interests of the Act.”

## Overview

Eelgrass is the dominant seagrass species of northern temperate coastal waters, where it contributes vital functions to the ecological integrity and economic value of coastal ecosystems.<sup>21</sup> Various human-induced disturbances such as overfishing, water quality impairment, dredging, and mooring fields have contributed to declines in distribution and abundance of eelgrass in New England. The most profound, documented, natural disturbance affecting eelgrass abundance was the wasting disease of 1931-32 that eliminated 90 percent of the eelgrass in the North Atlantic, including Massachusetts.<sup>22</sup> The greatest recovery of eelgrass beds occurred within New England bays and estuaries between the mid 1950s and late 1960s. Critical environmental conditions required for eelgrass survival include low to moderate tidal currents, moderate nutrient levels, light penetration, water temperature, and salinity.

According to mapping completed by USEPA and the DEP in 2002, a number of eelgrass beds have been identified within the Boston Harbor Watershed, primarily within the Boston Harbor Islands National Park area:

- Eastern edge of Logan Airport (Governors Island and Deer Island Flats);

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<sup>20</sup> U.S. Army Corps of Engineers New England District. *Massachusetts In-Lieu Fee Mitigation Program Fact Sheet*, March 18, 2010.

<sup>21</sup> U.S. Geological Survey, *Effects of Commercial Fishing Activities on Eelgrass in New England*.

<sup>22</sup> Costa, Dr. Joe, Buzzards Bay National Estuary Program, *Eelgrass in Buzzards Bay*, <http://www.buzzardsbay.org/eelgrass.htm>.



- South side of Hull, opposite Hog Island;
- Southwest of Bumpkins Island, midway to Grape Island;
- Southeast of Bumpkins Island, about 2/3 of the distance to Worlds End in Hingham; and
- Northwest edge of Worlds End, Hingham.

Within Boston Harbor, similar to other coastal regions of Massachusetts, there is a need to restore eelgrass beds that have been lost due to both natural and human impacts. Submerged Aquatic Vegetation such as eelgrass is an important component of sub-tidal estuarine systems, serving as a food source and nursery for a variety of organisms, contributing to water quality, and serving as an indicator of ecosystem health.<sup>23</sup> Public benefits include recreational fishing, and improved water quality for other aesthetic and recreational opportunities. Similar to coastal wetlands, degraded eelgrass beds have a reduced capacity to assimilate pollutants, support native biota, and provide opportunities for human use and enjoyment.

Recently, there has been a focus on restoration not only on sites where eelgrass was once known to grow, but also on sites selected after careful evaluation. The Nature Conservancy and a private consultant conducted coast wide searches for suitable sites, site selection and test transplants.<sup>24</sup> However, only a few potential areas were identified as suitable sites to support eelgrass and none have yet been planted at a large scale. Most areas need to be remediated for eutrophication before they are suitable candidates for restoration.

Portions of Boston Harbor have become suitable for eelgrass restoration due to recent major wastewater improvements which have substantially improved harbor water quality. Studies conducted by Signell and Butman determined that "natural repopulation of eelgrass in the harbor was unlikely due to tide and wind-driven current patterns, which would prevent reproductive shoots from reaching many areas of the estuary from existing beds."<sup>25</sup> The harbor was targeted for active eelgrass restoration by DMF, based on this, and other, eelgrass studies.

From spring 2004 to fall 2007, the DMF conducted an eelgrass restoration project for seafloor impacts associated with the construction of the HubLine natural gas pipeline in Massachusetts Bay. The project focused on site selection, transplant methods, and restoration of eelgrass at suitable locations in Boston Harbor. This effort resulted in the successful restoration of over 2 hectares (approximately 5 acres) of eelgrass on a previously degraded estuary and provided a better understanding of the limits to eelgrass restoration. Some of the conclusions of this study showed that:

- Hand planting and seeding were the most efficient and effective methods for growing eelgrass;

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23 Orth, R.J. and K. A. Moore. 1984. *Distribution and Abundance of Submerged Aquatic Vegetation in Chesapeake Bay: A Historical Perspective*. Estuaries 7: 531-540.

24 A. S. Leschen, et. al., "Successful Eelgrass (*Zostera marina*) Restoration in a Formerly Eutrophic Estuary (Boston Harbor) Supports the Use of a Multifaceted Watershed Approach to Mitigating Eelgrass Loss," 2010

25 A. S. Leschen, et. al., "Successful Eelgrass (*Zostera marina*) Restoration in a Formerly Eutrophic Estuary (Boston Harbor) Supports the Use of a Multifaceted Watershed Approach to Mitigating Eelgrass Loss," 2010.



- Silt/clay content of greater than 35 percent was a sediment characteristic at all successful sites, which is lower than some values found in the literature;
- Focusing on a watershed approach and identifying projects that improve water and sediment quality, and minimize existing impacts to eelgrass may be more effective at mitigating eelgrass loss in the long run; and
- In-lieu fee mitigation programs offer a mechanism by which mitigation efforts for individual project impacts can be pooled to conduct more far reaching restoration efforts.

Current limitations in the field of eelgrass restoration that the resource agencies have encountered include:

- Limited number of sites where eelgrass can grow because of increased coastal development and its effect on water quality;
- Nutrient concentrations from septic systems, fertilizer, and atmospheric deposition in embayments that may result in eutrophication;
- Light attenuation from enhanced algal growth caused by eutrophication in embayments;
- Prolonged time for conditions to improve within a previously disturbed area to allow eelgrass to re-establish; and
- Dredging, construction, storms, or disease-related eelgrass dieback may cause physical and biological changes in the water column and seafloor (e.g., sediment composition) that may revert the site back to undesirable conditions, and inhibit natural re-vegetation; and/or make the site become unsuitable for eelgrass.

#### Eelgrass Mitigation Working Group

The MEPA Certificate required that the Draft EA/EIR include mitigation strategies identified with the federal and state interagency eelgrass working group that has been established to address this issue. Massport convened the Eelgrass Mitigation Working Group to provide expertise on the subject of eelgrass restoration/re-establishment. The Working Group is comprised of representatives of the following agencies: FAA, USACE, USEPA, CZM, DEP, DCR, DER and DMF, and the Boston Environment Department. The Working Group has met five times (April 17, 2009; July 9, 2009; July 31, 2009; March 19, 2010; and June 9, 2010). Massport proposed a mitigation process that includes the following steps:

- **Identify Goals**—Quantify unavoidable loss of eelgrass, establish mitigation goals; determine geographic extent of study area;
- **Establish Watershed Needs**—Summarize available, current information on Boston Harbor eelgrass beds;
- **Seek expert panel input**—Meet with Eelgrass Working Group to discuss the site selection process and develop working list of potential restoration sites; and
- **Identify and site selection process**—Based on Working Group input, GIS analysis, and aerial photo interpretation.





### Proposed Mitigation Commitments

To offset the unavoidable loss of eelgrass for the public safety improvements at Runway-End 33L, Massport will implement a mitigation program designed to ensure no net loss of eelgrass resources. The mitigation program is expected to have in-kind replacement through the restoration or re-establishment as the primary focus. However, the mitigation program is expected to incorporate multiple approaches including in-kind replacement as well as studies that would potentially lead to the protection, preservation or enhancement of state-wide eelgrass resources equal to or greater than the projected losses associated with the proposed safety improvements. The ultimate program will be formalized through the permitting process as the direct and indirect impacts are refined and as the availability of in-kind replacement opportunities are further evaluated and confirmed. Massport will conduct additional post-construction mapping of the eelgrass bed to measure the actual physical loss of eelgrass due to construction activities.

Because of the low success rate of eelgrass restoration in New England to date, the Corps of Engineers has established a restoration ratio of 3:1 to achieve at least a 1:1 replacement of lost eelgrass habitat functions. Based on this ratio, approximately 4.2 acres of eelgrass restoration would be required to achieve no-net loss. This mitigation program could be undertaken directly by Massport (through a specialist contractor with demonstrated experience in eelgrass restoration in the Northeast), or Massport would agree to establish an eelgrass mitigation trust fund to allow a state and/or federal agency with expertise in eelgrass restoration to conduct the program.

Specific elements of the mitigation program include:

- Conducting a site selection study to identify optimal locations for eelgrass restoration within Boston Harbor and South Shore estuaries;
- Identifying up to 3 sites for initial test planting;
- Determining if substrate modification (replacing organic substrates with sand) would enhance restoration success; and
- Planting or seeding eelgrass at one or two sites, over a 4.2-acre area, to achieve a target of at least 1.5 acres of high-density eelgrass (60-80 percent cover) after 3 years.
- Massport is also willing to consider in-kind restoration by funding installation of Conservation Moorings. Each conventional mooring replaced by a Conservation Mooring would restore approximately 900 square feet of eelgrass. Replacing 50 conventional moorings would restore approximately 1 acre of eelgrass. This mitigation option would substitute for replacement or restoration at other sites, or would reduce the amount of restoration planting required.

In the alternative, Massport would undertake additional out-of-kind mitigation to provide protect and enhance existing eelgrass beds in Boston Harbor and elsewhere in Massachusetts that would achieve an equivalent level of wetland functions. These measures could include:

- Funding a research program to address the causes of eelgrass decline in the Commonwealth;



- Funding an Eelgrass Mapping effort, in coordination with DEP and other agencies, to more accurately define the limits of eelgrass beds in critical areas and protect these unmapped beds from inadvertent damage;
- Constructing artificial reefs to enhance fish habitat, one of the principal functions that eelgrass beds provide.

These strategies, although by definition “out-of-kind”, would meet the “no net loss” requirements of the Corps of Engineers and DEP’s wetlands and water quality regulatory programs, for the following reasons:

- As documented above, eelgrass is generally in decline throughout the Northeast, although there are localized areas such as parts of Boston Harbor where eelgrass beds are expanding. The causes of this decline are not well understood, and may include disease (“wasting disease”), poor water quality due to increased discharges of non-point source pollutants, and damage by invasive species such as green crabs. Much of the on-going research on eelgrass decline has focused on documenting population trends and on methods for restoration. Few research programs have focused on understanding the organic causes of eelgrass decline and developing solutions that would preserve significant areas of eelgrass or restore eelgrass to levels seen in the 1970s. Massport believes that this mitigation measure would have the most significant benefit to the protection of eelgrass habitat in Massachusetts and regionally and recommends that DEP and the Corps of Engineers select this as the preferred mitigation option in lieu of in-kind restoration. In-kind restoration has an uncertain success probability and would have significantly less benefit to regional populations of eelgrass.
- The boundaries of eelgrass beds have been shown to change over time, generally decreasing in size but sometimes increasing. DEP has documented several instances where eelgrass beds were damaged because work was authorized in areas that had not been mapped as eelgrass beds. More accurate and up-to-date eelgrass mapping would reduce such losses of eelgrass.
- Eelgrass is considered to be significant to fisheries by providing essential nursery habitat or food resources for larval and juvenile fish. Other mitigation measures, such as artificial reefs, could provide enhanced fisheries habitat (shelter and food substrates) that would provide an equivalent value to Boston Harbor’s fish resources.

Massport anticipates that the final list of mitigation commitments presented in the Final EA/EIR will include the results of the site selection study and specific commitments to strategies that will provide the most practicable benefit to eelgrass on the Massachusetts Coast. The final mitigation program will be evaluated after receipt of additional agency and public comments.

#### **Restoration/Re-Establishment Site Evaluation**

The MEPA Certificate required that the Draft EA/EIR contain updates on the continued dialogue with resource agencies to discuss the possibilities for mitigation of eelgrass impacts through possible direct plantings as well as alternative strategies. Massport consulted with the Eelgrass Mitigation Working Group throughout the development of the Draft EA/EIR regarding the site selection process. A literature review provided additional information regarding what sites have previously been evaluated for restoration suitability, and other potential sites that would require further investigation. The following studies and reports were of particular assistance regarding site selection criteria:



- Hubline Pipeline Project eelgrass restoration site selection analysis (several documents);<sup>26</sup>
- MWRA, “5 Years after transfer of Deer Island flows offshore” an update of water-quality improvements in Boston Harbor,” 2006;
- MWRA, “2007 Boston Harbor Benthic Monitoring Report,” 2008;
- A. S. Leschen, et. al., “Successful Eelgrass (*Zostera marina*) Restoration in a Formerly Eutrophic Estuary (Boston Harbor) Supports the Use of a Multifaceted Watershed Approach to Mitigating Eelgrass Loss,” 2010.

In 2008, DMF completed a transplant program in Boston Harbor that documented successful natural recolonization of the Deer Island Flats and indicated that there are opportunities for restoration in Boston Harbor. Mitigation planning for the HubLine project indicated that the Deer Island Flats site is a viable restoration site within northern Boston Harbor, with the Governors Island Flats as a secondary site. Resource agencies estimated that the Governors Island site may have approximately 150 hectares (370 acres) of potentially suitable eelgrass habitat, and could possibly accommodate both the HubLine and Logan RSA mitigation requirements.<sup>27</sup> However, DMF staff indicated that additional planting at the Governors Island site may not provide restoration benefit, however planting elsewhere within Boston Harbor could better ensure eelgrass survival due to the diversity of restored/created habitat area.<sup>28</sup>

The Hubline project included eight test sites, which were planted in 2008. In 2009, DMF surveyed the test sites. DMF found four viable sites of the eight test sites: Deer Island Flats, Governors Island Flats, Old Harbor, and South Hampton Islands in the Boston Harbor Islands. Eelgrass was present at the Deer Island and Governors Island Flats, but not healthy (noticeable reduction in shoot density since the plantings). Eelgrass was present at the Old Harbor and South Hampton sites, but in poor shape (shoots were browning and in decline). It was noted that the weather (lack of sunlight) could have contributed to the poor condition of the eelgrass at the Hubline test sites. The time of year of eelgrass transplant may affect success, for example sites planted in New Bedford in the wintertime have been successful.

Re-establishment of eelgrass at Logan Airport is not as desirable as restoring other sites because additional eelgrass re-establishment has the potential to create or exacerbate bird hazards at low tide (feeding by brant, Canada geese, or other waterfowl). It may be possible to reduce this hazard by re-establishing eelgrass at deeper sites (subtidal) rather than intertidal. Massport must apply the recommendations of the FAA Advisory Circular concerning proximity of bird attractants to runways. In addition, it may be more effective to target sites that do not currently have nearby eelgrass seed populations, which could re-establish naturally.

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26 Massachusetts Division of Marine Fisheries (DMF), *Eelgrass Restoration, Re-establishing Habitat in Boston Harbor*. Leschen, Alison S. Kessler, Ross K. Estrella, Bruce T., *Eelgrass Restoration Project. (July 1, 2004-October 31, 2007)*. DMF Presentation, *Hubline Mitigation Program*.

27 VHB. Meeting Notes: Eelgrass Mitigation Working Group Meeting 1. April, 17, 2009

28 Evans, Tay, DMF. Personal Communication. April 27, 2010.



As noted above, consultation with the agencies and the literature review indicated that there are several areas within Boston Harbor that appear suitable for eelgrass restoration, taking into consideration wave hydrodynamics, depth, water quality, and substrate quality. These sites include (Figure 5-3):

- Inner Boston Harbor, Logan Airport, Governors Island Flats;
- Inner Boston Harbor, Deer Island Flats;
- Inner Boston Harbor, Boston Harbor Islands, Peddocks Island (south); and
- Inner Boston Harbor, Quincy Bay, Long Island (west).

The Long Island and Peddocks Island sites were identified as viable sites during the DMF study conducted from spring 2004 to fall 2007.<sup>29</sup> Further evaluation of these sites would help to determine where the most successful restoration would occur.

