WOODS HOLE GROUP
A CLS COMPANY

December 31, 2021 Job No. 2020-0237

Secretary Kathleen Theoharides
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

Sent via email: MEPA@mass.gov

Re: **ENVIRONMENTAL NOTIFICATION FORM**
Proposed City of Boston Resilient Fort Point Channel Infrastructure Project
Boston Planning & Development Agency
Fort Point Channel Harborwalk between 15 Necco St. and Dorchester Ave.
Boston, MA

Dear Secretary Theoharides,

On behalf of the City of Boston and Boston Planning & Development Agency (BPDA), we are hereby submitting an electronic copy of an Environmental Notification Form (ENF) for the above referenced project. During remote operations, we are refraining from sending physical copies to MEPA and the distribution list, except for the Mass. Historical Commission.

Please post this ENF Filing Notification in the next Environmental Monitor.

If you have any questions, or require any additional information, please call me at 305-978-5993 or send an email to nbrahim@woodsholegroup.com.

Sincerely,

Nasser Brahim

Nasser Brahim
Senior Climate Resiliency Specialist

NB/beg

cc: Distribution List
Brian Golden, Boston Planning & Development Agency
Joe Christo, Boston Planning & Development Agency
Richard McGuinness, Boston Planning & Development Agency
Chris Busch, Boston Planning & Development Agency
Alison Brizius, City of Boston Environment Department

Sanjay Seth, City of Boston Environment Department
Mark Talbot, Massachusetts Emergency Management Agency
Michelle O'Toole, Massachusetts Emergency Management Agency
David Robbins, Federal Emergency Management Agency
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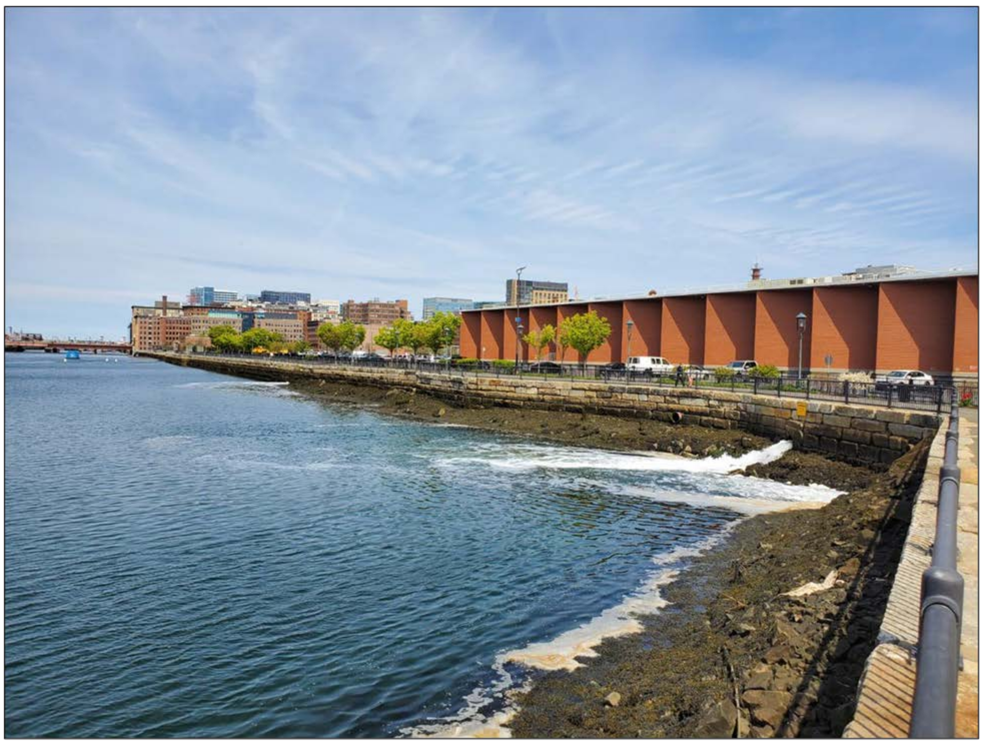
Kara Buckley, P&G - Gillette
Alan Sheard, P&G - Gillette
John Logg, P&G - Gillette
Leslie Fields, Woods Hole Group
Elizabeth Gurney, Woods Hole Group
Melissa Jaffe, Woods Hole Group

Environmental Notification Form

Proposed City of Boston Resilient Fort Point Channel Infrastructure Project
for Boston Planning & Development Agency



December 2021

PREPARED FOR:
Secretary Kathleen Theoharides
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

PREPARED BY:
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Environmental Notification Form Contents:

- Stormwater Report entitled “Resilient Fort Point Channel Infrastructure Project – Technical Support for Response to FEMA RFI” by Boston Water and Sewer Commission, dated 07/15/2020
- Memorandum for Fort Point Channel Flood Pathways, by Woods Hole Group, dated 03/02/2020
- Technical Memorandum for Benefit-Cost Analysis Methodology, by Arcadis, revision date July 2020

Section M - Project Map and Plans

- Boston USGS Map, identifying locus
- Plan entitled, “Existing Conditions”, by Woods Hole Group, dated 12/17/2021
- Plan entitled, “Environmental Constraints”, by Woods Hole Group, dated 12/17/2021
- Plan entitled, “Proposed Alignment Plan of Feature and Existing Utilities, City of Boston, Fort Point Channel Infrastructure Project”, by Arcadis, dated 12/21/2018

Section A

Environmental Notification Form Application

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

Environmental Notification Form

For Office Use Only
EEA#: ____________________
MEPA Analyst: ______________

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

Project Name: City of Boston Resilient Fort Point Channel Infrastructure Project		
Street Address: Fort Point Channel Harborwalk Between 15 Necco St & Dorchester Ave		
Municipality: Boston, MA	Watershed: Fort Point Channel	
Universal Transverse Mercator Coordinates:	Latitude: 42.347313° Longitude: -71.053382°	
Estimated commencement date: Summer 2023	Estimated completion date: Summer 2025	
Project Type: Coastal Infrastructure	Status of project design: 15% Complete	
Proponent: Boston Planning & Development Agency		
Street Address: One City Hall Square, 9 Floor		
Municipality: Boston	State: MA	Zip Code: 02201
Name of Contact Person: Nasser Brahim		
Firm/Agency: Woods Hole Group, Inc.	Street Address: 107 Waterhouse Rd.	
Municipality: Bourne	State: MA	Zip Code: 02532
Phone: 508-495-6237	Email: nbrahim@woodsholegroup.com	Fax: 508-540-1001

Does this project meet or exceed a mandatory EIR threshold (see 301 CMR 11.03)?
☐Yes ☒No

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

a Single EIR? (see 301 CMR 11.06(8)) ☐Yes ☐No
a Special Review Procedure? (see 301CMR 11.09) ☐Yes ☐No
a Waiver of mandatory EIR? (see 301 CMR 11.11) ☐Yes ☐No
a Phase I Waiver? (see 301 CMR 11.11) ☐Yes ☐No
(Note: Greenhouse Gas Emissions analysis must be included in the Expanded ENF.)

Which MEPA review threshold(s) does the project meet or exceed (see 301 CMR 11.03)?
301 CMR 11.03(3)(b)1.a and 301 CMR 11.03(3)(b)1.f

Which State Agency Permits will the project require?
DEP Chapter 91 License & CZM Federal Consistency Determination

Identify any financial assistance or land transfer from an Agency of the Commonwealth, including the Agency name and the amount of funding or land area in acres:
MEMA (via FEMA) Pre-Disaster Mitigation Grant for $10,000,000

Summary of Project Size & Environmental Impacts	Existing	Change	Total
LAND			
Total site acreage	**3.2**		
New acres of land altered		**1.7**	
Acres of impervious area	**1.7**	**-1.3**	**0.4**
Square feet of new bordering vegetated wetlands alteration		0	
Square feet of new other wetland alteration		**1.3**	
Acres of new non-water dependent use of tidelands or waterways		0	
STRUCTURES			
Gross square footage	0	0	0
Number of housing units	0	0	0
Maximum height (feet)	0	0	0
TRANSPORTATION			
Vehicle trips per day	0	0	0
Parking spaces	0	0	0
WASTEWATER			
Water Use (Gallons per day)	0	0	0
Water withdrawal (GPD)	0	0	0
Wastewater generation/treatment (GPD)	0	0	0
Length of water mains (miles)	0	0	0
Length of sewer mains (miles)	0	0	0

Has this project been filed with MEPA before?
☐ Yes (EEA #___________) ☒No

Has any project on this site been filed with MEPA before?
☒ Yes (EEA # 15547) ☐No

GENERAL PROJECT INFORMATION – all proponents must fill out this section

PROJECT DESCRIPTION:

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

The proposed project is located in the South Boston Fort Point urban neighborhood, along the southeast edge of Fort Point Channel. Existing development within the project site includes a pedestrian path (Harborwalk), parking lots, other paved areas, granite block seawall, and various underground utilities including 14 outfalls. Existing resource areas within the project site include coastal bank, land subject to coastal storm flowage, filled tidelands, and historic districts. For further details, see the Existing Environment in Section C.

Describe the proposed project and its programmatic and physical elements:

The proposed project is the construction of approximately 2,090 linear feet of mixed berm and floodwall mitigation features and 14 outfall backflow prevention flap gates along a portion of the Fort Point Channel's southeast shoreline, between approximately 15 Necco Street and Dorchester Avenue, along with installation of three interim flood protection barriers across the western end of Necco Court, A Street under the Summer Street overpass, and West Service Road under the Summer Street overpass. The purpose of the project is to reduce flood damage and provide protection to nearby populations, infrastructure, utilities, and structures in the 100 Acres Master Planning Area, which is bounded by the Fort Point Channel to the west, Summer Street to the north, the South Boston Bypass Road/Haul Road to the east, and West Second Street to the south, and portions of South Boston. The Fort Point Channel is a flood pathway into Boston and the project site is at the lowest elevation along the channel. The project is needed because of repetitive flooding from storm surge and associated damage, which is expected to increase in frequency and severity as a result of climate change and future sea level rise. The project will directly benefit 31 existing buildings, approximately 814 current residents, and numerous jobs and businesses exposed to present and future flood risk, with many additional people benefitting from the improved and more resilient waterfront and more reliable transportation network. For further details, see the Project Narrative in Section B and Alternatives Analysis in Section D.

