

Attachment 1
Project Narrative

PROJECT NARRATIVE

Hingham Waterfront Resiliency Project

Town of Hingham, MA

1. Introduction

The Town of Hingham (“Town” or “Proponent”) is submitting this Notice of Intent (NOI) to the Hingham Conservation Commission (“Commission”) to obtain an Order of Conditions (OOC) for proposed activities within coastal resource areas subject to protection under the Town of Hingham Wetlands Protection Bylaw (General Bylaws of the Town of Hingham, Article 22, as amended June 2026) and the Massachusetts Wetlands Protection Act (M.G.L. c. 131, § 40).

The Hingham Waterfront Resilience Project as a whole (the “Full Build-out Project”) is designed to address sea level rise and increasing storm severity along the Hingham Harbor (the “Harbor”) waterfront. The improvements proposed under the Full Build-out Project have been identified as the most effective long-term solution for coastal resilience within the Full Build-out Project area (detailed in Section 5.0), based on a comprehensive alternatives analysis and ongoing coordination with applicable regulatory agencies, which have informed the selection and refinement of the preferred design. The Full Build-out Project advances a comprehensive flood protection strategy along approximately six-tenths (0.6) of a mile of shoreline, extending west to east along the southerly edge of the Harbor, commonly referred to as the “Inner Harbor,” as shown on Figure 1 below.

As further described in Section 5.0, the Full Build-out Project will be implemented in phases to account for funding availability and scheduling, as well as to coordinate with planned improvements to State Highway Route 3A (Otis Street) by the Massachusetts Department of Transportation (MassDOT). This phased approach is also intended to ensure that the issued OOCs remain active throughout construction and do not expire prior to the initiation or completion of individual components, recognizing the extended timeline required to fully implement the Full Build-out Project.

This NOI represents the first phase of implementation (“Phase I”), which advances initial coastal resilience measures within the broader Full Build-out Project area. This NOI presents the technical analyses, coastal modeling, and alternatives evaluations completed to date for the Full Build-out Project, all of which comprehensively address existing conditions and future coastal flood risks across the entire Full Build-out Project area. In addition, this filing describes specific improvements at priority locations, including Hingham Bathing Beach (“Bathing Beach”), the Town boat ramp, associated parking areas, and the P.O.W./M.I.A. Memorial Park shoreline. The Project is described in detail in Section 4.0 and is shown on the Project Plans included as Attachment 14. Separate NOIs will be submitted for future Full Build-out Project phases, as outlined in Section 5.0.

The Full Build-out Project area includes a mix of Town-owned and privately owned properties, many of which support active commercial and public uses. Route 3A, and the heavily traveled Summer Street, form the northern boundary of the historic downtown area that requires protection from coastal flooding. The Route 3A corridor supports a range of commercial activities including offices, marine services, and automotive repair and fuel sales. Town-owned properties within the Full Build-out Project area include Bathing Beach and the adjacent picnic grove and bandstand, the Town boat ramp parking lot, Town Wharf (also known as Iron Horse Park and Town Pier), Whitney Wharf Park, the P.O.W./M.I.A. Memorial, 30 Summer Street, and Barnes Wharf. Additional jurisdictional interests include land controlled by the Commonwealth of Massachusetts at the rotary and along Route 3A, as well as the westernmost portion of the Project area managed by the Trustees of Bathing Beach.

The Full Build-out Project’s comprehensive approach to resiliency improvements aims to eliminate existing storm tide pathways (as illustrated in Figure 2 below) through 2050, while minimizing storm-driven wave overtopping of seawalls and revetments. Any overtopping that does occur is intended to be localized,

confined to areas immediately adjacent to shoreline protection structures, and limited in magnitude (e.g., requiring only minor post-storm maintenance). The design also incorporates flexibility to allow for future adaptation, including potential modifications to address 100-year flood conditions projected for 2070. Overall, the Full Build-out Project is designed to enhance the resilience of critical coastal infrastructure in an environmentally responsible manner while allowing for future expansion and adjustment as climate conditions evolve.

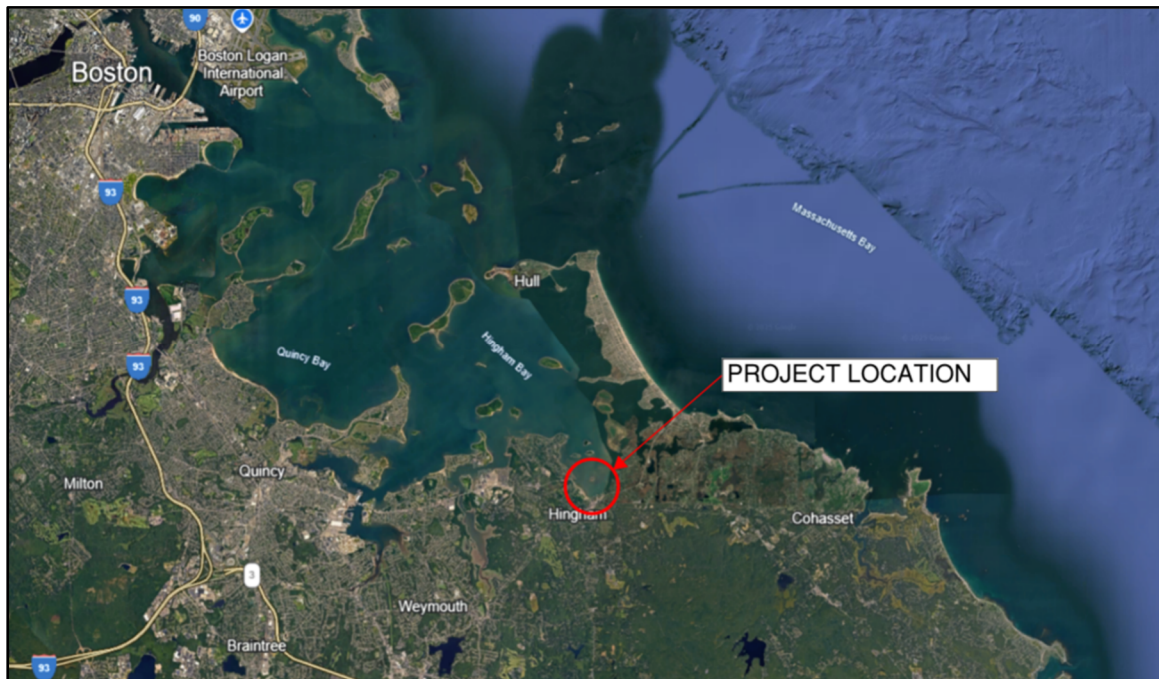


Figure 1: Full Build-out Project Area Location



Figure 2: Existing topography along the Hingham Harbor shoreline for the Full Build-out Project area. The black line indicates the approximate 10-ft NAVD88 contour (~100-year storm surge level), where lower-lying areas are shown in light green or blue. Potential storm tide pathways are indicated by the red arrows.