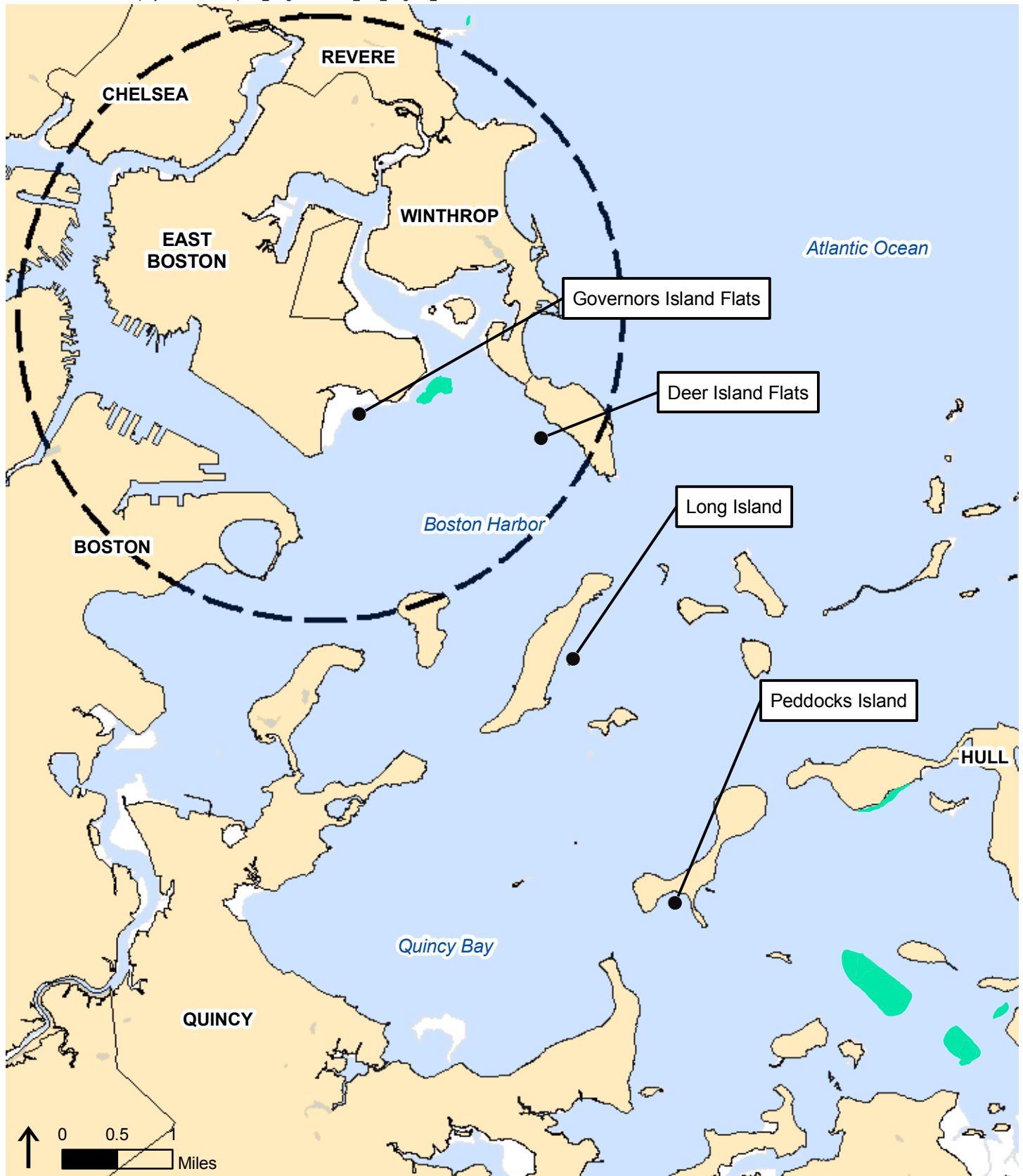
Massport would undertake a site selection process to locate suitable restoration sites , including:

- Aerial photo interpretation and water quality data analysis;
- Evaluation of sites within the Boston Harbor Watershed and estuaries along the South Shore, using the Short model,<sup>30</sup> adapted to a GIS analysis;
- Agency feedback on potential sites;
- Field Investigations:
  - Mapping of each site using side-scan sonar and bathymetry data,
  - Three transects at each location running parallel to the shore (approximately 200 feet apart and 2,000 feet in length),
  - Water depth sampling using Secchi disk, and limited (18, three per site) Ponar grab substrate samples taken at approximately 500-foot intervals along each transect and lab-analyzed to determine grain size and composition,
  - Recording of each sample using GPS and filmed using a submerged video camera, *and*
  - Characterization of the substrate conditions and presence of eelgrass using Side-scan sonar along each transect.





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29 A. S. Leschen, et. al., "Successful Eelgrass (*Zostera marina*) Restoration in a Formerly Eutrophic Estuary (Boston Harbor) Supports the Use of a Multifaceted Watershed Approach to Mitigation Eelgrass Loss. *Estuaries and Coasts*, DOI 10.1007/s12237-010-9272-7. February 23, 2010.

30 Short, F.T., and D.M. Burdick. 1996. *Quantifying Eelgrass Habitat Loss in Relation to Housing Development and Nitrogen Loading in Waquoit Bay, Massachusetts*. *Estuaries* 19: 730–739.



**Legend**

-  Wildlife Hazard Area
-  DEP-Mapped Eelgrass
-  Town Boundaries
-  Open Water



Logan RSA

**Figure 5-3**  
**Potential Sites for Eelgrass Restoration**

Source: MassGIS  
Vannasse Hangen Brustlin, Inc.



DEP, in their letter dated June 22, 2010 (see Appendix 4, Agency Correspondence) provided a detailed list of information required in the final eelgrass mitigation plan. Massport will develop this information and provide it in the detailed mitigation plan provided in the permit applications and the Final EA/EIR

- Test-planting - test-plots planted at locations that rate well in the initial site-selection evaluation, per DMF guidance:
  - Planting small patches of 1-9 m<sup>2</sup> using similar methods and during the same season is proposed for the large scale restoration project,
  - Initial monitoring within 1-10 days after transplanting to obtain a baseline shoot density of actual mean numbers of shoots per 0.25 m<sup>2</sup> in each plot, as well as the length and width (areal cover) of planted plots.
  - Monitoring for survival, shoot densities and areal cover, one month after planting and at pre-determined intervals for one year to ensure that the site can support eelgrass through different seasonal conditions (i.e. summer boating and winter ice scour).

A modification of the Short et al. 2002 site selection model<sup>31</sup> would be used to identify potential sites, based on transplant suitability rating. Data inputs to the site selection model would include sediment characteristics, wave exposure, depth, and water quality. Massport would utilize DMF's guidance regarding sediment grain size at a potential transplant sites; targeting sediment characterized as muddy sand with less than 37 percent silt/clay (Leschen et al. 2009) or a range below 70 percent silt/clay, if the latter conditions do not exist.<sup>32</sup>

### Eelgrass Restoration Methodology

Massport proposes restoration through a combination of transplanting from the RSA site and/or seeding. Transplanting eelgrass that would be lost due to the proposed Project would remove plants from the construction zone prior to impact, allowing their re-establishment at one (or more) of the selected sites. Combining seeding at the transplanted site, as well as another viable site, would help to increase restoration success. Proposed restoration techniques would include harvesting a small clump of 5-10 eelgrass plants with intact rhizomes from the impact site using a small garden trowel and transplanting eelgrass using a combination of techniques:

- Planting in plots arranged in a checkerboard pattern with 50 shoots planted in each ¼ meter square planting unit, alternating with unplanted units of the same size (using stakes to mark planting locations); and
- Seeding: divers bring premeasured quantities of seeds to the bottom in small plastic bags and scratch seeds into the sediment using a small garden claw at two of the sites; or seeds are broadcast from a boat.

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31 A. S. Leschen, et. al., "Successful Eelgrass (*Zostera marina*) Restoration in a Formerly Eutrophic Estuary (Boston Harbor) Supports the Use of a Multifaceted Watershed Approach to Mitigation Eelgrass Loss. *Estuaries and Coasts*, DOI 10.1007/s12237-010-9272-7. February 23, 2010.

32 *ibid*,



Success criteria will be established through the permitting process. Massport recommends that the success criteria be defined as achieving at least 1.5 acres of high-density eelgrass (60-80 percent cover) after 3 years. A reference site within the existing eelgrass bed adjacent to Logan will be monitored for comparison to the restoration site(s). A five-year restoration monitoring effort would follow the DMF *Restoration and Monitoring Technical Guidelines*,<sup>33</sup> and would include:

- Calculation of the percentage of planting units (clumps or horizontal rhizomes) that survived vs. the total planted;
- Shoot density (number of shoots vs. baseline shoot density);
- Percent cover;
- Canopy height (80 percent of the average of the tallest leaves);
- Presence and number of reproductive shoots; and
- Areal extent of the bed (determined as the total area of continuous eelgrass and patches at the project site).

#### 5.2.2.4 Mitigation Costs

The approximate range of eelgrass mitigation costs include:

- Re-establishment (at a 3:1 ratio, 4.2 acres): estimated at approximately \$1,000,000 to \$1,200,000 (including a contingency)
  - Site Selection: approximately \$35,000
  - Restoration: \$840,000 (assuming \$200,000 per acre for transplant);
  - Monitoring: \$125,000 total at \$25,000 per year (assumes a 5-year monitoring program on one site with a single yearly monitoring event by divers, sample processing and yearly report);
  - Conservation Moorings: estimated cost of full replacement is approximately \$2,000 to 2,500 per mooring (based on MBP conservation mooring pilot project).
- Out-of-kind Mitigation (if required):
  - Funding a research program to address the causes of eelgrass decline (cost not yet established);
  - Habitat Mapping: approximately \$80,000 total (based on MBP Digital Coastal Habitat Atlas budget); and
  - Constructing an artificial reef (cost not yet established).

Prior to developing a Final EA/EIR, Massport would work with the resource agencies to select potential restoration sites and to establish a restoration plan. Massport assumes that the cost commitment would be the

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33 Division of Marine Fisheries. *Eelgrass (Zostera marina) Restoration and Monitoring Technical Guidelines*. September 25, 2009.



cost of re-establishment (4.2 acres) of eelgrass, totaling approximately \$1.0 million. These funds would be used to support the mitigation package elements included in the final mitigation plan.

### 5.2.3 Land Containing Shellfish

According to the MA WPA, Land Containing Shellfish is found within other coastal wetlands resources subject to the jurisdiction of the MA WPA and it is a significant interest identified in the MA WPA. The shellfish species that are characteristic of Land Containing Shellfish according to the MA WPA include bay scallop (*Argopecten irradians*); blue mussel (*Mytilus edulis*); ocean quahog (*Arcydia 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*). Land Containing Shellfish is significant to the protection of land containing shellfish and the protection of marine fisheries when it has been identified and mapped by the local conservation commission or the DEP in consultation with the DMF or in consultation with the local shellfish constable or the DEP.

The proposed RSA improvements would affect Land Containing Shellfish identified in the ends of Runway 33L and Runway 22R RSA. Approximately 450 to 1,100 square feet would be lost from pile or caisson installation, and approximately 4,320 square feet would also be lost to construction of the emergency access ramps on either side of the proposed Runway 33L deck. Approximately 62,370 square feet of Land Containing Shellfish would be affected due to the construction of the ISA at the Runway 22R end. This shellfish bed is rarely, if ever, harvested due to the low density of soft shell clams.

The MEPA Certificate included a number of specific requirements for shellfish mitigation to be addressed in the Draft EA/EIR. These requirements include:

- Explain any proposed monitoring program and describe any habitat enhancements; and
- Identify potential mitigation measures and areas in consultation with the National Marine Fisheries Service, DMF, and the City of Boston.

#### 5.2.3.1 Avoidance

An extensive alternatives analysis was undertaken, as described in Chapter 2, *Alternatives*, of this Draft EA/EIR and in Appendix 3, *Alternatives Analysis and FAA Determinations*. The only alternative that would not impact wetlands or further reduce safety at Logan Airport is the No-Action Alternative. The No-Action Alternative is not an acceptable alternative because it does not meet the requirements of the 2005 federal mandate to increase the safety of RSAs at Logan Airport by 2013. Leaving the Runway 33L RSA or Runway 22R RSA in their current configurations would not increase the safety for aircraft and their passengers in emergency situations such as an overrun or undershoot situation.

#### 5.2.3.2 Minimization

Minimization measures were incorporated into the design process for both the proposed Runways 33L and Runway 22R RSA improvements. Massport has attempted to minimize impacts to the extent practicable, and will continue to work to minimize these impacts as the design of the safety improvements and agency review





progresses. The Secretary’s Certificate required that Massport evaluate whether these impacts could be minimized by design modifications.

**Runway 33L**

The Proposed Action for the proposed Runway 33L RSA improvements has the smallest footprint on a pile-supported deck that still provides the degree of safety consistent with the FAA guidelines. Table 5.2-4 illustrates how impacts to Land Containing Shellfish were avoided via the alternatives screening process.

**Table 5.2-4 Runway 33L RSA Land Containing Shellfish Minimization**

Preliminary Alternative <sup>1</sup>	Impacts to Land Containing Shellfish (sq. ft.)
Alternative 1 – 1,000 -foot RSA on Solid Fill	537,400
Alternative 2 – 600-foot long by 500-foot wide RSA with EMAS on Solid Fill	200,940
Alternative 3 – 600-foot long by 400-foot wide RSA with EMAS on Deck	153,341
Alternative 4 – 600-foot long by 300-foot wide RSA with EMAS on Deck	123,080

<sup>1</sup> The alternatives analysis reviewed different design options for each alternative. The greatest wetlands impact of those design options is displayed in the table.

Massport has eliminated Preliminary Alternatives 1 through 3 from further analysis on the basis that these would have the greatest potential impact to Land Containing Shellfish and other environmental resources. The most significant minimization strategy is the elimination of a solid fill structure and enhancing the existing EMAS bed which has the result of reducing the footprint and the resultant direct wetlands impacts. The solid fill structure would have greater impacts than the proposed pile-supported deck.

The proposed safety improvement minimizes impacts to Land Containing Shellfish by:

- Utilizing an RSA with EMAS rather than a full 1,000-foot long RSA;
- Selecting a deck and pile-supported structure rather than a solid fill structure;
- Minimizing the width of the RSA in compliance with FAA guidelines; and
- Providing additional habitat for sessile benthic organisms, possibly increasing habitat diversity, through the installation of pilings.

**Runway 22R**

Table 5.2-5 illustrates how impacts to Land Containing Shellfish were avoided through the Runway 22R alternatives screening.



Table 5.2-5 Runway 22R ISA Land Containing Shellfish Minimization

Preliminary Alternative <sup>1</sup>	Impacts to Land Containing Shellfish (sq.ft.)
Alternative 1A and 2A with 50-Knot Arrestment Speed	72,414
Alternative 1B and 2B with 60-Knot Arrestment Speed	158,394
Alternative 1C and 2C with 70-Knot Arrestment Speed	227,567
Inclined Safety Area	62,370

<sup>1</sup> Alternative 1 and 2 evaluated solid fill structures and pile-supported decks for incremental EMAS arrestment speeds. The values shown in the table correspond to the impact of a solid fill structure.

In the alternatives analysis, Massport considered the use of a solid fill structure and a pile-supported structure to achieve the level of safety required by the FAA. The solid fill structure would require approximately 272,760 square feet to be covered in fill to support the new safety area, of which approximately 250,580 square feet of fill would be in Boston Harbor, therefore this Alternative was dismissed.

The Proposed Action further reduces the impacts to Land Containing Shellfish. The footprint of the proposed ISA does not extend into Boston Harbor. It only extends to the mean lower low water line; a footprint that is significantly less than the other alternatives considered. It does not require the construction of a structure in the water. It also does not require the installation of ladders or emergency access ramps as the gradual slope of the inclined safety area can be accessed by first responders.

### 5.2.3.3 Compensatory Mitigation

The proposed Project will unavoidably alter Land Containing Shellfish (the overlay of the Coastal Beach and Land Under the Ocean), primarily at the Runway 22R ISA. Land Containing Shellfish at Logan and other Boston Harbor locations has been mapped by the DMF as a conditionally restricted designated shellfish growing area. The densities of soft-shell clams are very low and concentrated in the eastern portion of the ISA and only two market size individuals (minimum size 2 inches) were observed in a survey, as described in Chapter 3, *Affected Environment*.

Shellfish habitat would still be available after construction of the proposed Runway 33L RSA improvements. Installing pilings would result in the minor loss of natural substrate, and scour could alter the relief elevation and the distribution of the sediment grain size. The pilings, by providing additional habitat for sessile benthic organisms, could increase habitat diversity. The direct impact resulting from the installation of the piles is expected to be less than 1,500 square feet depending on pile size and configurations. The pilings beneath the high water mark would provide substrate for attached and mobile intertidal invertebrates including blue mussels. Approximately 62,370 square feet of Land Containing Shellfish mapped by the DMF as conditionally restricted designated shellfish growing area, and includes all of the Salt Marsh, Coastal Beach/Tidal Flat, and Land Under the Ocean that would be affected to construct the proposed Runway 22R ISA.

Shellfish mitigation for the RSA Improvements Project would likely consist of an in-lieu funding agreement with the DMF for implementation of measures to benefit the local population of soft shell clams.



#### 5.2.3.4 Cost

Mitigation costs to restore/replace shellfish habitat for the Runway 33L RSA and Runway 22R ISA improvements are currently being determined in coordination with the DMF.

#### 5.2.4 Water Quality

This Section describes proposed mitigation measures to protect post-construction water quality conditions, as required by the NEPA regulations addressing water quality<sup>34</sup> and the MEPA Certificate.

Standard 7 of the Massachusetts Stormwater Regulations (the Redevelopment Standard) requires that redevelopment projects result in an improvement over the existing conditions. In order to comply with this portion of the regulations, proposed and existing catch basins within the Runway 33L project area that are altered during construction will include deep sumps and hoods, providing additional measures of sediment removal and protection against discharge of spilled oil or floatable debris. Frequent sweeping of the paved portions of the Project area would further reduce the quantity of sediments that are available for transport by stormwater runoff. A new stormwater treatment inlet (Stormceptor or equivalent) would be installed at Outfall A-30 or A-31 to treat runoff from the relocated perimeter road and Taxiway C1. The estimated mitigation cost for water quality impacts is approximately \$60,000.