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

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

Alternative 1: No Action
Alternative 2: Flood Control Segments and Interim Flood Walls (Proposed Action)
Alternative 3: Flood Gate Alternative (Dismissed)

For further details on the alternatives considered, see Alternatives Analysis & Associated Impacts in Section D.

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

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

The proposed project includes mitigation measures to offset the impacts of the preferred alternative. Temporary construction equipment and vehicle emissions would be mitigated through the application of EPA emissions standards. Temporary construction-related water quality would be mitigated with erosion and sedimentation controls, including turbidity curtains for outfall flap gate installation. Temporary public access impacts to tidelands during construction would be mitigated by re-routing pedestrian and bicycle traffic around the project site. Temporary impacts caused by construction would be offset by the continuous benefits provided by the proposed project thereafter, including flood mitigation, heat island mitigation, stormwater management, groundwater recharge, and other ecosystem services provided by the increased green open space.

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

The project will be constructed in one phase.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN:

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

☐Yes (Specify_____)
☒No

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

____

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

____

RARE SPECIES:

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

☐Yes (Specify____) ☒No

HISTORICAL /ARCHAEOLOGICAL RESOURCES:

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

☒Yes (Specify: **See below**) ☐No

- **BOS.WZ – Fort Pt Channel Historic District**
- **BOS.CX – Fort Pt Channel District**
- **BOS.ZG – Fort Pt Channel Landmark District**
- **BOS.9513 – Fort Point Channel Bulkheads**
- **BOS.5550 – 6 Necco Ct – Boston Wharf Co. /New England Confectionary Co. Bldg**
- **BOS.15354 – 6 Necco Ct – Boston Wharf Co. /New England Confectionary Co. Warehouse**
- **BOS.15350 – 11-17 Melcher St. - New England Confectionary Co./Boston Wharf Co. Warehouse**

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

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

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

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

Boston Inner Harbor is listed as a Category 5 waterbody on MassDEP's 2016 Integrated List of Waters. Impairments listed for the waterbody include dissolved oxygen, enterococcus, fecal coliform, and PCBs in fish tissue.

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

STORMWATER MANAGEMENT:

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

The proposed project incorporates several measures that will improve stormwater system performance in terms of drainage and pollution prevention, compared to without the proposed project. The primary measure is the construction of a flood barrier system and installation of backflow prevention flap gates on 14 stormwater and combined sewer outfalls. During precipitation-based flood events, the flood barrier system will route runoff and debris within the area of flood protection to catch basins and prevent surface flooding and the pollutants it collects from running off directly into the Fort Point Channel untreated as may occur under existing conditions. During coastal flooding events and combined precipitation-coastal flooding events, the flood barrier system will prevent coastal flood waters from infiltrating stormwater and combined sewer systems within the area of flood protection and taking up capacity for storing and conveying stormwater and combined sewer flows. By mitigating the infiltration of coastal flood waters into combined sewer systems in the flood protection area, the proposed flood barrier system has the potential to prevent CSOs caused by overland coastal flooding. In addition, the project will reduce impervious surface area by 1.3 acres by converting parking lots in the area, which collect oils, lubricants, fuels, dirt and asphalt wear deposits, and other pollutants from parked vehicles, and other paved areas into green open space, thereby reducing nonpoint sources of pollution.

Boston Water and Sewer Commission (BWSC) carried out modeling analyses to evaluate the proposed project's potential impacts on urban flooding from a 10-year 24-hour rainfall design storm alone and in combination with sea level rise and a 100-year return period coastal flood (Section L). Each modeling scenario was run with the existing physical conditions present in the project area and separately with the proposed physical conditions associated with this project. Results were compared to identify differences caused by the project. The modeling analyses shows that the proposed project does not interfere with stormwater discharge or create additional risk in terms of accumulation of stormwater. In fact, in the extreme precipitation with sea level rise/storm surge scenario, the proposed project reduces the burden on the interior drainage system by reducing intrusion of coastal floodwaters. It is expected that this latter benefit would also be realized during larger extreme precipitation events that occur in combination with storm surge events.

Compliance with MassDEP Stormwater Standards:

- **Standard 1 – The project will comply with this Standard. Untreated stormwater will not be directly discharged to, nor will erosion be caused to, wetlands or waters of the Commonwealth as a result of this project. No new stormwater outfalls are proposed as part of this project.**

- **Standard 2 – The project will comply with this Standard. Vegetated areas and, if required, infiltration systems (to be designed) will treat, at a minimum, 1 inch of runoff over the project site, which will be a material improvement over the pre-development conditions under which the project site is almost entirely impervious and without infiltration systems or stormwater treatment. The proposed project will be subject to BWSC Site Plan Review, and BWSC will review stormwater mitigation in greater detail to ensure that discharge rates are reduced.**
- **Standard 3 – The project will prevent the loss of annual recharge to groundwater relative to the existing site conditions. The existing site is almost entirely impervious paved surface, and approximately 1.3 acres of that will be converted to vegetated open space. Surface infiltration systems, if required to meet the standard, will be designed and reviewed in greater detail by BWSC to ensure BWSC and Groundwater Conservation Overlay District requirements for the project are met. A small portion of the proposed Segment 1 berm and two interim flood barriers are located within Boston's Groundwater Conservation Overlay District, which requires projects within the district to infiltrate to the ground a minimum volume equivalent to 1 inch over the stie impervious area.**
- **Standard 4 – The project will remove 80 percent of the annual load of total suspended solids by the implementation of BMPs. Source controls and pollution prevention techniques proposed include minimizing site impervious area, incorporating nonstructural stormwater treatment, if required to meet infiltration and treatment requirements, and minimizing the need for fertilizers by using native drought-tolerant plantings. These measures will reduce runoff to existing subsurface drainage systems which are sized to capture and treat by structural means the required volume.**
- **Standard 5 – The project site will be occupied by open spaces not associated with land uses with higher potential pollutant loads.**
- **Standard 6 – The project site does not discharge within the Zone II or Interim Wellhead Protection Area of a public water supply or near any other critical area.**
- **Standard 7 – The project is considered a redevelopment project. The project will comply with the Stormwater Management Standards 1 through 6 to the maximum extent practicable and all other requirements of the Stormwater Management Standards and will thereby materially improve upon existing conditions.**
- **Standard 8 – Sedimentation and erosion controls will be employed to prevent construction or land disturbance impacts to groundwater. Erosion and sediment controls plans will be submitted to BWSC and the contractor will be required to implement the measures as part of the BWSC general services application process. The implementation of these measures are also a requirement of the NPDES permit that will be obtained for the project.**
- **Standard 9 – An operation and maintenance plan will be developed and implemented. The plan will be reviewed by the BWSC.**
- **Standard 10 – There are no currently known illicit discharges. All proposed discharges will be reviewed by the BWSC to ensure consistency with this standard.**

MASSACHUSETTS CONTINGENCY PLAN:

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

Typical of urban sites in Boston built on filled tidelands, the parcels on which the proposed project site is located contain portions that have been regulated under M.G.L.c.21E or the Massachusetts Contingency Plan. The following table summarizes their current status:

SITE NUMBER	ADDRESS	RTN	COMPLIANCE STATUS	CLEANUP PHASE	RAO	AUL
3-0034132	5 NECCO ST	3-34132	PSC	PHASE II	PA	YES
3-0033854	15 NECCO STREET	3-33854	TIER 2	PHASE II		NO
3-0034787	NECCO COURT EXTENSION	3-34787	URAM			NO
3-0035832	1 GILLETTE PARK	3-35832	URAM			NO
3-0035831	24-48 SOBIN PARK	3-35831	URAM			NO
3-0035100	1 GILLETTE PARK	3-35100	URAM			NO
3-0032074	1 GILLETTE PARK	3-32074	PSC		PA	YES
3-0027914	1 GILLETTE PARK	3-27914	RAO		A2	NO
3-0027847	1 GILLETTE PARK	3-27847	RAO		B3	YES
3-0012777	1 GILLETTE PARK	3-12777	RAO		A1	NO
3-0011312	70 SOBIN PARK	3-11312	REMOPS			NO
3-0004365	1 GILLETTE PARK Z BLDG W	3-4365 3-11312	REMOPS	PHASE V		NO
3-0012352	1 GILLETTE PARK	3-12352	RTN CLOSED	PHASE II		NO
3-0012767	1 GILLETTE PARK	3-12767	RTN CLOSED	PHASE II		NO
3-0015548	1 GILLETTE PARK	3-15548	RTN CLOSED			NO
3-0011418	164-170 A ST	3-11418	RTN CLOSED	PHASE II		NO
3-0013952	1 GILLETTE PARK	3-13952	RTN CLOSED	PHASE II		NO
3-0004278	24-48 SOBIN PARK	3-4278 3-11422 3-27847	RAO	PHASE III	PA	YES
3-0002966	35 MT WASHINGTON AVE	3-2966	RAO	PHASE III	A3	YES, Terminated

Is there an Activity and Use Limitation (AUL) on any portion of the project site? Yes _X__ No ___;
if yes, describe which portion of the site and how the project will be consistent with the AUL:.