2. Existing Inner Harbor Conditions and Historic Development

The Inner Harbor shoreline is presently characterized by a highly developed waterfront consisting of man-made quays, piers, seawalls, revetments, roadways, parking areas, and other public and commercial infrastructure. Although the area was historically known as “Bare Cove” and developed over time as a working harbor supporting fishing, transportation, and waterfront commerce, the shoreline has since been substantially altered from its natural condition. Existing conditions along the Harbor reflect this long-term transition to a hardened and actively used waterfront, with remaining historic waterfront features integrated among modern transportation, marine, recreational, and commercial uses.

While downtown Hingham continues to thrive, the historic Harbor-front infrastructure was constructed at a time when sea levels were over one foot lower than they are today. With ongoing sea-level rise, existing coastal infrastructure is not capable of withstanding impacts of severe coastal flooding associated with storm surge. As shown in Figure 3, unimproved shoreline infrastructure is currently flooded during substantial extra-tropical storm events; in this case during Winter Storm “Riley” in March 2018. In addition, much of the downtown business district, which consists of a significant number of historic structures dating to the 1700s, is below the existing 100-year storm surge level in the Harbor. Historically, flooding associated with storm surge alone has found storm tide pathways to inundate developed areas along the Inner Harbor. As shown above in Figure 2, significant portions of the developed Inner Harbor are susceptible to storm surge flooding during the 100-year event and storm tide pathways can allow flooding from the Harbor.



Figure 3: Town Wharf area flooded during the March 2018 Storm (Winter Storm “Riley”)

3. Purpose and Need

Coastal infrastructure plays a crucial role in supporting economic development, especially in coastal towns facing frequent flooding and storm damage. Hingham serves as a compelling example of how strategic investment in coastal infrastructure can foster economic growth and resilience. Hingham, like many coastal communities, has been contending with the adverse effects of climate change. Rising sea levels and more frequent storms have led to persistent flooding, threatening local businesses and the longevity of the shoreline. To address these challenges Hingham has initiated the coastal flood hazard mitigation strategies involving elevating seawalls, revetments, and coastal dune, as well as a self-regulating tide gate that will close to prevent upstream flood caused by coastal storms.

Overall, the purpose of the Full Build-out Project is to mitigate coastal flood damage by elevating shore protection infrastructure along the Harbor-front to provide contiguous coastal flood protection for historic downtown Hingham. The proposed infrastructure will assuredly improve the Town's long-term viability. Existing businesses will benefit from additional protection, and new businesses may be encouraged to open. With reduced flood risks and beach erosion, property values may increase, providing a stronger tax base. By protecting residential, commercial, and recreational areas, as well as enhancing transportation networks and attracting tourism. This financial stability allows for further investments in public amenities and services and therefore will contribute to economic growth and community development.

4. Proposed Project – Phase I

The following sections describe the first sequence of the coastal flood hazard mitigation strategy for the Inner Harbor area extending from the northwest of Bathing Beach to the P.O.W./M.I.A. Memorial Park shoreline, where the site limits connect the higher topographic elevations to both west and east. In this manner, eliminating storm tide pathways into historic downtown from the Harbor will provide long-term coastal resiliency for this critical portion of the community (see Attachment 14). As described above in Section 1.0, the Proponent will submit separate NOIs for the future phases of work. The phased approach is also intended to ensure that issued OOCs remain active and do not expire prior to the commencement and completion of associated work, recognizing the extended timeline required to fully implement the Full Build-out Project. To mitigate coastal flood damage, elevating shore protection infrastructure along the Harbor-front is critical to the Full Build-out Project area.

A Conditional Letter of Map Revision (CLOMR) will be required from the Federal Emergency Management Agency (FEMA) due to the placement of proposed fill within the mapped VE flood zone within the Full Build-out Project area. The CLOMR hydraulic and coastal analysis is currently underway and is anticipated to demonstrate modifications to the existing floodplain, including a reduction in the extent of the current flood zones between Route 3A and the shoreline within downtown Hingham. The Town will submit the CLOMR application to FEMA for review and approval prior to the initiation of construction activities that would alter the existing floodplain conditions. Upon completion of construction, a Letter of Map Revision (LOMR) will be filed to reflect as-built conditions and formally revise the effective Flood Insurance Rate Map (FIRM).

4.1 Project Overview

To address existing and future coastal flooding concerns, the Foth Infrastructure & Environment, LLC and Sustainable Coastal Solutions, Inc. (collectively, "Foth/SCS") team was tasked by the Town to develop a comprehensive coastal flood hazard mitigation strategy for the Inner Harbor area extending from west of Bathing Beach to Barnes Wharf, where the Full Build-out Project limits connect to higher topographic elevations to both the west and east. In this manner, eliminating storm tide pathways into historic downtown from the Harbor will provide long-term coastal resiliency for this critical portion of the community.

As all properties along the shoreline are not Town-owned, the Project team has been working with private landowners, as well as Massachusetts Department of Transportation (MassDOT) consultants, to ensure contiguous coastal flood protection along the shoreline. Planned MassDOT improvements to Route 3A (Otis Street) will provide a minimum sidewalk elevation of +11.0 ft to +11.5 ft relative to NAVD88 (North American Vertical Datum of 1988) along the seaward side of the roadway, which is above the expected 100-year stillwater storm surge level in 2050, and a vertical curve has been introduced to the roadway between Ship Street and North Street to provide passive flood protection to expected 100-year stillwater storm surge in 2070. The remaining non-Town-owned property requiring additional coastal flood hazard mitigation is Bare Cove Marina, immediately to the east of Town Wharf. As the Town moves forward with the comprehensive flood mitigation approach, alternatives for protecting or isolating the Bare Cove Marina property have been considered within the overall plan. To ensure protection against severe storm flooding to at least 2050, with the ability to increase flood protection out to 2070 with minor modifications, an assessment of site-specific engineering strategies was completed for each of the areas described below in Section 4.1.1 and shown in Figure 4.

Quantitative analyses of future sea-level projections and local site-specific storm wave conditions were performed to provide appropriate design conditions for future flood protection improvements. Overall, the Project team has taken a pragmatic science-based approach to ensure that (a) coastal flood protection improvements are designed to projected elevations consistent with the most recent scientific information that is supported by the historical water elevation data and (b) the designs allow for straight-forward incremental increases to flood protection structures, if necessary, in the future. The quantitative coastal processes analyses served as the basis for developing coastal flood mitigation alternatives. Where possible, nature-based flood protection measures were considered to allow potentially enhanced coastal resource areas to respond to the influence of sea-level rise.

