



SOURCE: NEARMAP APRIL 10, 2024

FEASIBILITY REPORT & ALTERNATIVES ANALYSIS | JUNE 30, 2024

Resilient Bennington Street and Fredericks Park Project

Boston and Revere, Massachusetts

PREPARED FOR

CITY of BOSTON

1 City Hall Sq Ste 500
Boston, MA 02201

City of Revere

281 Broadway
Revere, MA 02151

PREPARED BY



260 Arsenal Place #2
Watertown, MA 02472

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WITH

Terraink Landscape Architecture
Lahlaf Geotechnical Consulting, Inc.
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JUNE 30, 2024

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Feasibility Report and Alternatives Analysis

1.1 Introduction

The Resilient Bennington Street and Fredericks Park Project Feasibility Report (the “Report”) is part of an ongoing effort between the cities of Boston and Revere to address regional flood risk under both current and future conditions. This Report, which is funded by the Massachusetts Municipal Vulnerability Preparedness (MVP) Grant Program for FY24, builds on previous work conducted by several entities including:

- › [City of Revere Municipal Vulnerability Preparedness Summary of Findings Report, 2019](#)
- › [City of Boston Natural Hazard Mitigation Plan, 2021](#)
- › [Coastal Resilience Solutions for East Boston \(Phase II\) Plan, 2022](#)
- › [City of Revere Local Hazard Mitigation Report, 2022](#)
- › [MassDOT Bennington Street Targeted Safety Improvements Pilot, 2022](#)
- › [Belle Isle Marsh Climate Vulnerability Assessment, 2023](#)

The “Project” comprises an analysis of the coastal resilience strategies that will ultimately be selected to serve the Purpose and Need described below. The “Project Site” encompasses three “Project Areas” (**Figure 1.1**).

1. Portions of Bennington Street in both Boston and Revere;
2. The Beachmont Post 6712 Veterans of Foreign Wars (VFW) facility at 150 Bennington Street in Revere; and
3. Fredericks Park (including the Beachmont Veterans Memorial School (“Beachmont School”) co-located at 15 Everard Street in Revere) and adjacent properties to the east terminating around Montfern Avenue.

This Report describes the process of screening potential Project alternatives and summarizes and evaluates the alternatives selected for further analysis. It also discusses permitting issues including regulatory compliance and potential permitting pathways. It utilizes topographic survey, geotechnical investigations and wetland delineations conducted within the Project Site between December 2023 and March 2024. The detailed findings are included in **Attachments A through C**.

This Report is intended to assist the cities of Boston and Revere in selecting a preferred flood protection alternative to advance through design and permitting.


Figure 1.1: Project Site and Project Areas


Resilient Bennington Street and Fredericks Park
Revere and Boston, MA



 Project Site

Project Areas

 Beachmont VFW

 Bennington Street

 Fredericks Park

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1.2 Study Area Description

The “Study Area” encompasses the Project Site and its general surroundings. It is located on land originally occupied by the Pawtucket tribe. European settlers originally referred to the southern portion of the Project Area as “Hog Island” and later “Belle Isle” and “Breeds Island.” Today, this portion of the Study Area comprises Belle Isle Marsh and portions of the Suffolk Downs site. The northern portion of the Project Area comprises the Beachmont neighborhood, which is located in the uplands to the north of the Belle Isle Inlet and has been a well-established community since the mid-1800s. In 1875, the Boston, Revere Beach and Lynn Railroad (BRB&L) opened with service from East Boston to Lynn. It traversed the marsh between Orient Heights to the south and Beachmont to the north, with a station at Winthrop Avenue. By 1891, Bennington Street was located alongside the BRB&L line and fill had been added to the marsh along the north side of Belle Isle Inlet to create the City of Revere’s Belle Isle Park (now Fredericks Park) (**Figure 1.2**).

When this community and its infrastructure were established, climate change and future sea level rise were not known risk factors. Today, the community is already living with the impacts of rising seas, including extreme high tides and coastal storms that result in flooding. A recent survey of residents of East Boston, Revere, and Winthrop who live near the Belle Isle Marsh¹ found that 60% of respondents have experienced flooding from storms or tides. According to that survey’s lead researcher, most people felt that their families would be unable to cope with major flooding without government intervention. All but one of the populated Census Block Groups within about one mile of the Project Site are characterized as Environmental Justice (EJ) communities (**Figure 1.3**).

Table 1-1 below identifies current and future tidal and coastal storm elevations in the vicinity of the Project Site.

Table 1-1. Study Area Tidal and Coastal Storm Elevations (NAVD88 Datum)

	Current ^a	2050 ^b	2070 ^b
Mean Lower Low Water (MLLW)	-5.5	-2.5	-0.8
Mean Low Water (MLW)	-5.2	-2.3	-0.6
Mean Tide Level (MTL)	-0.3	2.6	4.4
Mean High Water (MHW)	4.3	7.4	9.3
Mean Higher High Water (MHHW)	4.8	7.8	9.6
Highest Astronomical Tide (HAT)	6.8	*	11.8 ^c
1% ACE Water Surface Elevation (Avg)	8.8	11.9	13.8
1% ACE Water Surface Elevation (Max)	8.8	11.9	13.8
0.2% ACE Water Surface Elevation (Avg)	*	12.8	14.7
0.2% ACE Water Surface Elevation (Max)	*	13.0	14.8
1% ACE Wave Action Water Elevation (Avg)	7.0 -12.0 ^d	13.0	15.2
1% ACE Wave Action Water Elevation (Max)	12*	13.8	15.7
0.2% ACE Wave Action Water Elevation (Avg)	*	14.3	16.6
0.2% ACE Wave Action Water Elevation (Max)	*	15.4	17.6

a. NOAA Station 8443970, Epoch 1983-2001

¹ Alemu, J. B.. *High Level Summary of the Belle Isle Communities Coastal Adaptation Survey*. Northeastern University & The Nature Conservancy. June 21, 2023.

- b. MC-FRM via RMA
- c. Woods Hole Group, Personal Communication, February 9, 2024
- d. FEMA FIRM Panel 25025C0038J, effective March 16, 2016
- * Elevation unknown

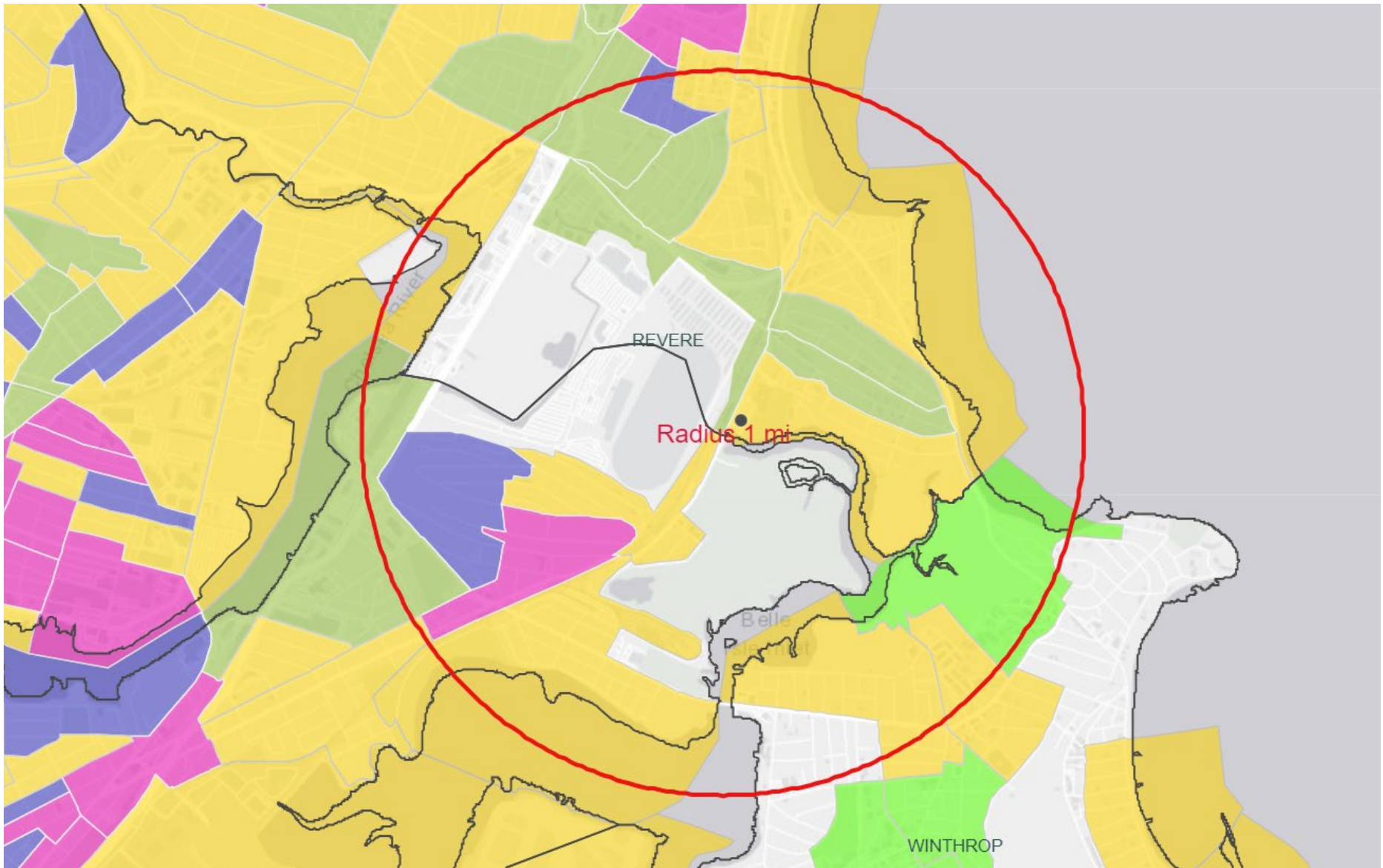


Source: MA Walker Atlas, David Rumsey Map Collection, via Mapjunction



Figure 1.2: Study Area c. 1891

Resilient Bennington Street and Fredericks Park
Boston and Revere, MA



Source: MA 2020 Environmental Justice Populations.
<https://mass-eoea.maps.arcgis.com/apps/MapSeries/index.html?appid=535e4419dc0545be980545a0eeaf9b53>.

- Minority: the block group minority population is $\geq 40\%$, or the block group minority population is $\geq 25\%$ and the median household income of the municipality the block group is in is $< 150\%$ of the Massachusetts median household income
- Income: at least 25% of households have a median household income 65% or less than the state median household income
- Minority and Income
- Minority and English isolation
- Income and English isolation
- Minority, Income and English isolation

 **Figure 1.3: EJ Populations**

Resilient Bennington Street and Fredericks Park
 Boston and Revere, MA

Belle Isle Marsh

Belle Isle Marsh is the largest remaining salt marsh in Boston Harbor. An asset to the Boston, Revere, and Winthrop communities, it provides critical wildlife habitat, valuable recreational space, and protection from flooding due to coastal storm events. Located within a highly urbanized area, the marsh is physically constrained by the surrounding dense development. It is also existentially threatened by rising sea levels and increasingly intense coastal storms.

The Belle Isle Marsh Reservation was officially opened in September of 1986, and in 1988 it was designated as an Area of Critical Environmental Concern (ACEC) as part of the larger Rumney Marshes ACEC. The ACEC boundary for Belle Isle Marsh includes the 100-year floodplain, wetlands edge, wetlands plus 100-foot buffer, and roads, encompassing the marsh and the tributary of Sales Creek as described in the [Rumney Marshes ACEC Designation](#).² The Belle Isle Inlet is designed as an Outstanding Resource Water (ORW) and shellfish growing area (although shellfishing is prohibited). According to the *Rumney Marshes ACEC Salt Marsh Restoration Plan* (2002), "The salt marshes are vitally important to the surrounding human population in their capacity to prevent flood damage by providing floodwater storage."

According to *Appendix B* of the MVP-funded 2023 *Belle Isle Marsh Climate Vulnerability Assessment*, under current conditions, marsh vegetation is well-equipped to manage infrequent storm surge events.³ However, by 2050, with 2.5 feet of SLR, spring high tide flooding is anticipated to begin encroaching on transitional marsh and upland areas in Winthrop and Revere. Flood depths will increase by a couple of feet and marsh habitat will be inundated for a longer period of time each day. A continued increase in estuarine open water is projected, with a gain of five additional acres.

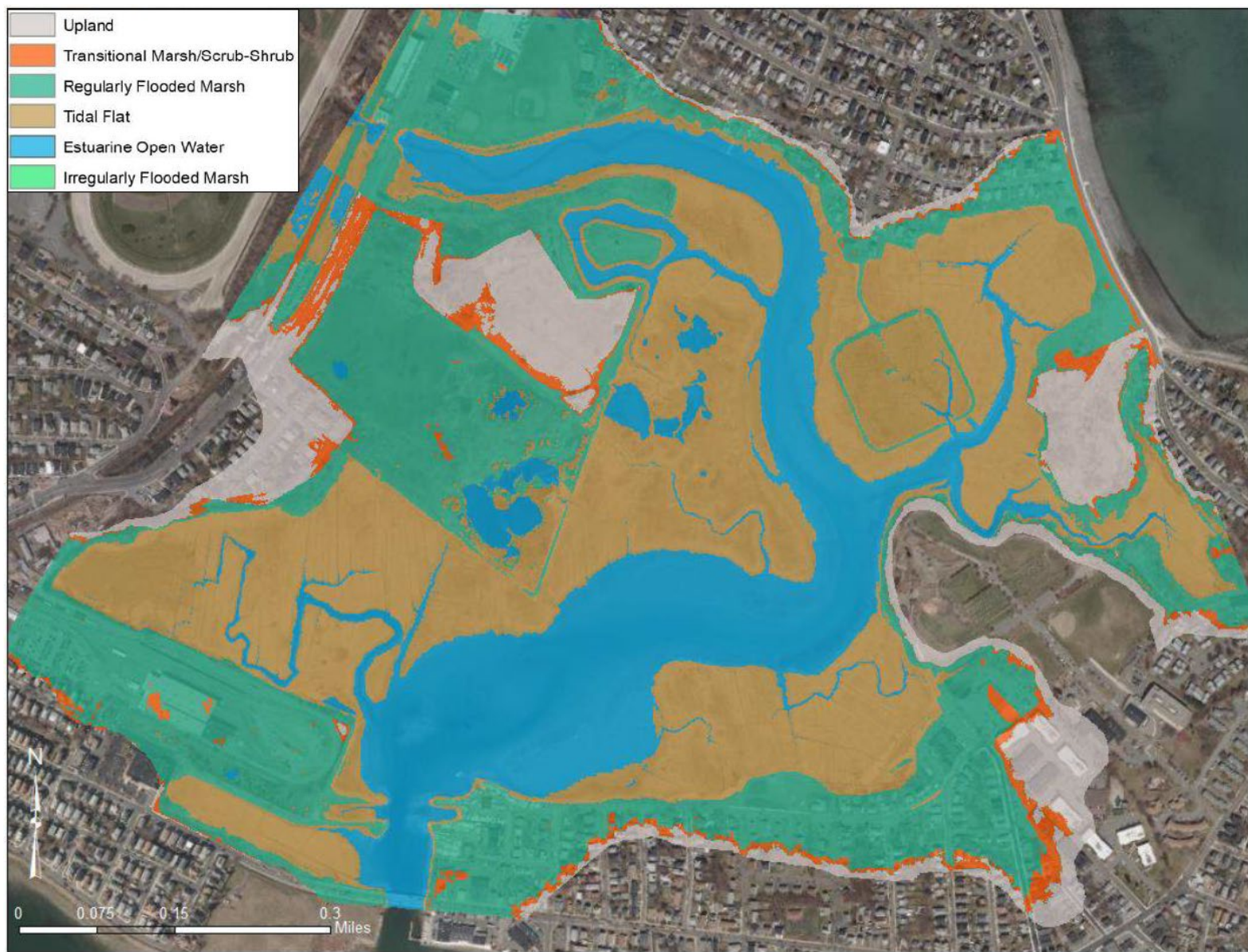
By 2070, with 4.3 feet of SLR, every foot of boundary between Belle Isle Marsh and inland development is anticipated to be inundated by the annual (100%) chance storm event. Furthermore, spring tidal flooding is anticipated to inundate the existing marsh, resulting in habitat conversion. Estuarine open water is anticipated to increase by an additional 24 acres.

Beyond 2080, the effects of sea level rise on low marsh reach a tipping point, where tidal inundation overtops the low marsh platform at an increased frequency and it converts nearly entirely to tidal flat, converting the salt marsh into a primarily subtidal/mudflat condition. Following 7.69 ft of SLR by year 2100, this conversion is nearly complete (**Figure 1.4**).