Several of the M.G.L. 21E sites within the parcels that the proposed project will be constructed have AULs, as indicated in the table above. However, the proposed project only includes activities potentially within the AUL for Site Number 3-0034787. The exact boundaries of the AUL relative to project activities and depths of excavation and construction activities will be further explored as the design progresses. No activities are proposed within the AULs for Site Numbers 3-0032074, 3-0027847, 3-0004278, or 3-0002966. The proposed project activities and uses will be consistent with activities and uses listed in the AUL as maintaining no significant risks. Based on review of the AUL, excavation and construction activities within certain portions of the project site may require Health and Safety Plans and Soil and Groundwater Management Plans. Health and Safety Plans and Soil and Groundwater Management Plans, if required, will be developed in accordance with M.G.L 21E and associated regulations. All activities will adhere to the AUL requirements, obligations, and conditions and follow any required Health and Safety Plans and Soil and Groundwater Management Plans.

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

SOLID AND HAZARDOUS WASTE:

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

The existing seawalls, Segment 1 Harborwalk, and Segment 3 South Bay Harbor Trail will be retained as part of this project. Excavation of soils to support construction of the Segments 1-3 berms and flood wall infrastructure is also included in the project. A waste management plan will be prepared to divert project-related construction waste material from landfills through recycling and salvaging where practicable, including:

- **Existing pavement will either be processed on-site for re-use or shipped off-site to an asphalt recycling facility.**

- **Analytical testing of the soils will be conducted to determine proper off-site disposal of excess soils generated during the construction.**
- **Materials will be handled according to applicable federal, state and municipal environmental laws and regulations.**
- **In the event that subsurface contamination exceeding Reportable Concentrations is encountered that requires notification, DEP will be notified and the contamination managed in accordance with MCP as applicable.**
- **Universal and/or regulated wastes will be managed and/or transported and disposed in accordance with applicable federal, state, and municipal environmental laws and regulations.**

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

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

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

The project will implement measures to limit emissions from construction equipment to the extent practicable, such as retrofitting diesel construction vehicles, or utilizing vehicles that use alternative fuels, such as ultra-low-sulfur diesel fuel to reduce emissions during construction activities. In addition, the Massachusetts anti-idling law will be enforced during the construction phase of the Project with the installation of on-site anti-idling signage.

DESIGNATED WILD AND SCENIC RIVER:

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

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

ATTACHMENTS:

1. List of all attachments to this document.
2. U.S.G.S. map (good quality color copy, 8-½ x 11 inches or larger, at a scale of 1:24,000) indicating the project location and boundaries.
3.. Plan, at an appropriate scale, of existing conditions on the project site and its immediate environs, showing all known structures, roadways and parking lots, railroad rights-of-way, wetlands and water bodies, wooded areas, farmland, steep slopes, public open spaces, and major utilities.
4 Plan, at an appropriate scale, depicting environmental constraints on or adjacent to the project site such as Priority and/or Estimated Habitat of state-listed rare species, Areas of Critical Environmental Concern, Chapter 91 jurisdictional areas, Article 97 lands, wetland resource area delineations, water supply protection areas, and historic resources and/or districts.
5. Plan, at an appropriate scale, of proposed conditions upon completion of project (if construction of the project is proposed to be phased, there should be a site plan showing conditions upon the completion of each phase).
6. List of all agencies and persons to whom the proponent circulated the ENF, in accordance with 301 CMR 11.16(2).
7. List of municipal and federal permits and reviews required by the project, as applicable.
8. Printout of output report from RMAT Climate Resilience Design Standards Tool, available here.

LAND SECTION – all proponents must fill out this section

I. Thresholds / Permits

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

II. Impacts and Permits

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

	Existing	Change	Total
Footprint of buildings	0	0	0
Internal roadways	0	0	0
Parking and other paved areas	3.17	-1.30	1.50 temporary 0.37 permanent
Other altered areas	0.03	0	0.03
Undeveloped areas	0	0	0
Total: Project Site Acreage	3.2		

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

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

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

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

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

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

III. Consistency

A. Identify the current municipal comprehensive land use plan

The City of Boston has several plans that discuss land use that apply to the Fort Point Channel area. The overall plan that is the most encompassing is the Imagine Boston 2030 Plan, however, several additional plans have been developed that cover land use planning for the Fort Point Channel area on a more detailed level, which are listed below and discussed.

Title: Imagine Boston 2030 Date: September 2017

Title: Boston Redevelopment Authority Master Plan for Planned Development Area No. 69, South Boston/The 100 Acres Date: January 2007

Title: Fort Point 100 Acres Open Space Concept Plan Date: December 2020

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

1) economic development
2) adequacy of infrastructure
3) open space impacts
4) compatibility with adjacent land uses

1) <u>Economic Development</u>: Imagine Boston 2030 highlights Boston's priorities of inclusive economic growth, the importance of the many diverse sectors that make up the local economy, and a thriving waterfront to foster economic opportunity and growth. The proposed project is consistent with these objectives by proving flood protection for existing businesses as well as inland areas that may experience redevelopment in the future. Without the proposed flood protection, existing and future businesses would likely face financial challenges as a result of flood and storm damage. This can be especially difficult for small, independently owned businesses, which are an essential cornerstone in the Boston economy. Flood protection also allows for continued inclusive economic growth by protecting and preserving existing housing, some of which includes environmental justice populations adjacent to the project area. Without the preservation of essential housing for these populations, they may not be able to continue contributing to Boston's diverse and inclusive economy.

Economic considerations listed in the Boston Redevelopment Authority Master Plan for Planned Development Area No. 69, South Boston/The 100 Acres include protection of Gillette's South Boston Manufacturing Center, which is a major employment center and component of Gillette's worldwide operations. The plan is also consistent with Imagine Boston 2030, noting the importance of diversification and expansion of the local economy. The proposed project will provide flood and storm protection for the Gillette manufacturing center, which is just inland of the proposed flood protection measures. This will increase resiliency and allow the facility to operate normally under circumstances that would likely interfere with work occurring at the facility without flood protection measures.

2) <u>Adequacy of Infrastructure</u>: Imagine Boston 2030 has outlined special goals for the Fort Point Channel area including enhancing transportation and infrastructure. This project is exactly in line with that goal by providing flood protection for existing infrastructure and transportation networks such as roads, making them more resilient to climate change.

The Boston Redevelopment Authority Master Plan for Planned Development Area No. 69, South Boston/The 100 Acres highlights the importance of improvements within the Fort Point Channel area that support additional development of transportation infrastructure and to create area-wide transit improvements. The proposed project will provide flood damage and storm protection for existing transportation infrastructure, such as roads, against present day risk and future risk, which is expected to increase with climate change.

3) <u>Open Space Impacts:</u> Objectives outlined in the Imagine Boston 2030 plan include designing flood protection for the Fort Point Channel area that also increases open space, redeveloping underutilized parcels, maintaining connections to open space such as by enhancing the Harborwalk, and creating an accessible waterfront area that serves as a public destination. The footprint of the proposed flood protection berm will result in an increase in open space, meaning the project has benefits beyond just flood protection. However, the primary benefit of flood protection will be to help maintain public access to the waterfront by making the area more resilient to storm impacts and protect inland parcels that may be redeveloped as open space in the future.

Open Space objectives in the Boston Redevelopment Authority Master Plan for Planned Development Area No. 69, South Boston/The 100 Acres include maintaining public access to high quality waterfront spaces along Fort Point Channel and expand or create new open spaces for recreation and enjoyment of both residents and tourists. The Fort Point 100 Acres Open Space Concept Plan (described below) outlines the development of new parks and open spaces in the Fort Point Channel area, which will benefit from flood and storm damage protection measures in the proposed project. The project will also maintain public access to the waterfront area.

The Fort Point 100 Acres Open Space Concept Plan provides a more in-depth discussion of open space goals for the Fort Point Channel area. The plan describes future development including a network of parks within or adjacent to the project area that strengthen connection to the waterfront and expands open spaces. The plan also notes the importance of addressing current and future flood risk due to climate change and sea level rise. In addition, landscapes within the Fort Point Channel area should be resilient to climate change and maintain accessibility for the public. The proposed project will primarily provide flood and storm protection against current and future conditions predicted to increase in severity with climate change. This will increase resiliency of inland areas, which will experience decreased impact from storms, and can be used after storm events faster than if no flood protection was constructed. The project will also result in some expansion of open space through the construction of the proposed flood protection berm.

4) **Compatibility with Adjacent Land Uses: Imagine Boston 2030 encourages the Fort Point Channel area to be one of mixed-use development that allows for living, working, and community gathering. In addition, preserving the waterfront area for future generations is also highly important. The proposed project will allow for the preservation of the current waterfront area by providing flood and storm protection for inland areas. The proposed project is also consistent with already existing varied development in the area, for instance, the berm naturally fits into existing open space areas and all inland areas utilized for housing, businesses, and community events will also benefit from flood and storm damage protection.**

The Boston Redevelopment Authority Master Plan for Planned Development Area No. 69, South Boston/The 100 Acres describes the need for harmonious land uses between adjacent parcels. The proposed project will be compatible with adjacent land uses by blending in well with the Harborwalk and existing development on the immediate waterfront area. Inland land uses will all benefit from increased storm damage and flood water protection.