4.1.1 Revetment Redesign

The Town completed the reconstruction of a pre-existing stone revetment in December 2014. The pre-2014 revetment was considered to be in “failing” condition and required improvements due to Coastal Bank erosion observed along the upland. Based upon observations since this revetment was reconstructed, scour is occurring along the southeast end of the structure. Part of the ongoing coastal resiliency efforts include improvements to this structure to address “end-effect” erosion and scour issues, as well as appropriate elevations and slopes to provide long-term coastal flood protection. An updated revetment, tapered into the armored dune, will help mitigate wave reflection and associated end scour.

Presently, the revetment crest has an elevation of +11.0 ft NAVD88, with an approximate slope of 1.5H:1V. The connection between the coastal dune and revetment is formed as the revetment armor stones curve upland to meet the elevation of the dune (see Figure 4). The adjacent dune consists of a concrete core along the extent of the north parking lot (see Figure 5). Following the implementation of these measures in 2014, additional erosion continued to be documented. The physical reconstruction of “hard” and “soft” elements of flood protection along the Inner Harbor are intended to work in conjunction with a beach sediment management plan¹ (BSMP) to improve upon the existing revetment and coastal dune system by reducing “end-effect” erosion, encouraging a natural rate of sand migration, and providing a plan for regularly scheduled monitoring and maintenance that will maintain the usability and enjoyment of the public beach and the safe access for the public to the water at the Town boat ramp.

¹ As described in the NPC, a new Beach Sediment Management Plan (BSMP) is proposed, replacing the current practice of limiting sand removal to the surface of the Town boat ramp (as directed by MA DFW for public access). The NPC also outlines associated monitoring (Sections 6.0 and 6.3) to ensure the BSMP functions effectively and meets erosion control objectives. Additional details regarding implementation will be provided in a future NOI filing, as described in Section 5.0 of this NOI.



Figure 4: 2014 Reconstructed Western Revetment (Facing Northwest)



Figure 5: Dune core placed as an early attempt to stabilize the later constructed coastal dune

Post-reconstruction of the Western Revetment, a concern was raised by regulatory agencies of seaward encroachment onto the adjacent Coastal Beach. A subsequent analysis of aerial photography was used to confirm that the shoreline position of the revetment did not drastically shift seaward; however, it is clear that the 2014 structure reconstructed the Coastal Bank at a steeper slope. The position of the 2014 revetment toe and top of bank fence line are illustrated in Figures 6 and 7. As shown, the comparison of revetment toe location between 2014 (pre-reconstruction) and 2020 (post-reconstruction) are nearly identical. However, the steeper revetment required infilling of the area landward of the reconstructed revetment. Proposed improvements to this revetment will ensure the updated design will maintain or decrease encroachment of existing coastal engineering structures on Coastal Beach resource areas.



Figure 6: Shoreline position aerial photography in 2014. The red line indicates the position of the revetment toe in 2014, and the blue line represents the location of the fence line along the bank crest in 2014.



Figure 7: Shoreline position aerial photography in 2020. The red line indicates the position of the revetment toe in 2014, and the blue line represents the location of the fence line along the bank crest in 2014.

4.1.2 Hingham Bathing Beach and Parking Lot

To ensure that coastal flood waters cannot propagate across Bathing Beach area and impact Town infrastructure and/or Route 3A, a contiguous dune has been designed to withstand storm surge and wave action from a 100-year storm event in 2050. It should be noted, erosion of the dune will occur during severe storms; therefore, maintenance of the dune feature will be required to ensure it maintains appropriate volume. The proposed dune construction will extend from the Western Revetment at Bathing Beach, easterly to the Town boat ramp. The dune will be constructed in a similar fashion to the existing dune fronting Bathing Beach, with constructed walkways over the dune. It is anticipated that compatible material for dune construction will be sourced from an upland site.

To optimize the dune design, a cross-shore morphological model was employed to determine the dimensions of a dune which would serve as an erodible barrier to ocean surges up to the 1% annual chance of recurrence (100-year) still water level (SWEL). The cross-shore transport model XBeach was used to determine a dune fill elevation and crest width which would withstand a major storm event with some remaining flood protection capacity. 100-year wave conditions applied to the model open boundary were derived from the SWAN wave model of Boston and Hingham Harbors, by applying 100-year winds from the north (52.0 kts). The duration of the storm was based upon a typical severe storm; in this case, the December 23, 2022, northeast storm. The storm surge component of the historic storm was scaled up so that the peak total water level would reach the present FEMA-designated 1% SWEL (+9.7 ft NAVD88 for present MSL conditions). Details regarding the numerical modeling can be found in Attachment 8.

For present sea levels, the existing dune at Bathing Beach is able to withstand the 1% storm; however, gaps in the dune used for at-grade walking paths will need to be modified to ensure these areas do not act as storm tide pathways. Proposed dune modifications require constructed walkways over the dunes, as shown in Attachment 14. It is anticipated that compatible material for dune construction will be sourced from an upland site. The dune toe (start of the foreshore slope on the beach) is at an elevation of about +7.0 ft NAVD88. For 2050 MSL conditions, the dune is able to withstand the 1% storm if the crest elevation is increased to +11.0 ft NAVD88. For 2070 MSL conditions, the dune crest elevation would need to be increased to +12.0 ft NAVD88 to withstand the 1% storm (Figure 8). The Project Plans (Attachment 14) include dune dimensions necessary to withstand the 100-year storm event in 2050 and a slightly wider dune crest of 25 ft, with the understanding that simple modifications to the dune profile can increase storm protection in future decades.

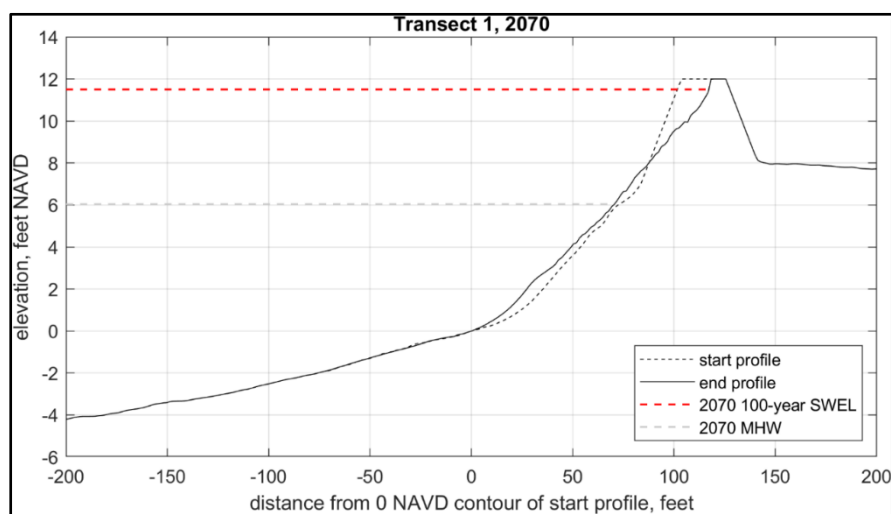


Figure 8: Xbeach model output for the modeled 1% (100-year) storm at Bathing Beach (Transect 1 in Attachment 8), with existing topography, for projected 2070 MSL. The start profile is indicated by the dashed black line, and the shoreline at the end of the simulation is indicated by the solid black line. 2070 MHW and the 2070 100-year SWEL are also indicated.