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### 5.3 Construction-Period Mitigation Measures

The MEPA Certificate included specific requirements regarding construction-period mitigation to be addressed in the Draft EA/EIR. These requirements include:

- Analyze feasible measures that can avoid or eliminate construction period impacts, particularly short-term increases in noise (from construction equipment) and air emissions from construction equipment;
- Present a draft Construction Management Plan;
- Include a transportation access plan;
- Propose a comprehensive Soil Erosion and Sediment Control Plan to minimize temporary impacts; and
- Discuss how construction would be undertaken in a way that minimizes temporary impacts to coastal resources and benthic organisms.

This section addresses the requirements of the Certificate and includes a description of proposed construction methods to minimize impacts to resources.

#### 5.3.1 Eelgrass Habitat

Potential construction impacts associated with the Runway 33L RSA improvements include damage to the eelgrass bed outside of the deck footprint due to barge activity. Massport will include specifications in the construction contract that minimize this potential damage, including restricting barge movements to designated

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<sup>34</sup> FAA. *Airport Environmental Handbook FAA Order 5050.4B* and *FAA Environmental Impacts: Policies and Procedures (FAA Order 1050.1E)*.



construction corridors that avoid travel over the eelbed, and restricting barge anchoring to the deck footprint to the extent practicable.

### 5.3.2 Water Quality

Potential construction impacts associated with the construction of the proposed RSA improvements 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. The proposed Runway 33L and the Runway 22R safety improvements are both subject to the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (disturbance of > 1 acre) and will comply with all requirements, as described in Chapter 6, *Regulatory Compliance*. Table 5.4-2 provides an overview of all water quality-related mitigation commitments.

#### 5.3.2.1 Runway 33L

The majority of the proposed Runway 33L RSA improvements will be constructed from barges and other water-based craft. The use of this equipment will limit the amount of disturbance to the areas immediately affected by the insertion of driven piles or installation of caissons for the pile-supported deck, the insertion of driven piles for the localizer deck, and additional piles for Category III Instrument Landing System (Cat III ILS) and a High-intensity Approach Lighting System with Sequenced Flashing Lights (ALS-F-2).

The spuds that barges deploy while operating (devices similar to legs lowered into the waterway floor to anchor the structure) may disturb benthic sediments in the water column and temporarily increase turbidity in the vicinity of operations. Installation and subsequent removal of the temporary piles used to hold templates for pile-driving operations similarly may release sediments (Pile/Deck Options 1, 2, and 3). Auguring caissons may release a percentage of the excavated sediments and a percentage of the drilling mud used during the drilling process (Pile/Deck Options 5 and 6). Prior to construction of the RSA deck, a portion of the existing light pier must be removed and a temporary lighting system installed. These activities may result in additional sediment disturbance during the removal of the existing timber deck and piles. Construction of the pile caps and installation of the deck may result in accidental releases of concrete or grout into the water, runoff of concrete curing water, and instances of debris being dropped in the water (all construction options). The following spill prevention measures would be deployed throughout the construction phase in order to prevent pollution from construction equipment or material:

- Installing protective measures, such as silt curtains/semi-permanent (overnight) debris booms, particularly around pile bents, secondary boom use around the excavation barge for additional containment, and silt fencing to prevent sediment from impacting water quality;
- Collecting and pumping slurry and/or silty water to a containment area on the barge and the placement of sediment on sheets of plastic film to contain runoff; and
- Managing contaminated materials encountered during construction according to the Massachusetts Contingency Plan (310 CMR 40.00) and Massachusetts General Law Chapter 21E; Oil and Hazardous Materials Release Prevention and Response Act.



The materials that will be used to build the RSA, perimeter road, and Taxiway C1 connector improvements include cement concrete, bituminous concrete, and steel. These materials would not impact water quality.

The following erosion and sedimentation controls would be used during the upland earthwork and construction phases of the Runway 33L RSA improvements. Proposed controls are provided as recommendations for the site contractor and do not constitute or replace the final Stormwater Pollution Prevention Plan that must be fully implemented by the Contractor and owner in Compliance with USEPA NPDES regulations and with Massport's contractor requirements.

#### **Hay Bale Barriers**

Hay bale barriers will be placed around upland work areas to trap sediment transported by runoff before it reaches the drainage system or leaves the construction site. Bales will be set at least four inches into the existing ground to minimize undercutting by runoff.

#### **Silt Fencing**

Hay bale barriers will be backed up with silt fencing. This semi-permeable barrier made of a synthetic porous fabric will provide additional protection. The silt fences and hay bale barrier will be replaced as determined by periodic field inspections.

#### **Catch Basin Protection**

Existing catch basins will be protected with hay bale barriers (where appropriate) or silt sacks throughout construction.

#### **Slope Stabilization**

Stabilization of open soil surfaces will be implemented within 14 days after grading or construction activities have temporarily or permanently ceased. Slope stabilization will be used to minimize erosion on slopes of 3:1 or flatter.

#### **Maintenance**

The contractor or subcontractor will be responsible for implementing each control shown on the Sedimentation and Erosion Control Plan. In accordance with USEPA regulations, the contractor must sign a copy of a certification to verify that a plan has been prepared and that permit regulations are understood. The on-site contractor will inspect all sediment and erosion control structures periodically and after each rainfall event. Records of the inspections will be prepared and maintained on-site by the contractor. The contractor will make the following adjustments, as necessary:

- Silt shall be removed from behind barriers if greater than 6 inches deep or as needed;
- Damaged or deteriorated items will be repaired immediately after identification;
- The underside of hay bales should be kept in close contact with the earth and reset as necessary;
- Sediment that is collected in structures shall be disposed of properly and covered if stored on-site; and



- Erosion control structures shall remain in place until all disturbed earth has been securely stabilized, disturbed areas shall be regraded and stabilized as necessary.

To reduce the potential for any impact to water quality during dredging or excavation, the soils to be excavated and placed will both be pre-characterized through soil sampling. Soil sampling will be completed to pre-characterize the material that will be dredged or excavated in order for Massport to understand the soil make-up. Massport has identified three licensed disposal facilities where the materials can be taken based on the pre-characterization. Material would be dredged or excavated from the shoreline and placed directly in trucks that would take the materials to one of the disposal facilities. There would be no storage of materials onsite. If the pre-characterization shows that additional preventative measures need to be taken to minimize any potential for a pollution release during construction or excavation or for pollutants reentering the water column, those measures will be in accordance with the NPDES permit process under the CWA, the Resource Conservation and Recovery Act (RCRA), Occupational Safety and Health Administration (OSHA) regulations, and the Massachusetts Contingency Plan (MCP).

#### 5.3.2.2 Runway 22R

Water quality in the vicinity of the proposed Runway 22R enhancement could be temporarily affected by short-term construction activities, particularly due to the excavation and dredging required to remove unsuitable substrate materials and to place new stone fill. The work will consist of the excavation and removal of soft organic soils in the intertidal and coastal bank areas and replacement with crushed stone/granular soil to provide a stable base for the slope. These activities may result in a temporary increase in suspended sediments and increased turbidity in the immediate vicinity of the proposed work. Any turbidity created would be quickly dispersed by the tides; therefore, the effects from temporary construction-related turbidity are negligible.

The first step in the construction sequence would be to protect the perimeter of the inclined safety area by placing gabions (partitioned, wire fabric containers filled with stone to form flexible, permeable structures for earth retention). The gabions would be wrapped with filter fabric during construction to also act as a barrier to sediment releases and reduce resulting turbidity. The majority of the excavation would occur in the intertidal areas to remove soft organic soils and replace them with crushed stone/granular soil to provide a stable base for the slope. Excavation within the intertidal zone would be completed during periods of low tide. The area will be surrounded by a siltation curtain/ debris boom to contain and minimize any debris or siltation. Construction completed at the Runway 22R end would follow a comprehensive Soil Erosion and Sediment Control Plan to minimize temporary impacts.

#### 5.3.3 Surface Transportation

Runway 33L RSA improvements will be constructed primarily from the water, which reduces the number of construction vehicles accessing the airport and surrounding roadways. In addition, Runway 33L and Runway 22R are not likely to be under construction simultaneously, which limits the amount of concurrent construction vehicle access, as shown in Chapter 4, *Environmental Consequences*. The Airport roadways can support the anticipated construction-related traffic, therefore, no mitigation is proposed and no transportation access plan is proposed. Massport requires all contractors to limit construction-related traffic to access and egress through the North Gate via only state and federal highways and the Airport roadway network prohibiting



construction-related traffic on the local East Boston roadways. Massport also requires contractors to implement a construction worker vehicle trip management, including requiring contractors to provide off-airport parking, use high-occupancy vehicle transportation modes for employees, and join the Logan Transportation Management Association (TMA).

#### 5.3.4 Noise

Sound levels from activities associated with the construction of the proposed Runway 33L or Runway 22R RSA improvements comply with the City of Boston's noise criteria, therefore no noise mitigation is required. However, construction equipment would use noise-reduction measures as listed in Table 5.4-2.

#### 5.3.5 Air Quality

The proposed safety improvements will not change the operational levels at Logan Airport nor alter ground-based aircraft movements (i.e., aircraft taxi and delay periods). Therefore, operational emissions will not change due to this project. 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, as described in Chapter 4, *Environmental Consequences*. The project would not exceed *de minimis* thresholds under the Clean Air Act and would not impact air quality. As part of its project approvals process, Massport requires all contractors to adhere to certain construction guidelines that relate to:

- Construction vehicle/equipment anti-idling;
- Retrofitting of appropriate diesel construction equipment with diesel oxidation catalyst and/or particulate filters; and
- Construction worker vehicle trip management, including requiring contractors to provide off-airport parking, use high-occupancy vehicle transportation modes for employees, and join the Logan TMA.

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### 5.4 Proposed Section 61 Findings

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 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.



### 5.4.1 Project Description

The proposed RSA Improvements Project includes two separate elements: Runway Safety Area (RSA) improvements at the Runway 33L end, consisting primarily of a larger EMAS bed on a pile-supported structure; and an Inclined Safety Area (ISA) at the Runway 22R end, similar to the previously-permitted Runway 22L RSA enhancements.

#### 5.4.1.1 Runway 33L

The Proposed Action for Runway 33L (Preliminary Alternative 4) is construction of a 600-foot long RSA with EMAS on a 300-foot wide pile-supported deck (Figure 2-5). The Proposed Action also includes moving the existing offset localizer to a new pile-supported deck at the end of the RSA, and upgrading the approach light system to a Cat III ILS and ALSF-2. Part of the existing timber light pier (approximately 560 feet) would be removed and the approach lights would be incorporated into the new deck.

While the Runway 33L Proposed Action would result in impacts to environmental resources, it would minimize unavoidable impacts to the all environmental resources including Coastal Bank, Coastal Beach, Land Under the Ocean, and Submerged Aquatic Vegetation (eelgrass). This alternative would also maintain runway utility and capacity, and would provide protection and functionality near equivalent to a RSA that fully meets the design criteria.<sup>35</sup> This is the only alternative that the MEPA Certificate required be carried forward in the Draft EIR. Massport and FAA retained this alternative on the basis that it was the alternative proposed by the FAA in its determination based on environmental impacts and cost.

The Proposed Action for Runway 33L would extend the length of the existing RSA from 187.5 feet to 600 feet. The new pile-supported section of the RSA would have a width of 300 feet. While the RSA would not fully comply with the current design criteria in the FAA's Airport Design Advisory Circular for RSAs<sup>36</sup> in terms of width, the FAA determined that the risk of an undershoot occurring outside of the 300-foot width is reduced by centerline guidance of the existing CAT II ILS and MALS visual aid on the runway.<sup>37</sup> The FAA strongly rejected consideration of any length of less than 600 feet "since the marginal costs and environmental impacts were not judged significant enough to offset the compromises in RSA function"<sup>38</sup>

The environmental consequences of five construction options were evaluated in Chapter 4, *Environmental Consequences*. The deck would be the same size (approximately 300 feet wide and 470 feet long) for each option, but with different sizes, numbers and arrangements of supporting pilings. The construction options, as described in detail in Chapter 2, *Alternatives*, are:

- Option 1: 20-inch diameter piles with 12-foot bent spacing totaling 442 vertical piles and 48 batter piles;

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35 Federal Aviation Administration, *Runway Safety Area Determination: Runway 15R-33L General Edward Lawrence Logan International Airport East Boston, Massachusetts*, January 30, 2009, p. 6.

36 United States Department of Transportation, Federal Aviation Administration, Advisory Circular (AC) 150/5300-13, Airport Design, Changes 1 through 15, December 31, 2009.

37 Federal Aviation Administration, *Runway Safety Area Determination: Runway 15R-33L General Edward Lawrence Logan International Airport East Boston, Massachusetts*, January 30, 2009, p. 6.

38 Federal Aviation Administration, *Runway Safety Area Determination: Runway 15R-33L General Edward Lawrence Logan International Airport East Boston, Massachusetts*, January 30, 2009, p. 5.





- Option 2: 20-inch diameter piles with 70-foot bent spacing totaling 182 vertical piles and 48 batter piles;
- Option 3: 20-inch diameter piles with 100-foot bent spacing totaling 155 vertical piles and 48 batter piles;
- Option 5: 48-inch drilled caissons with 70-foot bent spacing: totaling 112 vertical caissons; and
- Option 6: 48-inch drilled caissons with 100-foot bent spacing totaling 80 vertical caissons.

#### 5.4.1.2 Runway 22R

The Runway 22R Alternative 4 - ISA would enhance the existing RSA by constructing an inclined safety area at the end of Runway 22R. This alternative was advanced to the conceptual design phase because it would enhance the existing RSA and rescue access in the event of an emergency, at a construction cost which appears to be feasible.

The ISA would not increase the arrestment speed of the existing 60 psi strength EMAS bed, which meets the current minimum FAA Design Standards for overrun protection for the design aircraft (Boeing 757-200), but would provide a smoother transition into the water for any aircraft that exits the runway at a speed greater than 40 knots. There is a substantial elevation change and slope gradient from the end of the existing EMAS bed down to the mean low water elevation. An ISA would re-grade this area to provide a more constant slope in the event that the aircraft exited the EMAS bed and entered the water, and would reduce the potential for loss of life and damage to any aircraft that fails to stop within the existing EMAS bed. It would also significantly enhance access by rescue personnel as well as egress by passengers.

The proposed ISA would be similar to the ISA successfully constructed at the Runway 22L end. It would require gravel fill to be placed approximately 190 feet north from the existing EMAS bed and would be graded over the full width of the extended safety area down to the mean lower low water elevation.<sup>39</sup> Emergency access ramps would not be required because the ISA would provide first responders with access between the water and the airfield. The perimeter road would not be relocated. Figure 2-10 and Figure 2-11 depict the Proposed Action.

#### 5.4.2 History of MEPA Review

In June 2009, Massport submitted an Environmental Notification Form (ENF) to the Massachusetts Executive Office of Energy and Environmental Affairs (EOEA Number 14442), per the Massachusetts Environmental Policy Act 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 RSAs at the ends of Runway 33L and Runway 22R consistent with FAA's orders and regulations.<sup>40</sup>

The project Environmental Notification Form (ENF) was circulated to interested parties and a Public Notice of Environmental Review was published on July 8, 2009, in accordance with MEPA regulations 301 CMR 11.05 and

<sup>39</sup> Mean Lower Low Water (MLLW) = the average daily lower low water level of the tide at a location. Some locations have diurnal tides--one high tide and one low tide per day. At most locations, there are semidiurnal tides--the tide cycles through a high and low twice each day, with one of the two high tides being higher than the other and one of the two low tides being lower than the other.

<sup>40</sup> Letter from the U.S. Army Corps of Engineers to Stewart Dalzell, Massport. Dated March 12, 2010.



301 CMR 11.15. A public scoping meeting was held on July 30, 2009, to solicit public input on development of the Draft EA/EIR scope.

The Secretary issued a Certificate on the ENF on August 14, 2009, confirming the need to prepare an Environmental Impact Report (EIR). The Certificate approved coordinated submission of required documentation under NEPA. The Secretary stated that “the planning for this project would be best served by a coordinated review and the submission of a single set of documents to satisfy the requirements of both MEPA (Section 11.09(4)(c)) and NEPA.”

### 5.4.3 Related Permits and Approvals

In addition to compliance with the National Environmental Policy Act (NEPA) and the Massachusetts Environmental Policy Act (MEPA), a number of local, state, and federal permits are needed for the proposed Project, as listed in Table 5.4-1. Permitting for both the Runway 33L and Runway 22R RSA improvements would be similar since generally the same resources would be affected. The Runway 33L and Runway 22R RSA improvements could be permitted separately since each is a single and complete project that would be constructed independently of the other and possibly at different times. However, because of the similar elements of both projectd, Massport has initiated MA WPA review as a single project. A Notice of Intent (NOI) was submitted to the Boston Conservation Commission (BCC) on January 20, 2010 to initiate the MA WPA Variance process. Consistent with the MA WPA regulations, the BCC was required to deny the proposed Project in their Order of Conditions (OOC). The BCC procedural denial was then followed by Massport’s request to the DEP Northeast Regional Office for a Superseding OOC. On March 18, 2010, DEP denied the proposed Project in its Superseding Order, consistent with the MA WPA regulations. Massport submitted its request for a Variance to the DEP Commissioner on March 31, 2010. Chapter 4, *Environmental Consequences*, provides additional project details relative to the project impacts. On June 22, 2010 DEP provided a letter identifying specific additional information required for the Variance application (see Appendix 4, *Agency Correspondence*).