C. Identify the current Regional Policy Plan of the applicable Regional Planning Agency (RPA)
RPA: **Metropolitan Area Planning Council**

Title: **MetroFuture Regional Plan** Date **May 2008**

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

1)Economic Development: Economic growth and development is a high priority in the MetroFuture Regional Plan in order to obtain prosperity for the Boston region. The plan strives to generate new economic opportunity and address ongoing economic inequality due to race and discriminatory practices. The City also strives to be a leader in climate change resilience and clean energy. The proposed project is consistent with economic development principles outlined in the Metro Future

Regional Plan as it will protect the Fort Point Channel area from sea level rise and storm damage, making it more resilient to climate change. This is a fundamental requirement for the area to continue serving as a place of business and housing. If the City of Boston were not able to protect existing buildings and infrastructure from the impacts of climate change, existing businesses within the Fort Point Channel area that contribute to the local economy would no longer be able to function. The proposed project also offers protection for inland parking lots, which the plan mentions are necessary in order for commuters who need to be able to park within a reasonable distance of their place of work. The proposed project will not interfere with public access via the Harborwalk, which workers may also use to access their jobs. Adequate housing options are also essential for Boston, which allows local workers to reside within a reasonable commute of their place of work. Additionally, although the project area itself is not within an environmental justice population, it will benefit inland environmental justice populations by offering protection against storm damage. The MetroFuture Regional Plan highlights the importance of a diverse workforce contributing to the economy in Boston, which starts with adequate housing in the area. If no action were taken in the Fort Point Channel area, existing businesses, residential developments, parking lots, and walkways would all be damaged, negatively impacting the workforce and economy of Boston.

2) <u>Adequacy of Infrastructure</u>: The proposed project is consistent with infrastructure goals and priorities outlined in the MetroFuture Regional Plan. The plan details how existing infrastructure should be protected and made more resilient in order to avoid expanding infrastructure to new developments. Correspondingly, this will allow for population and job growth to remain concentrated in areas already served by infrastructure. The proposed project does exactly this; the proposed flood protection measures will provide increased flood and storm damage protection for infrastructure in the Fort Point Channel area, meaning additional, new infrastructure will not be required and that residents and business in the project area can continue to operate normally.

3) <u>Open Space Impacts</u>: The proposed project is located within a highly developed area of Boston, where existing open space is limited to Fort Point Channel and the Harborwalk, which provides public access to the waterfront area. The Metro Future Regional Plan prioritizes the preservation of existing open space within the region and urges re-development of existing areas to avoid expansion into open space. Maintaining a network of pedestrian routes as well as preserving access to open space is also an aim for the region outlined in the MetroFuture Regional Plan. The proposed project will not result in any adverse effects on existing open space within or surrounding the project area; it will result in increased open space through the construction of berms and increased protection for inland open space areas while still maintaining public access to the waterfront. Local land use plans require further expansion of open space within the project area, and no expansion of development into existing open spaces will be permitted.

4) <u>Compatibility with Adjacent Land Uses</u>: The Metro Future Regional Plan emphasizes land use that is consistent with regional and local goals, such as those discussed above. Land use should also be planned proactively, should support transportation needs, and should reduce growth pressure on suburban areas. As discussed above, the proposed project will support the City of Boston's goals related to economic growth, adequate infrastructure, and open space. The proposed project is a proactive resiliency measure against climate change, will preserve public access to the Harborwalk, and will protect existing development, thus avoiding the need for relocation into suburban areas. Land use bordering the project site is also highly developed, meaning the proposed project will not adversely affect adjacent areas. Rather, the project will provide increased flood and storm protection for adjacent, inland areas.

RARE SPECIES SECTION

I. Thresholds / Permits

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

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

B. Does the project require any state permits related to **rare species or habitat**? ___ Yes _X_ No

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

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

WETLANDS, WATERWAYS, AND TIDELANDS SECTION

I. Thresholds / Permits

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

301 CMR 11.03(3)(b)1.a: 760 linear feet of alterations to Coastal Bank, requiring a State permit.

301 CMR 11.03(3)(b)1.f: 68,887 square feet of alterations to Land Subject to Coastal Storm Flowage, requiring a State permit.

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

Order of Conditions, DEP Chapter 91 Waterways License, and CZM Federal Consistency Determination

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

II. Wetlands Impacts and Permits

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

B. Describe any proposed permanent or temporary impacts to wetland resource areas located on the project site:

See Section D – Alternatives Analysis & Associated Impacts

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

Coastal Wetlands	Area (square feet) or Length (linear feet)	Temporary or Permanent Impact?
Land Under the Ocean	0	
Designated Port Areas	0	
Coastal Beaches	0	
Coastal Dunes	0	
Barrier Beaches	0	
Coastal Banks	760 lf	Permanent
Rocky Intertidal Shores	0	
Salt Marshes	0	
Land Under Salt Ponds	0	
Land Containing Shellfish	0	
Fish Runs	0	
Land Subject to Coastal Storm Flowage	68,887	Permanent
Land Subject to Coastal Storm Flowage	60,273	Temporary

Inland Wetlands		
Bank (lf)	0	
Bordering Vegetated Wetlands	0	
Isolated Vegetated Wetlands	0	
Land under Water	0	
Isolated Land Subject to Flooding	0	
Bordering Land Subject to Flooding	0	
Riverfront Area	0	

D. Is any part of the project:

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

74,859 sf (permanent) and 66,625 sf (temporary)

E. Will the project:

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

III. Waterways and Tidelands Impacts and Permits

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

Initial research for current Chapter 91 Licenses affecting the project site has found the following licenses:

License #	Year	License #	Year
162	1873	1192	1930
572	1880	1395	1932
665	1882	43	1947
822	1884	4398	1960
837	1884	3137	1993
1057	1888	3909	1994
1593	1893	5803	1996
1930	1896	7426	1998
2088	1897	6544	1997
2101	1898	8420	1999
2169	1899	9342a	2003
3231	1907	9342b	2003
30	1912	10048b	2004
52	1912	12063	2008
188	1916	4398A	2009
56	1917	12906	2011
946	1928	14385	2017

Further research will be necessary prior to filing for the new Chapter 91 License for this proposed project.

For extent of filled tidelands, see Historic High Waterline on Environmental Constraints Plan Section M.

B. Does the project require a new or modified license or permit under M.G.L.c.91? _X__ Yes ___ No; if yes, how many acres of the project site subject to M.G.L.c.91 will be for non-water-dependent use? Current _0__ Change _0__ Total _0__

If yes, how many square feet of solid fill or pile-supported structures (in sf)?

C. For non-water-dependent use projects, indicate the following: **N/A**

Area of filled tidelands on the site:____________________

Area of filled tidelands covered by buildings:____________

For portions of site on filled tidelands, list ground floor uses and area of each use:

____

Does the project include new non-water-dependent uses located over flowed tidelands? Yes ___ No ___

Height of building on filled tidelands________________

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

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

Two of the proposed interim flood barriers will be located within landlocked tidelands. These deployable flood barriers are proposed to be installed under the Summer Street overpasses at A Street and West Service Road, across the public rights of way.

The proposed interim flood barriers would normally be kept in storage offsite, installed only when a coastal flood was impending, and then removed and put back in storage when a flood threat had passed. Therefore, any impacts on access to jurisdictional tidelands caused by these proposed project elements would be temporary in nature. Further, these impacts would only occur during emergencies when the public would likely be under advisories to shelter in place and avoid travel due to hazardous conditions. Without the project, under the same flooding scenarios, the A Street and West Service Road rights of way would potentially be flooded, resulting in a similar impact on access but higher damage, loss, and safety impacts from flooding.

Given the project location within a dense urban neighborhood with a robust transportation network, even during times when the flood barriers would be deployed, alternative paths of travel would be available around the barriers. For example, there are stairs on both sides of the Summer Street overpass at A Street that would allow a pedestrian to travel from one side of A Street to the other without a significant detour. The Harborwalk and South Bay Harbor Trail within the project area would remain open and traversable to other portions of the Harborwalk network during such deployments.

Finally, within the flood protection area, the interim flood barriers would provide a benefit to members of the public located within the flood protection area by preventing coastal flooding and maintaining access to jurisdictional tidelands during extreme events when the transportation network would otherwise be flooded.

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

A small portion of the proposed Segment 1 berm and two of the proposed interim flood barriers are located within Boston's Groundwater Conservation Overlay District, which requires projects within the district to infiltrate to the ground a minimum volume equivalent to 1 inch over the stie impervious area. The project will prevent the loss of annual recharge to groundwater relative to the existing site conditions. The existing site is almost entirely impervious paved surface, and approximately 1.3 acres of that will be converted to vegetated open space. Surface infiltration systems, if required to meet regulatory standards, will be designed and reviewed in greater detail by Boston Water and Sewer Commission (BWSC) to ensure DEP, BWSC, and Groundwater Conservation Overlay District requirements for the project are met.

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

G. Does the project include dredging? ___ Yes _X__ No; if yes, answer the following questions:
What type of dredging? Improvement ___ Maintenance ___ Both ____
What is the proposed dredge volume, in cubic yards (cys) _________
What is the proposed dredge footprint ____length (ft) ___width (ft)____depth (ft);
Will dredging impact the following resource areas?
Intertidal Yes__ No__; if yes, ___ sq ft
Outstanding Resource Waters Yes__ No__; if yes, ___ sq ft

Other resource area (i.e. shellfish beds, eel grass beds) Yes__ No__; if yes __ sq ft

If yes to any of the above, have you evaluated appropriate and practicable steps to: 1) avoidance; 2) if avoidance is not possible, minimization; 3) if either avoidance or minimize is not possible, mitigation?

If no to any of the above, what information or documentation was used to support this determination?

Provide a comprehensive analysis of practicable alternatives for improvement dredging in accordance with 314 CMR 9.07(1)(b). Physical and chemical data of the sediment shall be included in the comprehensive analysis.

Sediment Characterization

Existing gradation analysis results? __Yes ___No: if yes, provide results.

Existing chemical results for parameters listed in 314 CMR 9.07(2)(b)6? ___Yes ____No; if yes, provide results.

Do you have sufficient information to evaluate feasibility of the following management options for dredged sediment? If yes, check the appropriate option.