4.1.3 Town Boat Ramp and Parking Lot

The Town boat ramp profile and associated parking area will also be elevated to +12.0 ft NAVD88. The coastal flooding and wave analysis (Attachment 8) indicated that increasing the elevation of Town Wharf and Town boat ramp parking lot, as well as providing a sloped revetment along P.O.W./M.I.A. Memorial Park would provide the most appropriate method for enhancing flood protection along the Harbor-front area. The increased coastal flood protection incorporated the planned increase in Route 3A roadway elevation planned by MassDOT.

Between the Town boat ramp and the existing armoring at Town Wharf, the site transitions to a lawn area. Along this approximately 100-ft shoreline segment, the Project proposes an elevated grassed berm, raising the area to a crest elevation of +12.0 ft NAVD88 with a seaward slope of 1V:6H (vertical:horizontal). This feature maintains a 25-ft crest width, consistent with the coastal dunes proposed at Bathing Beach and the Town boat ramp parking lot (see Attachment 14) and is graded landward to the +12.0-ft NAVD88 contours to eliminate potential storm tide pathways. To ensure continuity of flood protection, the elevated berm will tie into the +12.0-ft contour at both Town Wharf and the eastern side of the Town boat ramp. This will require extension of the existing concrete wall along the eastern side of the Town boat ramp landward to meet the crest of the raised lawn area, thereby creating a continuous barrier to storm tide intrusion.

4.1.4 P.O.W./M.I.A. Memorial Park Shoreline

To improve storm wave attenuation and decrease wave reflection along the P.O.W./M.I.A. Memorial Park shoreline, the preferred alternative is a sloped armor stone revetment with a 1V:2H slope. To minimize environmental impacts on the existing beach, the toe of the revetment will be placed no further seaward than the existing armoring. Temporary environmental impacts will occur as a result of excavation for the toe stones within the existing beach. In addition, it is anticipated that a temporary sheet pile cofferdam may be needed by the contractor to protect the excavation required to set the revetment toe stones. As described in Attachment 8, shoreline segments consisting of revetments will require a crest elevation of +13.0 ft NAVD88 to withstand storm surge and wave action projected during 100-year storm conditions in 2050 and a crest elevation of +14.0 ft NAVD88 to withstand storm surge and wave action projected during 100-year storm conditions in 2070.

To enhance the utility of the park, the upper portion of the revetment (above +10.0 ft NAVD88) will consist of large granite blocks to form a contiguous seating area and flood protection along the top of the revetment (see Attachment 14 for details). Since minimal effort is required to bring the flood protection up to projected 100-year storm conditions in 2070 and a public benefit could be included in the form of seating built into the revetment, the proposed structure will have a crest elevation of +14.0 ft NAVD88. In addition, the land between the revetment and Route 3A will be elevated to +11.0 ft NAVD88 to be consistent with the previously improved Whitney Wharf.

East of P.O.W./M.I.A. Memorial Park, the land elevation along the Harbor shoreline increases and this area of higher elevation land extends to the area just east of Hingham Rotary, adjacent to Barnes Wharf. Flood protection along this stretch will be provided by the proposed MassDOT roadway improvements along Route 3A, which will ensure flood protection to elevation +11.5 ft NAVD88 along the seaward side of the roadway. Similar to the 3 Otis Street property, the private parcel (26 Otis Street) and public parcel (30 Otis Street) along this stretch of shoreline will be isolated and future flood protection will be the responsibility of the landowner.

4.1.5 Proposed Stormwater Improvements

The Project includes stormwater management improvements intended to improve runoff collection, treatment, and infiltration within the Bathing Beach parking lot area. Along the western edge of the parking lot, the existing concrete curb will be removed and replaced with a proposed 20-foot-wide rain garden and

gravel extension, as shown on Sheet 5 of the Project Plans included as Attachment 14. The rain garden is designed to collect and treat stormwater runoff from adjacent paved areas before discharge to the existing drainage system. The proposed system will promote infiltration, improve water quality, and reduce the potential for untreated runoff to enter nearby coastal resource areas.

The stormwater improvements have been designed to comply with the Massachusetts Stormwater Standards to the maximum extent practicable (MEP), recognizing the constraints of an existing developed coastal site. The Project is not anticipated to result in an increase in untreated stormwater discharge and is expected to provide a water quality benefit compared to existing conditions through the incorporation of stormwater best management practices. Additional information regarding the proposed stormwater management system, design assumptions, and compliance with the applicable Stormwater Standards is provided in the Stormwater Management System Report included as Attachment 11.

4.1.6 Coordination and Construction Phasing with MassDOT Route 3A Improvements

The Town is coordinating with MassDOT to ensure that the Full Build-out Project and the Route 3A project can proceed in either sequence while maintaining site functionality at the limits of their respective work areas. This coordination may include the implementation of temporary grading and retaining structures to facilitate proper tie-ins at the project site interfaces.

5. Full Build-out Project

5.1 Full Build-out Project Site Description

The Town of Hingham, including the Harbor, is located along Massachusetts' South Shore, approximately 15 miles south of Boston (see Figure 1 above). The Harbor is a historic, high-use area that supports significant recreational and commercial activity. Route 3A runs directly along the Harbor, at some locations within approximately 40 ft of the shoreline. As mentioned previously, flood-protection improvements are proposed at targeted locations along the Inner Harbor waterfront and are coordinated with the Route 3A State Highway Layout Improvements Project, which provides additional passive flood-resiliency benefits to Hingham's downtown. Figure 9 illustrates the overall Full Build-out Project site. As described in further detail below, the Full Build-out Project will be implemented in phases, with only areas "A", "B", and "E" included in this NOI filing. Descriptions of all proposed work elements are provided below for context and to illustrate the full extent of the Full Build-out Project.