The *Belle Isle Marsh Climate Vulnerability Assessment* also notes that as sea level rises, upland areas will become more susceptible to marsh migration, tidal inundation, and especially storm flooding. Flooding of surrounding assets and infrastructure is predicted to increase in frequency and extent of damage. Also, wave energy and tidal current velocities may increase and exacerbate marsh erosion, as tidal current velocities pull sediment loose and cause calving and erosion of marsh edge.

² Designation of Portions of the cities of Boston, Lynn, and Revere, and the Towns of Saugus and Winthrop as the Rumney Marshes Area of Critical Environmental Concern with Supporting Findings. August 22, 1988. <https://www.mass.gov/files/documents/2016/08/pf/rm-des.pdf>

³ Please note that this study does not identify the area of salt marsh present on the Fredericks Park site under current conditions..



Source: Belle Isle Marsh Climate Vulnerability Assessment, June 2023.
"Figure 9. SLAMM modeling results for Belle Isle Marsh and the surrounding area during 2100."

 **Figure 1.4: Belle Isle Marsh c. 2100**

Resilient Bennington Street and Fredericks Park
 Boston and Revere, MA

Bennington Street

Bennington Street is the main thoroughfare for the north-eastern portion of the East Boston neighborhood. It serves local and regional traffic connecting Boston to Revere, creating a key local link among East Boston's Orient Heights neighborhood, Revere's Beachmont neighborhood, and the planned Suffolk Downs development. It also creates a connection to businesses, beaches, schools, and open space, including Fredericks Park and the Belle Isle Marsh Reservation (the main entrance to which is located on Bennington Street). Furthermore, it is one of two designated evacuation routes for East Boston and the Town of Winthrop.

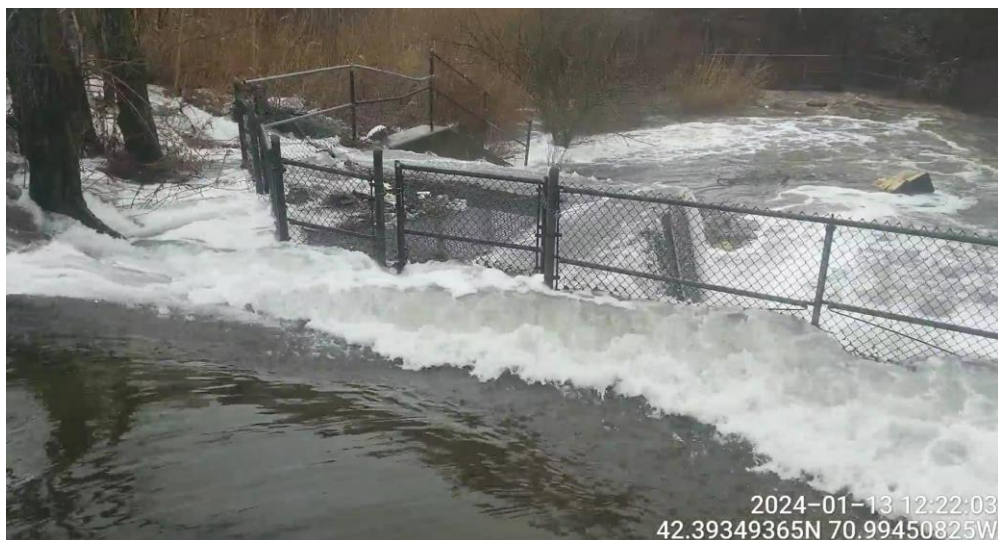
Bennington Street was designed to facilitate vehicle through-travel, with two vehicle travel lanes in each direction and no median. The speed limit ranges from 20 to 30 mph throughout this segment of the corridor. Sidewalks line both sides of the street, and the portion of the roadway adjacent to Belle Isle Marsh features wide grass buffers between the edge of the street and the sidewalk. There are no bicycle facilities present. While there is no on-street parking in Boston, on-street parking is allowed on both sides of Bennington Street in Revere. According to data collected in January 2022 by MassDOT, slightly over 10,000 vehicles use Bennington Street per day.⁴

Elevations on Bennington Street range from approximately 14.0 NAVD88 near Leverett Avenue, reaching a low point of 7.5 NAVD88 where the road crosses over Sales Creek, which is a primarily manmade drainage channel that runs through the Suffolk Downs site and discharges to the Belle Isle Inlet. In the 1980s, the Massachusetts Department of Conservation and Recreation (DCR) installed the Alfred H. Long Pump Station and Bennington Street Tide Gate to protect up-gradient areas in Revere that would otherwise be directly exposed to coastal flooding, including thousands of homes, the MBTA Blue Line tracks and Beachmont station. The pump station is approximately 40 years old with a pumping capacity of approximately 300 cubic feet per second. During lower tides, Sales Creek flows directly to the Belle Isle Inlet via culverts under Bennington Street. During heavy rainfall and storm surge events, the pump station moves stormwater from Sales Creek to Belle Isle Marsh.

The Project team met with William (Bill) Gode, DCR's Director of Flood Control Management and Navigational Operations Section, who noted that during high tide/storm surge events there is water spraying internally within the pump station from the discharge culvert through a cast iron cover. The pump station building has an approximately 14'-2" clear floor-to-ceiling height, which may allow for retrofits internally to the pump station, although this would be a challenge due to the need to raise the floor-level electronic equipment.

Bennington Street has a long history of coastal flooding. The coastal storm event that occurred on January 13, 2024, caused extensive flooding on Bennington Street and at the pump station. Flood waters reached an elevation of 8.87 NAVD88 at 12:24 pm (**Figure 1.5**).

⁴ Bennington Street Redesign Traffic Analysis Technical Memorandum. February 24, 2023. Toole Design for MassDOT.



Source: City of Boston, January 13, 2024.

Clockwise from top left: View from the west side of Bennington Street looking east toward Belle Isle Inlet; View from the west side of Bennington Street looking southeast toward Belle Isle Inlet; View from the west side of Bennington Street looking west toward Sales Creek; Alford H. Long Pump Station interior.

 **Figure 1.5: Flooding January 13, 2024**

Resilient Bennington Street and Fredericks Park
Boston and Revere, MA

Beachmont Post 6712 Veterans of Foreign Wars

The Beachmont Post 6712 Veterans of Foreign Wars (the “VFW”) facility is located on 1.49 acres of land at 150 Bennington Street. The southern end of the parcel extends slightly into the Belle Isle Marsh. The VFW’s approximately 10,000-sf building was constructed in 1965. The post is run by a non-profit organization, serving as a function hall and a place for its members to gather, hold meetings, and provide programs and services such as veterans activities, charitable work, and tributes. It also offers parking spaces for rent and provides an easement to Metro PCS for a cell tower. The land’s elevation near the cell tower is about 8.0 NAVD88.

Under existing conditions, the VFW periodically experiences stormwater-related flooding. While the VFW seeks to eliminate flooding on the Site, they also wish to maintain existing conditions to the maximum extent practicable.

Fredericks Park and Adjacent Properties

15 Everard Street is an approximately 15.05-acre parcel created in 1891 by elevating a portion of land adjacent to the Belle Isle Inlet to create the City of Revere’s Belle Isle Park. In 1979, the Beachmont Veterans Memorial School (“Beachmont School”) was built on approximately 4.83 acres of the parcel. An approximately 6.97-acre portion of the parcel⁵ known as Charles W. Fredericks Park (“Fredericks Park”) was rehabilitated in the 1990s with grants that require retention of the site for recreation use in perpetuity. Fredericks Park is also designated as recreation land under Article 97.

In its current configuration, Fredericks Park includes a soccer field, two basketball courts, a hockey court, a tot-lot, a baseball field, and a softball field. These facilities are available for use by the community as well as by the Beachmont School, which serves a diverse student body of just under 300 students in grades Pre-K through five and 115 students at the City Lab alternative High School for grades 9-12.

Fredericks Park ranges in elevation from 7.5 NAVD88 near the shoreline to 9.0 NAVD88 near the baseball diamond. There is an approximately 15,590-sf lobe of salt marsh that has migrated onto the southeastern portion of the park. There is an additional approximately 24,120-sf area of salt marsh on 15 Everard Street outside of Fredericks Park.

Directly to the east of Fredericks Park are two three-story apartment buildings on 0.62 acres of land at 45 and 55 Belle Island Avenue. Built in 1972, these buildings provide homes for 29 households along with accessory parking. The grade of the shoreline near these buildings is approximately 6.5 NAVD88. Additional properties within the eastern portion of this Project Area include 0 Orchard Street (undeveloped), 42 Orchard Street (double lot with two-family home), and 196 Pearl Avenue (two-family home).

During nor’easters in December 2022 and January 2024, over three feet of water inundated Belle Isle Avenue and Montfern Avenue and the entire parking lot at 45-55 Belle Isle Avenue, causing damage to vehicles and immobilizing residents for hours until the tide receded. Less severe events impact 45-55 Belle Isle Ave on average four times per year. The current flooding conditions frequently immobilize residents and cause damage to personal and public property, negatively impacting the quality of life for people living in this area, which is a State-designated

⁵ The remaining approximately 3.25 acres of the parcel is maintained as passive open space by the City of Revere.

environmental justice population. This threat is consistently increasing in frequency and severity and Massachusetts Coastal Flood Risk Model (MC-FRM) predictions specify the risk will escalate in the years ahead.

1.3 Project Purpose and Need

The Project is needed to reduce the risk of flooding in northern East Boston and Revere's Beachmont neighborhood, which are already impacted via three flood pathways originating in the adjacent Belle Isle Marsh. Due to climate change-induced sea level rise, flooding in the future is anticipated to occur more frequently, more extensively, and at greater depths than experienced today. This is problematic because these low-lying Environmental Justice (EJ) neighborhoods are densely populated and contain highly utilized critical regional infrastructure.

For example, Bennington Street is the main regional connection between Boston and Revere, and provides access to the Belle Isle Marsh Reservation, among many other significant community assets. The MBTA Blue Line, which typically carries up to 40,000 passengers per weekday,⁶ is highly sensitive to the impact of flooding, and could lose service for up to two days with as little as 0.5 feet of flooding, while flood depths greater than one foot could result in loss of service for more than 90 days.⁷ Fredericks Park serves the Beachmont Veterans Memorial School's nearly 415 students and also provides much-needed recreational space (protected as such under Article 97) for the City's diverse, primarily working-class residents. Finally, the Belle Isle Marsh itself is highly vulnerable to the impacts of sea level rise, with models showing that by 2070, with 4.3 feet of sea level rise, resource areas will begin to undergo conversion, with spring tides inundating the existing marsh and open water increasing by 24 acres.⁸

Therefore, the purpose of the Project is not only to provide a flood protection system that will prevent coastal flooding in northern East Boston and Revere's Beachmont neighborhood from events up to the elevation of the 2070 1% annual chance event (ACE), but to also enhance recreational space while maximizing additional co-benefits, including avoiding, minimizing and mitigating potential negative impacts to the adjacent Belle Isle Marsh.

The Project will utilize a design flood elevation (DFE) of 16.0 NAVD88, which was calculated using a site-specific wave model and is consistent with the MC-FRM (see Section 1.6.1 below).

⁶ MBTA Blue Line Overview, Weekday Ridership. [Overview | Data Dashboard \(transitmatters.org\)](https://transitmatters.org/data/mbta-blue-line-overview-weekday-ridership/). Accessed 06-17-24.

⁷ Coastal Resilience Solutions for East Boston and Charlestown (Phase II), August 2022. p. 133.

⁸ Belle Isle Marsh Climate Vulnerability Assessment, 2023, Appendix B.

1.4 Alternatives Screening

There are many different alternatives that could potentially meet the Project purpose. The Project team first screened 19 potential alternatives for the three Project Areas. Of these, eleven alternatives were selected for further study based on their ability to meet the following two criteria:

- › **Prevents flooding through 2070** – Measures must reach elevation 16.0 NAVD88 to prevent upland areas from flooding due to the 2070 1% ACE.
- › **Enhance Recreation Facilities** – Measures must limit loss of land available for recreation at Fredericks Park to 30%. At a minimum, Fredericks Park must be able to accommodate two (2) U10 and one (1) adult soccer fields. Optimally, three (3) U10 and one (1) full size adult soccer fields, four (4) pickleball courts, a tot-lot, and a half-size basketball court could be accommodated. Where possible measures should create, enhance and protect recreational facilities elsewhere within the Project Site.

In addition, at least one alternative for each Project Area that avoids salt marsh impacts was carried forward for further analysis. No alternatives for Fredericks Park were identified that met both screening criteria and avoided salt marsh impacts. Therefore, two alternatives that did not meet both screening criteria were carried forward.

Table 1-2 below shows the results of the screening analysis. The alternatives that were advanced for further analysis are described in Sections 1.5 and 1.7. The alternatives that were dismissed (in italics) are described in Section 1.6 below.

Table 1-2. Screening Assessment

Alternative		Prevents flooding of assets from 2070 1% ACE	Enhances Recreation Facilities	Avoids Salt Marsh Impacts
No Action		No	No	No ^a
Bennington Street				
BS-1	Elevated Roadway	Yes	Yes	Yes
BS-2a	Living Levee with Shared Use Path	Yes	Yes	No
BS-2b	Living Levee with Shared Use Path and Retaining Wall	Yes	Yes	Yes
B-3	<i>Flood Wall–East Side</i>	Yes	No	Yes
B-4	<i>Flood Wall–West Side</i>	No	Yes	Yes
B-5	<i>Bennington Street Bridge</i>	No	No	Yes
VFW				
VFW-1	Living Levee with Parking Compensation	Yes	n/a	Yes
VFW-2	Sea Wall–South Side	Yes	n/a	Yes ^b
VFW-3	<i>Living Levee with Parking Comp Ramp Alt</i>	No	n/a	Yes
VFW-4	<i>Flood Wall–North Side with Elevated Bennington</i>	No	n/a	Yes
VFW-5	<i>Elevated Parking Lot</i>	No	n/a	Yes
Fredericks Park				
FP-1	Living Levee with Sea Wall	Yes	No	Yes ^b

Alternative		Prevents flooding of assets from 2070 1% ACE	Enhances Recreation Facilities	Avoids Salt Marsh Impacts
FP-2	Elevated Park with Sea Wall	Yes	No	Yes ^b
FP-3	Living Levee with On-Site Salt Marsh Replication	Yes	Yes	No
FP-4	<i>Elevated Park with On-Site Salt Marsh Replication</i>	Yes	No	No
FP-5	Living Levee with Off-Site Salt Marsh Restoration	Yes	Yes	No
FP-6	Elevated Park with Off-Site Salt Marsh Restoration	Yes	Yes	No
FP-7a/b	<i>Living Levee or Elevated Park with Sea Wall, 4'</i>	No	No	Yes ^b
FP-8	<i>Flood Wall–North Side</i>	No	No	Yes

- a. Under future climate conditions the existing salt marsh will convert to mud flats and ultimately open water.
- b. While these alternatives avoid immediate impacts to salt marsh, there is potential for wave energy reflection that could negatively impact the salt marsh in the future.

1.5 Summary of Alternatives Analyzed

This section describes the eleven “Alternatives” within the three Project Areas that met the criteria for further analysis.

- › Bennington Street
 - BS-1: Elevated Roadway
 - BS-2A: Living Levee with Shared Use Path
 - BS-2B: Living Levee with Shared Use Path and Retaining Wall
- › VFW
 - VFW-1: Living Levee with Parking Compensation
 - VFW-2: Seawall
- › Fredericks Park
 - FP-1: Living Levee with Sea Wall
 - FP-2: Elevated Park with Sea Wall
 - FP-3: Living Levee with On-Site Salt Marsh Replication
 - FP-5: Living Levee with Off-Site Salt Marsh Restoration
 - FP-6: Elevated Park with Off-Site Salt Marsh Restoration

Bennington Street

The following three Alternatives were designed to meet the Project goals; avoid/minimize wetland impacts, flood protection solutions that require deployable flood barriers, and impacts to abutting properties; and improve safety across all modes of transportation.

MassDOT is currently proposing the Bennington Street Targeted Safety Improvements Pilot which proposes to restripe Bennington Street from four vehicular travel lanes (two in each direction) to two vehicular travel lanes (one each direction). This study completed a detailed traffic study to support the lane reduction, which the Resilient Bennington Street and Fredericks Park project is carrying forward. The project is expected to be implemented in the near future and additional details regarding the MassDOT safety improvements initiative can be accessed via the following link: [Bennington Street Targeted Safety Improvements Pilot \(arcgis.com\)](https://arcgis.com).