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

IV. Consistency:

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

See Section F – Review of Consistency w/ CZM Policies

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

South Boston Waterfront District Municipal Harbor Plan – 2000
South Boston Waterfront District Municipal Harbor Plan Amendment – 2009 and
South Boston Waterfront District Municipal Harbor Plan Renewal and Amendment - 2016

The Fort Point Downtown Waterfront Municipal Harbor Plan – Phase 2, dated September 2003, was also reviewed but not addressed for consistency as the planning area boundary only included land west of the channel and was therefore outside of the project area. This plan does reference the greater South Boston Waterfront District Municipal Harbor Plan, which includes the full area of the proposed project. Since the Fort Point Downtown Waterfront Municipal Harbor Plan is consistent with the South Boston Waterfront District Municipal Harbor Plan, as long as the proposed project is consistent with the South Boston Waterfront District Municipal Harbor Plan, it will also be consistent with the Fort Point Downtown Waterfront Municipal Harbor Plan. This is important as the Fort Point Downtown Waterfront Municipal Harbor Plan planning area is adjacent to the proposed project area.

The South Boston Waterfront District Municipal Harbor Plan directly addresses the Fort Point Channel and a set of five planning objectives were developed. These objectives include access to Boston Harbor as a shared natural resource, preserve and enhance the industrial port, plan for the district as a mixed-use area, develop the district as part of Boston's economy, and enhance the South Boston Community. The proposed project is consistent with, and will help to achieve, these objectives. For instance, the proposed project will maintain access to the Harborwalk and South Bay Harbor Trail, which provide public access to the natural resource of the waterfront area. The project will not interfere with any industrial port activities and will provide increased flood and storm protection for inland development on the eastern side of Fort Point Channel. Development bordering Fort Point Channel is already diverse, and increased flood protection will help protect existing and future uses. The Fort Point Channel area currently includes an array of development that supports economic activity and the community. The proposed flood and storm protection will protect these existing activities and ensure they do not need to be relocated in the future due to flooding impacts.

The proposed Segment 1 berm is located within the planning area addressed within the 2009 South Boston Waterfront District Municipal Harbor Plan Amendment. This Amendment employs the 100 Acres Master Plan (Boston Redevelopment Authority Master Plan for Planned Development Area No. 69, South Boston/The 100 Acres) as the framework and design guidance for Chapter 91 licensing with respect to public access network, pedestrian links, compatibility, and coordination with zoning. This Amendment also includes substitute provisions and offsetting public benefits for the water-dependent use zone (WDUZ), and reorganizes building height standards in keeping with the purposes of Chapter 91 regulations. In particular, it enhances the City's Harborpark zoning standard by requiring an 18-foot clear walkway where there is a WDUZ of at least 100 feet, and a 12-foot clear walkway along the remainder of the water's edge which serves as a substitution of the baseline Chapter 91 regulations in this area of the harbor. The proposed Segment 1 berm will be located within the area with a WDUZ of at least 100 feet and will be configured landward of the existing Harborwalk with sufficient space to accommodate an 18-foot clear walkway (Harborwalk) as part of future developments. The Segment 1 berm, as flood control infrastructure, is a water-dependent use and will create new public open space for passive use and enjoyment within the WDUZ, consistent with the Amendment.

WATER SUPPLY SECTION

I. Thresholds / Permits

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

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

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

WASTEWATER SECTION

I. Thresholds / Permits

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

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

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

TRANSPORTATION SECTION (TRAFFIC GENERATION)

I. Thresholds / Permit

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

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

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

TRANSPORTATION SECTION (ROADWAYS AND OTHER TRANSPORTATION FACILITIES)

I. Thresholds

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

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

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

ENERGY SECTION

I. Thresholds / Permits

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

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

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

AIR QUALITY SECTION

I. Thresholds

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

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

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

SOLID AND HAZARDOUS WASTE SECTION

I. Thresholds / Permits

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

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

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

HISTORICAL AND ARCHAEOLOGICAL RESOURCES SECTION

I. Thresholds / Impacts

A. Have you consulted with the Massachusetts Historical Commission? _X__ Yes ___ No; if yes, attach correspondence.

See Section K – MA Historic Commission concurrence letter, dated 04/09/2021, to FEMA's Section 106 Consultation submittal.

For project sites involving lands under water, have you consulted with the Massachusetts Board of Underwater Archaeological Resources? __X__Yes ____ No; if yes, attach correspondence

See Section K – FEMA's Section 106 Consultation Submittal to BUAR, dated 03/10/2021. No response was received by FEMA.

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

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

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

II. Impacts

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

Under the Proposed Action, there would be no direct physical construction effects to any buildings within the project area. Both historic and non-historic resources within the Fort Point Channel neighborhood would be protected from the 100-year flood event. The construction of these flood mitigation measures will not adversely affect the characteristics of the historic properties within the project area as determined through consultation with the SHPO's office. However, while not anticipated, additional work could become necessary to stabilize or repair existing channel seawalls based on conditions to be assessed during the construction phase. To mitigate the effects of such repairs FEMA will add a special condition to the project that the City of Boston must notify FEMA of the repair work and all repair or replacement work must be in-kind. In-kind shall mean that it is either the same or similar material, and the result shall match all physical and visual aspects, including form, color, and workmanship. Therefore, any new stones or mortar, or repair work on the channel walls will match the existing channel walls in materials, size, and color to minimize the effect to the historic channel walls.

As many parcels to the east of the project site are paved parking lots, minor visual effects would be anticipated. To the west on the Downtown Boston side, the only building with possible views of the project area is the U.S. Post Office General Mail Facility, with its loading docks facing Fort Point Channel. The Gillette World Shaving Headquarters complex, which is located adjacent to the Harborwalk, is also visible from parts of Interstate 93 (expressway) and the railroad tracks to the west.

Construction related effects to historic (standing) structures would be none and there would be minor long-term beneficial effects to historic structures from flood-related damages.

III. Consistency

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

For the proposed project, FEMA consulted with the Massachusetts State Historic Preservation Office (SHPO), the Massachusetts Board of Underwater Archaeology (BUAR), and the Native American Tribal governments through the responsible Tribal Historic Preservation Officer (THPO), whose areas of interest include Suffolk County (Mashpee Wampanoag Tribe and Mashpee Wampanoag Tribe of Hay Head [Aquinnah]), under Section 106 of the NHPA. FEMA submitted its initial finding that the proposed action would have "No Adverse Effect" on historic properties to the SHPO and THPOs on March 10, 2021. FEMA also submitted letters to several cultural and historic non-profits within the Fort Point Channel neighborhood, including Boston Landmarks Commission, Historic Boston Inc., Friends of Fort Point Channel, Boston Preservation Alliance, and the Boston Tea Party Ships & Museum.

April 9, 2021, the SHPO's office concurred that the project would have no adverse effect on the historic resources within the project area (Section K). The SHPO's office also concurred that there are no archaeological concerns within the project area as the ground has been previously disturbed by construction and demolition activities throughout the history of the neighborhood."

Boston Landmarks Commission and Fort Point Channel Landmark District Commission will be further consulted during design and, if required, an application will be submitted for a Certificate of Design Approval for the proposed project.

During the design and construction phases, the City will comply with the standards and conditions set for the project by the regulatory bodies of jurisdiction.

CLIMATE CHANGE ADAPTATION AND RESILIENCY SECTION

This section of the Environmental Notification Form (ENF) solicits information and disclosures related to climate change adaptation and resiliency, in accordance with the MEPA Interim Protocol on Climate Change Adaptation and Resiliency (the "MEPA Interim Protocol"), effective October 1, 2021. The Interim Protocol builds on the analysis and recommendations of the 2018 Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan (SHMCAP), and incorporates the efforts of the Resilient Massachusetts Action Team (RMAT), the inter-agency steering committee responsible for implementation, monitoring, and maintenance of the SHMCAP, including the "Climate Resilience Design Standards and Guidelines" project. The RMAT team recently released the RMAT Climate Resilience Design Standards Tool, which is available here.

The MEPA Interim Protocol is intended to gather project-level data in a standardized manner that will both inform the MEPA review process and assist the RMAT team in evaluating the accuracy and effectiveness of the RMAT Climate Resilience Design Standards Tool. Once this testing process is completed, the MEPA Office anticipates developing a formal Climate Change Adaptation and Resiliency Policy through a public stakeholder process. Questions about the RMAT Climate Resilience Design Standards Tool can be directed to rmat@mass.gov.

All Proponents must complete the following section, referencing as appropriate the results of the output report generated by the RMAT Climate Resilience Design Standards Tool and attached to the ENF. In completing this section, Proponents are encouraged, but not required at this time, to utilize the recommended design standards and associated Tier 1/2/3 methodologies outlined in the RMAT Climate Resilience Design Standards Tool to analyze the project design. However, Proponents are requested to respond to a respond to a user feedback survey on the RMAT website or to provide feedback to rmat@mass.gov, which will be used by the RMAT team to further refine the tool. Proponents are also encouraged to consult general guidance and best practices as described in the RMAT Climate Resilience Design Guidelines.

Climate Change Adaptation and Resiliency Strategies

I. Has the project taken measures to adapt to climate change for all of the climate parameters analyzed in the RMAT Climate Resilience Design Standards Tool (sea level rise/storm surge, extreme precipitation (urban or riverine flooding), extreme heat)? _X_Yes __ No

Note: Climate adaptation and resiliency strategies include actions that seek to reduce vulnerability to anticipated climate risks and improve resiliency for future climate conditions. Examples of climate adaptation and resiliency strategies include flood barriers, increased stormwater infiltration, living shorelines, elevated infrastructure, increased tree canopy, etc. Projects should address any planning priorities identified by the affected municipality through the Municipal Vulnerability Preparedness (MVP) program or other planning efforts, and should consider a flexible adaptive pathways approach, an adaptation best practice that encourages design strategies that adapt over time to respond to changing climate conditions. General guidance and best practices for designing for climate risk are described in the RMAT Climate Resilience Design Guidelines.