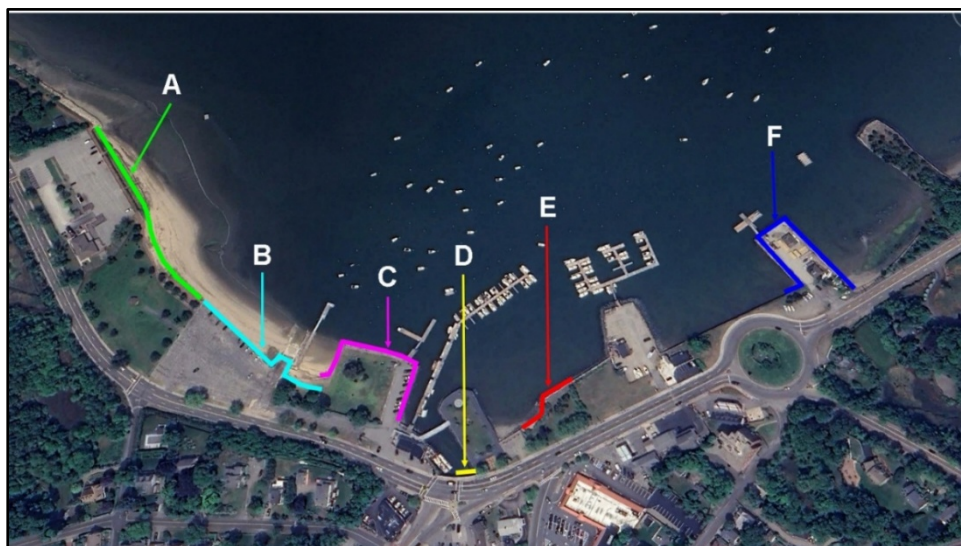


Figure 9: Areas of proposed flood protection improvements along Town-owned parcels.

Section “A” includes Bathing Beach and its associated parking, which comprises approximately 725 ft of shoreline, including approximately 375 ft fronted by a low-elevation constructed dune system. Periodic accessways connect the beach to adjacent parking areas, which are situated at elevations of approximately +9.0 ft NAVD88. Landward of the dune, the site includes planted trees, a vegetated park area to the east, and a brick pedestrian pathway lined in many locations with a continuous granite block wall along its seaward edge. Ground elevations landward of the beach and dune generally range from approximately +9.0 ft to +10.0 ft NAVD88, which are at or below the current 100-year stillwater flood elevation. As a result, the area is vulnerable to coastal flooding, and the adjacent parking lot already experiences inundation during severe storm events. Figure 10 illustrates these low-lying beach and upland conditions. Proposed coastal resilience improvements for this area are addressed in Section 4.1.2 of this NOI.



Figure 10: Existing topography along the Inner Harbor shoreline for the Full Build-out Project area. The black line indicates the approximate +10.0 ft NAVD88 contour (the approximate 100-year stillwater elevation), where lower-lying areas are shown in light green or blue.

At the western end of the Project area, an existing stone revetment (the “Western Revetment”), shown in Figure 11, extends above the 100-year stillwater elevation (approximately +10.0 ft NAVD88). The revetment was reconstructed in December 2014 within its original footprint, following Commission approval and U.S. Army Corps of Engineers (USACE) filing, to replace a failing structure that had been impacted by severe erosion of the upper Coastal Bank.

Despite its elevation, the revetment’s steep slope and abrupt transition to the adjacent beach contribute to wave reflection, overtopping, and localized scour, commonly referred to as “end-effect” erosion. Continued erosion in this area underscores the need for improved sediment management and shoreline stabilization. As described in Section 4.1.2, the Project will modify this area by tapering the armored dune to create a more gradual transition, thereby reducing wave reflection and minimizing end-effect erosion while enhancing long-term stability. Approximately 150 linear feet (LF) of the Western Revetment will be removed and reconstructed (see Attachment 14).

Maintaining the coastal beach system’s function for storm damage protection requires ongoing management, including periodic nourishment to sustain beach form and resilience. The Town’s original beach management framework, the “Bathing Beach Management Plan” (May 2015), was developed in

conjunction with a 2014-2015 erosion control project (ECP) that established a program to address coastal erosion. Bathing Beach has been actively managed by the Town Bathing Beach Trustees for over ninety years.



Figure 11: The Harbor, located south of Boston, Massachusetts. Bathing Beach is shown in green. The Western Revetment is shown in red (discussed above), and area of the Town boat ramp (shown in yellow) is at the eastern end of the beach system.

Section “B” includes the Town boat ramp, adjacent parking lot, and the beach area to the east, collectively representing approximately 400 ft of shoreline. The unarmored portions of this shoreline lack a coastal dune. This area functions as a municipally maintained access point that provides both public recreational and operational marine access to the Harbor. The facility includes a paved boat ramp, limited parking, and maneuvering areas used for the launching and retrieval of trailered vessels.

The site supports a range of uses throughout the year, with activity levels varying seasonally. Use of the Town boat ramp is most active during the late spring, summer, and early fall months, corresponding with peak recreational boating season. During this period, the area is regularly used by residents, visitors, and commercial operators for boating, fishing, and general water access. The ramp also serves as an important access point for municipal and emergency response vessels. During the off-season, use declines but continues on a limited basis for cold-weather boating, maintenance operations, and municipal needs. Overall, the Town boat ramp represents a critical piece of coastal infrastructure supporting both recreational use and public safety access. Existing ground elevations within the parking area range from approximately +8.0 ft to +9.0 ft NAVD88, which are below the current 100-year stillwater coastal flood elevation. As a result, the site is vulnerable to coastal flooding during storm events. Figures 12 and 13 show the existing conditions at the Town boat ramp area. Proposed coastal resilience improvements are addressed in Section 4.1.3 of this NOI.



Figure 12: View of the Town Boat Ramp Facing North Seaward towards the Harbor



Figure 13: View of the Town Boat Ramp Facing West Toward Bathing Beach (Source: North and South Rivers Watershed Association)

Section "C" includes Town Wharf, a central waterfront facility that provides public access to the Harbor and supports a range of recreational and marine-related uses. The wharf includes docking infrastructure, pedestrian areas, and access points for both transient and seasonal vessels, serving as a key hub for boating activity within the Inner Harbor. Its proximity to the Hingham Shipyard, as well as nearby commercial and residential areas, contributes to a high level of seasonal use. Adjacent to the wharf is the Iron Horse monument, a historic maritime marker reflecting Hingham's shipbuilding heritage. The existing

elevation of Town Wharf is approximately +7.5 ft NAVD88, which is more than two (2) ft below the current 100-year stillwater elevation, making the area vulnerable to coastal flooding. As noted previously, proposed coastal resilience improvements for Town Wharf will be included under a future NOI filing.