The Project team is proposing 30-foot wide roadway cross-section comprising of an 11-foot drive vehicular lane in each direction and an additional 8-foot lane, which can be allocated for parking, bus lanes, or turning lanes. This configuration not only aligns with the objectives of the current MassDOT safety improvements project but also optimizes the available space to enhance the resiliency aspects of the project. This cross-section and lane striping will need to be refined in a subsequent design phase to ensure that this configuration adequately meets traffic demands and safety measures.

1.5.1.1 BS-1: Elevated Roadway

This alternative proposes to raise the elevation of Bennington Street to elevation 16.0 NAVD 88, which is facilitated by completing a road diet down for one travel lane in each direction and a row of parking (for a total cross-sectional width of 30-feet). Additionally, a shared use pathway of a width of 14-feet is proposed along the seaward edge of the property. Elevation changes are principally facilitated by a 2H:1V slope along the landward edge, and a 5H:1V slope along the seaward edge. The elevation of Bennington Street is reduced along the northern and southern edges to tie into existing elevations at the Alfred H. Long Pump Station and Leverett Avenue.



Figure 6: Alternative BS-1 Elevated Roadway—Illustrative Cross-Section (Terraink)

1.5.1.2 BS-2A: Living Levee with Shared Use Path

This alternative proposes to construct a living levee, with a 14-foot shared use pathway situated on top of the living levee, along the seaward edge of Bennington Street up to elevation 16.0 NAVD 88. Similar to alternative BS-1 this is facilitated by completing a road diet down for one travel lane in each direction and a row of parking (for a total cross-sectional width of 30-feet). Elevation changes are principally facilitated by a 3H:1V slope along the landward edge, and a 5H:1V slope along the seaward edge. This alternative would have significant impacts to the grading into the Belle Isle Marsh parking lot and would impact salt marsh (which is quantified in Table 1-6)

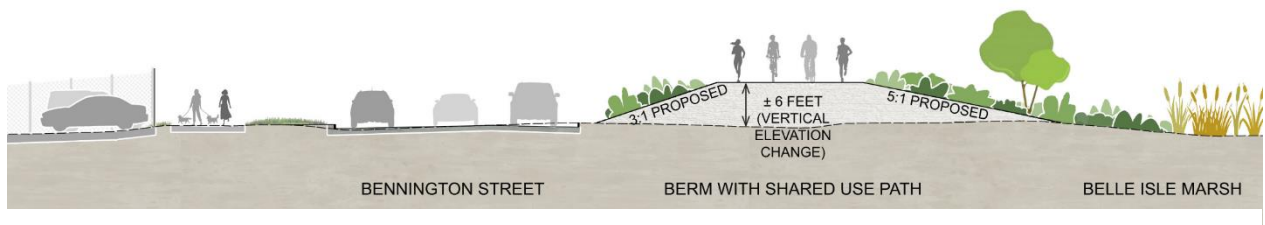


Figure 1.7: Alternative BS-2A: Living Levee with Shared Use Path—Illustrative Cross Section (Terraink)

1.5.1.3 BS-2B: Living Levee with Shared Use Path and Retaining Wall

Alternative BS-2B is identical to BS-2A except proposing a retaining wall along the landward side of the living levee to reduce grading impacts into the seaward resource areas. This alternative would require a deployable barrier at the entrance to the Belle Isle Marsh parking lot.

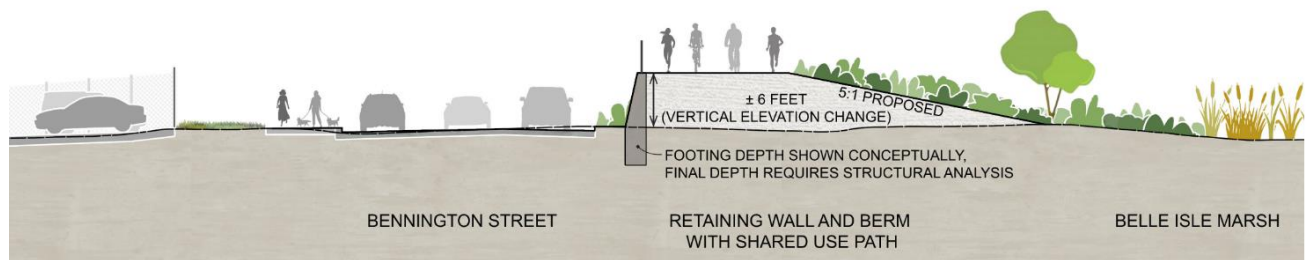


Figure 1.8: Alternative BS-2B: Living Levee with Shared Use Path and Retaining Wall—Illustrative Cross-Section (Terraink)

VFW

The following two Alternatives were designed to meet the Project goals and avoid/minimize loss of parking spaces, loss of vehicular access, impacts to the existing cell tower, and public access through the property.

1.5.1.4 VFW-1: Living Levee with Parking Compensation

This alternative proposes a living levee along the seaward edge of the VFW property. This results in a loss of two rows of parking spaces and the relocation of the cell tower. The cell tower is proposed to be relocated to the north, and the parking spaces to the north in the City of Revere property. This alternative will require either a taking or easement.

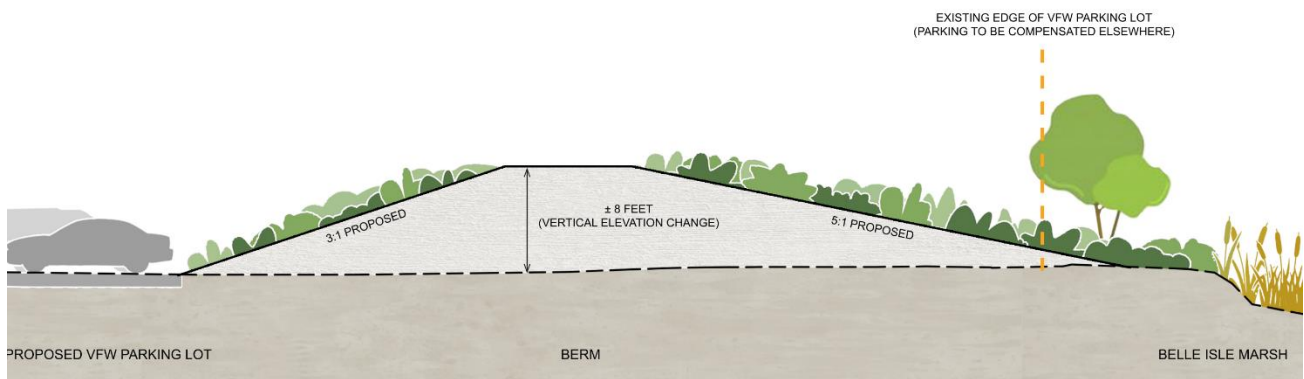


Figure 1.12: Alternative VFW-1 Living Levee with Parking Compensation—Illustrative Cross Section (Terraink)

1.5.1.5 VFW-2: Seawall

This alternative proposes a seawall/sheet pile wall along the seaward edge of the site. The seawall would likely be sheetpile to reduce construction related impacts to the abutting salt marsh.

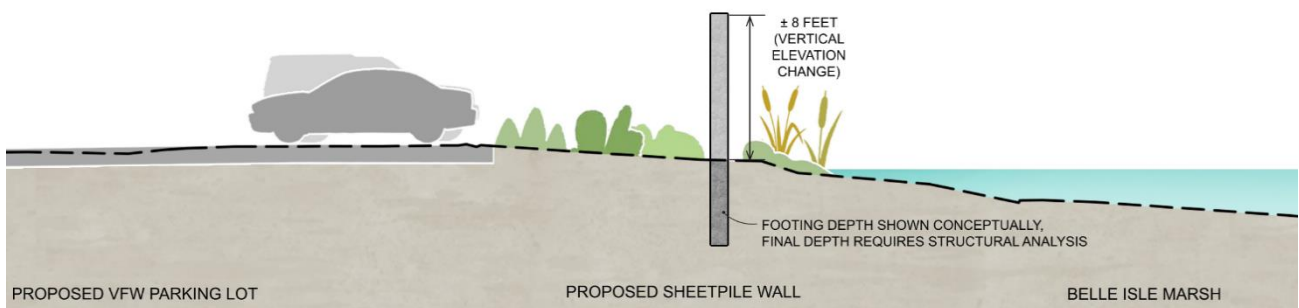


Figure 1.13: Alternative VFW-2: Sheet Pile Wall—Illustrative Cross Section (Terraink)

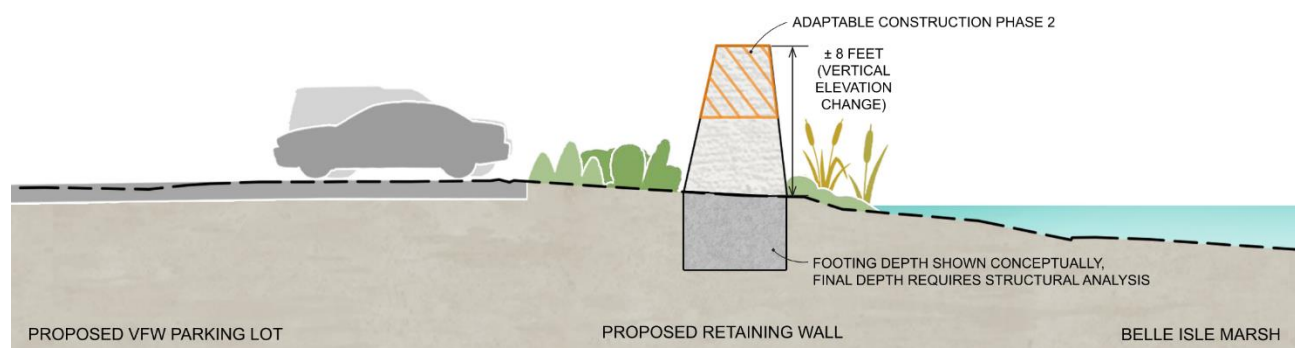


Figure 1.14: Alternative VFW-2 Adaptive Concrete Retaining Wall—Illustrative Cross Section (Terraink)

Fredericks Park

The following six Alternatives were designed to meet the Project goals; avoid/minimize the loss of use of the fields due to saturation and waterfront access from outside school property; and accommodate specific recreational uses.

1.5.1.6 FP-1: Living Levee with Sea Wall

This alternative proposes a living levee along the seaward edge of Fredericks Park, moving northerly along the salt marsh area within Fredericks Park, and then ultimately transiting to a sea wall/sheetpile wall near the apartment building on Belle Isle Avenue. The living levee has a seaward slope of 5H:1V, and a landward slope of 3H:1V.

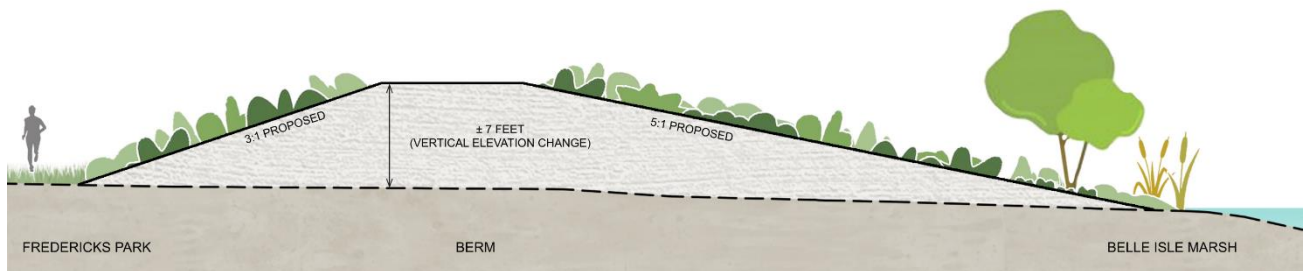


Figure 1.17: Alternative FP-1 Living Levee with Seawall—Illustrative Cross Section (Terraink)

1.5.1.7 FP-2: Elevated Park with Sea Wall

This alternative is similar to FP-1, however the entirety of Frederick's Park is raised to provide improved interior stormwater drainage.

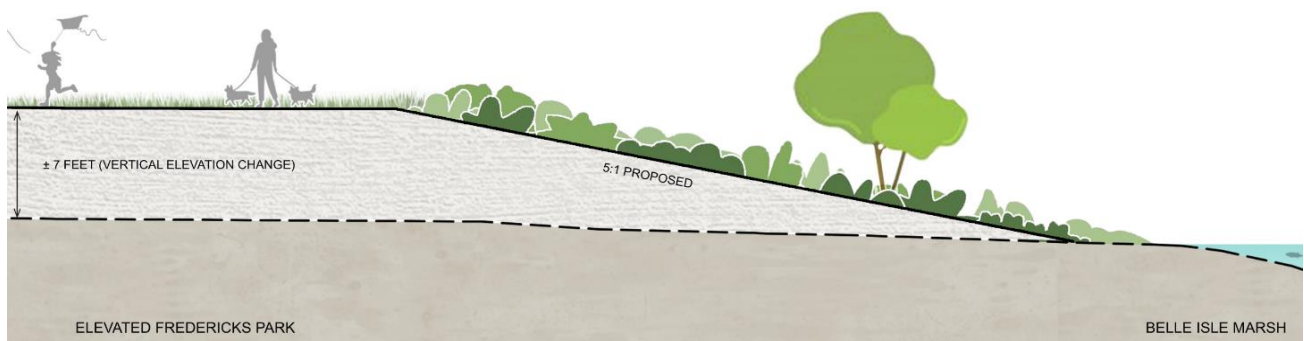


Figure 1.18: Alternative FP-2: Elevated Park with Seawall—Illustrative Cross Section (Terraink)

1.5.1.8 FP-3: Living Levee with Salt Marsh Replication

This alternative is similar to FP-1, however a living levee is proposed along the entirety of the seaward edge of Fredericks Park and the abutting properties to the east. This would result in impacts to the existing salt marsh resource area but would propose an on-site salt marsh replication by relocating the living levee landward to the Beachmont Memorial School.



Figure 1.19: Living Levee with Salt Marsh Replication—Illustrative Cross Section (TerrainK)

1.5.1.9 FP-5: Living Levee with Off-site Restoration

This alternative is similar to FP-1 and FP-3 with the proposal of a living levee. Alternative FP-5 proposes a living levee along the seaward edge of Fredericks Park and the eastern abutting properties. This results in the loss of a salt marsh within Fredericks Park, however, maximizes the usable recreational open space. The loss of salt marsh would be restored off-site at a site to be determined at a future project phase.

1.5.1.10 FP-6: Elevated Park with Off-site Restoration

This alternative is nearly identical to alternative FP-5 however proposes to elevate Fredericks Park to improve interior stormwater drainage.

1.6 Dismissed Alternatives

- › **No Action** – Under a No Action scenario, the Study Area’s neighborhoods and assets would be increasingly vulnerable to extensive flooding. Even without sea level rise, the properties within the current floodplain would have at least a 39.5% chance of being flooded over the next 50 years.⁹ No Action would have significant adverse effects on the interests of flood control and storm damage prevention in relation to the built environment (*i.e.*, without the Project, there would be a significant increase in flooding or storm damage affecting buildings, wells, septic systems, roads or other human-made structures or infrastructure). Further, No Action does NOT protect the Belle Isle Marsh. As described in Section 1.2.1 above, by the end of the century the marsh is projected to be lost, having converted into a subtidal/mudflat condition.
- › **B-3: Flood Wall–East Side** – This alternative involves erecting a vertical seawall between Bennington Street and the Belle Isle Marsh. While such a solution could provide adequate flood protection, it would not enhance or maintain recreation, as any bike/ped improvements would be hemmed in by a tall wall that blocks views of and access to Belle Isle Marsh. This solution would also require a deployable flood barrier at the entrance to the Reservation.
- › **B-4: Flood Wall–West Side** – A flood wall on the west side of Bennington Street would protect the MBTA tracks and upland neighborhood, but it would not protect Bennington Street (or any assets along its east side) from flooding.
- › **B-5: Bennington Street Bridge** – This alternative involves replacing Bennington Street with a bridge. This would expand the tidal reach of the Belle Isle Inlet into the Bordering Vegetated Wetland (BVW) on the west side of Bennington Street, potentially allowing the salt marsh to expand in the short term. However, this saltmarsh would quickly be drowned by sea level rise without the introduction of fill. While Bennington Street itself would be protected from flooding, this alternative increases flood exposure for the MBTA tracks, Suffolk Downs, and the entire Sales Creek watershed by eliminating the pump station and tide gate that was installed by the Army Corp with the purpose of protect those areas.
- › **VFW-3: Living Levee with Parking Compensation and Ramp Alternative** – This alternative is essentially the same as VFW-1, but it provides a different ramp configuration that allows the VFW to maintain both existing curb cuts. However, it is not possible to meet the DFE with this configuration and also maintain adequate parking on the VFW site.
- › **VFW-4: Flood Wall–North Side with Elevated Bennington** – This alternative includes elevating Bennington Street (as in BS-1 or BS-2) and connecting it to the existing higher roadway elevation to the north of the VFW property, in conjunction with erecting a flood wall along the north and east sides of the VFW property. This solution avoids impacts to the salt marsh but eliminates the VFW’s curb cuts, making it inaccessible. It also does not protect the property from future flooding.
- › **VFW-5: Elevated Parking Lot** – This alternative involves elevating the parking lot portion of the VFW site to serve as the flood barrier rather than constructing a berm or seawall at the property’s southern edge. However, in order to maintain a connection to the adjacent roadway and to avoid blocking building entryways, the parking lot could only be raised by two to three feet, which is not adequate to protect the Study Area from the 2070 1% ACE.
- › **FP-4: Elevated Park with On-Site Salt Marsh Replication** – This alternative is similar to FP-3, but it includes elevation of all of Fredericks Park. It impacts the same area of salt marsh as

⁹ National Weather Service Flood Return Period Calculator https://www.weather.gov/epz/wxcalc_floodperiod

FP-3. However, it results in approximately 111,500 sf of usable park space (37% of Fredericks Park), and therefore does not meet the screening criteria.