A. If no, explain why.

B. If yes, describe the measures the project will take, including identifying the planning horizon and climate data used in designing project components. If applicable, specify the return period and design storm used (e.g., 100-year, 24-hour storm).

Sea Level Rise/Storm Surge

The main purpose of the proposed project is to adapt the South Boston/Fort Point neighborhood to sea level rise/storm surge climate risks by mitigating future coastal flood exposure. Coastal flooding is the top priority climate risk identified for South Boston in the *Climate Ready Boston* (2016) report, the city-wide vulnerability assessment and adaptation

plan. The report noted, “Of all Boston focus areas, South Boston consistently faces the greatest or near-greatest exposure and potential losses to coastal flooding across all sea level rise conditions and flood events.” The report recommended that the City prioritize and study the feasibility of district-scale flood protection solutions for South Boston. The City subsequently carried out a detailed feasibility study, *Coastal Resilience Solutions for South Boston* (2018), which identified and analyzed alternatives. Through the feasibility study process, the proposed project was selected as the highest priority project for near-term implementation. Copies of these reports can be provided upon request. The proposed project is the direct result of the City’s ongoing climate adaptation planning and completely aligned therewith.

The project includes a combination of permanent and interim flood barrier systems to provide independent flood protection for a large, highly vulnerable area of the South Boston/Fort Point neighborhood. Permanent flood barriers consist of a mixed berm and floodwall system to be constructed along a portion of the southeast bank of the Fort Point Channel. This portion of the shoreline functions as a flood pathway under present climate conditions and is the lowest elevation area along the channel. If left unprotected, this flood pathway could contribute to coastal flooding in even larger areas of South Boston as climate change increases storm severity and raises sea levels in the medium and longer term. Flap gates will also be permanently installed on 14 outfalls along this portion of the shoreline to prevent flood waters in the channel from bypassing the berm and floodwall system by backflowing through underground pipe networks and overflowing from catch basins and manholes. Interim flood barriers consist of deployable stop logs that will be installed at strategic locations to block minor overland flood pathways into the South Boston/Fort Point neighborhood. During normal conditions, stop logs will be in storage at 22 Drydock Ave. In advance of an impending flood, they will be deployed and temporarily installed. After floodwaters recede, they will be removed and put back in storage.

Permanent flood barriers are proposed to meet a sea level rise/storm surge design flood elevation (DFE) of 14.6 ft NAVD88. This DFE was selected based on the Boston Harbor Flood Risk Model (BH-FRM) projections for the 2070 100-year return period water level plus 1.3 ft of freeboard. The City of Boston has adopted the BH-FRM projections in its own *Climate Resilient Design Guidelines for Protection of Public Rights-of-Way* (2018) as well as in its Zoning Code through the Coastal Flood Resilience Zoning Overlay District (2021) and associated design guidelines (2020). The adoption of BH-FRM projections was informed by a scientific consensus report entitled *Climate Change and Sea Level Rise Projections for Boston: The Boston Research Advisory Group Report* (2016) prepared by University of Massachusetts Boston for the City of Boston and Boston Green Ribbon Commission.

BH-FRM preceded the development of the Massachusetts Coast Flood Risk Model (MC-FRM), which is the basis for RMAT Climate Resilient Design Standards. Both models are high resolution, probabilistic, and hydrodynamic flood risk models that incorporate sea level rise and storm intensification. The most pertinent difference between BH-FRM and MC-FRM projections is in the amount of sea level rise assumed, with the MC-FRM projections assuming higher sea level rise. The RMAT Climate Resilience Design Standards Tool identifies Sea Level Rise/Storm Surge as a High Risk for the proposed project and recommends that the project be designed to meet a sea level rise/storm surge DFE for an interim year of 2050 or target year of 2070 at the 50-year return period (Section G). Based on MC-FRM projections, this equates to a recommended interim year DFE of 13.8 ft NAVD88 and a recommended target year DFE of 15.4 ft NAVD88. The proposed DFE for permanent flood barriers of 14.6 ft NAVD88 is the average of the two RMAT-recommended DFEs. It is the City of Boston’s position that the BH-FRM-based projections and freeboard incorporated in the proposed DFE adequately account for future sea level rise/storm surge risks during the useful life of the proposed permanent flood barriers.

Based on the City's *Coastal Resilience Solutions for South Boston* adaptation plan, additional permanent flood barrier systems will be needed for other sections of South Boston's shoreline to provide passive coastal flood protection to the even larger areas that will face increasing sea level rise/storm surge risks over the medium and longer term. These will be implemented incrementally over time as sea level rise is observed, funding is secured, and implementation capacity is built. As additional permanent flood barrier systems are constructed, north of Summer Street on the Fort Point Channel, and tied-in with the proposed permanent flood barrier systems, interim flood barrier proposed in this project will become obsolete or redundant. The plan's implementation roadmap timeline recommends these sections, north of Summer Street, be constructed in the 2030 timeframe. With these plans and considerations in mind, the City has selected a lower sea level rise/storm surge DFE for interim flood barriers. Interim flood barriers are proposed to meet a sea level rise/storm surge DFE of 11.5 ft NAVD88, based on the 1,000-year return period water level in 2030 from BH-FRM projections. This water level is greater than the RMAT-recommended 50-year return period DFE based on the MC-FRM projections in 2030.

<u>Extreme Precipitation – Urban Flooding</u>

The proposed project incorporates several measures that will improve stormwater system performance during extreme precipitation events, compared to without the proposed project. The primary measure is the construction of a flood barrier system and installation of backflow prevention flap gates on 14 stormwater and combined sewer outfalls, which will prevent coastal flood waters from infiltrating stormwater and combined sewer systems and taking up capacity for storing and conveying rainfall stormwater during combined rainfall/storm surge events. In addition, the project will reduce impervious surface area by 1.3 acres by converting parking and other paved areas into green open space.

The RMAT Climate Resilience Design Standards Tool identifies Extreme Precipitation – Urban Flooding as a Moderate Risk for the project and recommends that the project be designed to extreme precipitation from a 25-year return period 24-hour rainstorm in the target year of 2070, considering total precipitation depth and peak intensity based on a Tier 2 methodology (Section G). Based on NOAA Atlas 14, the 25-year 24-hour rainstorm total precipitation depth at the project location is 6.25 inches. Using the 20% increase factor prescribed by the Tier 2 methodology, RMAT's recommended total precipitation depth design storm equals 7.5 inches, with the associated Type III peak intensity. Mitigating long-term stormwater flooding risks in the project area is beyond the scope of the proposed project's goals. Boston Water and Sewer Commission (BWSC) has an ongoing program of planning and implementation projects focused on minimizing such risks. However, the proposed project was modeled and analyzed to determine what effect it would have on stormwater system performance in the project area, considering extreme precipitation and future sea level rise/storm surge conditions.

BWSC carried out modeling analyses to evaluate the proposed project's potential impacts on urban flooding from extreme precipitation alone and in combination with sea level rise and a 100-year return period coastal flood (Section L). The rainstorm modeled was a present day 10-year 24-hour storm (SCS Type III) with 5.15 inches total precipitation depth and peak intensity of 3.3 inches/hour. BWSC generally uses the present 10-year return period design storm as the basis for design of stormwater collection and management systems. Designing to the 25-year 24-hour rainstorm is often unachievable within Boston's dense and highly developed urban contexts. The sea level rise and sea level rise/storm surge conditions used in the modeling analysis were taken from MC-FRM based on 2030 conditions. Each modeling scenario was run with the existing physical conditions present in the project area and separately with the proposed physical conditions associated with this project. Results were compared to identify differences caused by the project. In addition, it should be noted that the coincident impact of intense rainfall and significant

coastal storm surge, modeled in this analysis, may not be typical and represents a conservative assumption for the purpose of analyzing a "worst-case" scenario. In general, rain events with high peak intensity (such as the SCS distribution used for the design storm) are "airmass" events that occur in absence of organized lifting mechanisms. These airmass events (single cell thunderstorms) are not associated with storm surge. In Boston, rain events that are associated with storm surge (nor'easters and tropical events), have much lower peak rainfall intensities.

The modeling analyses shows that the proposed project does not interfere with stormwater discharge or create additional risk in terms of accumulation of stormwater. In fact, in the extreme precipitation with sea level rise/storm surge scenario, the proposed project reduces the burden on the interior drainage system by reducing intrusion of coastal floodwaters. It is expected that this latter benefit would also be realized during larger extreme precipitation events, such as the recommended RMAT design storm, that occur in combination with storm surge events.

Extreme Precipitation – Riverine Flooding
The RMAT Climate Resilience Design Standards Tool does not recommend any design standards for riverine flooding due to low/no exposure to riverine flooding at the project location. Overbank flood risk at the project site is driven by coastal flooding, not riverine, and the project is specifically designed to mitigate coastal flooding risks from sea level rise/storm surge.

Extreme Heat
The proposed project is located on an area of land that is almost entirely impervious surface, including large, paved parking lots. This exposes the site to substantial urban heat island effects. However, the proposed project is also located next to a large body of water (Fort Point Channel), which mitigates the urban heat island effect and the human health impacts of extreme heat by channeling wind and evaporative cooling. This is evidenced by lower daytime land surface temperatures measured in areas next to the channel compared with areas of the Fort Point neighborhood located further inland.

The proposed project will mitigate extreme heat in a portion of the project area, compared to without the proposed project. The primary extreme heat mitigation measure is the construction of vegetated berms, containing drought tolerant plantings, on land that is currently paved and impervious. The project will convert 1.3 acres of asphalt and concrete surfaces to green open space. Land surface temperatures, ambient air temperatures, and heat indexes are measurably cooler over green open spaces than over dark paved surfaces. These new green open spaces will abut the existing Harborwalk and South Bay Harbor Trail, a public multi-use path, located along the Fort Point Channel, thereby providing the human health and comfort benefits of cooling to users. Significant additional climate-resilient open space is planned in the vicinity of the project area as part of future redevelopment, and the proposed project would connect to these spaces and further opportunities for cooling.