Section “D” includes the Home Meadows culvert area. While the Home Meadows culvert area was evaluated during the early stages of Project development, improvements within Section D are no longer included in the proposed Project.

Section “E” includes the P.O.W./M.I.A. Memorial Park shoreline. The approximate 200-ft shoreline along P.O.W./M.I.A. Memorial Park consists of both dilapidated armor stone revetment sections and granite block seawalls, as shown in Figure 14. East of P.O.W./M.I.A. Memorial Park the land elevation along the Harbor shoreline increases and this area of higher elevation land extends to the area just east of Hingham Rotary, adjacent to Barnes Wharf. Flood protection along this stretch will be provided by the proposed MassDOT roadway improvements along Route 3A, which will ensure flood protection to elevation +11.5 ft NAVD88 along the seaward side of the roadway. Similar to the 3 Otis Street property, the private parcel (26 Otis Street) and public parcel (30 Otis Street) along this stretch of shoreline will be isolated and future flood protection will be the responsibility of the landowner. Proposed coastal resilience improvements for this area are described in Section 4.1.4 of this NOI.



Figure 14: Existing shoreline armoring along P.O.W./M.I.A. Memorial Park

Section “F” includes Barnes Wharf, which is a developed waterfront area located along the Harbor that provides marine access and supports a mix of recreational and commercial uses. The site consists of a fixed pier structure with associated floats, docking areas, and upland support space. The wharf is constructed of timber and/or concrete elements typical of coastal marine infrastructure and is subject to regular tidal influence, wave action, and vessel traffic. The upland portion of the site includes paved and/or hardened surfaces used for pedestrian access, limited staging, and operational needs. Existing shoreline conditions in the immediate vicinity of the wharf are characterized by armored or modified edges, with little to no natural coastal features such as dunes or vegetated buffer areas. As a result, the site functions primarily as hardened coastal infrastructure rather than a natural resource area. Elevations at Barnes Wharf are relatively low and susceptible to tidal inundation and coastal storm flooding, particularly during high tide and storm surge events. The wharf and surrounding areas are influenced by daily tidal fluctuations and are exposed to wave activity within the Inner Harbor. Barnes Wharf represents an important local marine resource supporting Harbor access and waterfront activity but is vulnerable to coastal flooding due to its low elevation and lack of natural protective features. Proposed coastal resilience improvements for Barnes Wharf will be addressed in a future NOI filing.

5.2 Full Build-out Project Sequencing

The Full Build-out Project is being implemented in a phased approach due to funding availability, as well as to allow time for coordination with the planned MassDOT improvements to Route 3A. Additionally, elements of the Full Build-out Project's development have been supported by the Massachusetts Office of Coastal Zone Management (CZM) Coastal Resilience Grants, such as the Hingham Shore Protection Alternatives Analysis, to determine the preferred alternative for Harbor-front coastal infrastructure, preliminary design, and draft permit application submittals. The Town will submit separate NOIs for the future phases of work, as outlined below. This phased approach is also intended to ensure that issued OOCs remain active and do not expire prior to the commencement and completion of associated work, recognizing the extended timeline required to fully implement the Full Build-out Project.

NOI 1 – Coastal Resiliency Efforts at Hingham Bathing Beach, Town Boat Ramp, associated parking areas, and the P.O.W./M.I.A. Memorial Park Shoreline: The proposed Project, as described in this NOI, focuses on coastal resilience measures at Bathing Beach, the Town boat ramp, associated parking areas, and the P.O.W./M.I.A. Memorial Park seawall, as further detailed in Section 4.0 and Attachment 14 (Project Plans).

NOI 2 – Beach Operations & Maintenance (O&M) Plan: NOI 2 will amend the Town's O&M Plan for Bathing Beach and the Town boat ramp areas, including maintenance dredging within the footprint of the Town boat ramp as required, general beach maintenance (e.g., raking and sediment management), and dredge sediment placement within the dune between the Town boat ramp and the western end of Bathing Beach. Based upon the extent of coastal armoring and development in the vicinity of Bathing Beach, historical sediment sources to this shoreline have essentially been eliminated. To ensure that the coastal beach system continues to provide coastal storm damage protection, ongoing maintenance of the beach system is required, including nourishment to maintain the beach form and function.

NOI 3 – Town Wharf Improvements: NOI 3 will detail the proposed Town Wharf improvements. The Town Wharf is currently vulnerable to severe storm conditions because its elevation (about +7.5 ft NAVD88) is more than two (2) feet below projected 100-year storm surge levels. To improve resilience, the Full Build-out Project proposes to raise the wharf area, including the paved pathway and parking, to an elevation of +12.0 ft NAVD88. Vertical seawalls will also be designed to this 12-ft elevation to better withstand future storm surge and wave impacts. Although waves may still overtop the seawalls during extreme storms, elevating the wharf will help protect existing infrastructure from damage. Additionally, the seawall foundations will be built to support a potential future increase of up to two (2) more feet in height if needed. The existing pile-supported timber pier at the northeast corner of Town Wharf will be reconstructed to match the proposed raised wharf elevation. The pier length will be reduced to maintain gangway slopes and accessibility to the floating docks. The floating docks are currently bottom-anchored, the Full Build-out Project proposes installation of new float-anchor piles to replace the existing anchoring system. The existing Harbormaster building on Town Wharf will be relocated to a more landward location at the southwest edge of the lawn area to the east of the Town boat ramp. This building location is not within the existing V-Zone, nor is it in filled tidelands and will be designed to appropriate building code standards.

NOI 4 – Barnes Wharf Improvements: NOI 4 will describe the proposed resiliency improvements at Barnes Wharf. The improvements aim to increase resilience to future storm conditions by raising shoreline protection and the wharf elevation. Vertical seawalls will be constructed with a crest elevation of +12.0 ft NAVD88 to better withstand projected 100-year storm surge and wave action by 2050. The wharf surface, including paved pathways and parking areas, will also be elevated to +12.0 ft NAVD88 to reduce the risk of damage to Town infrastructure, even though waves may still overtop the seawalls during severe storms. The seawall foundations will allow for a future height increase of up to two (2) more feet in height if needed. A new seawall will connect to the existing MassDOT seawall along Route 3A and will not extend farther seaward than the current structure. On the upland side, the existing Hingham Maritime Center buildings will be replaced with a single structure positioned as far landward as possible, with no increase in total building footprint.