- › **FP-7a/b: Living Levee or Elevated Park with 4-foot Sea Wall** – This alternative could be identical to either FP-3 or FP-4 (described below), initially erecting a 4-foot seawall along the south side of the 45-55 Belle Isle Avenue site to avoid entirely blocking views of the marsh. However, this solution does not protect against the 2070 1% ACE, and eventually the seawall would have to be elevated by at least four additional feet.
- › **FP-8: Flood Wall–North Side** – This alternative avoids all marsh impacts and allows marsh migration by erecting a flood wall along the north side of Fredericks Park rather than the south side. While this protects land that is further upland from flooding, it results in the loss of the entire city park.

1.7 Evaluation of Alternatives

As noted in Section 1.3 above, the Project has multiple goals:

- › Reduce the risk of flooding from the 1% annual chance flood event through 2070 to ensure the protection of people, homes, businesses, critical infrastructure, and community assets;
- › Enhance recreational opportunities at Fredericks Park and elsewhere on the Project Site; and
- › Provide a myriad of co-benefits, including:
 - Minimized impacts and increased ecological benefits to Belle Isle Marsh,
 - Transportation improvements along Bennington Street that prioritize pedestrians and cyclists,
 - Improved stormwater management utilizing green infrastructure,
 - Reduced urban heat island effect through additional tree canopy and native vegetation, and
 - Improved public realm access and experience through connectivity to the waterfront.

Fully meeting all of these goals is a challenge. For example, it is not possible to maximize the area of land available for future marsh migration and/or green infrastructure and simultaneously maintain the existing amount of land available for recreation at Fredericks Park. Belle Isle Marsh is physically constrained and will be negatively impacted by sea level rise whether or not any flood protection measures are implemented. Flood levees cannot structurally support mature trees. Selecting a preferred alternative involves a complex interplay among physical practicability, environmental sustainability, and social welfare, which are deeply interlinked. This project uses an evaluation approach that considers these factors from the outset.

All Alternatives studied protect the Alfred H. Long Pump Station from storm surge from Belle Isle Marsh, and they maintain vehicular and pedestrian access. However, the pump station has not been studied regarding: its ability to maintain adequate flood protection while discharging the water downstream of the pump station that is at a higher elevation due to sea-level rise; the current issues of spraying as noted above; or potential retrofits or reconstruction costs of upgrades to the pump station. The Project team recommends either including these items for future study as part of a later phase of the Project or conducting a separate feasibility study specifically focused on upgrades to the Alfred H. Long Pump Station, which would allow the cities of Boston and Revere and DCR to adequately plan for the long-term viability of the pump station. This should be completed in coordination with the developer of Suffolk Downs (the HYM

Investment Group), which has mitigation commitments as part of its MEPA approval for flood protection improvements (including potential improvements to the pump station).

Flood Protection Analysis

The VHB team previously built a district-scale nested flood model of the Shirely Avenue, Beachmont, and East Boston neighborhoods to study flooding from current and future events as part of the adjacent Suffolk Downs Redevelopment Project. The model integrates existing flood protection measures including the Alfred H. Long Pump Station, the Bennington Street Tide Gate, and the Roughan's Point Flood Protection System. Based on a Letter of Map Revision (LOMR) issued by the Federal Emergency Management Agency (FEMA) on May 31, 2023, the Project team's model is now the regulatory model for these neighborhoods.

The VHB Team used this model to run simulations of flooding conditions from a 100-year coastal event in 2050 and 2070 both with and without the proposed Project. This model allows for a quantitative evaluation of flood protection benefits resulting from this Project that apply to the entire district, which includes over 10,000 properties. The model also provides advanced visualization highlighting a future coastal storm surge event both with and without the proposed project. In addition, the VHB Team also completed coastal wave modeling, including wave run-up, to inform the flood protection system design requirements. Both the district-scale nested flood model and the wave model use the results of the MC-FRM as inputs. An additional 1.3 feet of freeboard was added to the resulting elevation to generate the DFE of 16.0 NAVD88. This is consistent with the RMA's Projected Maximum Wave Action Water Elevation for the 2070 1% ACE of 15.7 NAVD88 at the Project Site.

The project area protects multiple Environmental Justice (EJ) Block Groups in Boston and Revere, protecting minority and low-income communities. Specifically, the project is located in Block Group 4, Census Tract 511.01; Block Group 1, Census Tract 1707.01; and Block Group 4, Census Tract 1708 (see Table 3 and Figure 1.25). However, the protected area extends beyond the immediate project area to include surrounding EJ Block Groups. This project aims to safeguard residents' homes, critical infrastructure, and natural and recreational resources from flood damage originating from Belle Isle Marsh.

Figure 1.25 shows the modeled extent of flooding in 2070 with and without the Proposed Project.

Recreation Analysis

All of the Bennington Street Alternatives improve recreation by adding pedestrian and bicycle facilities.

All of the Fredericks Park Alternatives result in loss of recreation land as indicated in Table 1-6 below. However, some Alternatives would still provide enough area to improve utilization. The screening criteria "Enhance Recreation Facilities" was deemed met if the Alternative could, at a minimum, accommodate two (2) U10 and one (1) U14 soccer fields. However, optimally, the selected Alternative would accommodate three (3) U10 and one (1) full size adult soccer fields, four (4) pickleball courts, a tot-lot, and a half-size basketball court. Table 1-3 indicates which criteria each Alternatives meets.





Table 1-3. Fredericks Park Alternatives: Enhanced Recreation Criteria

Alternative	Meets Minimum Criterion	Meets Optimal Criterion
FP-1	No	No
FP-2	No	No
FP-3	Yes	No
FP-5	Yes	No
FP-6	Yes	Yes

An example layout is provided for Alternative FP-6 that includes an adult regulation-size soccer field (or three U10 soccer fields) with bleachers, a basketball court, four pickleball courts, two bocce courts, and a restroom/storage facility.

Attachment E. *Fredericks Park Design Alternatives* depicts the various layouts considered.



-  Project Site
-  100-year Coastal Storm Flood Extents with 1.5 feet of Sea Level Rise
-  Municipal Boundary
-  Approximate Location of Flood Barrier

Resilient Bennington Street & Fredericks Park | Boston and Revere, MA
Figure 1.25 - 100-year Coastal Storm Flood Extents with 1.5 ft of Sea Level Rise
 Source Info: USGS, MassGIS, VHB

Co-Benefits Analysis

Table 1-4 below summarizes the ability of each Alternative to provide the desired co-benefits. Each co-benefit is described in more detail below the table.

Table 1-4. Co-Benefits

	Allows potential salt marsh migration	Includes bike/ped improvements on Bennington	Accommodates green stormwater infrastructure	Avoids need for inland drainage	Allows increase in tree canopy	Provides/maintains waterfront connectivity
Bennington Street						
BS-1	Yes	Yes	No	Yes	No	Yes
BS-2A	Yes	Yes	Yes	No	No ^a	Yes
BS-2B	Yes	Yes	Yes	No	No ^a	Yes
VFW						
VFW-1	Yes	N/A	No	No	No	No
VFW-2	No	N/A	No	No	No	No
Fredericks Park						
FP-1	Yes	N/A	Yes	No	Yes	No
FP-2	Yes	N/A	Yes	Yes	Yes	Yes
FP-3	Yes	N/A	Yes	No	Yes	No
FP-5	Yes	N/A	Yes	No	Yes	No
FP-6	Yes	N/A	Yes	Yes	Yes	Yes

a. Tree canopy could be increased if existing utilities on the west side of Bennington Street were relocated below-grade.

1.7.1.1 Salt Marsh Migration

As sea level rises, the marsh will be pushed further inland. As a result, wetlands will transition, and uplands will become wetlands. To allow the vegetation within the Belle Isle Marsh's Upper Main Channel to migrate uninhibited onto the Project Site as sea level rises¹⁰ (i.e., without the Project), the properties listed in Table 1-5 would need to be made available for this purpose. Please note that real estate property values tend to be higher than the values reported in the Tax Assessor's database. Post-acquisition activities (such as demolition and site preparation) would also be part of the cost of allowing uninhibited marsh migration. Further, allowing uninhibited marsh migration would not alleviate the need to construct a flood protection barrier landward of the migrated marsh.

¹⁰ As depicted in Town of Winthrop's Belle Isle Marsh Climate Vulnerability Assessment, June 2023 (Figure 9., pdf p.90).

Table 1-5. Properties Impacted by Uninhibited Marsh Migration^a

Address	Use	Lot Size (Acres)	Ownership	Assessed Value
15 Everard Street	Beachmont Veterans Memorial School Fredericks Park	15.05	Public	\$25,081,900
150 Bennington Street	Beachmont Post 6712 VFW Hall	1.49	Private	\$1,581,600
145 Bennington Street	61 Residential Units	0.82	Private	\$17,887,500
45 and 55 Belle Isle Avenue	29 Residential Units	0.62	Private	\$5,116,500
37 Belle Isle Avenue	1 Residential Unit	0.27	Private	\$490,000
0 Dyke Street	Undeveloped	0.17	Private	\$44,200
50 Belle Isle Avenue	2 Residential Units	0.10	Private	\$655,000
19 Montfern Avenue	1 Residential Unit	0.08	Private	\$491,000
17 Montfern Avenue	2 Residential Units	0.80	Private	\$296,200
15 Montfern Avenue	1 Residential Unit	0.10	Private	\$491,000
11 Montfern Avenue	2 Residential Units	0.12	Private	\$850,300
3 Montfern Avenue	3 Residential Units	0.12	Private	\$686,400
0 Orchard Street	Undeveloped	0.12	Public	\$21,600
41 Orchard Street	2 Residential Units	0.03	Private	\$414,900
TOTAL	104 Residential Units	19.89		\$54,108,100

a. Source: MassGIS Data: Property Tax Parcels May 2024

While it is not possible to implement the Project and still allow uninhibited marsh migration, some Project Alternatives include areas suitable for potential marsh migration while still providing flood protection. Such areas have all the following characteristics:

- › A maximum slope of 5:1,
- › Surface conditions suitable for native salt marsh vegetation,
- › Adjacency to existing salt marsh, and
- › Land between elevations 7 NAVD88 and 11 NAVD88.

All Bennington Street Alternatives provide areas for potential marsh migration as follows (areas are approximate):

- › BS-1 Elevated Roadway: 7,600 sf
- › BS-2A Living Levee with Shared Use Path: 6,100 sf
- › BS-2B Living Levee with Shared Use Path and Retaining Wall: 8,900 sf

Alternative VFW-1 Living Levee with Parking Compensation provides approximately 5,000 sf for potential marsh migration.

All Fredericks Park Alternatives provide areas for potential marsh migration as follows (areas are approximate):

- › FP-1 Living Levee with Sea Wall: 43,000 sf
- › FP-2 Elevated Park with Sea Wall: 43,000 sf

- › FP-3 Living Levee with On-Site Salt Marsh Replication: 20,000 sf
- › FP-5 Living Levee with Off-site Salt Marsh Restoration: 22,500 sf
- › FP-6 Elevated Park with Off-site Salt Marsh Restoration: 22,500 sf

1.7.1.2 Bennington Street Bike/Ped Improvements

All Bennington Street Alternatives provide adequate bicycle and pedestrian improvements, including sidewalks and a waterfront shared use path.

1.7.1.3 Green Stormwater Infrastructure

The City of Boston uses Green Infrastructure (GI) as an umbrella term for stormwater management features that use plants, soil and other natural materials to remove pollutants and allow stormwater to absorb back into the ground. These features help prevent flooding and reduce the amount of polluted water that goes to the City's water bodies. GI also has many environmental, social and economic benefits. Types of GI relevant to this project include bioretention features (bioretention areas, rain gardens and bioswales), infiltration features (stone infiltration areas, stormwater chambers, and drywells), porous paving materials (porous asphalt, permeable and porous pavers, and porous concrete), and tree pits/tree trenches.

While stormwater management has been considered as part of the Project, the scope of this Feasibility Study does not include conceptual designs for such systems. Table 1-3 above indicates "Yes" for those Alternatives that allow space for GI features. Management of stormwater in each Project Area requires further evaluation based upon the combination of alternatives that is ultimately selected to address coastal flooding in the project area.

1.7.1.4 Inland Drainage

In addition to implementation of general stormwater management, some Alternatives would impede excess stormwater from flowing off-site during extreme precipitation events. To alleviate this these alternatives would require the modification of the existing drainage features and/or the installation of additional drainage features, such as swales and inlets. Additional analysis should be conducted in the next design phase to determine the optimal solution for the selected alternative. The following alternatives require more robust inland drainage systems: BS-2A, BS-2B, VFW-1, VFW-2, FP-1, FP-3 and FP-5.

1.7.1.5 Tree Canopy

Increasing the tree canopy is one of the desired potential co-benefits of the Project. Unfortunately, none of the Bennington Street Alternatives immediately allow for the planting of additional trees. It is unlikely that trees could be accommodated under Alternative BS-1, wherein the entire right-of-way is elevated to create the flood control berm. There are currently utility poles on the west side of Bennington Street. If these utilities could be relocated below-grade, there would be opportunities to add trees under Alternatives BS-2a and BS-2b.

While none of the VFW Alternatives preclude adding new trees to the VFW site, given the property owner's preference for maintaining the existing number of parking spaces, it is unlikely that new trees would be added.

All Fredericks Park Alternatives could accommodate new trees outside the footprint of the proposed recreational facilities.

1.7.1.6 Public Realm/Waterfront Connections

Improvements to the public realm and maintaining/creating connections to the waterfront is another potential co-benefit of the Project. The Project includes two ways to provide waterfront connectivity:

- › Maintain site-wide grades within a few feet of the DFE, or
- › Provide pedestrian access along the elevated shoreline protection measure within a few feet of the DFE.

All Bennington Street Alternatives maintain waterfront connections. Due to space constraints, and the undesirability of creating public access through the VFW site to the Fredericks Park site (due to its co-location with the Beachmont School), none of the VFW Alternatives maintain waterfront connections. The Fredericks Park Alternatives that include elevating the site (FP-2 and FP-6) maintain waterfront connections. While the current conceptual designs for FP-1, FP-3, and FP-5 do not include public access at the top of the living levee, there is potential to add a waterfront path as design progresses.

Impact Assessment

Direct impacts to salt marsh, reductions in recreation space, and impacts to properties that abut each alternatives limit of work are provided in Table 1-6 below. The impacts are further described below the table.

Table 1-6. Area Impacts

Direct Salt Marsh Impacts (sf)	Recreation Space Reduction		Impacts to Abutting Property (sf)	
	(sf)	% of Park Loss		
Bennington Street				
BS-1	0	0	0%	19,300
BS-2A	9,675	0	0%	37,000
BS-2B	0	0	0%	6,500
VFW				
VFW-1	0	0	0%	19,300
VFW-2	0	0	0%	1,500
Fredericks Park				
FP-1	0	100,000	33%	1,900
FP-2	0	102,000	34%	1,900
FP-3	40,000	87,860	29%	2,700
FP-5	40,000	53,000	17%	2,675
FP-6	40,000	74,500	25%	2,675

1.7.1.7 Impacts to Existing Salt Marsh

Alternative BS-2A would result in direct impacts to salt marsh due to the footprint of the levee extending outside the existing roadway right-of way.