The RMAT Climate Resilience Design Standards Tool identifies Extreme Heat as a High Risk for the project and recommends designing the project to account for 2070 50th percentile projections, based on a Tier 2 methodology, for average annual/seasonal temperatures; heat index; days per year above 95F, above 90F, and below 32F; number of heat waves per year; and average heat wave duration days. As noted above, under all of the recommended conditions, the proposed project is expected to perform better in terms of cooling than the existing conditions.

C. Is the project contributing to regional adaptation strategies? _X_ Yes __ No; If yes, describe.

The entire project and the area directly benefitting from the project are in the City of Boston (i.e., not multi-jurisdictional). However, the Fort Point and broader South Boston neighborhood is an important regional jobs center and contains important transportation and other infrastructure of regional importance. By adapting the area to future coastal flood risks from sea level rise/storm surge, the project will enhance regional resilience. The project is also an important initial component of a larger system of shoreline adaptation measures envisioned by the *Coastal Resilience Solutions for South Boston* plan that would provide more comprehensive protection to vulnerable areas of South Boston, and other neighborhoods south and west of the Fort Point Channel. Over time, implementation and integration of other projects will provide even greater regional benefits in terms of economic and infrastructure resilience to climate risks.

II. Has the Proponent considered alternative locations for the project in light of climate change risks? _X_ Yes ___ No

A. If no, explain why.

B. If yes, describe alternatives considered.

As described in the Alternatives Analysis section of this filing, an alternative location was considered when determining the preferred strategy to protect this vulnerable area of the Fort Point/South Boston neighborhood from coastal flooding risks. Both the dismissed and selected alternative needed to be in close proximity to the area the City prioritized for coastal flood risk mitigation, due to the nature of coastal flooding dynamics. The alternative location considered was to construct and operate a large flood gate across the mouth of the Fort Point Channel. This Flood Gate Alternative was determined to be less advantageous than the selected proposed alternative, due its greater impacts on wetland resource areas and waterways, lower feasibility, higher cost, and lower cost-effectiveness.

III. Is the project located in Land Subject to Coastal Storm Flowage (LSCSF) or Bordering Land Subject to Flooding (BLSF) as defined in the Wetlands Protection Act? __X_Yes ____No

If yes, describe how/whether proposed changes to the site's topography (including the addition of fill) will result in changes to floodwater flow paths and/or velocities that could impact adjacent properties or the functioning of the floodplain. General guidance on providing this analysis can be found in the CZM/MassDEP Coastal Wetlands Manual, available here.

The proposed project will construct permanent flood barriers, including the addition of fill, and interim flood barriers within LSCSF to create a continuous line of coastal flood protection set at consistent top elevations. The project will block a flow pathway across the lowest elevation portion of the east bank of the Fort Point Channel, tying into higher existing grades and structures at both the north and south ends of the project site. No low elevation gaps will remain between Summer St and Dorchester Ave to concentrate velocities.

While the project will block certain flow paths into a large area of the Fort Point/South Boston neighborhood, it is not expected to change the flood extent, depth, or velocity of coastal flooding on adjacent properties that remain unprotected by the project. The volume of water that will be prevented from flooding the Fort Point/South Boston neighborhood area of flood protection is small relative to the volume in the Fort Point Channel and surrounding water bodies. As such, the increase in water surface elevation from the mitigation of the flooding in this area would have

insignificant impact on the water levels in Fort Point Channel and, therefore, no impact on neighboring areas on the west side of the channel. The west bank and waterfront of the Fort Point Channel, opposite the proposed project site, is also higher in elevation. The next nearest flow pathways on the east side of the channel, north (between 250 Summer St and 303-305 Congress St buildings) and south (MBTA Cabot Yard) of the project limits, are separated from potential localized effects of the proposed project by large existing structures that control the volume and velocity of flooding through the respective flow paths. These controlling structures include the Summer St bridge, 250 Summer St building, and 303-305 Congress St building, north of the project limits, and the Dorchester Ave bridge (Rolling Bridge Park) and railway bridge at the constriction of the Fort Point Channel and its confluence with the Bass River, south of the project limits. These flow paths are independent of influence from the flow path mitigated by the proposed project, except that the proposed interim flood barriers proposed at A Street and West Service Rd Ext may marginally reduce the volume and extent of flooding in the area impacted by the northern flow path under certain storm scenarios.

The proposed project is located within a highly developed, highly impervious, dense urban area, where floodplain functions are extremely limited. The proposed project will provide significantly greater storm damage prevention and flood control functions for the benefit of both the built environment and wetland resource areas than the existing floodplain would without the proposed project.

CERTIFICATIONS:

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

   (Name) Boston Herald (Date) December 30, 2021

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

Signatures:

12-20-2021 Brian P. Golden	12-17-2021 Nasser Brahim
Date Signature of Responsible Officer or Proponent	Date Signature of person preparing ENF (if different)
Brian Golden	Nasser Brahim
Name (print or type)	Name (print or type)
Boston Planning & Development Agency	Woods Hole Group, Inc.
Firm/Agency	Firm/Agency
One City Hall Square, 9th Floor	107 Waterhouse Road
Street	Street
Boston, MA 02201	Bourne, MA 02532
Municipality/State/Zip	Municipality/State/Zip
617-918-4326	508-495-6237
Phone	Phone

Section B

Project Narrative

B. PROJECT NARRATIVE

1.0 Introduction

The proposed project is the construction of approximately 2,090 linear feet of mixed berm and floodwall mitigation features along of a portion of the Fort Point Channel's southeast shoreline, between approximately 15 Necco Street and Dorchester Avenue. The purpose of the project is to reduce flood damage and provide protection to nearby populations, infrastructure, utilities, and structures in the 100 Acres Master Planning Area, which is bounded by the Fort Point Channel to the west, Summer Street to the north, the South Boston Bypass Road/Haul Road to the east, and West Second Street to the south, and portions of South Boston. The Fort Point Channel is a flood pathway into Boston and the project site is at the lowest elevation along the channel. The project is needed because of repetitive flooding from storm surge and associated damage, which is expected to increase in frequency and severity as a result of climate change and future sea level rise. The project will directly benefit 31 existing buildings, approximately 814 current residents, and numerous jobs and businesses exposed to present and future flood risk, with many additional people benefitting from the improved and more resilient waterfront and more reliable transportation network.

2.0 Project Components

Flood protection measures will be constructed in three segments that vary in the proposed type of measure to be built as described below and shown in Figure B-1. The work will occur over the course of approximately two years.

Figure B-1. Locus map showing segments and interim flood protection measures.

2.1 Segment 1

Segment 1 will extend from approximately 15 Necco Street to the southern end of the Gillette pump house and will be approximately 729 feet long. Flood protection in Segment 1 will be an earthen berm with a 5-foot crown width and side slopes with a ratio of 4:1 (four horizontal units to one vertical unit). The earthen berm will be located landward of the existing Harborwalk and will be elevated to approximately 14.6 feet North American Vertical Datum of 1988 (NAVD88). The designed elevation height of 14.6 feet NAVD88 is based on the 100-year flood event in 2070 accounting for sea level rise and more intense storms based on the Boston Harbor Flood Risk Model and 1.3 feet of freeboard. A knee wall on the seaward side of the berm feature will be incorporated to minimize the lateral width required for the berm to 45 feet. The knee wall will be raised 2.5 feet relative to the existing Harborwalk, to an elevation of approximately 10.5 feet NAVD88. The northern end of the berm will tie into site grade on the Alexandria/National Development property, which has already been raised by the owner to 11.5 feet NAVD88. At the south end, the berm will end at the access driveway to the Gillette pump house, where a 15-foot-wide passive deployable flood gate will be installed to cross the driveway. The berm will be vegetated, contain salt and drought tolerant plantings, ensure the continuity of Harborwalk, and connect to other green spaces throughout the neighborhood, providing both flood protection and co-benefits for residents. A temporary 30 ft wide zone along the landward side of Segment 1 would be used for construction access. All areas of the site outside the footprint of the earthen berm would be restored to pre-existing conditions upon completion of the project.

2.2 Segment 2

Segment 2 will extend from the Gillette pump house to where Fort Point Channel turns west and will be approximately 816 feet long. Segment 2 will consist of a double retaining wall of granite blocks that will match and be built on top of the blocks of the existing seawall. The seaward side of the retaining wall will raise the existing seawall's crest elevation approximately 6 vertical feet to reach 14.6 feet NAVD88. The landward side will make use of the granite blocks as a retaining wall feature, with impermeable clay fill in between the seaward and landward walls. This segment will be 18 feet wide, with a 12-foot-wide, shared-use path for the Harborwalk on top of the clay fill. The blocks will rest on a concrete footing. All blocks will be dowelled together with rebar rods. A temporary 32 ft wide zone along the landward side of Segment 2 would be used for construction access. All areas of the site outside the footprint of the double retaining wall would be restored to pre-existing conditions upon completion of the project.

2.3 Segment 3

Segment 3 will extend from the western turn in the Fort Point Channel to Dorchester Avenue and will be approximately 546 feet long. Segment 3 will have a similar earthen berm as described for the Segment 1 flood protection that will run parallel to and landward of the existing Harborwalk. The western end of the berm will tie into existing grades along Dorchester Avenue. A temporary 30 ft wide zone along the landward side of Segment 3 would be used for construction access. All areas of the site outside the footprint of the earthen berm would be restored to pre-existing conditions upon completion of the project.