6. Existing Site Conditions: Storms, Sea Level Rise and Coastal Flooding, and Sediment Dynamic

6.1 Storms

The Harbor, located within the larger Boston Harbor area, is typically protected from high wave energy. A large peninsula, the Town of Hull (Hull), lies directly to the east of the Harbor and extends out approximately four (4) miles nearly perpendicular to Hingham's shoreline. However, periodic high energy events, such as nor'easters, that normally last for several tidal cycles, result in increased storm surge and flooding in this area. Generally, even minor nor'easters can cause moderate and localized flooding. Table 1 below includes the highest monthly water elevations observed over the time frame of the Boston Harbor gauge operation between 1921 and 2023. These water elevations represent the highest observed tides and do not include the influence of local wave action.

Table 1: Highest Historical Monthly Water Levels Observed Since 1921 in Boston Harbor

Rank	Date	Elevation (ft NAVD88)
1	January, 2018	9.66
2	February, 1978	9.59
3	March, 2018	9.12
4	January, 1987	8.69
5	October, 1991	8.63
6	January, 1979	8.53
7	December, 1992	8.52
8	December, 1959	8.47
9	February, 1972	8.38
10	January, 2014	8.33

6.2 Sea Level Rise and Coastal Flooding

Due to the existence of the Nantasket Beach barrier complex and the series of Harbor Islands, the mainland shoreline of the Harbor is protected from storm wave conditions often associated with the open Atlantic Ocean, providing relatively safe conditions for development of communities along the shoreline. However, this stretch of coastline is particularly susceptible to coastal flooding due to the low-lying topography in some areas. Based upon the topography of the Harbor shoreline and associated coastal structures, much of the landward area is presently between +7.0 ft and +11.0 ft NAVD88. The FEMA stillwater 100-year flood elevation for the area is +10.0 ft NAVD88, where nearby Boston Harbor recorded water elevations of +9.6 ft NAVD88 in both February 1978 and January 2018.

The Massachusetts Sea Level Assessment and Projections technical memorandum (DeConto and Kopp, 2017) is presently being utilized by the Commonwealth of Massachusetts as guidance regarding future projections of sea level rise in Boston Harbor. The range of varying projections are determined based on the probability of exceedance given possible future atmospheric greenhouse gas concentration pathways, as well as methods of accounting for Antarctic ice sheet projections. These projections have been incorporated into the Resilient MA analyses tools and serve as the basis for guiding Massachusetts sea level rise policy in the near-term. Tools developed with the DeConto and Kopp (2017) sea level rise projections include the Massachusetts Coastal Flood Risk Model (MC-FRM) and the Resilient Massachusetts Action Team (RMAT) Design Guidance. The quantitative analyses depicted by the tools represented in Resilient MA are directly dependent upon the specific sea level rise scenario (Attachment 8).

Based upon the existing land elevations along the Inner Harbor shoreline, as well as through the downtown area, significant portions of the developed downtown area are below the existing 100-year flood elevation (see Figure 2). As described in Attachment 8, intermediate sea level rise projections indicate that mean sea level will increase to +1.0 ft NAVD88 by 2050 and +1.8 ft NAVD88 by 2070. Therefore, the future 100-year stillwater flood level will increase by approximately 1.3 ft by 2050 and 2.1 ft by 2070 from present-day conditions. Thus, the future 100-year stillwater flood levels can be expected to be approximately +10.9 ft NAVD88 and +11.7 ft NAVD88 for 2050 and 2070, respectively. The exposure of population and infrastructure to flooding along the Inner Harbor shoreline has significantly increased over the last several decades, exacerbated by sea level rise.

6.3 Sediment Transport along Bathing Beach

Based upon the extent of coastal armoring in the vicinity of Bathing Beach, historical sediment sources to this shoreline have essentially been eliminated. To ensure that the coastal beach system continues to provide coastal storm damage protection, ongoing maintenance of the beach system will be required, including nourishment to maintain the beach form and function. Due to the extensive coastal armoring in the region, the alongshore sediment transport system associated with Bathing Beach is predominantly a “closed” littoral system, where no significant sediment source exists to naturally maintain the beach. A littoral cell is a system that includes the area of sediment source, transport, and ultimately sink. The armored shoreline and geographic location of the beach means that the primary source of sediment for the beach is the beach system itself. To illustrate the extent of local coastal armoring, Attachment 6 indicates the coastal infrastructure inventory for the area. The wave-induced littoral drift direction also limits sediment sourcing for the area. Predominantly, sediment is transported by wind-driven waves along the Inner Harbor shoreline from a northwest to southeast direction (see Figure 15). As mentioned previously, this is largely due to the geography of Hingham Bay, which has an opening oriented towards the northwest, but also the predominant wind direction, which causes locally generated wind waves to transport material in the same direction (west-to-east), as shown in Figure 16. The result is a closed system that cycles sediment within the bounds of Bathing Beach shoreline to the southeast; the Town boat ramp obstructs flow, and sediments accrete at this structure. Previous sediment management efforts have involved excavation of material adjacent to the northwest side of the Town boat ramp and placement of this dredged material along the Bathing Beach shoreline.



Figure 15: Predominant direction of wave-induced littoral drift (northwest-to-southeast) is illustrated by the red arrows, providing limited natural nourishment for Bathing Beach. Additionally, armored shorelines (orange) directly updrift from the beach restrict sediment inputs. The result is a closed littoral system with its terminus at the Town boat ramp.

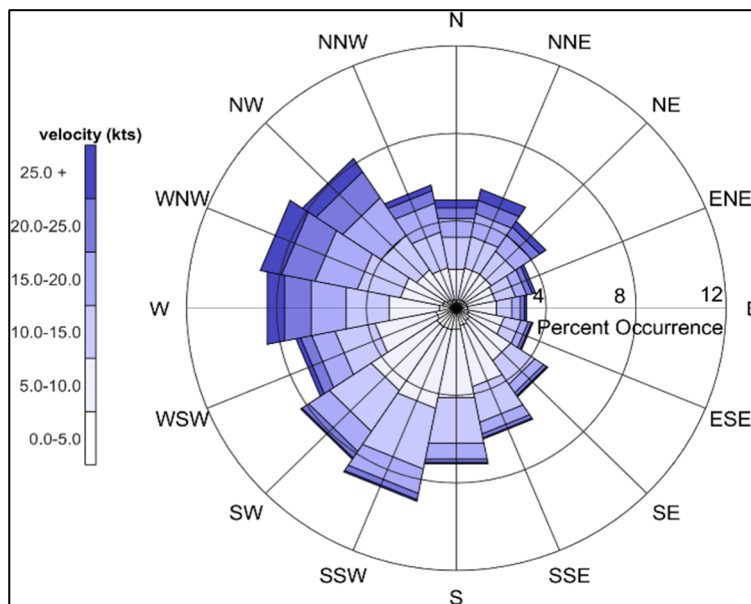


Figure 16: Rose plot of wind speed (knots) for the WIS hindcast record at station 63052 offshore Boston Harbor. Grey-tone segments indicate the percentage of time winds in the record blow within the indicated speed range from the indicated compass sector. The shoreline angle is indicated, demonstrating that the majority of applicable winds are coming from the northwestern direction, driving the sediment transport along the beach towards the Town boat ramp

6.4 Selected Coastal Resilience Model

The selected coastal resilience model for the Full Build-out Project focuses on providing continuous flood protection along the Inner Harbor shoreline to address projected 100-year storm conditions through 2050, while allowing for incremental adaptation to future 2070 conditions if warranted. This approach was selected because it provides a practical balance between coastal flood protection, constructability, environmental impact minimization, public access, and long-term adaptability.