**Table 5.4-1 Required Permits and Approvals**

Issuing Agency	Approval or Permit
U.S. Army Corps of Engineers	Clean Water Act, Section 404 and Section 10 Individual Permit
U.S. Environmental Protection Agency Region I	National Pollutant Discharge Elimination System, Construction General Permit
Massachusetts Office of Coastal Zone Management	Coastal Zone Management, Federal Consistency Determination
Massachusetts Executive Office of Energy and Environmental Affairs	Public Benefits Determination
Massachusetts Department of Environmental Protection	Massachusetts Wetlands Protection Act Variance Massachusetts Public Waterfront Act Variance/Approval (Chapter 91) Clean Water Act, Section 401 Water Quality Certificate Section 61 Finding



#### 5.4.4 Overview of Project Impacts and Mitigation Measures

The proposed RSA Improvements Project will result in impacts to Coastal Bank, Coastal Beach, Land Under the Ocean, Salt Marsh, Land Containing Shellfish, and Submerged Aquatic Vegetation (eelgrass). Massport has proposed compensation for impacts to wetland resources: salt marsh, submerged aquatic vegetation, and land containing shellfish. In the alternative, Massport has also committed to providing out-of-kind mitigation that would enhance research and mapping efforts of state and federal resource agencies, as discussed in previous sections. Temporary impacts to environmental resources would also be mitigated through contractor equipment specifications, as well as soil and erosion controls to prevent adverse water quality impacts.

##### 5.4.4.1 Permanent Impacts

Permanent impacts resulting from construction of the RSA Improvements Project would be mitigated, as described in Section 5.2 and summarized in Table 5.4-2. 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, coastal resources, wild and scenic rivers, farmland, natural resources, light emissions, and energy supply. Therefore, mitigation is not required for these resources.

##### 5.4.4.2 Construction Impacts

Temporary, short-term impacts from construction activities would be mitigated to the extent practicable (see Table 5.4-2). 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 150/5370-10 (latest edition), Standards for Specifying Construction of Airports*.<sup>41</sup> 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.

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<sup>41</sup> Advisory Circular 150/5370-10, Standards for Specifying Construction of Airports.



Table 5.4-2 Proposed Project Mitigation Commitments

Environmental Categories	Runway End	Mitigation Measure	Approximate Cost	Implementation Schedule	Implementation Responsibility
Eelgrass	33L	A mitigation program that will combine replacing lost eelgrass area and function by creation of new eelgrass, at a 3:1 replacement loss ratio, out-of-kind mitigation, or in-lieu payments.	\$1.0 - \$1.2 million	During Construction	Massport
		Implement sedimentation control measures.	TBD	During Construction	Massport
		Restrict barge movement to designated construction corridors outside of the eelgrass bed.	TBD	During Construction	Massport
Land Containing Shellfish	Both	Provide in-lieu fee for restoration.	\$TBD	During Construction	Massport
Water Quality		Install stormwater management treatment structure at either Outfall 30 or Outfall 31 at the Runway 33L end	\$60,000	During Construction	Massport
		Develop and implement a comprehensive Soil Erosion and Sediment Control Plan in accordance with NPDES and DEP standards.	TBD	During Construction	Massport
		Apply water to dry soil to prevent dust production.	TBD	During Construction	Massport
		Stabilize any highly erosive soils with erosion control blankets and other stabilization methods, as necessary.	TBD	During Construction	Massport
		Use sediment control methods (such as silt fences and hay bales), during excavation to prevent silt and sediment entering the stormwater system and waterways.	TBD	During Construction	Massport
		Maintain equipment to prevent oil and fuel leaks.	TBD	During Construction	Massport
		Silt curtains/semi-permanent (overnight) debris booms and secondary boom use around the excavation barge for additional containment, and silt fencing.	TBD	During Construction	Massport
Collect and pump of slurry and/or silty water to a containment area on the barge and the placement of sediment on sheets of plastic film to contain runoff.	TBD	During Construction	Massport		
Salt Marsh	22R	Restore/create new salt marsh at a 2:1 replacement/loss ratio.	\$600,000 to \$1.0 million	During Construction	Massport
		Monitor compensatory Salt Marsh for success and invasive plant species, and implement an invasive species control plan.	\$125,000 (\$25,000 per year)	5-year period following construction	Massport
		Implement erosion and sedimentation control measures according to the Soil Erosion and Sediment Control Plan.	TBD	During Construction	Massport



Table 5.4-2 Proposed Project Mitigation Commitments (continued)

Environmental Categories	Runway End	Mitigation Measure	Approximate Cost	Implementation Schedule	Implementation Responsibility
Noise	Both	Maintain mufflers on construction equipment.	TBD	During Construction	Massport
		Keep truck idling to a minimum in accordance with MA anti-idling regulations.	TBD	During Construction	Massport
		Fit any air-powered equipment with pneumatic exhaust silencers.	TBD	During Construction	Massport
		Do not allow nighttime construction.	TBD	During Construction	Massport
Traffic	Both	Limit construction traffic to federal or state highways, restricting use of any East Boston roadways by construction vehicles.	TBD	During Construction	Massport
		Implement construction worker vehicle trip management, including requiring contractors to provide off-airport parking, use high-occupancy vehicle transportation modes for employees, and join the Logan TMA.	TBD	During Construction	Massport
Air Quality	Both	Keep truck idling to a minimum in accordance with MA anti-idling regulations.	TBD	During Construction	Massport
		Retrofit appropriate diesel construction equipment with diesel oxidation catalyst and/or particulate filters.	TBD	During Construction	Massport
		Implement construction worker vehicle trip management, including requiring contractors to provide off-airport parking, use high-occupancy vehicle transportation modes for employees, and join the Logan TMA.	TBD	During Construction	Massport
Hazardous Materials and Solid Waste	Both	Pre-characterize any materials that would be dredged or excavated from the Project areas to determine course of action for removal.	TBD	During Construction	Massport

TBD: To be Determined

#### 5.4.5 Proposed Section 61 Findings

Proposed Section 61 Findings for the Project have been prepared to comply with the requirements of Massachusetts General Laws, Chapter 30, Section 61, and MEPA regulations at 301 CMR 11.07(6)(k), which require state agencies and authorities to review, evaluate, and determine the impacts on the natural environment of all projects or activities requiring permits issued by the state. State agencies are also asked to issue findings describing environmental impacts and to certify that all feasible measures have been taken by Massport to avoid or minimize these impacts. Section 61 Findings will be required from DEP with responsibilities for issuing the following permits, and from Massport for funding the construction:

- Section 401 Water Quality Certification;



- Wetlands Protection Act permit Variance; and
- Massachusetts Public Waterfront Act Variance.

The language in the following paragraphs is a proposed Section 61 Finding that extends to cover all potential impacts of the project.

Project Name: Boston-Logan International Airport Runway Safety Area  
Improvements Project  
Project Location: Boston-Logan International Airport, East Boston,  
Massachusetts  
Project Proponent: Massachusetts Port Authority  
EOEA Number: 14442

The potential environmental impacts of the project have been characterized and quantified in the Draft EA/EIR, which are incorporated by reference into this Section 61 Finding. Throughout the planning and environmental review process, Massport has been working to develop measures to mitigate significant impacts of the proposed safety improvements. With the mitigation proposed and carried out in cooperation with state agencies, [Agency] finds that there are no significant unmitigated impacts.

Massport has prepared a Table of Mitigation (Table 5.4-2 of the Draft EA/EIR) that specify, for both temporary and permanent impact, the mitigation that Massport will provide.

Therefore, [Agency] having reviewed the MEPA filings for the Boston-Logan International Airport Runway Safety Area Improvements Project, including the mitigation measures summarized in Chapter 5 of the Draft EA/EIR, finds pursuant to M.G.L. C. 30, §61 that, with the implementation of these mitigation measures, all practicable and feasible means and measures will have been taken to avoid or minimize potential damage from the project to the environment. In making this finding, [Agency] has considered reasonably foreseeable climate change impacts, including additional greenhouse gas emissions, and effects, such as predicted sea level rise.



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# 6

## Regulatory Compliance

### 6.1 Introduction

In addition to complying with the National Environmental Policy Act (NEPA) and the Massachusetts Environmental Policy Act (MEPA), a number of state and federal permits are needed for the proposed Runway Safety Area (RSA) Improvements Project. Table 6.1-1 lists required state and federal permits. All listed agencies also participate in the review of the project through the NEPA and/or MEPA process. Permitting for both the Runway 33L and Runway 22R RSA improvements individually would be similar since generally the same resources would be affected. The proposed Runway 33L and Runway 22R RSA improvements could be permitted separately since each is a single and complete project that would be constructed independently of the other and possibly at different times. However, Massport has initiated Massachusetts Wetlands Protection Act (MA WPA)<sup>1</sup> review as a single project for both Runway 33L and Runway 22R RSA improvements, primarily for environmental review efficiency.

**Table 6.1-1 Required Permits and Approvals**

Issuing Agency	Approval or Permit
U.S. Army Corps of Engineers	Clean Water Act, Section 404 and Section 10 Individual Permit
U.S. Environmental Protection Agency Region I	National Pollutant Discharge Elimination System Construction General Permit
Massachusetts Office of Coastal Zone Management	Coastal Zone Management, Federal Consistency Determination
Massachusetts Executive Office of Energy and Environmental Affairs	Public Benefits Determination
Massachusetts Department of Environmental Protection	Massachusetts Wetlands Protection Act Variance
	Massachusetts Public Waterfront Act Variance/Approval (Chapter 91)
	Clean Water Act Section 401 Water Quality Certificate
	Section 61 Finding

<sup>1</sup> The Wetlands Protection Act. Massachusetts General Laws Chapter 131, Section 40. <http://www.mass.gov/dep/water/laws/ch131s40.pdf>.





The Secretary's Certificate on the Environmental Notification Form (ENF) stated that the draft Environmental Assessment/Environmental Impact Report (EA/EIR) must:

- Address criteria for issuance of a Wetlands Protection Act variance (301 CMR 10.05(10));
- Address how the Project will meet the standards for a Massachusetts General Law, Chapter 91 license;
- Document how the Project complies with requirements for the Public Benefits Determination (301 CMR 13.00); and
- Demonstrate how the proposed stormwater management system is designed in compliance with the Stormwater Management Standards stated in the MA WPA (310 CMR 10.05(6)(b)(1)(a)) and the Massachusetts Water Quality Certification Regulations (314 CMR 9.06(1)(a)).

The following sections describe the required permits and approvals for the RSA Improvements Project.

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## 6.2 Department of the Army Permit (Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act)

The United States Army Corps of Engineers (USACE); (a) determined the Basic Project Purpose (BPP) of the Runway Safety Area Improvements Project: "to increase safety for aircraft and their passengers in emergency situations by enhancing the RSAs at the ends of Runway 33L and Runway 22R consistent with FAA's orders and regulations;"<sup>2</sup> (b) concurred with the range of alternatives explored for the proposed Project's alternatives analysis; and, (c) agreed on the procedures for evaluating and screening alternatives (see agency correspondence in Appendix 4, *Agency Correspondence*). The proposed RSA improvements for Runway 33L and Runway 22R will require materials (in the form of fill or pilings) to be placed below the extreme high water line.

Section 404 of the Clean Water Act (CWA) regulates the discharge of dredged or fill material into "Waters of the United States," which include vegetated wetlands and land under a water body. Section 10 of the Rivers and Harbors Act (33 U.S.C. 401) requires authorization from the USACE for the construction of any structure in or over any navigable water of the United States (U.S.), the excavation/ dredging or deposition of material in these waters, or any obstruction or alteration in a navigable water. The proposed RSA Improvements Project would require a permit authorized under Section 404 of the CWA for the placement of fill in coastal wetlands because it would result in new fill in navigable waters of the U.S. and new pile-supported structures within vegetated shallows (permanently inundated areas that support communities of rooted aquatic vegetation such as eelgrass). It will also require permit coverage authorized under Section 10 of the Rivers and Harbors Act for construction of the pile-supported deck into navigable waters off Runway 33L and excavation within tidal waters up to highest high water for the Inclined Safety Area (ISA) at the Runway 22R end. The RSA Improvements Project does not meet the thresholds for coverage under the Massachusetts General Permit for these activities in waters of the U.S.; therefore, an Individual Department of the Army Permit will be sought.

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<sup>2</sup> Letter from the U.S. Army Corps of Engineers to Stewart Dalzell, Massport. Dated March 12, 2010.



Permits for activities regulated under both Acts are processed simultaneously by USACE. Massport intends to file a permit application as project design and mitigation planning progresses.

The regulations regarding the issuance of permits for the discharge of dredged or placement of fill into waters of the U.S. (33 CFR Part 323)<sup>3</sup> include procedures to be followed by the USACE regarding the review of applications for Department of the Army Permits. The evaluation of whether to issue a permit is based on an evaluation of the probable impact, including cumulative impacts, of the proposed activity on the public interest. This evaluation includes application of the U.S. Environmental Protection Agency's (EPA) *Section 404 (b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material* (40 CFR Part 230).<sup>4</sup> Wetlands and vegetated shallows (eelgrass beds) are included in the Section 404 definition of special aquatic sites (SAS):

*"Geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region."*

The Section 404(b)(1) Guidelines provide specific information regarding the avoidance of impacts from the discharge of dredged or fill material to SAS. The Guidelines state that "all practicable alternatives to the proposed discharge [of dredged or fill material], which do not involve a discharge into a special aquatic site, are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise." The alternatives analysis, described in Chapter 2, *Alternatives* and Appendix 3, *Alternatives Analysis and FAA Determinations*, demonstrates that other feasible alternatives do not have less impact on the aquatic ecosystem, rather, that the proposed RSA improvements would have the least adverse impact. The Section 404(b)(1) guidelines also provide guidance to the USACE regarding the avoidance of unnecessary filling in wetlands. There are four criteria provided for compliance evaluation. These criteria and the proposed RSA improvement's compliance with them are summarized below.

- *"There must be no practicable alternatives available which would have less adverse impact on the aquatic ecosystem and which do not have other significant adverse environmental consequences."* Chapter 2, *Alternatives*, demonstrates that there are no alternatives that would allow Massport to comply with Federal Aviation Administration (FAA) safety standards that would not alter wetlands subject to jurisdiction under Section 404. The No-Action/No-Build Alternative does not fulfill the project's purpose: to increase safety for aircraft and passengers in emergency situations, by enhancing the RSAs at the ends of Runway 33L and Runway 22R consistent with FAA's orders and regulations.<sup>5</sup>
- *"The activity must not violate federal or state water quality standards or threaten a federally-listed threatened or endangered species."* The proposed RSA improvements would not violate state water quality standards and would have no adverse effects to federally-listed threatened or endangered species, as documented in Chapter 4, *Environmental Consequences*. The RSA Improvements Project would include Best Management

3 33 CFR Part 323, *Permits for Discharges of Dredged or Fill Material into Waters of the United States*, <http://www.usace.army.mil/CECW/Documents/cecwo/reg/33cfr323.pdf>.

4 40 CFR Part 230, Subpart B § 230.10, *Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material*.

5 Letter from the U.S. Army Corps of Engineers to Stewart Dalzell, Massport. Dated March 12, 2010.



Practices (BMPs) as part of a proposed stormwater management plan. This plan would mitigate potential impacts to water quality by controlling stormwater runoff volume and discharge rates along the proposed Runway 33L deck structure.

- *“There must not be significant degradation of waters and wetlands.”* Although the proposed RSA improvements would have unavoidable impacts on wetlands, these impacts would be mitigated, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*. Coordination with federal and state review agencies including EPA, U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and the Massachusetts Department of Environmental Protection (DEP), regarding proposed mitigation, have occurred throughout the development of this EA/EIR and will continue through final permitting.
- *“All reasonable steps must be taken to minimize adverse effects to the aquatic environment.”* The 1990 Memorandum of Agreement between the EPA and the Department of the Army<sup>6</sup> established policy and procedures for evaluating potential significant degradation and established standards for avoidance and minimization of adverse effects before consideration of mitigation. Massport has altered the proposed design of both the Runway 22R ISA and the Runway 33L RSA to avoid and minimize impacts to wetland resources, as described in Chapter 2, *Alternatives*, and Chapter 5, *Proposed Mitigation and Section 61 Findings*. Massport has continued to work within the FAA’s latest guidelines to develop an alternative that would meet the needs of users, minimize potential environmental impacts, and be practicable from safety, operational, and cost perspectives.

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### 6.3 National Pollutant Discharge Elimination System Permit

As authorized by the CWA, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the U.S. Point sources are discrete conveyances such as pipes or man-made ditches. The NPDES program includes permitting for municipal, industrial and construction-related sources of pollution under general or individual permits. The proposed RSA improvements for Runway 33L and Runway 22R must meet the standards included in Logan Airport’s individual NPDES permit (No. MA0000787), which allows Massport to discharge stormwater from all outfalls on the airport property.