Three of the Fredericks Park Alternatives would impact the existing salt marsh at the eastern edge of the park. At this location, the salt marsh has already migrated to create an approximately 32,470-sf lobe on the City's property, approximately 15,590 sf of which is in protected recreation land. Under Alternatives FP-3 through FP-6, this lobe would be separated from the waterway by the proposed levee and would be filled to reclaim functional recreation area. Alternatives FP-1 and FP-2 (which include sea walls) avoid direct salt marsh impacts by aligning the proposed levee along the west side of the lobe and building a flood wall around its north and east sides. In order to provide the desired level of protection, the seawall would need to be eight feet higher than existing ground. As a result, there is potential for this seawall to cause wave reflection, which would cause increasingly negative impacts to the salt marsh over time.

1.7.1.8 Impacts to Recreation Land

Under existing conditions, marsh migration has resulted in the loss of approximately 15,590 sf (5%) of land reserved for recreational purposes. All Fredericks Park Alternatives result in loss of recreation land as well due to reconfiguring the park with various combinations of measures to protect existing salt marsh and grading associated with flood protection. The Alternatives result in losses ranging from 17% to 34% of the existing 6.97-acre park.

1.7.1.9 Impacts to Abutting Properties

All Bennington Street Alternatives would necessitate grading work on land owned by DCR on the east side of the street. BS-1 would also require grading work within the driveways of 1240 Bennington Street (owned by the MBTA) and 10-20 Leverett Avenue (privately owned by a condominium association).

Alternative VFW-1 would impact the Beachmont School at 15 Everard Street, wherein replacement parking would be located on the City-owned parcel.

All Fredericks Park Alternatives would have some impact on adjacent properties. Impacts are primarily located on City-owned land (including the Montfern and Orchard Street rights-of-way). In addition, all Alternatives would impact approximately 650 sf at 45-55 Belle Isle Ave, 300 sf at 0 Orchard Street (adjacent to 42 Orchards Street), and 600 sf at 0 Dyke Street. FP-3 through FP-6 would impact an additional 1,350 sf at 45-55 Belle Isle Ave.

1.8 Public Involvement and Stakeholder Engagement

Public Involvement

Community engagement has been fundamental in previous planning efforts led by Boston and Revere, the Study of Belle Isle Marsh, and this phase of work for the Project. This Project was identified as a priority through these efforts, which were directly informed by residents in East Boston and Revere, many (if not most) of whom are members of EJ Populations and other priority populations that are present within and around the Study Area. These residents have shared their lived experiences of flooding in their backyards, disruptions to travel along Bennington Street due to flooding, deterioration or lack of usability of Fredericks Park due to frequent inundation, fear of damage to the MBTA Blue Line, loss of or damage to property or vehicles, and concern for the health of Belle Isle Marsh. The desire for this Project expressed by these community members has been heard and recorded over many years, and the impacts of

flooding continue to threaten the stability of the lives of East Boston and Revere residents. Most recently, lived experiences have been shared by members of the Beachmont Improvement Commission (BIC) for the Beachmont neighborhood, who have advocated for swift action to protect their community. Community members, particularly members of the Friends of Belle Isle Marsh, have expressed a preference for nature-based solutions as opposed to hard infrastructure such as seawalls to reduce harmful impacts to Belle Isle Marsh and support opportunities for marsh migration. Members of the VFW expressed significant concern regarding the impact of the Project on their property and the project team is committed to minimizing impacts to the property where possible.

Community engagement will continue to be a priority as this Project advances. During this phase of the Project, the project team held a Public Informative Session in November 2023, a virtual Community Meeting in May 2024, and two virtual office hours sessions and an in-person coffee hour in May 2024. Outreach for the Community Meeting in May 2024 included the distribution of over 450 flyers, social media and website content, direct communication with community-based organizations, and local newspaper articles. All Community Meeting materials (meeting presentations, flyers, social media content) included Spanish and Arabic translations and live simultaneous interpretation was provided at the meeting. Over 50 community members attended the Community Meeting to learn about the Project and shared their feedback.

Stakeholder Engagement

During this Project, the project team held a Regulatory Agency meeting on April 3, 2024, to discuss the findings of the site investigations, the alternatives being studied, and permitting pathways for the Project with representatives from the MEPA Office, MassDEP, the Office of Coastal Zone Management (CZM), and the Boston and Revere Conservation Commissions. On June 5, 2024, the project team led a site walk with representatives of these organizations to evaluate the Study Area and discuss the alternatives under evaluation. This site walk was followed by two additional meetings with MassDEP and CZM (which were held on June 10, 2024 and June 20, 2024) to continue to discuss each Alternative, associated tradeoffs, and permitting pathways.

Additionally, the project team coordinated closely with partner agencies and adjacent landowners, including the MA Department of Conservation and Recreation (DCR), the MA Department of Transportation (MassDOT), the MBTA, the Boston Transportation Department (BTD), the Planning Department (formerly the Boston Planning and Development Agency), the Boston Public Works Department (PWD), the Revere Planning Department, the Revere Department of Public Works (DPW), the Revere Department of Parks and Recreation, and Revere Public Schools. The project team has also engaged local elected officials, including State Representatives, State Senators, and City Councilors.

1.9 Permitting Analysis

This section addresses the ability of each Alternative to comply with applicable regulations and describes potential permitting pathways.

Regulatory Compliance

This section addresses compliance with regulations related to recreation and environmental protection. Table 1-7 below provides a summary of each Alternatives ability to comply with the applicable regulations. A discussion of each regulation is provided below the table. **Figure 1.26** and **Figure 1.27** depict the environmental constraints and the delineated wetland resource areas in and around the project area.

Table 1-7. Permitting Compliance Overview

	WPA	BWO	MESA	Ch91	Sec. 401	Sec. 404 ^a
Bennington Street						
BS-1	Yes	Yes	N/A	Yes	N/A	N/A
BS-2A	No	Yes	Yes	Yes	Yes ^b	Yes
BS-2B	Yes	Yes	N/A	Yes	N/A	N/A
VFW						
VFW-1	Yes	N/A	N/A	N/A	N/A	N/A
VFW-2	No	N/A	N/A	N/A	N/A	N/A
Fredericks Park						
FP-1	Yes	N/A	N/A	Yes	N/A	N/A
FP-2	Yes	N/A	N/A	Yes	N/A	N/A
FP-3	No	N/A	N/A	Yes	Yes ^b	Yes
FP-5	No	N/A	N/A	Yes	Yes ^b	Yes
FP-6	No	N/A	N/A	Yes	Yes ^b	Yes

Yes = Compliant with applicable regulations

No = Not compliant with applicable regulations and therefore requires a variance

N/A = Regulations not applicable

a. Section 404 level of permitting assumed based on concept-level design and reviews as a single and complete project.

b. A variance under Section 401 is not required if the Project is able to meet the criteria at 314 CMR 9.06(3). See Section 1.9.1.6 below.

1.9.1.1 Wetlands Protection Act and Boston Wetlands Ordinance

The wetland resource areas described below are located within the Project Site (**Figure 1.28**). They are regulated under the Wetlands Protection Act (WPA) and/or the Boston Wetlands Ordinance (BWO). Work within these areas must be approved by the Boston Conservation Commission and the Revere Conservation Commission under Orders of Conditions. The Project Alternatives presented above all impact Land Subject to Coastal Storm Flowage. Some also impact Salt Marsh, Coastal Bank and/or Waterfront Area. None of the Alternatives impact BVW, Tidal Flats, or Land Under Ocean (LUO).

Salt Marsh (WPA)

- › **Definition:** A salt marsh is a coastal wetland that extends landward up to the highest high tide line, that is, the highest spring tide of the year, and is characterized by plants that are well adapted to or prefer living in saline soils.
- › **On the Project Site:** Salt marsh exists along the northern and eastern portions of the Project Site where the perimeter of Belle Isle Marsh meets Bennington Street, Fredericks Park, and

waterfront private properties. A lobe of salt marsh extends north into Fredericks Park along its eastern boundary and the adjacent private residential properties.

› **Performance Standards:**

- As per 310 CMR 10.32(3), projects in or within 100 feet of a salt marsh shall not destroy any portion of the salt marsh and shall not have an adverse effect on the productivity of the salt marsh. Alterations in growth, distribution and composition of salt marsh vegetation shall be considered in evaluating adverse effects on productivity.
- No project may be permitted which will have any adverse effect on specified habitat sites of rare species (310 CMR 10.32(6)).
- As per the 2023 draft revisions to 310 CMR 10.32(5), creation of a new salt marsh or conversion of another Resource Area to expand a salt marsh may be permitted provided that the design is in accordance with Best Available Measures. Further, work may be permitted to encourage the migration of Salt Marsh in LSCSF (within the 100-foot buffer to Salt Marsh) provided that there are no adverse effects on any Resource Area or adjacent properties.

› **Project Compliance:** Alternatives BS-2A, VFW-2 and FP-3 through FP-6 all impact salt marsh and therefore do not comply with the applicable performance standards. Implementation of these alternatives would require a variance from the WPA.

Land Subject to Coastal Storm Flowage (LSCSF) (WPA, BWO)

› **Definition:** According to 310 CMR 10.04, LSCSF means 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. The landward boundary of LSCSF is located where the ground elevation is the same as the Base Flood Elevation (BFE) depicted on the currently effective or preliminary FEMA Flood Insurance Rate Map (FIRM).

› **On the Project Site:** FEMA FIRM panel 25025C0038J, effective March 16, 2016, identifies much of the Project Site as an AE zone with base flood elevations (BFE) ranging from 7 to 12 NAVD88.

› **Performance Standards:**

- There are no currently effective regulations under the WPA.
- The Massachusetts Department of Environmental Protection's (MassDEP) 2023 proposed amendments to 310 CMR 10.36 introduce new performance standards for work in areas that are not previously developed and do not overlie another coastal Resource Area (10.36(5-7)). No portion of the Project Site is within the area of Moderate Wave Action (MoWA) or the Velocity Zone (V Zone), therefore Sections 10.36(5-6) would not apply. As per Section 10.37, the Project would be required to minimize adverse effects on the critical characteristics of LSCSF by:
 - (a) Allowing flood waters to spread inland and laterally by avoiding fill, structures, or topographic alterations which would increase velocity or redirect flow and cause increased erosion, channelization, storm damage, or flooding;
 - (b) Avoiding fill, structures, or topographic alterations that would, in the judgment of the Issuing Authority, contribute incrementally to an increase in flood velocity, volume, or elevation on other properties resulting in storm damage;
 - (c) Avoiding, or mitigating through flood easements or other means, any fill, structure, or topographic alteration that would increase flood velocity to the extent it would have a scour impact, volume, or elevations within a topographic depression or

- confined basin that can be identified using LiDAR or on a USGS topographic map where a manmade or natural feature significantly impedes or prevents the return flow of coastal flood waters;
- (d) Preserving soils and vegetation at the site to reduce erosion to the maximum extent practicable and allow coastal flood waters to percolate downward;
- (e) Reducing impervious surfaces to increase permeability and avoid increasing the velocity of floodwater;
- (f) Managing stormwater as required by 310 CMR 10.05(6)(k) through (q).
- The BWO includes the following applicable requirements and performance standards:
 - Applicants must consider the impacts of climate change on LSCSF and integrate climate resilience and adaptation strategies to protect the resource area and properties adjacent to it for the next 50 years.
 - Work within LSCSF must not have an adverse impact on the subject site, adjacent properties, or any public or private way by increasing the elevation or velocity of flood or storm waters or by increasing flows due to a change in drainage or flowage characteristics.
 - Proposed activity or work shall not result in flood damage due to filling, which causes lateral displacement of flood waters that, in the judgment of the Commission, would otherwise be confined within said area.
 - If LSCSF receives coastal flood waters that naturally flow across the landform surface without redirecting or channeling the flow, the proposed activity or work shall not cause flood water to become redirected or channeled or increase in velocity, so as to cause erosion, scour, and increased storm damage to the project's locus and adjacent areas.
 - If LSCSF is significant to wildlife and their habitat, proposed activity or work shall not impair the capacity of those portions of LSCSF to provide important wildlife habitat functions.
 - Proposed work or activity in LSCSF which results in alteration to vegetative cover, interruptions in the beneficial supply of sediment to other wetland resource areas, or changes to the form or volume of a dune or beach, and such result will have an adverse impact on said dune or beach's ability to provide storm damage prevention and flood control, is prohibited.
 - Notwithstanding the performance standards above, the Commission may permit additional activities, including the following:
 - Projects that are designed and intended to reduce the risk of coastal flooding, inland flooding, extreme weather events, SLR, and other adverse impacts of climate change, including, but not limited to, strategies and plans described in Climate Ready Boston or any successor initiative of the City; and
 - Flood mitigation projects designed and intended to have no significant adverse effect on the ability of LSCSF to protect from storm damage and flood control.
- › **Project Compliance:** There are currently no performance standards under the WPA for work in LSCSF. Should the proposed amendments be promulgated, hydraulic modeling would be needed to determine whether the selected Alternative complies with the performance standards. The Project can be designed to comply with the performance standards under the BWO.

Coastal Bank (WPA, BWO)

- › **Definition:** A Coastal Bank is the seaward face or side of any elevated landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action, or other wetland. MassDEP interprets this to include the land immediately behind a coastal engineering structure. The BWO expands this definition to include seawalls and bulkheads themselves under the definition of coastal bank.
- › **On the Project Site:** Coastal banks on the Project Site were delineated using landscape position, slope determinations and limits of LSCSF, in accordance with MassDEP's *Wetlands Program Policy 92-1: Coastal Banks*. A coastal bank exists along the eastern edge of Bennington Street north of the entrance to Belle Isle Marsh Reservation. In this area, the limits of the coastal bank coincide with the top of the slope at Bennington Street.

The coastal bank on the Project Site is thickly vegetated and may supply sediment to coastal transport functions, as well as provide velocity dissipation, storm damage prevention, flood control, and act as vertical buffer to stormwater.

- › **Performance Standards:**
 - As per 310 CMR 10.30(3), no new bulkhead, revetment, seawall, groin or other coastal engineering structure shall be permitted on a coastal bank that supplies sediment to coastal beaches, coastal dunes or barrier beaches, except that such a coastal engineering structure shall be permitted when required to prevent storm damage to buildings constructed prior to August 10, 1978.
 - Any project on a coastal bank, or within 100 feet landward of the top of a coastal bank, that supplies sediment to coastal beaches, coastal dunes or barrier beaches, other than a structure permitted by 310 CMR 10.30(3), shall not have an adverse effect due to wave action on the movement of sediment from the coastal bank to coastal beaches or land subject to tidal action (310 CMR 10.30(4)).
 - Any project on a coastal bank, or within 100 feet landward of the top of coastal bank, that is a vertical buffer to storm waters shall have no adverse effects on the stability of the coastal bank. (310 CMR 10.30(6)).
 - Bulkheads, revetments, seawalls, groins or other coastal engineering structures may be
 - permitted on a coastal bank that is a vertical buffer to storm waters except when such bank is significant to storm damage prevention or flood control because it supplies sediment to coastal beaches, coastal dunes, and barrier beaches. (310 CMR 10.30(7)).
- › **Project Compliance:** While all of the Bennington Street Alternatives would impact Coastal Bank, none would result in an adverse effect.

Waterfront Area (BWO)

- › **Definition:** The BWO defines the Waterfront Area as a portion of the buffer zone which extends 25 feet horizontally from the edge of several resource areas, including salt marsh and coastal bank.
- › **On the Project Site:** The area 25 feet landward of salt marsh or top of coastal bank along the eastern edge of Bennington Street north of the entrance to Belle Isle Marsh Reservation.
- › **Performance Standards:** There are currently no performance standards for this resource area. However, the Commission has a strong preference for restoring or maintaining a strip of continuous undisturbed or restored vegetative cover or providing public access throughout the Waterfront Area.

- › **Project Compliance:** While no Bennington Street Alternative maintains a 25-foot strip of continuous vegetated cover within this resource area, they all provide areas of vegetated 5:1 slope extending from the edge of salt marsh/coastal bank and a shared use path for waterfront public access on top of the living levee or berm.

Bordering Vegetated Wetland (WPA)

- › **Definition:** BVWs are defined as freshwater wetlands that border on creeks, rivers, streams, ponds and lakes. They are areas where the soil is saturated and/or inundated such that they support a predominance of wetland indicator plants. The boundary of BVW is the line within which 50% or more of the vegetational community consists of wetland indicator plants and saturated or inundated conditions exist. Please note that the waterbody that the freshwater wetland borders may be freshwater or saltwater.
- › **On the Project Site:** BVW in the vicinity of the Project Site was delineated on December 23, 2023, and March 6, 2024, by VHB's environmental scientists in accordance with methods developed by MassDEP¹¹ and the U.S. Army Corps of Engineers¹² (see **Attachment C**). BVW exists along the west side of Bennington Street in the low-lying areas between Bennington Street and the MBTA railroad tracks. These areas border Sales Creek and are prevented from receiving tidal flow due to the tide gate at Bennington Street. Vegetation consistent with BVW is also present on the east side of Bennington Street between the coastal bank and the salt marsh associated with the Belle Isle inlet. This area is primarily above the HAT elevation of 6.82 NAVD88.
- › **Impacts:** None of the Alternatives impact this resource area.