Prior planning and technical evaluations considered a range of potential flood protection strategies, including no-action and higher-elevation protection scenarios. These approaches were not advanced because they either did not meet the Project's flood protection objectives, resulted in disproportionate cost or environmental impacts, or relied on storm surge assumptions beyond the typical design life of the proposed infrastructure. The selected model advances a phased and adaptable approach that addresses near-term flood risk while preserving flexibility for future modifications.

The selected model is based on updated sea level rise projections and site-specific coastal modeling completed for the Inner Harbor. The model provides flood protection to likely 2050 100-year storm conditions, including consideration of storm surge and wave action, while establishing design features that can be incrementally raised or modified to address projected 2070 conditions if future sea level rise warrants additional protection. More detailed information regarding the sea level rise and coastal process analyses is provided in Attachment 8.

For planning of future infrastructure, incorporating a safety factor to accommodate potential future sea level rise is warranted; therefore, the Resilient MA 'High' sea level rise projections are useful to ensure that future development is safe from the impacts of sea level rise. However, when developing flood mitigation strategies for existing infrastructure, designing for future sea level conditions that are 'extremely unlikely to occur' can be both cost-prohibitive and unnecessary. Specifically for the sites evaluated along the Harbor shoreline, appropriate design levels for flood mitigation strategies should be based upon expected future sea levels, which NOAA project to be approximately +1.0 ft NAVD88 in 2050 and +1.8 ft NAVD88 in 2070.

As the proposed flood mitigation strategies involve elevating seawalls, revetments, and coastal dunes, it will be a simple process to modify the design if future sea level rise exceeds the intermediate projections developed by NOAA (Sweet, et al., 2022). Table 2 provides expected future sea level rise for 2030, 2050, and 2070, based upon NOAA estimates (Sweet, et al., 2022). Figure 17 provides both the 2022 NOAA projections and the projections that have been utilized for project planning by SCS engineers over the past decade that was based on Intergovernmental Panel on Climate Change (IPCC) modeling with the addition of ice sheet contribution from Rignot et al., 2011. Good agreement between these two sets of projections indicates that this pragmatic approach continues to provide a valid science-based methodology for evaluating future sea level rise, especially in the near-term (next 30 to 40 years).

Table 2: Relative Mean Sea Level (ft NAVD88) Projections for Boston, MA as Presented in Sweet, et al., 2022

Scenario	Probabilistic Projections	2030	2050	2070
NOAA - Intermediate	Conditions that are about as likely as not to occur or, in other words, a 50% chance of occurrence (RCP 8.5)	0.4	1.0	1.8

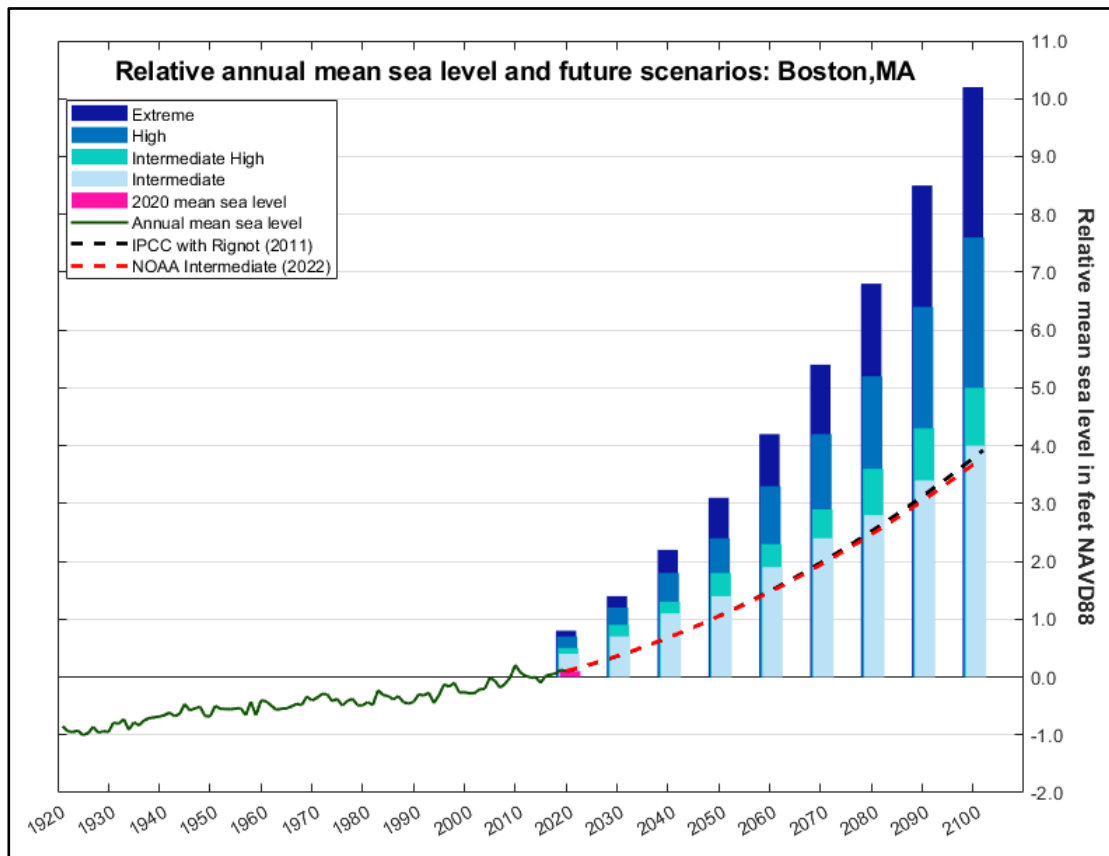


Figure 17: Sea level rise projections with the latest NOAA projections (adjusted to account for current mean sea level; dashed red line) and a curve representing flood projections from the IPCC augmented by sheet ice contributions determined by Rignot et al. (2011; dashed black line). The bar plot represents the sea level rise projections presented in Resilient MA.