The proposed pile-supported deck for the Runway 33L improvements would include scuppers that discharge stormwater off the deck and into Boston Harbor. The deck will slightly increase impervious surfaces at the Runway 33L project area. In addition, alterations to the existing perimeter roadway would be necessary. There would be no increase in impervious surfaces at the Runway 22R project area. The proposed Runway 22R ISA would include a rip-rap sloped surface that is mostly underwater at high tide. These project elements would meet the standards of Logan Airport’s NPDES individual permit due to proposed stormwater management BMPs.

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<sup>6</sup> Memorandum of Agreement Between the Department of the Army and the Environmental Protection Agency: *The Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines*, February 6, 1990.



The proposed RSA Improvements Project would also require completion and submittal of a Stormwater Notice of Intent to the USEPA for coverage under the NPDES Construction General Permit (CGP) for stormwater discharge from construction activities because the Project would disturb more than one acre of land. The CGP requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that includes specific sedimentation and erosion control measures for the entire duration of the construction activities. Standard 8 of the Massachusetts Stormwater Management Policy also requires the use of erosion and sediment controls during construction. Proper implementation of the SWPPP would ensure no negative impacts would occur from construction related stormwater management. Mitigation measures included in the Airport's existing SWPPP to minimize sedimentation and erosion are described in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

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## 6.4 Federal Consistency Review

The federal Coastal Zone Management Act (CZMA), gives the Massachusetts Office of Coastal Zone Management (CZM) the authority to review federal projects to ensure that they meet state standards articulated in its coastal zone management plans through a process called federal consistency review. Federal consistency review is required for most projects that are in or can reasonably be expected to affect a use or resource of the Massachusetts coastal zone and/or require certain federal licenses or permits, receive certain federal funds, or are a direct action of a federal agency. Massport will request consistency review when the Department of the Army Permit application is filed.

The CZMA defines "enforceable program policies" as "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 waters uses and natural resources in the coastal zone."<sup>7</sup> Proponents must demonstrate that projects subject to federal consistency review are consistent with these policies. The following sections describe the enforceable program policies and associated authorizing legislation that are applicable to the proposed RSA improvements, and explains how the RSA Improvements Project is consistent with these policies.

### 6.4.1 CZM Water Quality Policy 2

*Ensure that nonpoint source (NPS) pollution controls promote the attainment of state surface water quality standards in the coastal zone.*

CZM implements this policy through the provisions of the following statutes and regulations that are applicable to the RSA Improvements Project:

- Clean Water Act 401 Water Quality Certification;
- Massachusetts Surface Water Quality Standards (314 CMR 4.00);
- Massachusetts Wetlands Protection Act (M.G.L. c. 131, §40) and Regulations (310 CMR 10.00); and

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<sup>7</sup> Commonwealth of Massachusetts. *Coastal Zone Management/Federal Consistency Review, 301 CMR 21.00*. May 14, 1999. Appendix D.



- Massachusetts Stormwater Management Policy and Management Standards.

The proposed RSA improvements will be designed to comply with the Massachusetts Surface Water Quality Standards and Stormwater Standards. Proposed stormwater management measures within the Runway 33L project area and on the decking structure will be designed to satisfy the Stormwater Standards, as described in Section 6.5.3 and Chapter 5, *Proposed Mitigation and Section 61 Findings*.

The only potential exposure to pollutants would be from an aircraft accident or infrequent access to the existing light pier for maintenance. These conditions currently exist at this location. The project would not generate additional pollutants, as there will be the same number of aircraft and ground vehicle operations under the No-Action/No-Build and Build Alternatives. Therefore, there will be change of atmospheric deposition.

Massport currently sweeps runways and the perimeter roadway, in an effort to remove sediments and pollutants from these impervious surfaces. Snow blowers are used to remove snow from Engineered Material Arresting System (EMAS) beds, however; there will be no chemical use on the EMAS. Existing stormwater management measures regarding containment of oil spills, mandated in Logan Airport's NPDES permit, have been described in Chapter 4, *Environmental Consequences*.

#### 6.4.2 CZM Habitat Policy 1

*Protect coastal resource areas including salt marshes, shellfish beds, dunes, beaches, barrier beaches, salt ponds, eelgrass beds, and fresh water wetlands for critical wildlife habitat functions as well as other including nutrient and sediment attenuation, wave and storm damage protection, and landform movement and processes.*

CZM implements this policy through participation in and review of the MA WPA and CWA 401 Water Quality Certification programs. CZM will review the MA WPA variance request submitted for the project in determining the Project's consistency. Coastal Beach, Coastal Bank and Land Under Water wetlands resources have been protected through careful design of the project, as described in Section 6.5.1. Impacts to salt marsh and eelgrass beds are unavoidable, as documented in Chapter 5, *Proposed Mitigation and Section 61 Findings*. Massport has proposed measures to mitigate for the loss of these resources, which include, among others, eelgrass restoration/ re-establishment and salt marsh restoration/creation measures. Chapter 5, *Proposed Mitigation and Section 61 Findings*, describes these mitigation measures.

#### 6.4.3 CZM 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.*

CZM implements this policy through participation in and review of the MA WPA and CWA 401 Water Quality Certification programs. CZM will review the MA WPA variance request submitted for the proposed improvements in determining the Project's consistency. Impacts are unavoidable to complete runway safety measures. Proactive mitigation measures include the restoration of salt marsh in excess of the amount that



would be lost (2:1 ratio). Proposed eelgrass mitigation actions include in-kind restoration to meet a replacement ratio of 3:1 or out-of-kind mitigation that improves the protection of existing beds in Boston Harbor and elsewhere (including contributions to statewide eelgrass mapping, scientific studies, and conservation mooring studies). Chapter 5, *Proposed Mitigation and Section 61 Findings*, describes these mitigation measures.

#### 6.4.4 CZM 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.*

CZM implements this policy through technical assistance to project proponents and to other public agencies and review of projects proposed on coastal landforms. The proposed RSA improvements will not affect the flood control or storm damage functions of the coastal bank at either Runway end, as described in Section 6.6.2 and Chapter 4, *Environmental Consequences*.

#### 6.4.5 CZM 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 are examined by CZM on a case by case basis for the following:

- The Project's consistency with Coastal Hazard Policy #1; and
- 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).

The construction of the proposed pile-supported deck structure at the Runway 33L end would result in minor changes to coastal processes, particularly sediment transport scour around the proposed pilings. The proposed pier and deck design seeks to minimize changes to coastal processes, as described in Chapter 4, *Environmental Consequences* and Chapter 5, *Proposed Mitigation and Section 61 Findings*. Waves and currents would generally move unimpeded under the pile-supported deck with some reduction in speed due to the presence of the piles. There would be no adverse impact to waves or currents at the Runway 22R end, as documented in Chapter 4, *Environmental Consequences*, and Appendix 6C, *Coastal Processes*. The proposed improvements are compliant with the Coastal Hazard Policy 2.



#### 6.4.6 CZM 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; and
- Be reasonably safe from flood and erosion related damage.

The proposed pile-supported deck at the Runway 33L end has been designed to withstand flood and erosion related damage as it would be elevated above mean high water, thereby diminishing damage from erosion.

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### 6.5 Massachusetts Wetlands Protection Act - Order of Conditions

The Massachusetts MA WPA Regulations establish performance standards for work proposed within each of the state wetland resource areas and require review of any work proposed within 100 feet of a wetland resource to determine if that work would alter the resource area.

Construction of the proposed RSA improvements would require the Commissioner of the DEP to issue a Variance from the MA WPA Regulations. Runway 33L safety improvements would not meet the MA WPA performance standards under 310 CMR 10.25(6)(b) because the proposed Runway 33L RSA improvements would result in the loss of approximately 60,100 square feet of eelgrass (*Zostera marina*) due to shading. The proposed Runway 22R ISA would not meet the performance standards under 310 CMR 10.32(3) because the proposed safety improvements would eliminate approximately 27,930 square feet of Salt Marsh.

The Secretary's Certificate on the ENF stated that the EA/EIR must:

- Address the three criteria of the Wetlands Protection Act Regulations (301 CMR 10.05) regarding granting of a Variance request:
  - There are no reasonable conditions or alternatives that would allow the project to proceed in compliance with the wetlands regulations;
  - Mitigation measures are proposed that will allow the project to be conditioned so as to contribute to the protection of the interests identified in the Wetlands Protection Act; and
  - The variance is necessary to accommodate an overriding community, regional, state or national public interest, or to avoid an unconstitutional taking of property without compensation;
- Demonstrate that source controls, pollution prevention measures, erosion and sediment controls, and the post-development drainage system will be designed in compliance with the performance standards in the Massachusetts Stormwater Management regulations (310 CMR 10.00); and
- Demonstrate how water quality and quantity impacts would be controlled in compliance with the Stormwater Management Standards for water quality and quantity impacts and Massport's National Pollutant Discharge Elimination System (NPDES) Permit.



## 6.5.1 Compliance With Regulatory Performance Standards

The following sections document how the proposed RSA Improvements Project has been designed to meet the applicable MA WPA performance standards for Coastal Bank, Coastal Beach and Land Under the Ocean. A Variance from any of these performance standards not met will be requested.

### 6.5.1.1 Runway 33L

The following section provides documentation on how the proposed Runway 33L RSA improvements meet the MA WPA performance standards for two resource areas.

#### Coastal Bank

The proposed Runway 33L RSA improvements meet the regulatory performance standards for Coastal Bank. The regulations at 310 CMR 10.30(3) through (8) establishes six general performance standards for work proposed in Coastal Bank. The Coastal Bank at this location does not supply sediment to Coastal Beaches, Coastal Dunes, or Barrier Beaches. Therefore, the performance standards identified in 310 CMR 10.30(3) through (5) are not applicable, and only the performance standards identified in 310 CMR 10.30(6) and (8) are applicable.

- 310 CMR 10.30(6) *“Any project on such a coastal bank or within 100 feet landward of the top of such coastal bank shall have no adverse effects on the stability of the coastal bank.”* The proposed project will not have any effect on the stability of the man-made Coastal Bank. The existing placed stone, the large boulder groins west of the light pier, and the large boulder rip-rap east of the light pier contribute to the stability of the Coastal Bank, and will continue to contribute to the prevention of storm damage and flooding. The new bulkhead will continue to provide stability to the Coastal Bank.
- 310 CMR 10.30(8) *“Notwithstanding the provisions of 310 CMR 10.30(3) through (7), no project may be permitted which will have an adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.”* There would be no permanent impacts to the upland sandpiper (*Bartramia longicauda*), the Massachusetts-listed endangered species known to occur within the grassy interior of the airfield. The Massachusetts Natural Heritage and Endangered Species Program (NHESP) indicated that the proposed Project would not adversely affect the actual resource area habitat for the state-protected species.<sup>8</sup> The minor loss of aquatic habitat is not anticipated to affect shorebirds or waterfowl.

#### Coastal Beach

The work meets the regulatory performance standards for this resource area. The regulations at 310 CMR 10.27(3) through (7) establish five general performance standards for work proposed in Coastal Beach. The Coastal Beach at Runway 33L is significant to storm damage prevention, flood control, and the protection of wildlife habitat. As there are no Tidal Flats, proposed solid pier or jetty, or proposed beach nourishment off of Runway 33L, 310 CMR 10.27 (4) through (7) are not applicable. However, the standard relating to the prevention of erosion and protection of the Coastal Beach form is applicable (310 CMR 10.27(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.*

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<sup>8</sup> Letter received from the Massachusetts Natural Heritage and Endangered Species Program dated March 26, 2010.





The proposed Runway 33L RSA improvements would not affect the interests of the MA WPA significant to Coastal Beach. The Coastal Beach would continue to contribute to storm damage prevention, flood control, and the protection of wildlife habitat.

#### 6.5.1.2 Runway 22R

The following section provides documentation on how the proposed Runway 22R Inclined Safety Area (ISA) meet MA WPA performance standards for three resource areas.

##### Coastal Bank

The work meets the regulatory performance standards for this resource area. The regulations at 310 CMR 10.30(3) through (8) establishes six general performance standards for work proposed in Coastal Bank. The Coastal Bank does not supply sediment to Coastal Beaches, Coastal Dunes, or Barrier Beaches. Therefore, the performance standards identified in 310 CMR 10.30(3) through (5) are not applicable, and only the performance standards identified in 310 CMR 10.30(6) and (8) are applicable.

- 310 CMR 10.30(6) “Any project on such a coastal bank or within 100 feet landward of the top of such coastal bank shall have no adverse effects on the stability of the coastal bank.” The proposed Runway 22R ISA improvements would not impact the interests protected by the MA WPA that are significant to Coastal Bank. The Coastal Bank at Runway 22R is not significant to storm damage prevention or flood control because it does not supply sediment to coastal beaches, coastal dunes or barrier beaches. The ISA is not expected to change wave direction or velocity or to result in increased erosion or deposition because of its orientation. It is not likely to impact any adjacent or downdrift Coastal Beach and will not interfere with littoral drift. The ISA would also maintain the stability of the shoreline, which over time, may have reduced stability due to the Runway 22R salt marsh erosion.
- 310 CMR 10.30(8) “Notwithstanding the provisions of 310 CMR 10.30(3) through (7), no project may be permitted which will have an adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.” The performance standard is not applicable. Based on review of the Natural Heritage Atlas (2008) portions of Logan Airport are mapped as Priority Habitat. The Upland sandpiper (*Bartramia longicauda*), which is listed as endangered in Massachusetts, is known to occur in the large grassy uplands in the interior of the airfield. The area around Runway 22R end is not mapped as Priority Habitat. Similarly, the area mapped as Estimated Habitat of Rare Wildlife is outside the project areas for the proposed runway-end safety improvements.

##### Coastal Beach

The work meets the regulatory performance standards for this resource area. The regulations at 310 CMR 10.27(3) through (7) establishes five general performance standards for work proposed in Coastal Beach. The Coastal Beach at Runway 22R is also Tidal Flat. The Coastal Beach at Runway 22R is significant to storm damage prevention, flood control, the protection of wildlife habitat and to marine fisheries. Performance standards set forth at 310 CMR 10.27 (3), (4), and (6) apply to the ISA improvements.



- 310 CMR 10.27(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 ISA is not expected to change wave direction or velocity or to result in increased erosion or deposition because of its orientation. It is not likely to impact any adjacent or downdrift Coastal Beach. There have been no observed impacts at the Runway 22L inclined safety area, a similar structure located 1,500 feet east of the proposed Runway 22R inclined safety area.
- 310 CMR 10.27(4) *“Any groin, jetty, solid pier, or other such solid fill structure which will interfere with littoral drift...”* The proposed ISA will not interfere with littoral drift.
- 310 CMR 10.27(6) *“In addition to complying with all of the requirements of 310 CMR 10.27(3) and 10.27(4), a project on a tidal flat shall, ...if non-water-dependent, have no adverse effects on marine fisheries and wildlife habitat...”* The proposed Runway 22R ISA improvements is a non-water-dependent project and will have no adverse effects on marine fisheries and wildlife habitat caused by changes in water circulation, alterations in the distribution of sediment grain size, and changes in water quality. Water quality in the vicinity of the proposed ISA improvement could be temporarily impacted by short-term construction activities. However, construction would follow a comprehensive Soil Erosion and Sediment Control Plan to minimize temporary impacts, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*.

#### Land Under the Ocean

The work meets the regulatory performance standards for this resource area. The regulations at 310 CMR 10.25 establish general performance standards for work proposed in Land Under the Ocean. The Land Under the Ocean and Nearshore Areas of Land Under the Ocean at Runway 22R are significant to storm damage prevention, flood control, the protection of wildlife habitat and to marine fisheries.

- 310 CMR 10.25(5) *“Projects not included in 310 CMR 10.25(3) or 10.25(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.”* The construction of the ISA may alter the bottom topography slightly. However, the work will not increase storm damage or erosion of Coastal Beaches, Coastal Banks, Coastal Dunes, or Salt Marshes.
- 310 CMR 10.25(6) *“Projects not included in 310 CMR 10.25(3), which affect land under the ocean shall, ...and if nonwater-dependent, have no adverse effects on marine fisheries and wildlife habitat...”* The proposed project, a non-water-dependent project, will have no adverse effects on marine fisheries and wildlife habitat protected by Land Under the Ocean as the proposed project is not anticipated to cause any changes to the items listed in the performance standard. The proposed project is not expected to change wave direction or velocity or to result in increased erosion or deposition in the marine environment. Eelgrass and widgeon grass are not present in the Runway 22R project area. The proposed project will not introduce any pollutants to the marine environment. High densities of polychaetes, mollusks, or macrophytic algae are not present in the project area.