Tidal Flats (WPA)

- › **Definition:** A Tidal Flat is a nearly level part of a coastal beach which usually extends from the mean low water line landward to the more steeply sloping face of the coastal beach or which may be separated from the beach by land under the ocean.
- › **On the Project Site:** Within the channel of the Belle Isle Inlet, tidal flats comprise the land above elevation -5.2 NAVD88 that is not colonized by salt marsh.
- › **Impacts:** None of the Alternatives impact this resource area.

Land Under Ocean (WPA)

- › **Definition:** All land seaward of mean low water (MLW), which is -5.2 NAVD88 in Boston Harbor.
- › **On the Project Site:** Land below elevation -5.2 NAVD88 within the channel of the Belle Isle Inlet is regulated as LUO.
- › **Impacts:** None of the Alternatives impact this resource area.

1.9.1.2 Area of Critical Environmental Concern

- › **Definition:** An area which has been designated by the Secretary in accordance with 301 CMR 12.00: Areas of Critical Environmental Concern. ACECs are those areas within the Commonwealth where unique clusters of natural and human resource values exist, and which are worthy of a high level of concern and protection.

¹¹ MassDEP, 1995. *Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act*.

¹² USACE, 2012. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, Version 2.0*.

- › **On the Project Site:** The Belle Isle Marsh Reservation is designated as an ACEC as part of the larger Rumney Marshes ACEC. Within the ACEC, Belle Isle Inlet and its adjacent wetlands are designated as an ORW.¹³ Within the Project Site, all of Fredericks Park and the Beachmont School, the majority of the VFW site, the portion of Bennington Street that includes the pump station and tide gates, and the area adjacent to the east side of the Bennington Street right-of-way are within the ACEC.
- › **Performance Standards:** As per 310 CMR 10.24 (5)(b) "When any portion of a designated Area of Critical Environmental Concern is determined by the Issuing Authority to be significant to any of the interests of M.G.L. c. 131, § 40, any proposed project in or impacting that portion of the Area of Critical Environmental Concern shall have no adverse effect upon those interests, except as provided under 310 CMR 10.25(4) for maintenance dredging, under 310 CMR 10.11 through 10.14, 10.24(8) and 10.53(4) for Ecological Restoration Projects."
- › **Project Compliance:** Alternatives BS-2A, VFW-2, and FP-3 through FP-6 would result in direct impacts to salt marsh. These alternatives do not meet the WPA performance standard for no adverse effects to resource areas within the ACEC, and therefore would require a variance.

1.9.1.3 Habitats of Rare Species and the Massachusetts Endangered Species Act

- › **Summary:** The Massachusetts Endangered Species Act (MESA) protects rare species and their habitats by prohibiting the "Take" of any plant or animal species listed as Endangered, Threatened, or Special Concern. In reference to animals, "Take" means to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct. In reference to plants, "Take" means to collect, pick, kill, transplant, cut or process or attempt to engage or to assist in any such conduct. Disruption of nesting, breeding, feeding or migratory activity may result from, but is not limited to, the modification, degradation or destruction of Habitat.
- › **On the Project Site:** The Project Site includes areas identified as rare species habitat on the most recent (August 2021) Estimated Habitats of Rare Wildlife (EH 965) and Priority Habitats of Rare Species (PH 1348) maps published by the Massachusetts Natural Heritage & Endangered Species Program (NHESP). If work is proposed within rare species habitat, Notices of Intent for the project must be sent to NHESP so that they may determine, in compliance with MESA, whether any state-listed species identified on the aforementioned map is likely to continue to be located on or near the site of the original occurrence and, if so, whether the area to be altered by the proposed project is in fact part of such species' habitat.
- › **Performance Standards:** As per 310 CMR 10.37, if the Project is found by the issuing authority (Conservation Commission) to alter a resource area which is part of the habitat of a state-listed species, the Project shall not be permitted to have any short- or long-term adverse effects on the habitat of the local population of that species.
- › **Project Compliance:** Alternative BS-2A encroaches slightly into areas mapped as rare species habitat for state-listed species. Coordination with NHESP would be required to pursue this Alternative.

¹³ MassDEP Water Quality Data Viewer. <https://arcgisserver.digital.mass.gov/massdepwaterquality/Home/Index> Accessed 06-18-24.

1.9.1.4 Chapter 91

- › **Summary:** Any construction, placement, excavation, addition, improvement, maintenance, repair, replacement, reconstruction, demolition or removal of any fill or structures, and any change in use of fill or structures in filled tidelands (between the historic mean high and mean low water marks) or flowed tidelands (seaward of the current mean high water mark) is subject to jurisdiction under M.G.L. c. 91, the Massachusetts Public Waterfront Act, and its implementing regulations at 310 CMR 9.00 (together, “Chapter 91”).
- › **On the Project Site:** Filled tidelands are present on Bennington Street (approximately 0.6 acres) and in Fredericks Park (approximately 0.3 acres). Work within these areas would require either a new Chapter 91 License or a minor modification to an existing license issued by the MassDEP Waterways Department.
- › **Regulatory Requirements:**
 - Chapter 91 allows fill for flood protection purposes. The Project could obtain a water-dependent use license as a waterfront park (9.12(2)(a)4.) and/or a shore protection structure (9.12(2)(a)11).
 - Fill or structures for any use on previously filled tidelands within an ACEC are allowed (9.32(1)(e)1.)
- › **Project Compliance:** As a water-dependent use, the Project can be designed to comply with Chapter 91 regulatory requirements.

1.9.1.5 Clean Water Act Section 404

- › **Summary:** The U.S. Army Corps of Engineers (USACE) regulates the discharge of dredged or fill material into Waters of the U.S. (WOTUS) under Section 404 of the federal Clean Water Act (CWA) (33 CFR 328).
- › **On the Project Site:** Portions of the Project Site including the Belle Isle Inlet and associated salt marsh and the BVW associated with Sales Creek fall under the definition of WOTUS. Federal jurisdiction in tidal waters extends up to the highest high tide line (HTL), which in Massachusetts is coterminous with the HAT. Activities within jurisdictional areas would be regulated under Section 404 of the CWA.
- › **Regulatory Requirements:**
 - The Project must demonstrate compliance with all applicable 2023 Massachusetts General Permits (GP) and applicable general conditions. Projects impacting less than 1,000 sf of salt marsh may be eligible for a GP.
 - If the Project does not meet the criteria for a GP, an Individual Permit (IP) must be obtained.
 - Activities must be designed and constructed to avoid and minimize adverse effects to the aquatic environment (both area and function) to the maximum extent practicable.

Project Compliance:

- Alternative BS-2A would result in permanent fill below the HTL,¹⁴ and would result in a permanent loss of more than 1,000 sf of salt marsh. As such it would require an IP. Based on the availability of Alternatives BS-1 and BS-2B, Alternative BS-2A is unlikely to qualify as the Least Environmentally Damaging Practicable Alternative (LEDPA).

¹⁴ The term “high tide line” means the line of intersection of the land with the water’s surface at the maximum height reached by a rising tide. The highest astronomical tide in the Study Area is 6.82 NAVD88.

- Alternatives FP-3 through FP-6 would result in fill below the high tide line and a permanent loss of over 1,000 sf of saltmarsh. As such they would require an IP.
- Alternative FP-3 would provide salt marsh mitigation at a 1:1 ratio; however, USACE generally prefers compensatory mitigation in the form of an In-Lieu Fee, instead of on-site mitigation.
- Alternatives FP-5 and FP-6 would seek to provide off-site salt marsh restoration.

1.9.1.6 Clean Water Act Section 401, Water Quality Certification

- › **Summary:** Massachusetts Water Quality Certification (WQC) regulations (314 CMR 9.00) establish procedures and criteria for the administration of Section 401 of the CWA (33 CFR 1251) for the discharge of dredged or fill material, dredging, and dredged material disposal in WOTUS within the Commonwealth and an action under Section 404 is required.
- › **On the Project Site:** Portions of the Project Site including the Belle Isle Inlet and associated salt marsh and the BVW associated with Sales Creek are considered WOTUS within the Commonwealth. Belle Isle Inlet and the wetlands bordering it are also designated as ORWs (314 CMR 04.06(2)).
- › **Regulatory Requirements:**
 - No discharge of dredged or fill material to a WOTUS shall be permitted if there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem.
 - Discharge of dredged or fill material to an ORW may be permitted without a variance provided it meets the requirements of 314 CMR 9.06(1), (2), (4), (5), and (7); is not identified in 314 CMR 9.06(4) as a discharge of dredged or fill material that requires a variance; and is an activity described in 314 CMR 9.06(3)(a-k). The Project has the potential to meet these criteria if, as per 314 CMR 9.06(h), it receives a variance under the WPA in compliance with 310 CMR 10.05(10), provided consideration has been given to the Outstanding Resource Water designation in the variance analysis.
 - No project may be permitted which will have an adverse effect on rare species habitat.
 - All activities must be compliant with the Massachusetts Stormwater Handbook.
- › **Project Compliance:**
 - Alternatives BS-2A and FP-3 through FP-6 would result in fill below the HTL, including areas of salt marsh. These alternatives do not achieve complete avoidance of fill within an ORW. However, as described above, a variance under the WPA would eliminate the need for a variance under the WQC regulations.

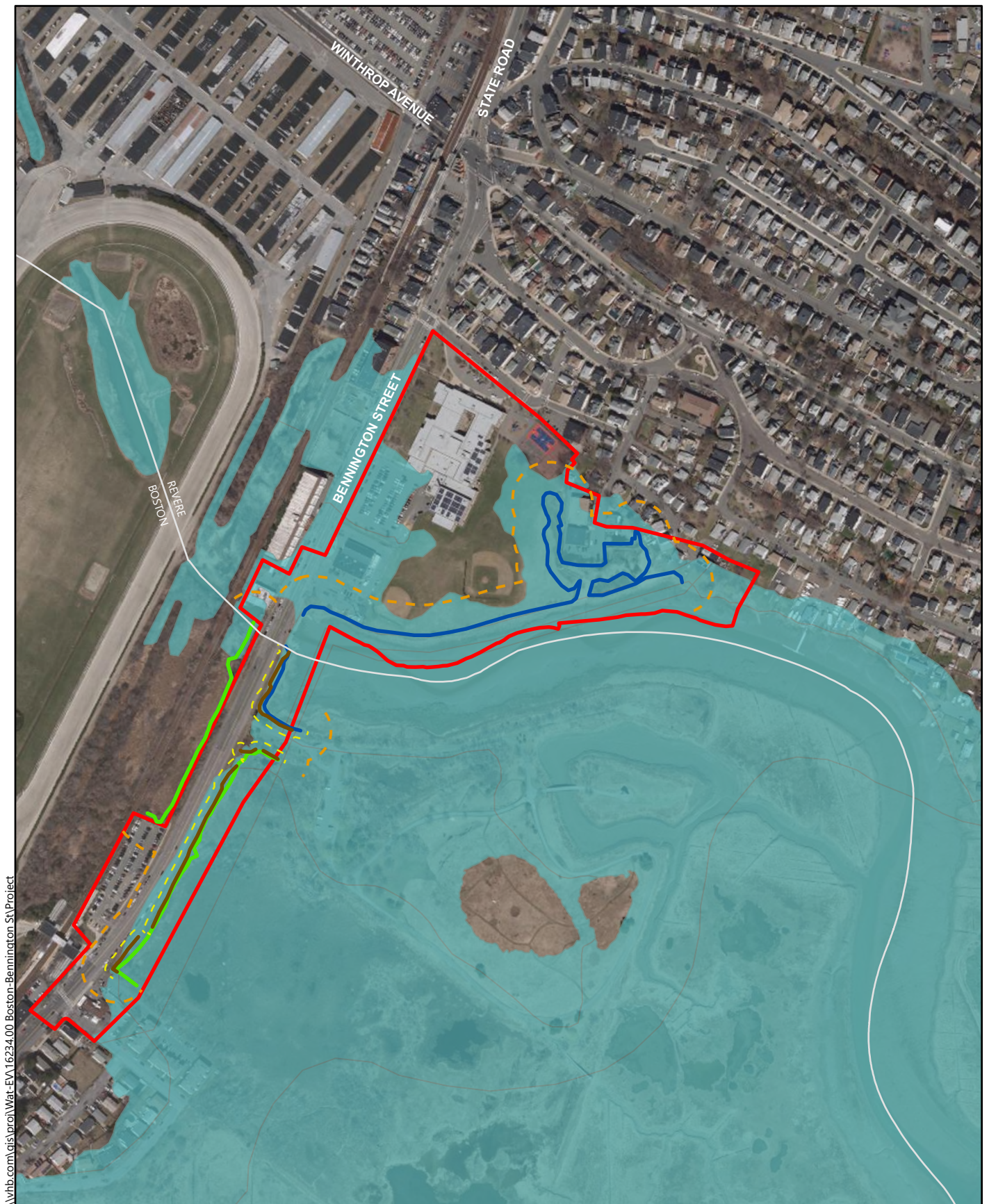


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- Legend**
- Project Site
 - Areas of Critical Environmental Concern
 - NHESP Priority Habitats of Rare Species
 - Outstanding Resource Waters
 - Shellfish Suitability Area
 - Public Way
 - Jurisdiction
 - Landlocked Tidelands
 - Historic High Water
 - - Inferred Historic High Water
 - Contemporary High Water
 - - Inferred Contemporary High Water
 - Marsh Boundary - Landward
 - - Marsh Boundary - Seaward
 - ✱ NHESP Potential Vernal Pools - None Present
 - ✱ NHESP Certified Vernal Pools - None Present
 - NHESP Estimated Habitats of Rare Wildlife - None Present

Figure 1.27 - Environmental Constraints
Source Info: USGS, MassGIS, VHB



Legend

- Project Site
- Municipal Boundary
- 100-foot Resource Buffer
- 25-foot Waterfront Area
- Bordering Vegetated Wetland
- Salt Marsh
- Coastal Bank
- AE: 1% Annual Chance of Flooding

Resilient Bennington Street & Fredericks Park | Boston and Revere, MA

Figure 1.28 - Delineated Wetland Resources

Source Info: USGS, MassGIS, VHB

Potential Permitting Pathway

As indicated above, the Project is subject to multiple Federal, State, and local regulations and requires a complex permitting process. The permitting sequence for a Project that requires a variance under the WPA differs from one that does not require a variance only at the very beginning of the permitting process. If an alternative requiring a variance is selected, it is important to begin the process with a variance request, as it would not be sensible to begin the environmental review process without certainty that a variance could be obtained. Alternatives that do not require a variance would begin with the MEPA process. **Figure 1.28** depicts the order in which permitting processes need to be completed (please note that several of the processes may proceed concurrently).

1.9.1.7 MassDEP Wetlands Variance

A Project that impacts salt marsh would require a variance under the WPA. As per 310 CMR 10.05(10)(a) the Commissioner may waive the application of any regulation(s) in 310 CMR 10.21 through 10.60 when he or she finds that:

1. There are no reasonable conditions or alternatives that would allow the project to proceed in compliance with 310 CMR 10.21 through 10.60;
2. That 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; and
3. That 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 property as to constitute an unconstitutional taking without compensation.

As per 310 CMR 10.05(10)(b), the process for projects that cross municipal boundaries is as follows:

- › The applicant may file a request for a variance directly with the Commissioner, with a copy to each affected conservation commission.
- › If, after public notice, the Commissioner finds that a project meets the variance criteria, they shall specify which regulation(s) has been waived and what general requirements or conditions must be met to satisfy the variance criteria listed in 310 CMR 10.05(10)(a).
- › The applicant shall then file a Notice of Intent with the appropriate conservation commissions in accordance with the procedures contained in 310 CMR 10.01 through 10.10.
- › The conservation commissions shall issue Orders of Conditions consistent with all provisions of 310 CMR 10.21 through 10.60 except those waived by the Commissioner and containing any additional conditions or requirements imposed by the Commissioner in the variance.

Once a variance is issued, the MEPA review process and/or the permitting processes under the WPA and BWO could begin.