## 6.5.2 Wetlands Protection Act Variance Compliance

The proposed RSA Improvements Project would have permanent impacts to wetland resources. The proposed Runway 33L RSA improvements would include a pile-supported deck (approximately 470 feet long by 300 feet wide) that would affect coastal wetlands resources within an area of approximately 3.65 acres. Runway 33L improvements would not meet the MA WPA performance standards for Land Under the Ocean and Land Containing Shellfish because the proposed Runway 33L RSA improvements would eliminate approximately 60,100 square feet of eelgrass (*Zostera marina*) and displace or eliminate shellfish habitat by construction of the pilings. The proposed Runway 22R ISA improvements would have permanent impacts to coastal wetlands. The ISA, constructed with gravel fill, would replace coastal wetlands resources in an area of approximately 1.9 acres. The proposed Runway 22R ISA would not meet the performance standards for Salt Marsh (310 CMR 10.32(3)) or Land Containing Shellfish because the proposed improvements would eliminate approximately 27,930 square feet of Salt Marsh and displace or eliminate shellfish habitat in the intertidal zone. A Variance from the MA WPA is required for both the Runway 33L RSA and Runway 22R ISA improvements.

To initiate the Variance process, a Notice of Intent (NOI) was submitted to the Boston Conservation Commission (BCC) on January 20, 2010. Consistent with the MA WPA regulations, the BCC denied the proposed Project in its Order of Conditions (OOC). The BCC procedural denial was then followed by Massport's request to the DEP Northeast Regional Office for a Superseding OOC. On March 18, 2010, DEP denied the proposed Project in its Superseding Order, consistent with the MA WPA regulations. Massport submitted its request for a Variance from the Wetland Protection Act standards to the DEP Commissioner on March 31, 2010. Chapter 4, *Environmental Consequences*, provides additional project details relative to the project impacts and Chapter 5, *Proposed Mitigation and Section 61 Compliance* provides an explanation of proposed mitigation measures. DEP, in its letter dated June 22, 2010 (see Appendix 4, *Agency Correspondence*) provided a detailed list of information required for its review of the Variance application. Massport will provide such information in the Final EA/EIR and future submittals to DEP.

Variances may be granted by the Commissioner only if a proposed project meets three criteria.<sup>9</sup> These criteria and the proposed RSA Improvements Project's compliance with them are presented below.

### 6.5.2.1 No Reasonable Conditions or Alternatives

*"There are no reasonable conditions or alternatives that would allow the project to proceed in compliance with 310 CMR 10.21 through 10.60."*

An extensive alternatives analysis was undertaken for the proposed RSA Improvements Project, as described in Chapter 2, *Alternatives*. This analysis found that there are no other alternatives that could be constructed with less of an impact to wetlands and in compliance with the regulatory performance standards that do not sacrifice safety. The No-Action/No-Build Alternative does not meet the project Purpose and Need. As discussed in Chapter 1, *Purpose and Need*, the FAA's required RSA improvements are necessary to accommodate an overriding public safety interest.

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<sup>9</sup> 310 CMR 10.05 (10)(a), *Wetlands Protection Act Regulations*.



### Runway 33L

RSA alternatives that avoid impacts to wetlands resource areas. However, these alternatives are not practicable because they would affect normal runway operations, runway capacity, or types of aircraft that can use the runways. Runway 15R-33L, the longest runway at Logan Airport and used for long-haul arrivals and departures, cannot have any reduced capacity or safety without adversely affecting the current airport operations. Other concerns that would affect runway operations that arose from alternatives that would not impact wetlands include:

- Any shift of the runway to the northwest would bring airport activities closer to the adjacent East Boston neighborhood.
- The Runway 33L glide slope indicator would need to be relocated into the protected area of Runway 27, and while objects fixed by function are allowed within the RSA, the FAA strives to limit these objects.
- There would be incompatible land uses within the Runway 15R Runway Protection Zone (RPZ).
- There would be increased penetrations to the Runway 15R approach surface and the Runway 33L departure surface, resulting in significant weight penalties and limits on runway usage during all-weather operations.

The only practicable alternative that meets project safety goals extends the RSA on a pile-supported deck into Boston Harbor. The footprint of the pile-supported deck decreases the wetlands impact. A filled structure would significantly increase impacts to wetlands, particularly to the eelgrass bed located at the Runway 33L end. Using EMAS in the Runway 33L RSA allows the footprint of the RSA to be smaller consistent with FAA design criteria. By using the smallest footprint allowable, while maintaining the safety level of the RSA, reduces the wetlands impact significantly.

### Runway 22R

The Runway 22R ISA cannot be constructed without impacts to wetlands. Based on the alternatives analysis, the ISA provides the greatest amount of safety in combination with the existing EMAS bed while reducing the impacts to wetlands. A filled structure and a pile-supported deck have larger environmental impacts as well as significantly increased cost. The cost estimates of the filled structure alternatives and the pile-supported deck alternatives exceed the FAA's maximum feasible RSA improvement cost guidelines, therefore they are not practicable.

Increasing the strength of the existing EMAS blocks at Runway 22R was also evaluated. However, neither the design aircraft nor the fleet mix for this runway justifies the use of higher strength EMAS blocks. To limit potential structural damage to the aircraft that typically use this runway, the design of the EMAS would need to be changed, likely requiring an EMAS that would be longer than the existing 60 psi strength block design. The EMAS bed could not be strengthened within the same configuration at Runway 22R and it potentially would have impacts to wetlands, as the EMAS bed would need to be lengthened.

The only practicable safety measure at this location is to construct an ISA that would smooth the transition between the end of the runway and the water's edge. An ISA would re-grade this area to provide a more constant slope in the event that the aircraft exited the EMAS bed and entered the water, and would potentially



reduce the loss of life and damage to an aircraft that fails stop within the existing EMAS bed. It would also significantly enhance access by rescue personnel. The ISA area has minimal wetlands impact, significantly increases the safety of Runway 4L-22R, and has a feasible cost estimate.

#### 6.5.2.2 Mitigating Measures

*"Mitigating measures are proposed that will allow the project to be conditioned so as to contribute to the protection of the interests identified in M.G.L. c.131, §40."*

Unavoidable wetland impacts would be mitigated as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*. Massport is committed to providing full mitigation for impacts to Bank, Coastal Beach/Tidal Flats, Salt Marsh, Submerged Aquatic Vegetation (eelgrass), and Land Containing Shellfish. Massport has convened two working groups to discuss mitigation related to salt marsh and to eelgrass. The working groups comprise local, state, and federal agency representatives, Massport representatives, and Massport's permitting team. Mitigation concepts were developed in coordination with the representatives on both working groups. To the extent practicable and feasible, mitigation will be within in Boston Harbor. However, proposed mitigation must not have the potential to create or exacerbate any bird hazard in accordance with FAA requirements.<sup>10</sup> This would apply to any eelgrass and salt marsh mitigation that would occur at Logan Airport or within the Airport's 10,000-foot Wildlife Hazard Area (WHA).

Shellfish mitigation would be provided for both the proposed Runway 33L and Runway 22R safety improvements. Massport anticipates mitigation actions to be similar to the shellfish mitigation previously completed for the installation of an ISA at Runway 22L. The shellfish mitigation initially consisted of transplanting and seeding and was completed through an in-lieu funding agreement.

#### Runway 33L

The proposed eelgrass mitigation for the proposed Runway 33L RSA improvements would replace or restore lost eelgrass resource areas, lost ecological functions, and affected wetland vegetation cover types. In-lieu mitigation, which provides benefit to the protection of eelgrass, has also been discussed with the resource agencies as an option. Proposed potential eelgrass mitigation actions include, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*:

- In-kind restoration to meet a replacement ratio of 3:1;<sup>11</sup> 201,600 square feet (4.2 acres) through the restoration/re-establishment of previously existing eelgrass beds and/or installing conservation moorings.
- Out-of-kind mitigation that improves the protection of existing beds in Boston Harbor and elsewhere, such as:
  - Funding a DEP/USEPA-approved research program to address the causes of eelgrass decline in the Commonwealth;

<sup>10</sup> U.S. Department of Transportation, Federal Aviation Administration. *Airport Design Advisory Circular No. 150/5200-33B*. August, 2007.

<sup>11</sup> U.S Army Corps of Engineers New England District. *Addendum to New England District Compensatory Mitigation Guidance: Compensation for Impacted Aquatic Resource Functions*. NAE-2006-3648. December 18, 2007.



- ❑ Funding an eelgrass mapping project, in coordination with DEP and other agencies, to define more accurately the limits of eelgrass beds in critical areas within the Commonwealth and protect these unmapped beds from inadvertent damage;
- ❑ Constructing artificial reefs to enhance fish habitat, one of the principal functions that eelgrass beds provide.

### Runway 22R

The proposed salt marsh mitigation for the proposed Runway 22R ISA improvements would replace lost salt marsh resource areas, lost ecological functions, and affected wetland vegetation cover types. Massport proposes a mitigation goal of 2:1 replacement of filled wetland via restoration of formerly filled salt marsh or creation of salt marsh in uplands based on current USACE and DEP guidance, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*. If the selected mitigation method is enhancement of existing salt marsh, a higher mitigation ratio could be required.

#### 6.5.2.3 Overriding Public Interest

*"The variance is necessary to accommodate an overriding community, regional, state or national public interest; or that it is necessary to avoid an Order that so restricts the use of the property as to constitute an unconstitutional taking without compensation."*

This Draft EA/EIR documents the need for safety improvements at Logan Airport and substantiates the statement of Project Purpose (see Chapter 1, *Purpose and Need*), which is to increase safety for aircraft and passengers in emergency situations by improving the RSAs at the ends of Runway 33L and Runway 22R consistent with FAA's orders and regulations.

The purpose of the project is to protect the lives and safety of aircraft passengers in emergency situations by enhancing the RSAs at the ends of Runway 33L and Runway 22R consistent with FAA's guidelines and the Authority's responsibilities as airport operator. As stated in FAA Order 5100-38B, "The highest aviation priority of the United States 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 enhance 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. In addition, the DOT Inspector General's 2009 Report to Congress On the Status of Runway Safety Areas at US Airports listed Runway 33L at Logan Airport as one of the top 11 priority runway end safety enhancement projects in the US.

On May 4, 1993, DEP issued a variance under its Wetlands Regulations for the Runway-End Safety Improvement Project for Runway 22L at Logan Airport to be constructed. Like the project now being proposed by Massport, the 1993 project was undertaken to "enhance safety for aeronautical and rescue operations" pursuant to criteria established by the FAA (DEP Variance File No. 6-554/82-118, May 4, 1993). The reasoning underlying the 1993 DEP Variance Decision remains current and equally applicable to the Runway Safety Area Project now proposed. In addition, DEP's recent decision on the 2008 Hanscom Field Runway Safety Area Project permitted that project to go forward.



First and foremost, the 1993 DEP Variance Decision clearly recognized the overriding public interest served by the Runway-End Safety Improvement Project:

“Chapter 456 of the Acts and Resolves of 1956 established Massport as a public instrumentality for the performance of an essential government function... The public interest to be served by the project is that of improving the degree of safety at the end of Runway 22L at Logan Airport. Existing conditions at the airport runway-end do not comply with recommended aeronautical safety standards and would inhibit efficient rescue operations.

In coastal airports, an important development in the area of air crash/rescue strategy has involved the evolution of inclined safety areas (ISAs) at the water end of the runways. ISAs serve two major life-safety purposes. First, ISAs help cushion and retard the impact of an aircraft leaving the end of the runway and entering the water. Secondly, ISAs play an integral role in rescue operations once a crash has occurred.

The initial benefit of the ISA is provided by the gradual slope and the materials used, which help reduce the possibility that an aircraft will break apart and expose passengers to the water. Once the crash has occurred, the ISA provides significantly improved survival chances for passengers by providing a relatively safe and easy pathway up and out of the water. Secondly, and more importantly, the ISA provides a safe deployment site for rescue personnel and equipment. ISAs provide a fast and efficient means of access to the water. ISAs provide a smooth transition from the runway end to the water by which trailered boats, dive teams, floating walkways and other rescue equipment can be deployed most rapidly. The absence of ISAs can result in significant delays in the critical moments following air crashes. For example, in the case of the September 21, 1989, USAir crash at LaGuardia Airport, fire fighting and rescue personnel were hindered from getting to victims in the water by the abrupt vertical drop-off at the end of the runway to the shoreline and tidal flats below. Aviation experts agreed that the rescue efforts would have been significantly enhanced by the availability of the ISAs.

In sum, I find that the applicant has established that the proposed project will promote an overriding public interest. The ISA at Runway 22-L will improve airport operations in the event of an aircraft accident, will help minimize aircraft damage in the event of an overrun/undershoot, and result in enhanced survivability from such accidents.”<sup>12</sup>

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12 DEP Variance File No. 6-554/82-118, May 4, 1993



As explained in Chapter 1, *Purpose and Need*, the RSA improvements proposed at Runway 22R and Runway 33L are required to satisfy applicable FAA public safety criteria established to preserve the lives of the users of Logan Airport. As stated in Chapter 1, *Purpose and Need*, the Airport does not meet FAA standards for RSAs for either Runway 33L or Runway 22R. To emphasize the critical project safety need, until an airport corrects RSA deficiencies, the FAA will not provide funding for even routine maintenance activities, such as replacing or rehabilitating the runway pavement.

### 6.5.3 Massachusetts Stormwater Management Standards

The proposed RSA Improvements Project requires work within wetland resource areas and buffer zones as defined and regulated under the MA WPA. Projects that fall under the jurisdiction of the MA WPA must comply with the Massachusetts 2008 Stormwater Management Standards (310 CMR 10.05).

The Stormwater Management Standards defines the requirements for stormwater management for new or re-development sites in the State of Massachusetts. The ten performance standards and compliance for the proposed RSA improvements are presented below.

#### 6.5.3.1 Runway 33L

Compliance with the Stormwater Management Standards for Runway 33L is presented below.

- **Standard 1:** *No new stormwater conveyances may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.* Rain that falls on the surface of the deck-based portion of the RSA will not be detained and will be discharged at several locations in order to prevent erosive forces associated with concentrated flow from entraining sediment and impacting the receiving water. Stormwater runoff from the deck will be discharged via scuppers located beneath the deck. Runoff from portions of the deck located within the intertidal zone (landward of mean low water) will be collected in a separate piped drainage system and discharged at a location seaward of mean low water. Runoff from portions of the deck located seaward of mean low water will 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 will be distributed and will only occur at locations that are inundated throughout the tidal cycle.
- **Standard 2:** *Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.* This stormwater standard is not applicable to the proposed project. The proposed project is a coastal location and it is not required to meet this standard.
- **Standard 3:** *Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures to the maximum extent practicable. The annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type.* Construction of the Runway 33L RSA deck and approach slab will result in changes to stormwater runoff in by adding impervious areas in currently grassed uplands. However, runoff from the landside (airfield) portion of the Runway 33L RSA project area will continue to drain via overland flow into Boston Harbor. The proposed Runway 33L RSA improvements would not affect the ability of any wetlands outside of the RSA footprint to recharge or





discharge groundwater. At this coastal location, wetlands outside of the RSA footprint are unlikely to recharge or discharge groundwater.

- **Standard 4:** *Stormwater management systems shall be designed to remove 80 percent of the average annual post-construction load of Total Suspended Solids (TSS). No TSS will be generated by the proposed deck. The deck will not be sanded during the winter and therefore does not have the potential to produce TSS.*
- **Standard 5:** *For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. RSAs are not land uses with higher potential pollutant loads (i.e., apron, plane maintenance, plane deicing/anti-icing areas, fueling, plane or other vehicle storage). The DEP indicated that RSAs are not land uses with higher potential pollutant loads in a December 21, 2009, letter requesting information regarding the New Bedford Airport MA WPA Variance Decision (File No. SE 49-635).*
- **Standard 6:** *Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures. Designated shellfish growing areas are considered critical areas. There will be no new stormwater discharges to designated shellfish growing areas at the Runway 33L end. There will be no direct discharges within Zone II or Interim Wellhead Protection Areas of a public drinking water supply from the proposed safety improvements.*
- **Standard 7:** *Redevelopment of previously-developed sites must meet the Stormwater Management Standards to the maximum extent practicable: When it is not practicable to meet all the standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions. The proposed Runway 33L RSA improvements will improve the stormwater conditions to the extent practicable where it is practicable and feasible. A stormwater management device (a Stormceptor or equivalent) would be installed at Outfall A-30 or A-31 at the Runway 33L end.*
- **Standard 8:** *Erosion, sedimentation, and other pollutant sources must be controlled during construction and land disturbance activities to prevent impacts. Erosion and sediment controls are proposed at the project's limit of work. The proposed action will require the issuance of an USEPA NPDES Stormwater Discharge Permit for Construction activities, which requires implementation of sedimentation and erosion controls, as described in Chapter 5, Proposed Mitigation and Section 61 Findings.*
- **Standard 9:** *A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed. Operations and maintenance will be consistent with the existing Operation and Maintenance (O&M) Plan for the Airport. The O&M requirements will be incorporated into the existing SWPPP and SPCC currently in place for the Airport under the existing NPDES Stormwater Permit.*
- **Standard 10:** *All illicit discharges to the stormwater management system are prohibited. Illicit discharges are prohibited at the site and will be specified as such in the O&M Plan.*



### 6.5.3.2 Runway 22R

Compliance with the Stormwater Management Standards for Runway 22R is presented below.

- **Standard 1:** *No new stormwater conveyances may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth. No new stormwater conveyance will be created. The proposed project would not result in any new discharge of untreated stormwater directly to a water of the Commonwealth or to a location that would result in erosion in wetlands or waterways. The gradual stone slope of the proposed Runway 22R ISA will prevent scouring by runoff.*
- **Standard 2:** *Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This stormwater standard is not applicable to the proposed project. The project area is a coastal location, to which this standard is not applicable.*
- **Standard 3:** *Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures to the maximum extent practicable. The annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. A large portion of the proposed inclined safety area will be located within intertidal areas where there is no recharge. The proposed Runway 22R ISA would not affect the ability of any wetlands outside of the RSA footprint to recharge or discharge groundwater. At this coastal location, wetlands outside of the RSA footprint are unlikely to recharge or discharge groundwater.*
- **Standard 4:** *Stormwater management systems shall be designed to remove 80 percent of the average annual post-construction load of Total Suspended Solids (TSS). There is no new pavement proposed at the Runway 22R end, and the proposed Runway 22R ISA will not generate TSS.*
- **Standard 5:** *For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. RSAs are not land uses with higher potential pollutant loads (i.e. apron, plane maintenance, plane deicing/ anti-icing areas, fueling, plane or other vehicle storage). The DEP indicated that RSAs are not land uses with higher potential pollutant loads in a December 21, 2009 letter requesting information regarding the New Bedford Airport MA WPA Variance Decision (File No. SE 49-635).*
- **Standard 6:** *Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures. Designated shellfish growing areas are considered critical areas. There will be no new stormwater discharges to designated shellfish growing areas at the Runway 22R end. The existing Outfall A-12 at the Runway 22R end is causing erosion. Massport will improve the conditions around the outfall in order to mitigate for the erosion. There would be no direct discharges within Zone II or Interim Wellhead Protection Area of a public drinking water supply from the proposed project.*
- **Standard 7:** *Redevelopment of previously-developed sites must meet the Stormwater Management Standards to the maximum extent practicable: When it is not practicable to meet all the standards, new (retrofitted or expanded) stormwater management systems must be designed to improve existing conditions. The proposed improvements will improve the stormwater conditions to the extent practicable. Erosion is present around Outfall*



A-12. Massport will evaluate opportunities to improve the conditions around the outfall to minimize the erosion such as the use of energy dissipaters at the outfall end to minimize scour and erosion.

- **Standard 8:** *Erosion, sedimentation, and other pollutant sources must be controlled during construction and land disturbance activities to prevent impacts.* Erosion and sediment controls are proposed at the project's limit of work. The proposed improvements would require the issuance of an USEPA NPDES Stormwater Discharge Permit for Construction activities, which requires implementation of sedimentation and erosion controls. A comprehensive plan will be included in the project's NPDES Notice of Intent and Stormwater Pollution Prevention Plan.
- **Standard 9:** *A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.* Operations and maintenance will be consistent with the existing O&M Plan for the Airport. The O&M requirements would be incorporated into the existing SWPPP currently in place for the Airport under the existing NPDES Stormwater Permit.
- **Standard 10:** *All illicit discharges to the stormwater management system are prohibited.* Illicit discharges are prohibited at the site. There is no new stormwater management system proposed at the Runway 22R; therefore, there is no potential for illicit discharges.

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## 6.6 Massachusetts Public Waterfront Act - Chapter 91

The Certificate of the Secretary of Energy and Environmental Affairs dated August 14, 2009, establishing the scope for this Draft EIR/EA for the RSA Improvements Project called for an explanation of how the DEP Waterways Regulations at 310 CMR 9.00 apply to the proposed RSA Improvements Project, and a chapter of the Draft EIR/EA to address how the Project will meet the requirements for a positive Public Benefit Determination under 301 CMR 13.00.

The RSAs are a required public safety measure associated with existing runways at Logan Airport. As such, they are an "Infrastructure Facility" as that term is defined by 301 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 inapplicable. 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”:<sup>13</sup>

- (a) the protection of maritime commerce, industry, recreation and associated public access;
- (b) the protection, restoration, and enhancement of living marine resources;
- (c) the attainment of water quality goals;
- (d) 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;
- (e) the protection and enhancement of public views and visual quality in the natural and built environment of the shoreline;
- (f) the preservation of historic sites and districts, archaeological sites, and other significant cultural resources near waterways.

The RSA Improvements Project incorporates appropriate measures to protect water quality and to avoid and minimize any 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, DEP should typically require implementation of reasonable measures to provide open spaces for active or passive recreation at on near the water’s edge only if and as “appropriate” under the specific circumstances. DEP’s Waterway 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.”<sup>14</sup>

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 G. L. c. 90, § 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, DEP may prescribe such alterations and conditions as it deems necessary to ensure the project conforms with:<sup>15</sup>

- (a) any requirements contained in the legislative authorization; and

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<sup>13</sup> Waterways Regulations, 310 CMR 9.55(1).

<sup>14</sup> Waterways Regulations, 310 CMR 9.55(2).

<sup>15</sup> Waterways Regulations, 310 CMR 9.31(4).



- (b) the standards of 310 CMR 9.31 through 9.60, to the extent consistent with the legislative authorization.

In addition, as discussed in Section 3.3.3.3 in Chapter 3, *Affected Environment*, the DEP may authorize the RSA Project pursuant to a Memorandum of Understanding (MOU) with Massport that incorporates appropriate conditions and mitigation measures.<sup>16</sup>

### 6.6.1 The Variance Standards

New fill and structures for nonwater-dependent use are generally prohibited seaward of the mean high water mark (310 CMR 9.32(1) (a)). While, as noted above, there are exceptions to this prohibition, DEP may decide that the exceptions should not be applied to the RSA Improvements Project. Without application of the available exceptions, DEP would likely conclude that the proposed Runway 33L RSA improvements 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 nonwater-dependent uses that extend beyond the footprint of the existing, previously authorized pile-supported structures (310 CMR 9.32(1)(a)). Likewise, absent application of the available exceptions, the proposed Runway 22R ISA improvements would not likely meet the basic requirements set forth in 310 CMR 9.31(1) except to the extent that it includes new fill located below the high water line that is within an authorized, previously altered footprint even though it is not a water-dependent use (310 CMR 9.32(1)(a)). To that extent, the RSA Improvements Project could proceed without a Variance from the Chapter 91 performance standards for nonwater-dependent uses.

In many respects, the variance standards under DEP's Waterway Regulations, 310 CMR 9.00 et seq., parallel the variance requirements under DEP's Wetlands Protection Act Regulations, 310 CMR 10.00 et seq. discussed above at Section 6.5. Under 310 CMR 9.21, a variance may be granted if the Commissioner finds that:

- (a) there are no reasonable conditions or alternatives that would allow the project to proceed in compliance with 310 CMR 9.00;
- (b) 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
- (c) 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 must be included to advance the statutory interests and compensate for detrimental environmental impacts.

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<sup>16</sup> Waterways Regulations, 310 CMR 9.03(3).



## 6.6.2 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 2, *Alternatives*. This analysis found that there are no reasonable alternatives that would allow the existing RSAs to be enhanced to meet FAA standards and the same time be in compliance with the Waterways Regulations, as the site limitations necessitate construction in tidelands below mean high water. As demonstrated in Chapter 1, *Purpose and Need*, the proposed RSA improvements are necessary to accommodate an overriding public/safety interest. During the subsequent design phases of the proposed RSA improvements, additional design modifications would be investigated to ensure that waterways impacts have been minimized to the extent practicable.

## 6.6.3 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.* The construction of the ISA would alter an area that supports shellfish. However, as described in Chapter 3, *Affected Environment*, the densities of soft-shell clams is low and concentrated in the eastern portion of the ISA and only two market size individuals (minimum size 2 inches) were observed in a survey. Shellfish mitigation would be provided for both Runway 33L and Runway 22R ISA improvements, consisting of an in-lieu funding agreement.
- *Salt Marsh Mitigation.* Massport proposes a salt marsh mitigation goal of 2:1 replacement of filled wetland via restoration of formerly filled salt marsh or creation of salt marsh in uplands based on current USACE and DEP guidance.
- *Eelgrass Mitigation.* Proposed eelgrass mitigation actions include possible in-kind restoration and/or out-of-kind mitigation that will improve the protection of existing beds in Boston Harbor and elsewhere (contributions to statewide eelgrass mapping, and conservation mooring or eelgrass ecology studies), as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*.
- *Water Quality Mitigation.* Water quality goals will be attained through the use of stormwater BMPs. Specifically, mitigation would include improving current stormwater management conditions, to the extent practicable, to meet the Stormwater Management Redevelopment Standard, as discussed in Section 6.5.3. Massport will evaluate opportunities to improve the conditions around Outfall A-12 at the Runway 22R end to minimize the erosion such as the use of energy dissipaters at the outfall end to minimize scour and erosion.
- *Storm Damage Prevention.* The proposed Runway 33L RSA improvements would convert the existing rip-rap bank to a sheet pile bank or crushed stone ramp, and would not affect the functions or significant interests of the Coastal Bank including storm damage prevention and flood control. The new sheet pile bank and



crushed stone ramp would provide additional stability to the Coastal Bank. The Coastal Bank at Runway 22R is not significant to storm damage prevention or flood control because it does not supply sediment to coastal beaches, coastal dunes or barrier beaches. The ISA is not expected to change wave direction or velocity or to result in increased erosion or deposition because of its orientation. It is not likely to impact any adjacent or downdrift Coastal Beach and will not interfere with littoral drift. The ISA would also maintain the stability of the shoreline, which over time, may have reduced stability due to the Runway 22R salt marsh erosion. The proposed RSA Improvements would not impact the ability of the Coastal Bank to protect Logan Airport from flood damage or erosion, therefore mitigation measures are not proposed.

- *Protection of Archeological Resources.* There are no known historic sites and districts, archaeological sites, and other significant cultural resources located within the proposed RSA Improvements Project area. However, in order to mitigate for any unintended consequences during construction, an Unanticipated Discovery Plan would be developed by Massport and implemented during construction. Massport would coordinate with the Federal Aviation Administration, the Massachusetts Historical Commission, Tribal Historic Preservation Officer(s), and the Board of Underwater Archaeological Resources to determine the protocol should an unanticipated discovery be made during construction of the Runway 22R ISA in accordance with the Board of Underwater Archaeological Resources Policy Guidance for the Discovery of Unanticipated Underwater Archaeological Resources, September 2006.

#### 6.6.4 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 RSAs at the ends of Runway 33L and Runway 22R consistent with FAA's guidelines and the Authority's responsibilities as airport operator. As stated in FAA Order 5100-38B, "The highest aviation priority of the United States 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 enhance 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. In addition, the DOT Inspector General's 2009 Report to Congress On the Status of Runway Safety Areas at US Airports listed Runway 33L at Logan Airport as one of the top 11 priority runway end safety enhancement projects in the US.

Section 6.5 of this Draft EA/EIR documents how the proposed safety projects meet this standard, based on FAA policy and requirements and DEP's prior Variance Decision on the Runway 22L Safety Area Improvement which clearly recognized the overriding public interest served by these safety projects.



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## 6.7 Massachusetts Public Benefits Determination

The Public Benefits Determination Regulations (310 CMR 13.00) establishes a procedure for the Secretary of Energy and Environmental Affairs to ensure that public benefits are protected and/or provided by nonwater-dependent projects within tidelands, pursuant to the authority granted under M.G.L. c. 91, Section 18B. The regulations provide that the public benefit determination will not in any way impair DEP's exercise of its powers under Chapter 91 and that DEP will incorporate the public benefit determination into the official record of the Chapter 91 decision.

The Secretary required that a mandatory public benefit review is conducted for the proposed RSA Improvements Project following procedures within 310 CMR 13.03. Specifically, the Certificate required that the EA/EIR include detailed information describing the nature of the tidelands affected by the nonwater-dependent project and document compliance with the requirements for public benefits. The proposed RSA improvements would result in a positive Public Benefits Determination, as described in the following sections.

### 6.7.1 Purpose and Effect of the Project

The purpose of the proposed RSA improvements is to increase safety for aircraft and their passengers in emergency situations by enhancing the RSAs at the ends of Runway 33L and Runway 22R consistent with FAA's orders and regulations (see Chapter 1, *Purpose and Need*).<sup>17</sup> 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.<sup>18</sup>

### 6.7.2 Impact on Abutters and the Surrounding Community

There will be no adverse impacts to the surrounding community by the proposed Project, as the Airport is an isolated peninsula surrounded by water on three sides, as discussed in Chapter 4, *Environmental Consequences*. Truck traffic would occur during construction; however, noise and air emissions from these trucks would not affect residents or businesses in adjacent communities, as the distance creates a buffer. There will be no permanent change to air quality or noise at the airport as a result of the proposed safety improvements, and there are no changes to aircraft operations. Chapter 5, *Proposed Mitigation and Section 61 Findings*, describes mitigation commitments for any impacts during construction.

### 6.7.3 Enhancement to the Property

The proposed RSA Improvements Project includes important safety improvements at the Airport. The existing Runway 33L RSA does not meet current FAA design criteria for overrun and undershoot protection for the runway's design aircraft (Boeing 747-400). The Runway 33L Proposed Action would include construction of a 600-foot long RSA with EMAS on a 300-foot wide Pile-Supported Deck. The Proposed Action would maintain

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<sup>17</sup> Letter from the U.S. Army Corps of Engineers to Stewart Dalzell, Massport. Dated March 12, 2010.

<sup>18</sup> United States Department of Transportation, Federal Aviation Administration, *Advisory Circular (AC) 150/5300-13, Airport Design, Changes 1 through 15*, December 31, 2009.





runway utility and capacity, and would provide protection and functionality near equivalent to a RSA that fully meets the design criteria.<sup>19</sup>

The existing Runway 22R RSA meets the minimum FAA design criteria for overrun protection for the runway's design aircraft, the Boeing 757-200. However, improvements to the Runway 22R RSA are critical to protect aircraft in the event that an aircraft arriving on Runway 4L overruns and fails to stop on the runway. The Runway 22R Proposed Action would enhance the existing RSA by constructing an inclined safety area (ISA) at the end of Runway 22R. The ISA would not increase the arrestment speed of the existing 60 psi strength EMAS bed, but would provide a smoother transition into the water for any aircraft that exits the runway at a speed greater than 40 knots. The Proposed Action includes re-grading of the current elevation change and slope gradient from the end of the existing EMAS bed down to the mean low water elevation. This action would provide a constant slope in the event that the aircraft exited the EMAS bed and entered the water, and would reduce the potential for loss of life and damage to any aircraft that fails to stop within the existing EMAS bed. It would also significantly enhance access by rescue personnel as well as egress by passengers.

#### 6.7.4 Benefits to the Public Trust Rights in Tidelands

In light of 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 proposed Project is located. Limited shellfish harvesting by licensed clambers is allowed within the Security Zone with prior notice from DMF. Historically, because of the paucity of harvestable shellfish, no shellfishing has been conducted in the area adjacent to Runway 33L.

Although the proposed RSA improvements would impact Chapter 91 waterways and tidelands, there are no significant impacts to the public's existing interests in these tideland areas. The only interests relevant to the proposed RSA Project Site are shellfishing, living marine resources, and water quality. Limited shellfishing will 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 is designed to protect, restore, and enhance living marine resources, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*. Water quality goals will continue to be attained, and some improvements may occur due to proposed upgrades to the existing airfield stormwater management system.

#### 6.7.5 Community Activities on the Site

Due to aviation operations and state and federal security restrictions, there are no community activities that take place on the Project Site.

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<sup>19</sup> Federal Aviation Administration, *Runway Safety Area Determination: Runway 15R-33L General Edward Lawrence Logan International Airport East Boston, Massachusetts*, January 30, 2009, p. 6.



### 6.7.6 Environmental Protection and Preservation

The proposed Project aims to avoid and minimize impacts to wetland resources, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*. Mitigation measures for impacts to wetlands and eelgrass resources are proposed. Proposed eelgrass mitigation actions include in-kind restoration and out-of-kind mitigation that improves the protection of existing beds in Boston Harbor and elsewhere (including programs such as contributions to statewide eelgrass mapping, conservation mooring and eelgrass ecology studies), as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*. Massport proposes a wetland mitigation goal of 2:1 replacement of filled wetland via restoration of formerly filled salt marsh or creation of salt marsh in uplands based on current USACE and DEP guidance.

### 6.7.7 Public Health and Safety, and the General Welfare

The RSA improvements will address the overriding public interest in aviation safety. Safety enhancements 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, when it is more likely that an aircraft will need additional distance to land.