1.9.1.8 MEPA Review

MEPA review is required when projects meet or exceed review thresholds related to environmental impacts and require a related State Agency Action. The Project is likely to exceed at least one of the following review thresholds at 301 CMR 11.03:

- › Mandatory Environmental Impact Report (EIR)

- (3)(a)1.a: CH91 License, 401 WQC or Superseding Order of Conditions (SOC) + alteration of one or more acres of salt marsh
- (3)(a)2: Alteration requiring a variance in accordance with the Wetlands Protection Act
- › Environmental Notification Form (ENF)
 - (1)(b)3. Disposition or change in use of land or an interest in land subject to Article 97 of the Amendments to the Constitution of the Commonwealth, unless the Secretary waives or modifies the replacement land requirement pursuant to section 5A of chapter 3 of the Massachusetts General Laws and its implementing regulations.
 - (3)(b)1.a: CH91 License, 401 WQC or SOC + alteration of coastal bank
 - (3)(b)1.c: CH91 License, 401 WQC or SOC + alteration of 1,000 or more sf of salt marsh or outstanding resource waters
 - (3)(b)1.f: CH91 License, 401 WQC or SOC + alteration of ≥ 0.5 acres of LSCSF
 - (11)(b): Any Project of $\frac{1}{2}$ or more acres within a designated ACEC

The following State Agency Actions may be required:

- › MassDEP, Chapter 91 License
- › MassDEP, Section 401 WQC
- › MassDEP, SOC (if required)
- › DCR, Access Permit
- › MassDOT, Access Permit
- › State Financing

The Project would need to undergo MEPA review as a single project (on the overall Project Site) rather than three distinct projects (one in each Project Area) to ensure that all impacts are disclosed, and that the Project avoids, minimizes, and/or mitigates environmental impacts to the maximum extent practicable. The EJ Policy applies to this Project due to the presence of one or more EJ Communities within one mile of the Project Site.

If a Mandatory EIR threshold is exceeded, a three step-filing process would be required: ENF, Draft EIR (DEIR), and Final EIR (FEIR). If only an ENF threshold is exceeded, the Project would still be required to file an EIR in compliance with the EJ Policy. This requirement could be fulfilled by filing an Expanded ENF and a Proposed EIR with a request for a Rollover review process; filing an Expanded ENF with a request for a Single EIR; or undergoing the full three-step review process (ENF, DEIR, FEIR).

Upon issuance of a final certificate from the Secretary of Energy and Environmental Affairs, the Project would be allowed to move forward with state permitting.

1.9.1.9 Wetlands Permitting

Upon issuance of a variance from MassDEP if pursued, or, if no variance is pursued, upon adequate advancement of design and the required documentation, the Applicant would file an NOI with both the Boston and Revere Conservation Commissions in accordance with the procedures contained in 310 CMR 10.01 through 10.10, wherein the total impacts to all resource areas for the entire Project Site are identified. The NOI must also address compliance with the BWO and its implementing regulations.

As noted above, in the case a variance is issued, the Conservation Commissions would issue Orders of Conditions that are consistent with all provisions of 310 CMR 10.21 through 10.60 except those waived by the Commissioner and that contain any additional conditions or requirements imposed by the Commissioner in the variance.

1.9.1.10 Parks Review

Section 7-4.11 of the Boston Code of Ordinances requires that buildings or structures erected or altered within 100 feet of a park or parkway must gain permission from the Boston Parks and Recreation Department (BPRD). The Belle Isle Marsh Reservation is considered a park by the BPRD. Therefore, proposed structures located within 100 feet will be subject to review. This review takes place after completion of all other local reviews and/or issuance of local permits (including the OOC).

1.9.1.11 MassDEP Section 401 WQC

Upon issuance of the final MEPA Certificate, the Applicant may submit a Section 401 WQC application for jurisdictional work at Bennington Street and Fredericks Park. It typically takes up to one year to obtain a Section 401 WQC.

1.9.1.12 MassDEP Chapter 91 License

Upon issuance of the final MEPA Certificate and submission of an NOI, the Applicant may submit a Chapter 91 License application for proposed work at Bennington Street and Fredericks Park within filled tidelands. The license process cannot be completed until the OOC and 401 WQC are issued. It typically takes 9 to 14 months to obtain a Chapter 91 License.

1.9.1.13 DCR Access Permit

Upon issuance of the final MEPA Certificate, the Applicant may submit a DCR Access Permit application for work adjacent to or impacting DCR-owned land.

1.9.1.14 MassDOT Access Permit

Upon issuance of the final MEPA Certificate, the Applicant may submit a MassDOT Access Permit application for work within the Bennington Street right-of-way.

1.9.1.15 CZM Federal Consistency Review

The Massachusetts Office of Coastal Zone Management (CZM) is responsible for conducting a review of federal actions affecting the Commonwealth's coastal uses and/or resources to ensure that the actions are consistent with the state's enforceable program policies. Federal permits including Individual Permits under the National Pollutant Discharge Elimination System (NPDES) and Section 404 programs require CZM review (projects that qualify for general permits under these programs are not usually subject to additional federal consistency review).

CZM begins its review after the MEPA process is complete and within 30 days of submission of a federal permit application. CZM must complete its review within six months. However, since it cannot be completed until all applicable state licenses have been received, CZM and the Applicant typically work together to issue a stay on the review period until a Chapter 91 License and 401 WQC are issued.

1.9.1.16 USACE Section 404 Permit

USACE's IP approval process involves an extensive interagency review to comply with the National Environmental Policy Act (NEPA). A project should anticipate multiple agency reviews under a variety of federal statutes, including the federal Endangered Species Act, the National Historic Preservation Act, Coastal Zone Management Act, and federal Clean Water Act, in a process that can take upwards of one year to complete.

Impacts to jurisdictional WOTUS may require compensatory mitigation in the form of payment of an In-Lieu Fee.

1.9.1.17 Additional Considerations

National Parks Service UPARR Program

Fredericks Park was rehabilitated with a grant from the National Parks Service's *Urban Park and Recreation Recovery* (UPARR) program. The program requires that grant recipients must maintain the site or facility to which the grant was applied for public recreation use in perpetuity. In accordance with section 1010 of the UPARR act (now codified at 54 U.S.C. 200507), no property improved or developed with UPARR assistance shall be converted to other than public recreation uses without the approval of the Secretary of the Interior. The local governmental recipient must make a request to the National Park Service (NPS) to convert the recreation area to a non-recreational use, including conversion to conservation area. Approval of a conversion of a recreation area (in whole or in part) is contingent upon replacement of adequate of recreation property and opportunities of reasonably equivalent location and usefulness. According to 36 CFR § 72.72, *Conversion Requirements*, the NPS will only consider conversion requests if the following six prerequisites have been met:

1. All practical alternatives to the proposed conversion have been evaluated.
2. The proposed conversion and substitution are in accord with the current Recovery Action Program and/or equivalent recreation plans.
3. The proposal assures the provision of adequate recreation properties and opportunities of reasonably equivalent usefulness and location.
4. In the case of assisted sites which are partially rather than wholly converted, the impact of the converted portion on the remainder shall be considered.
5. The guidelines for environmental evaluation have been satisfactorily completed and considered by NPS during its review of the proposed 1010 action.
6. State intergovernmental clearinghouse review procedures have been adhered to if the proposed conversion and substitution constitute significant changes to the original grant.

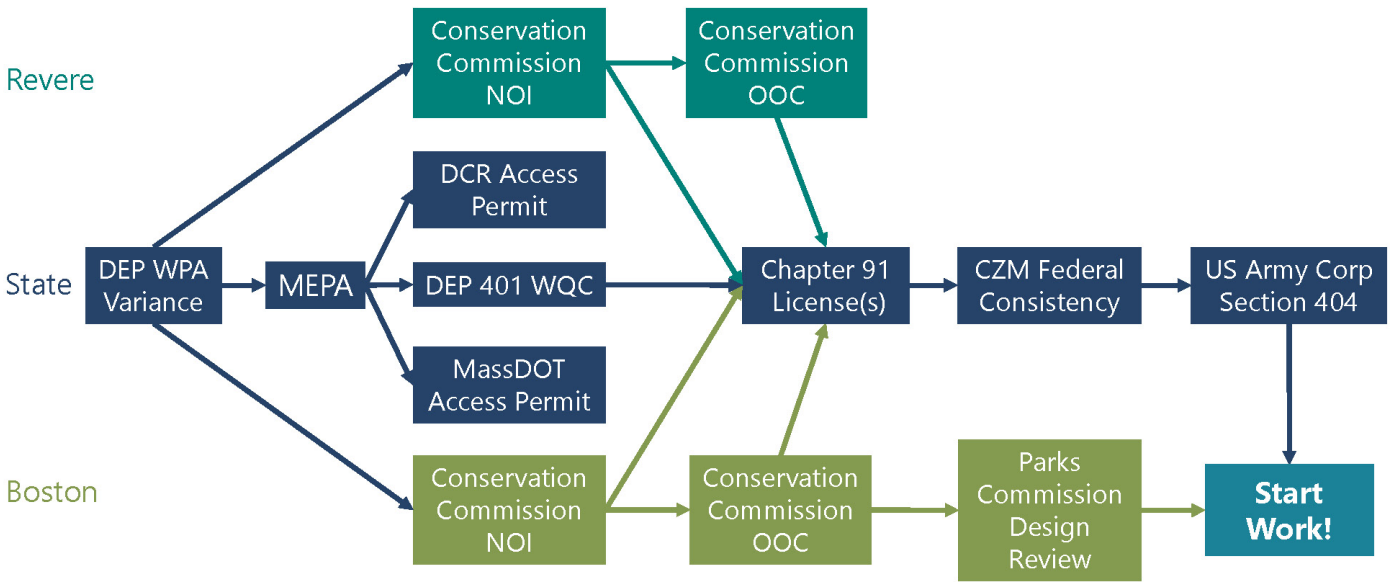
Article 97

Article 97 applies to land taken or acquired by a public entity for "conservation, development and utilization of agricultural, mineral, forest, water, air, and other natural resources." Fredericks Park is identified in the June 2024 Protected and Recreational Open Space MassGIS data layer as being protected for the primary purpose of "Recreation," wherein activities are facility based. Land or easements subject to Article 97 shall not be used for other purposes or disposed of without a two-thirds roll call vote of the Legislature. In 2022, *An Act Preserving Open Space in the Commonwealth* (Chapter 274 of the Acts of 2022, M.G.L. Chapter c. 3, Section§ 5A), also known as

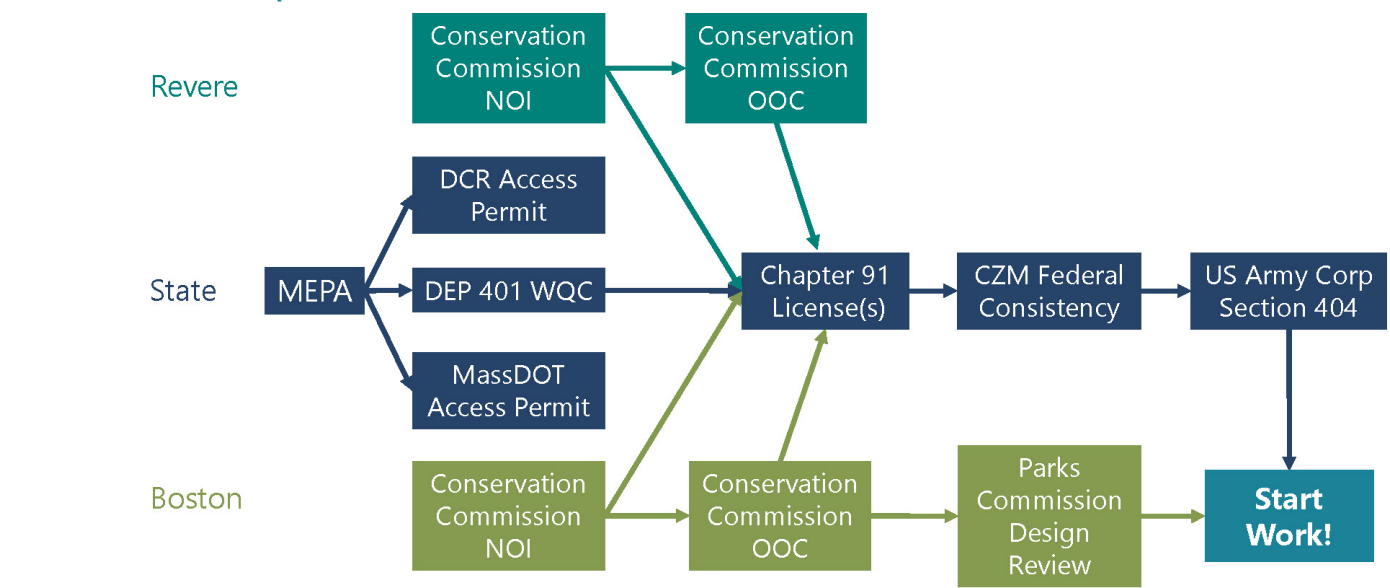
the *Public Lands Preservation Act* (PLPA), was adopted, establishing requirements and a process for submission to the legislature of petitions to authorize a change in use or disposition of land subject to Article 97. A change in use of portions of Fredericks Park from Recreation to "Conservation," wherein activities are non-facility based, may require the City of Revere to conduct the following process:

1. Conduct, submit to the Secretary, and notify the public of an alternatives analysis demonstrating that all other options to avoid or minimize disposition or change in use of Article 97 land have been explored and no feasible or substantially equivalent alternative exists.
2. Identify replacement land or an interest in land, which is not already subject to Article 97, in a comparable location and that is of equal or greater natural resource value, as determined by the Secretary, and acreage and monetary value, as determined by an appraisal of the fair market value or value in use, whichever is greater; and
3. Take, acquire, or dedicate the replacement land or interest in the land for Article 97 purposes.

Variance Required



No Variance Required



Source: VHB



Figure 1.28 Permitting Completion Sequence

Resilient Bennington Street and Fredericks Park
Boston and Revere, MA

1.10 Cost Analysis

The cost estimates for the proposed project alternatives were developed utilizing a combination of MassDOT weighted bid prices and RSMeans data. The MassDOT weighted bid prices provide a reliable and region-specific foundation for estimating costs, grounded in historical data from past MassDOT project bids. Complementing this, RSMeans data supplied comprehensive, industry-standard construction cost information. Allowances were also included for non-itemized project costs, estimated based on typical project work in the region. The total estimated cost of each project alternative is summarized in Table 1-8 below. Note that these estimates are based on a preliminary design and are subject to change. Additionally, the cost estimates for the Fredericks Park alternatives currently do not include the expenses associated with the park's recreational programming. These costs will fluctuate based on the chosen design and specific recreational features and will require a detailed estimate at a subsequent stage of the design process. A more detailed breakdown of the individual cost estimates can be found in **Attachment D - Cost Estimates**.

Table 1-8. Summary of Cost Analyses

Alternative	Estimated Cost 2024	Estimated Cost 2029
BS-1: Elevated Roadway	\$ 11,600,000	\$ 14,200,000
<i>BS-2B: Living Levee with Shared Use Path and Retaining Wall</i>	\$ 16,900,000	\$ 20,700,000
VFW-1: Living Levee with Parking Compensation	\$ 3,100,000	\$ 3,800,000
<i>VFW-2: Seawall</i>	\$ 5,500,000	\$ 6,800,000
<i>FP-1: Living Levee with Sea Wall</i>	\$ 18,400,000	\$ 22,500,000
FP-2: Elevated Park with Sea Wall	\$ 24,900,000	\$ 30,600,000
<i>FP-3: Living Levee with On-Site Salt Marsh Replication</i>	\$ 11,700,000	\$ 14,300,000
<i>FP-5: Living Levee with Off-Site Salt Marsh Replication</i>	\$ 15,000,000	\$ 18,300,000
FP-6: Elevated Park with Off-Site Salt Marsh Replication	\$ 17,400,000	\$ 21,300,000
Reconfiguration of Beachmont School Parking Lot	\$ 2,000,000	\$ 2,400,000
Total Project Cost (No Variance)	\$ 41,600,000	\$ 51,000,000
Total Project Cost (With Variance)	\$ 34,100,000	\$ 41,700,000

1.11 Recommendations and Next Steps

The purpose of the Project is not only to provide a flood protection system that will prevent coastal flooding in northern East Boston and Revere's Beachmont neighborhood from events up to the elevation of the 2070 1% annual chance event (ACE), but to also enhance (and potential optimize) recreational space while maximizing additional co-benefits, including avoiding, minimizing and mitigating potential negative impacts to the adjacent Belle Isle Marsh; allowing potential salt marsh migration; including bike/ped improvements on Bennington Street; accommodating green stormwater infrastructure; avoiding the need for inland drainage systems; allowing an increase in tree canopy; providing/maintaining waterfront connectivity, and minimizing impacts to adjacent properties.

Recommendations

Table 1-8 below provides a summary of the recommended alternatives. Two alternatives are recommended for Fredericks Park: one that does not require a variance under the WPA and one that does. **Figures 1.29 and 1.30** depict the two layouts considered.