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## 6.8 Massachusetts Water Quality Certification (Section 401 of the Clean Water Act)

Projects that result in discharge or fill to a wetland or water body (any project that requires a Section 404 permit), require water quality certifications, pursuant to the Massachusetts Clean Waters Act (M.G.L. Chapter 21, Sections 26 – 53). The proposed RSA Improvements Project would require an individual Water Quality Certification, administered by the DEP Division of Wetlands and Waterways, because the proposed RSA Improvements Project would result in the loss of approximately 27,930 square feet of salt marsh and would impact land below Mean High Water, subject to federal jurisdiction. There are seven criteria for the evaluation of applications for discharge of dredged or fill material (314 CMR 9.06). These criteria and the proposed RSA Improvements Project's compliance with them are presented below. Massport intends to apply for a Water Quality Certification when the Department of the Army Permit is filed.

- *"No discharge of dredged or fill material shall be permitted if there is a practicable<sup>20</sup> alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem."* Chapter 2, *Alternatives*, demonstrates that there are no alternatives which would allow Massport to comply with FAA safety standards that would not alter wetlands subject to jurisdiction under Section 401. The No-Action/No-Build Alternative does not fulfill the project's purpose and need because it does not fully comply with the FAA minimum overrun and undershoot requirements.

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<sup>20</sup> Section 404(b)(1) *Guidelines for Specification of Disposal Sites for Dredged or Fill Materials (40 CFR Part 230)* defines practicable as "The term practicable means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes."



- *“No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts to the bordering or isolated vegetated wetlands or land under water, including a minimum of 1:1 restoration or replication of isolated or bordering vegetated wetlands.”* Altered salt marsh at the Runway 22R end would be restored at a 2:1 ratio as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*. Affected eelgrass beds will be restored/re-established at a 3:1 equivalent ratio, also described in Chapter 5. In combination with restoration/re-establishment, other mitigation measures include eelgrass mapping and other scientific studies that are much broader in scope.
- *“No discharge of dredged or fill material shall be permitted to Outstanding Resource Waters (ORWs), except for the activities specified in 314 CMR 9.06(3)(a) through (i), which remain subject to an alternatives analysis and other requirements of 314 CMR 9.06.”* The proposed RSA improvements do not involve the discharge of dredged or fill material to an ORW.
- *“Discharge of dredged or fill material to an ORW specifically identified in 314 CMR 4.06(1)(d) (e.g., vernal pools, areas within 400 feet of a water supply reservoir, and any other area so restricted) is prohibited as provided therein unless a variance is obtained under 314 CMR 9.08.”* The proposed RSA improvements do not involve the discharge of dredged or fill material to an ORW.
- *“No discharge of dredged or fill material is permitted for the impoundment or detention of stormwater for the purposes of controlling sedimentation or other pollutant attenuation.”* No dredging or fill is planned in conjunction with the construction of stormwater management systems.
- *“Stormwater discharges shall be provided with BMPs to attenuate pollutants and provide a set back from receiving water or wetland.”* The proposed stormwater management system for Runway 33L includes BMPs in compliance with DEP stormwater management policy, as described in Section 6.5.3 and Chapter 5, *Proposed Mitigation and Section 61 Findings*.
- *“No discharge of dredged or fill material shall be permitted in the rare circumstances where the activity meets the criteria for evaluation but will result in substantial adverse impacts to the physical, chemical, or biological integrity of surface waters of the Commonwealth.”* The proposed project would not result in substantial adverse impacts to the surface waters of the Commonwealth, as described in Chapter 4, *Environmental Consequences*. Unavoidable impacts would be mitigated, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*. Stormwater management systems would meet all applicable regulations and performance standards, and stormwater runoff would not degrade surface water quality. Sediment and erosion controls would be employed during construction, as described in Chapter 5, *Proposed Mitigation and Section 61 Findings*.



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## Public and Agency Involvement

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### 7.1 Introduction

Massport and the Federal Aviation Administration (FAA) have made public and agency involvement a priority for the Logan Airport Runway Safety Area (RSA) Improvements Project. Because of the nature of this critical aviation safety project and the affected resource areas, informal and formal briefing sessions with local, state and federal agencies and community groups commenced well in advance of the initial regulatory filing. These meetings included project overview briefings with organized community groups interested in airport activity and a broad constituency of regulatory agencies and harbor advocacy groups. The following sections summarize meetings both with community groups and regulators. This community and agency outreach and coordination will continue through permitting, design and construction of the proposed safety improvements.

FAA *Order 1050.1E*<sup>1</sup> updates FAA policies and procedures for compliance with the National Environmental Policy Act (NEPA) and implementing regulations issued by the Council on Environmental Quality (40 CFR Parts 1500-1508). Project proponents are required to obtain information from the public regarding environmental concerns surrounding the proposed action, fully assess and disclose potential environmental impacts resulting from the proposed action and alternatives, and provide the public with this information and allow it to comment on these findings. FAA *Order 5050.4B* provides the FAA Office of Airports with guidance on evaluating environmental effects of a project. Specific requirements for ensuring proper public input include direct coordination with resource agencies, industry groups, and the affected community.

In coordination with the FAA, Massport has sought public involvement throughout the scoping, planning, and analysis of the proposed Logan Airport RSA Improvements Project. Comments received during early coordination on environmental impacts of proposed actions have been considered and are addressed in Chapter 4, *Environmental Consequences*. Public involvement was provided while the Environmental Notification Form (ENF) and Draft Environmental Assessment/Environmental Impact Report (EA/EIR) were drafted, as described in further detail in the following subsections. Massport has also consulted directly with resource agencies, and the affected community regarding potential impacts, minimization of these impacts, and mitigation strategies.

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<sup>1</sup> United States Department of Transportation, Federal Aviation Administration, Order 1050.1E, *Environmental Impacts: Policies and Procedures*, March 20, 2006.



The Massachusetts Environmental Policy Act (MEPA) regulations (301 CMR 11.00) also include specific requirements for filing environmental reports and ensuring inclusive public involvement. Massport has met each requirement for the filing of the ENF and the EA/EIR, as described in this Chapter.

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## 7.2 Public Involvement

Well in advance of any regulatory filings, Massport presented the proposed safety improvements to two community groups. The initial two public briefings were held on October 15, 2007 with the Orient Heights Civic Association and on October 24, 2007 with AIR, Inc. The goal of these meetings was to acquaint the abutting community with the overall safety project and solicit early input regarding potential neighborhood issues. Massport continues to informally update those groups on project status and review opportunities and schedules.

The project ENF was circulated to interested parties and a Public Notice of Environmental Review was published on July 8, 2009, in accordance with MEPA regulations 301 CMR 11.05 and 11.15. To solicit public input on development of the Draft EA/EIR scope, a public scoping meeting was held at Logan Airport on July 30, 2009. Responses to public comments on the ENF are provided in Appendix 2, *Response to Comments*.

To initiate public review under the state wetlands regulatory process, Massport filed a Notice of Intent (NOI) with the Boston Conservation Commission. A Notice of the Public Hearing regarding the NOI for the proposed Project, as required under the Massachusetts Wetlands Protection Act (MA WPA), was published in The Boston Herald and was posted in Boston City Hall on January 26, 2010. The NOI public hearing was held on February 3, 2010. In addition to meeting its regulatory obligations, Massport mailed notification to residents of the Bayswater neighborhood in East Boston on January 25, 2010 informing residents about the NOI and the upcoming hearing. There are no direct abutters to the project, but the Bayswater area is the closest residential neighborhood to the Runway 22R end. There are no neighborhoods in close proximity to the Runway 33L project site.

This Draft EA/EIR will be available for public review at least 30 days before the public meeting to solicit comments on the draft and will circulate the document in accordance with FAA *Order 5050.4B*, *Paragraphs 404-406 and 804*, and Sections 11.07 and 11.16 of the MEPA regulations. Notice of the public meeting will appear in local, general circulation newspapers such as the Boston Herald, the East Boston Times Free Press, and the Winthrop Transcript, and will be mailed to Massport's standard MEPA mailing list, as periodically updated. Commenters on the ENF and other interested parties will also receive the document. As appropriate, provisions will be made to accommodate the needs of the elderly, handicapped, non-English speaking, minority, and low-income populations. As requested in the Certificate on the ENF, the Draft EA/EIR will be distributed to the shellfishing industry and local shellfishing representatives so that they are aware of impacts to land containing shellfish. A copy of the Draft EA/EIR will be made available for public review at the Boston Public Library (East Boston Branch), the Revere Public Library, the Chelsea Public Library, the Everett Public Library and the Winthrop Public Library, as requested in the Certificate. Massport has followed and will



continue to follow the guidance in the FAA *Community Involvement Manual* in organizing and scheduling public meetings.<sup>2</sup>

Information about key regulatory filings are also posted on the Massport website at the following URL: [http://www.massport.com/about/press\\_news\\_RSAENF09.html](http://www.massport.com/about/press_news_RSAENF09.html). The website is updated periodically as information becomes available. The Draft EA/EIR and Appendices are available on the website.

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### 7.3 Agency Consultation and Coordination

The ENF was distributed to local, state, and federal agencies for their review and comment. Responses to agency comments are provided in Appendix 2, *Response to Comments*. Those agencies that provided comments on the ENF include:

- National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS)
- Massachusetts Office of Coastal Zone Management (CZM)
- Massachusetts Board of Underwater Archaeological Resources
- Massachusetts Department of Environmental Protection (DEP) Northeast Region
- Massachusetts Department of Fish and Game Division of Marine Fisheries (DMF)
- City of Boston Environmental Department (CBED)
- City of Boston Transportation Department (BTD)

Prior to the submittal of the ENF, Massport began agency consultation and coordination by reaching out to numerous resource agencies to receive data and feedback regarding affected environmental resources and potential impacts. Letters were mailed to agencies in November, 2007 requesting specific information such as: federally protected threatened and endangered wildlife, fishery or plant species; Priority Habitat and Estimated Habitat of Rare Wildlife locations; and historic or cultural resources. The results of this coordination are documented in Chapter 3, *Affected Environment*, and correspondence is provided in Appendix 4, *Agency Coordination*.

On September 26, 2007, Massport convened an informal resource agency briefing to introduce agency representatives to the proposed Project. The following agencies were represented:

- U.S. Department of Transportation Federal Aviation Administration (FAA)
- U.S. Army Corps of Engineers (USACE)
- U.S. Fish and Wildlife Service (USFWS)
- CZM
- DMF
- DEP
- Massachusetts Environmental Policy Act Office (MEPA)

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<sup>2</sup> U.S. Department of Transportation. *Public Involvement Techniques for Transportation Decisionmaking* (FAA-EE-90-3). August 1990. Chapter 2: Community Involvement Manual.



- NMFS
- CBED
- BTD

Representatives were made aware of FAA's mandate to provide runway safety areas that meet FAA standards, to the extent practicable, at all Part 139 certificated airports by 2015 and the goal to meet those standards at Logan Airport by 2013. Meeting attendees were provided with an overview of FAA's RSA design standards and Massport's on-going program to improve RSAs at Logan Airport. A description of existing conditions at the ends of Runway 33L and Runway 22R was provided by Massport, as well as an overview of the proposed Project. Natural resources located within the proposed Project area were identified as well as potential permits required.

A second agency briefing occurred on March 26, 2009 with federal and state resource agencies to brief agency representatives on specific Project elements for Runway 33L and Runway 22R.

Massport has held three agency coordination meetings in addition to the resource agency briefings (Table 7.3-1). These meetings were held to receive agency feedback on the proposed alternatives, impacts to natural resources, regulatory compliance, and mitigation strategies. In addition, Massport met independently with DEP, Bureau of Resource Protection representatives to discuss regulatory compliance and water quality issues associated with the proposed Project. Massport also met with DEP Waterways representatives to discuss regulatory compliance with Massachusetts General Law Chapter 91; Massachusetts Public Waterfront Act, and its accompanying regulations (310 CMR 9.00). Agency representatives were notified by email and/or letter in advance of each meeting. As described in the following sections, Massport has convened two working groups, the Salt Marsh and Eelgrass Working Groups, to specifically focus on mitigation opportunities for those natural resources.



Table 7.3-1 Agency Coordination Meetings

Resource Agency(ies)	Date	Topic
Agency Briefing (1)	7/27/2007	Project Overview
Notice of Intent Hearing (Massport, Boston Conservation Commission)	10/17/2007	Hearing to receive permission to drill borings for geotechnical investigation at proposed project site.
Boston Environment Dept.	6/8/2008	Initial Project Briefing
Agency Briefing (2)	3/26/2009	Alternatives, impacts to natural resources, regulatory compliance, and mitigation strategies
Eelgrass Mitigation Working Group Meeting 1 (NMFS, USEPA, CZM, DEP, DMF)	4/17/2009	Project overview and impacts, mitigation goals and criteria.
Boston Environment Dept. (Env. Dept. Staff, Massport)	6/5/2009	Project Status Update
Eelgrass Mitigation Working Group Meeting 2 (USACE, NMFS, USEPA, DEP, DMF)	7/9/2009	Project impacts, mitigation requirements, regulatory compliance.
MEPA/NEPA Scoping (FAA, MEPA Staff, Massport)	7/30/09	Project overview, impacts.
Eelgrass Mitigation Working Group Meeting 3 (USACE, USEPA, DEP, DMF)	7/31/2009	Mitigation requirements, potential mitigation sites, regulatory compliance.
Agency Site Walk (all Resource Agencies)	9/25/2009	Visit to Runways 22R and 33L end to visualize proposed project and potential impacts.
DEP Bureau of Resource Protection	10/15/2009	Water quality issues and regulatory compliance.
Salt Marsh Mitigation Working Group Meeting 1(FAA, USACE, USEPA, CZM, DEP, DMF, DCR, CBED)	10/23/2009	Revised mitigation sites, regulatory compliance.
Boston Environment Dept.	12/16/2009	Project overview, impacts.
Boston Conservation Commission	2/3/2010	Public hearing in regard to Notice of Intent submittal
DEP Waterways	2/8/2010	MGL Ch 91 regulatory compliance.
Salt Marsh Mitigation Working Group Meeting 2 (FAA, USACE, USEPA, CZM, DEP, DMF, DCR, CBED)	2/22/2010	Anticipated impacts, mitigation goals and criteria, potential mitigation sites, regulatory compliance.
Eelgrass Mitigation Working Group Meeting 4 (USACE, NMFS, USEPA, CZM, DEP, DMF, DCR)	3/19/2010	Potential mitigation sites, regulatory compliance.
Joint Salt Marsh Working Group and Eelgrass Working Group Meeting	6/9/2010	Mitigation overview

### 7.3.1 Salt Marsh Mitigation Working Group

Massport established a Salt Marsh Mitigation Working Group to develop a mitigation approach for the RSA Project that would fulfill all agency rules and regulations for mitigation of impacts to salt marshes. Specifically, mitigation criteria, including USACE compensatory mitigation and DEP mitigation standards, mitigation goals, and potential mitigation sites are discussed among Working Group members. Active Working Group resource





agencies include FAA, USACE, U.S. Environmental Protection Agency (USEPA), CZM, DEP, Massachusetts Division of Conservation and Recreation (DCR), Massachusetts Department of Fish and Game Division of Ecological Restoration (DER), and CBED.

The first Salt Marsh Mitigation Working Group meeting occurred on October 23, 2009 where anticipated salt marsh impacts from the proposed Inclined Safety Area at Runway 22R were discussed. Specific mitigation criteria, including USACE compensatory mitigation and DEP mitigation standards, were discussed. The Salt Marsh Working Group was asked to help develop a list of potential mitigation sites. A follow-up Working Group meeting occurred on February 22, 2010 to solicit feedback on Massport's identification of potential mitigation sites for the proposed Project. Massport provided an overview of the site identification process and asked for the Working Group's assistance in narrowing down the list to a manageable number of sites for field investigation purposes. Mitigation goals, categories, and types were discussed (see Chapter 5, *Proposed Mitigation and Section 61 Findings*, for further details).

Massport anticipates holding additional meetings with the Salt Marsh Working Group to finalize salt marsh mitigation commitments.

### **7.3.2 Eelgrass Mitigation Working Group**

An Eelgrass Mitigation Working Group was established to develop an appropriate approach for offsetting the potential loss of eelgrass beds within the Runway 33L proposed improvement area. Direct impacts (removal within footprint of proposed pile-supported deck), indirect impacts (shading or sediment deposition), mitigation options, state and federal mitigation requirements, and potential sites are discussed at Working Group meetings. Active Working Group resource agencies include FAA, USEPA, DMF, DEP, CZM, and NMFS, CBED.

Massport anticipates holding additional meetings with the Eelgrass Working Group to finalize eelgrass mitigation commitments.



# 8

## Distribution List

FAA Order 5050.4B states that airport development will likely trigger public interest. Distributing an Environmental Assessment (EA) to the public is the best way to provide the public with the information needed to formulate an opinion. FAA Order 5050.4B, Paragraph 804, requires distribution to the federal agencies having jurisdiction by law or regulation over the action and to the public for review.

In accordance with Section 11.16 of the MEPA regulations (301 CMR 11.00), the Massachusetts Port Authority (Massport) is distributing this Draft EA/EIR to the following federal, state, and local agencies and interested parties.

It is our understanding that this document will be noticed in the *Environmental Monitor* published on July 21, 2010 commencing the 45-day public review period. Therefore, comments on the Draft EA/EIR are due by September 3, 2010.



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