Table 1-9. Summary of Recommended Alternatives

	BS-1 Elevated Roadway	VFW-1 Living Levee with Parking Compensation	FP-2 Elevated Park with Sea Wall	FP-6 Elevated Park with Off- Site Salt Marsh Restoration
Protects from 2070 1% ACE Flood	Yes	Yes	Yes	Yes
Recreation Space Reduction	n/a	n/a	34%	25%
Meets Recreation Criteria	Yes	n/a	No	Yes
Salt Marsh impacts	0 sf	0 sf	0 sf ^a	40,000 sf
Potential Marsh Migration	7,600 sf	5,000 sf	43,000 sf	22,500 sf
Impacts to Abutting Properties	19,300 sf	19,300 sf	1,900 sf	2,700 sf
Accommodates Green GI	No	No	Yes	Yes
Avoids Need for Inland Drainage	Yes	No	Yes	Yes
Allows Increase in Tree Canopy	No	No	Yes	Yes
Provides Waterfront Connections	Yes	Yes	Yes	Yes

a. Avoids immediate impacts to salt marsh, but may promote drowning. Additional study is advised.

1.11.1.1 Bennington Street

Alternatives BS-2A and BS-2B were not selected as the preferred alternative due to significant considerations regarding ecological and practical impacts. The BS-2A alternative, which proposes a living levee with a shared-use path, is not favored because it would result in substantial impacts to the grading of adjacent areas, primarily the entrance to the Belle Isle Marsh parking lot and the area around the Sales Creek tide gate. This option would impact adjacent salt marsh and require inland drainage infrastructure. BS-2B, which includes a retaining wall to minimize grading

impacts, necessitates the use of a deployable flood barrier at the entrance of the Belle Isle Marsh parking lot to prevent flooding from flanking the levee and reaching Bennington Street through this opening. This adds complexity and potential long-term maintenance challenges. With these considerations the preferred alternative for the Bennington Street project area is the Elevated Roadway (BS-1) alternative.

The Elevated Roadway (BS-1) alternative effectively balances flood protection, environmental stewardship, and community accessibility, fostering a resilient and integrated urban landscape. The elevated roadway mitigates flood risks while enhancing transportation infrastructure and safety for both vehicular and pedestrian traffic. The inclusion of a 14-foot shared-use pathway promotes active transportation, aligning with the project's mobility goal for pedestrians and cyclists. This solution creates enhanced community connectivity to the waterfront area by maintaining engagement with the scenic Belle Isle Marsh. This alternative also avoids the need for inland drainage, which is preferable since none of the Bennington Street alternatives have adequate space to accommodate green infrastructure. The Elevated Roadway (BS-1) alternative effectively balances flood protection, environmental stewardship, and community accessibility, fostering a resilient and integrated urban landscape.

1.11.1.2 VFW

Over the course of the project the City of Revere met on site with the VFW representatives to provide an overview of the project and better understand the VFW's use of the parking lot. The project team learned that the VFW is currently renting parking spaces to generate income for the facility and that the owner of the cell tower, MetroPCS purchased the small square of property to install the cell tower. This infrastructure generates a payment of \$20,000 to the VFW annually for another 3 years. The VFW brought members that raised concerns that any encroachment to the parking lot could contribute to a revenue loss for the facility. Concerns were raised about issues to the facility and the continued flooding they experience in the parking lot because of stormwater. The project team has heard this feedback and will continue to work with the VFW regarding the alternatives.

With these considerations in mind, the project team considered alternative VFW-2 to reduce the footprint of the flood protection strategy by utilizing a seawall constructed either as a concrete faced sheet pile wall or a traditional concrete cantilever wall. This alternative was not preferred as it would require an 8-foot reveal and cause wave reflection into the existing salt marsh. In addition, the excavation required for a stabilized footing would increase the impact to the marsh due to proximity and takes away the added benefit of marsh migration.

Therefore, the preferred option for the VFW site is the Living Levee with Parking Compensation (VFW-1) alternative. This strategy addresses flood risks effectively while preserving the critical functions of the VFW facility. By constructing a living levee along the seaward edge, the site gains enhanced flood defense capabilities. Furthermore, the proposed parking compensation leverages underutilized space on adjacent city-owned land, ensuring essential parking capacity and continued accessibility for VFW members and visitors. This alternative aligns with community preferences for nature-based solutions, reducing potential ecological impacts and enhancing the site's resilience against future storm events. Additionally, it supports the VFW's mission by maintaining its usability and accessibility for gatherings and community services. To advance this regional strategy additional conversations between the VFW and project team will be an important next step in the next phase of work.

1.11.1.3 Fredericks Park

Alternative FP-2, which involves elevating the park and creating a seawall around the existing salt marsh area, is included as a permittable option due to its lack of direct impacts on the marsh area footprint. However, there are significant concerns that make it less desirable compared to FP-6. This alternative would be hardscaped and would not accommodate salt marsh migration. The construction of the seawall's footings risks impacting the existing marsh due to proximity. There has also been expressed concerns about the effects of wave refraction potentially causing disturbance in the marsh. FP-2 would result in a 34% reduction in protected recreational space compared to the 25% reduction in FP-6. The seawall would also have negative effects on public access and visual appeal. These potential drawbacks underline the reasons why FP-2 is not preferred, despite its permissibility under current regulations.

Despite requiring a variance and a more extensive permitting process, the preferred alternative for the Fredericks Park site area is the Elevated Park with Off-site Salt Marsh Restoration (FP-6) alternative. This alternative accommodates key recreational facilities which meet the optimum recreation criteria while providing flood protection. By proposing off-site restoration for impacted salt marsh areas, this alternative balances functional recreational space with ecological conservation goals. The offsite migration area would still promote the overall health of the Rumney Marshes Area of Critical Environmental Concern (ACEC) which Belle Isle Marsh is included in. By creating salt marsh in the larger more cohesive Rumney Marsh location there would be a greater potential for ecological integration and additional migration into the future.

Next Steps

1.11.2.1 Abbreviated Notice of Resource Area Delineation (ANRAD)

An important next step is for the Cities of Boston and Revere to each pursue an Abbreviated Notice of Resource Area Delineation (ANRAD) with the Boston and Revere Conservation Commissions. The ANRAD provides a procedure for an applicant to confirm the delineation of a BVW and other resource area boundaries. According to the Massachusetts Association of Conservation Commissions (MACC), an ANRAD will contain a wetlands evaluation of the site by a wetland scientist and a map showing protected wetland resource areas. The commission will hold a publicly advertised meeting to review and discuss the ANRAD and issue a decision on the extent and boundaries of the wetland resource areas. This is recommended as a next step so that the wetland resource area delineation for the project area is recorded and finalized before starting a permitting process.

1.11.2.2 Continued Stakeholder Engagement

Another next step is for the Cities of Boston and Revere to continue stakeholder engagement, particularly with abutting landowners and regulatory agencies, to share the findings of this report. In addition to internal engagement with departments within each municipality, this includes, but is not limited to, MassDOT, DCR, MBTA, MassDEP, CZM, the VFW, MetroPCS, the residents of the Beachmont neighborhood. Continued engagement is also recommended with community-based organizations who have been involved with the project, such as the Friends of Belle Isle Marsh and the Beachmont Improvement Commission as well as the East Boston and Revere communities more broadly.

1.11.2.3 Funding for Design and Permitting

The City of Boston, in partnership with the City of Revere, submitted an FY25-26 MVP grant application in April 2024 for continued funding for the project. The ongoing partnership between Boston and Revere attests to the tremendous benefit of working across municipal boundaries to develop resilience solutions as a region. The regional and urgent flood risk in the project area requires Boston and Revere to continue their partnership on this project and further the technical study, design, permitting, and community and stakeholder engagement to advance the recommended alternatives in each Project Area. As proposed in the grant application, the next phase of the project will advance the recommended alternatives identified during the first phase to 75% design in FY25 and permit submittals in FY26, with a goal of completing the MEPA permitting process and submitting permits to other applicable local, State, and Federal permitting agencies. The application requested approximately \$1.2 million for a two-year grant.

If MVP grant funding for FY25-26 is not awarded, the Cities of Boston and Revere will need to pursue alternative funding sources to advance this critical project. Other potential funding sources include, but are not limited to:

- › FEMA Hazard Mitigation Grant Program (HMGP);
- › FEMA Building Resilient Infrastructure and Communities (BRIC) grant program;
- › U.S. Department of Transportation (USDOT) Promoting Resilient Operations for Transformative, Efficient, and Cost-saving Transportation (PROTECT) grant program;
- › Boston Region Metropolitan Planning Organization (MPO) Transportation Improvement Program (TIP) funding;
- › Federal Earmarks; and/or
- › City capital funding.

The project team extends its sincerest gratitude to the MVP Grant Program for providing funding for this phase of the project. We look forward to continuing to work with the Executive Office of Energy and Environmental Affairs to build a resilient future for the residents, ecosystems, and critical infrastructure in the Commonwealth of Massachusetts.

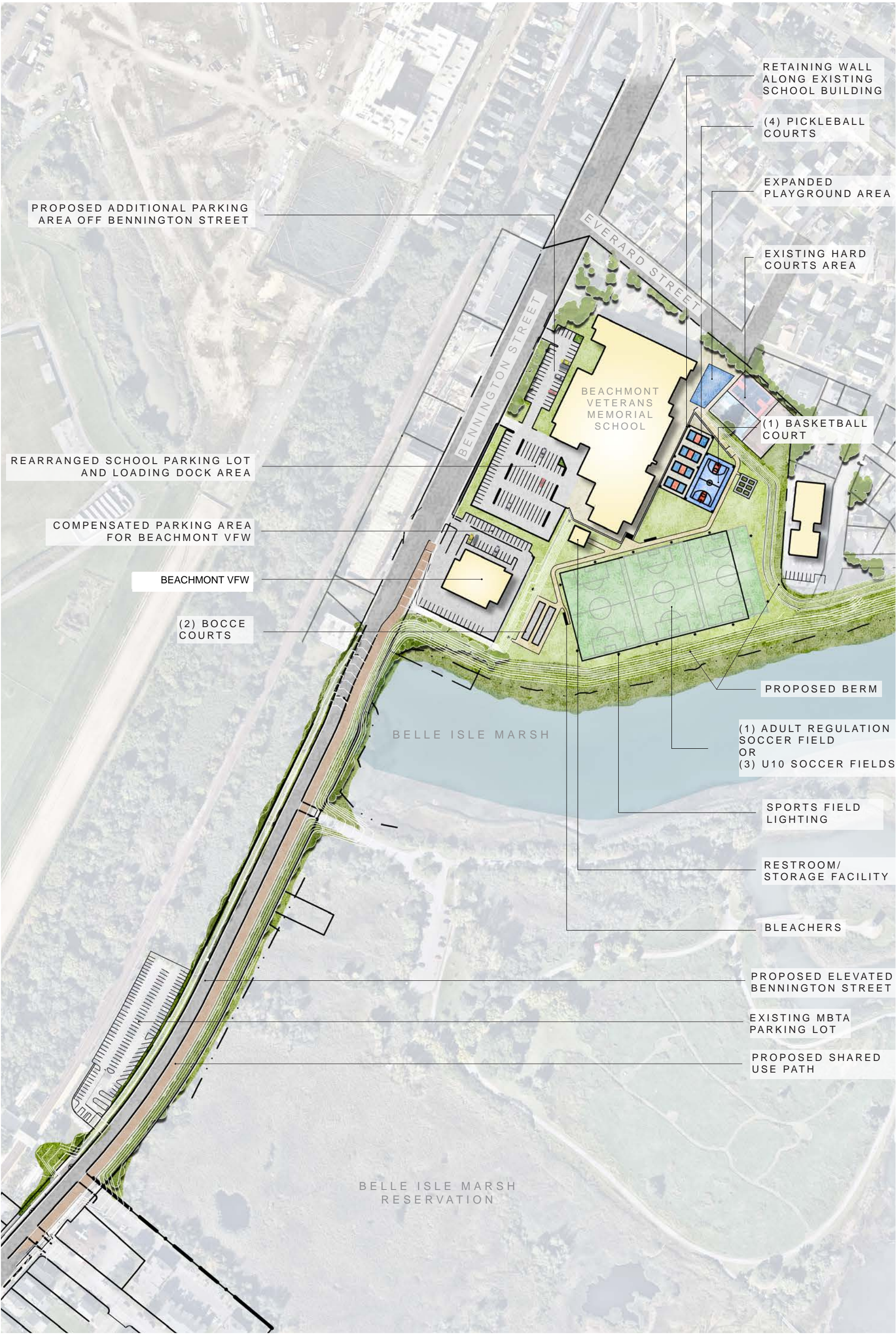


Figure 1.29 - Illustrative Site Plan for Project (with Variance)

NOT TO SCALE

NORTH



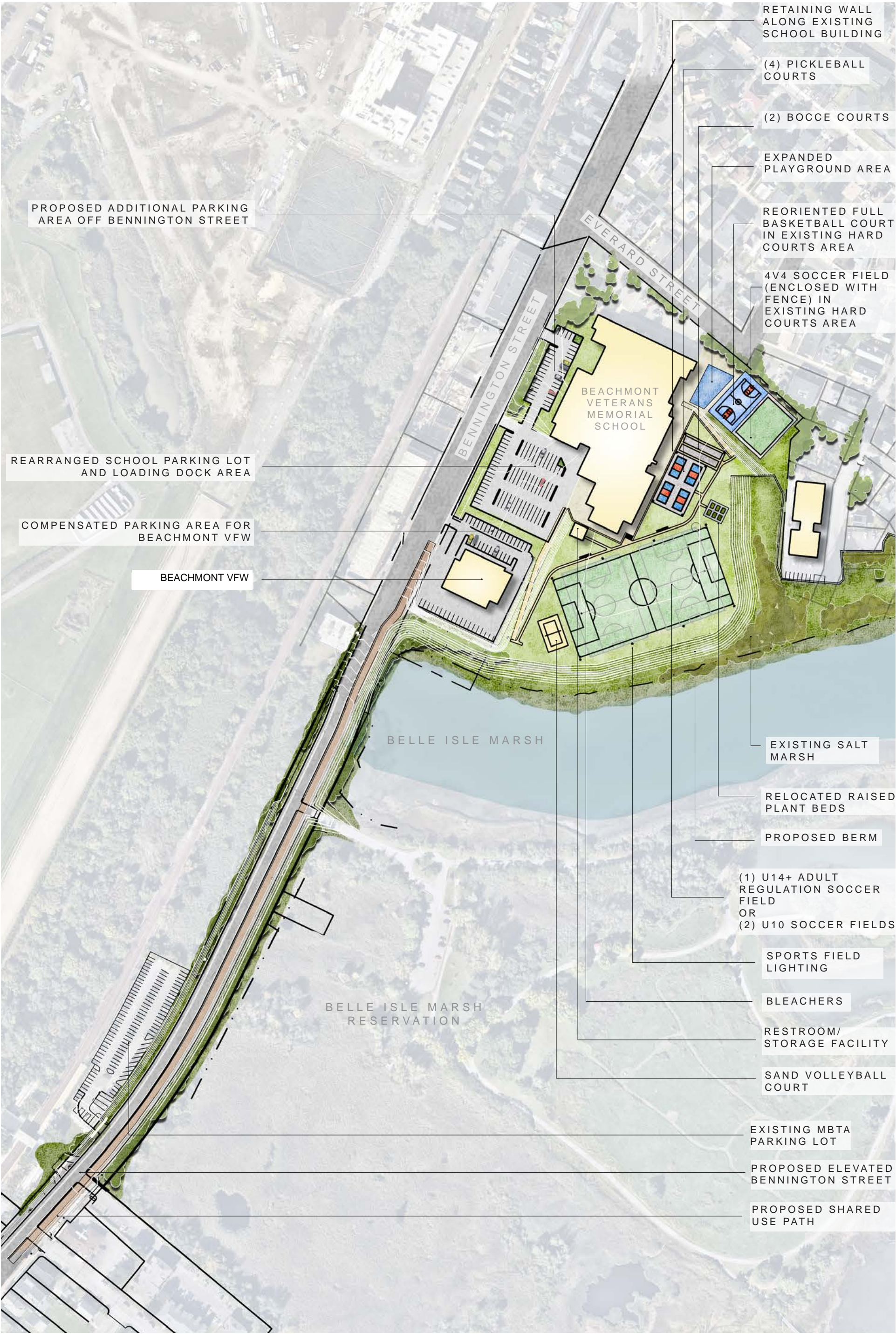


Figure 1.30 - Illustrative Site Plan for Project (without Variance)

NOT TO SCALE

NORTH