2.4 Interim Flood Measures

In addition to the three flood control segments, the proposed project includes three deployable flood walls as interim measures and backflow mitigation improvements at outfalls. The deployable flood walls will be located at A Street, West Service Road, and Necco Court (Figure B-1). The interim measures will ensure the proposed project will have independent utility from the other proposed flood control measures in the area by protecting both the primary flood pathway along the Fort Point Channel (mixed berm and floodwall feature) and minor flood pathways (interim measures) into the 100 Acre Master Plan area (Figure B-2). These interim flood walls will be removed once other projects in the Climate Ready Boston plan are implemented. The interim flood walls are part of the proposed project and will ensure it functions as designed independently of the completion of other projects in the plan. The deployable flood walls would be within the City's rights-of-way and connect to permanent anchor points. Implementation of the interim measures would require minimal ground disturbance. The flood walls would be transported to the areas in anticipation of a flood event and stored at City property at 22 Drydock Avenue when not in use.

It should be noted that the proposed project will have no permanent intrusions into Fort Point Channel. Work on the outfalls would be accessed from land during low tides and the work area would be isolated with turbidity curtains. Thus, some in-water work from the implementation of turbidity curtains would be needed to repair existing drainage outfalls, but there will be no fill or new construction in the channel.

Figure B-2. 100 Acre Master Planning Area and flood protection segments.

3.0 Purpose and Need

The purpose of the proposed project is to reduce flood hazards within the 100 Acre Master Plan area (Figure B-2). The project is needed because of repetitive flooding from storm surge and associated damage, which is expected to increase in frequency and severity as a result of climate change and future sea level rise (EPA 2021). A flood pathways analysis for the project area is presented in Figure B-3.

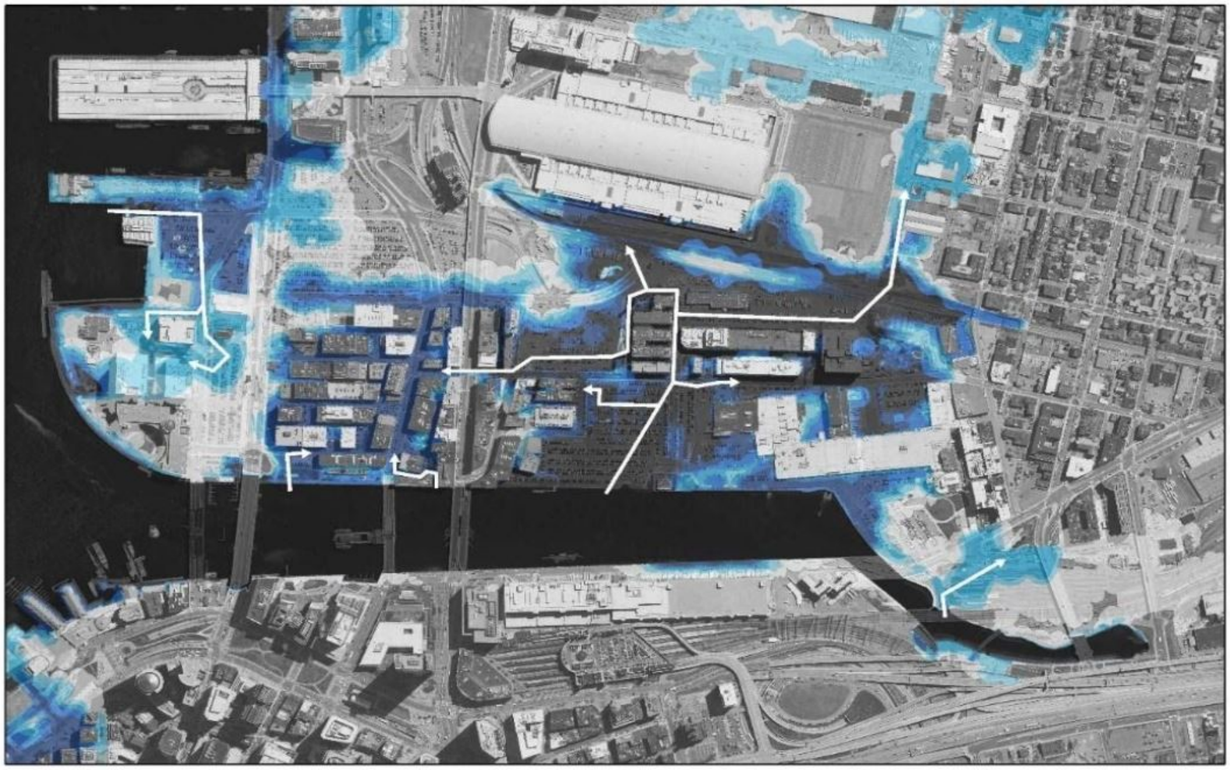

Figure B-3. Detailed time-series flood pathway analysis for Fort Point Channel, 0.1 percent annual chance event with 9 inches of sea level rise.

The project will directly benefit 31 existing buildings, approximately 814 current residents, and numerous jobs and businesses exposed to present and future flood risk, with many additional people benefitting from the improved and more resilient waterfront and more reliable transportation network. This Environmental Notification Form (ENF) is the first application filed for the project which will initiate environmental review. All other applications will be submitted once the Massachusetts Environmental Policy Act (MEPA) review process is complete. Obtaining environmental approvals is a critical path for the project to move from concept to reality, including the commitment of $10 million of federal grant funding and an equal or greater investment of City funds.

A total of three alternatives were evaluated as summarized below. A detailed description of the alternatives considered is provided in Section D.

Alternative 1: No Action
Alternative 2: Flood Control Segments and Interim Flood Walls (Proposed Action)

Alternative 3: Flood Gate Alternative (Dismissed)

Environmental impacts associated with each alternative were evaluated and are discussed in Section D. Findings from the evaluation of environmental impacts were used to select a preferred alternative that achieves the goals for the project site and minimizes adverse impacts. Table B-1 provides a summary of the preferred alternative selected with associated resource area impacts.

Table B-1. Resource area impacts associated with the preferred alternative.

Coastal Wetlands	Area (sf) or Length (ft)	Temporary or Permanent Impact
Land Under the Ocean	0	N/A
Designated Port Areas	0	NA
Coastal Beaches	0	NA
Coastal Dunes	0	NA
Barrier Beaches	0	NA
Coastal Banks	760 lf	Permanent
Rocky Intertidal Shores	0	NA
Salt Marshes	0	NA
Land Under Salt Ponds	0	NA
Land Containing Shellfish	0	NA
Land Subject to Coastal Storm Flowage	68,887 60,273	Permanent Temporary

4.0 References

Environmental Protection Agency (EPA). 2021. "Climate Change Indicators: Weather and Climate." Accessed May 24, 2021, https://www.epa.gov/climate-indicators/weather-climate.

Section C

Existing Environment

C. EXISTING ENVIRONMENT

1.0 Location and Physical Description

The proposed project is in Boston, Suffolk County, Massachusetts, in the urban South Boston Fort Point neighborhood (Figure C-1). The largest portion of the project area is along the southeast edge of Fort Point Channel, where proposed berm and floodwall mitigation features will be located, at the lowest elevation along the channel. The northern end of this portion of the project area is immediately south of 15 Necco Street and extends approximately 2,090 feet south along the Fort Point Channel to Dorchester Avenue (Figure C-2). There are also three smaller portions of the project area where interim flood protection measures are proposed, including at the eastern end of Necco Court, at A Street under the Summer Street overpass, and at West Service Road under the Summer Street overpass (Figure C-2)

Figure C-1. Project vicinity area.

Figure C-2. Locus map showing segments and interim flood protection measures.

1.1 Topography and Soils

The project area is located in the Boston Basin ecoregion, which is characterized by low rolling topography and includes the hilly urbanized Boston area and outlying lowlands on metamorphic and volcanic rock types (EPA 2009). Topography in the project area is generally flat with a slope ranging between 0 and 3 percent (USDA 2021).

Much of the Boston shoreline, including the project area, is composed of artificial fill material from land reclamation practices dating back to the 1600s (Mason 2017). According to geotechnical borings performed by the City, the project area is composed of soft clay and mud fill to approximately 25-30 feet below the surface and below that is composed of alternating layers of hard and soft compressible clays, mixed with sporadic sand and shell lenses to approximately 70 feet below existing grade (City of Boston 2020).

1.2 Water Quality

The *Massachusetts Year 2016 Integrated List of Waters* issued by MassDEP contains a list of waters requiring a TMDL, which is also known as the 303(d) list or Category 5 waters. The Boston Inner Harbor, including Fort Point channel, is included on the 303(d) list, as it is an impaired water requiring a TMDL. Categories of impairment for this area include lack of dissolved oxygen, enterococcus, fecal coliform, polychlorinated biphenyls in fish tissue, and contaminants in fish and/or shellfish from unknown causes (MassDEP 2019).

1.3 Coastal Zone and Processes

The project area is entirely within the Massachusetts Coastal Zone, specifically the Boston Harbor coastal zone region (MA CZM 2021). The project area encompasses a portion of the existing Fort Point Channel coastline, which is presently protected by a concrete block seawall and riprap at the northern edge and includes 14 drainage outfalls. Based on site visits to the project area in spring 2021 and a review of aerial imagery, there are no natural beaches in the project area or vicinity. The project area contains a portion of the Boston Harborwalk and South Bay Harbor Trail, which run parallel to the coastline and includes piers overlooking and providing access to the water. The project area vicinity is primarily developed infrastructure, such as buildings and parking lots with minimal areas of landscape vegetation.

The project area is also in a coastal area that is subject to future sea level rise that could increase flooding. The project area has the lowest elevations along Fort Point Channel, and water from the channel frequently overtops the existing shoreline during unusually high tides and coastal storm events (Section L). In the future, considering sea level rise, it is likely that flood waters entering through this area would extend further inland toward neighborhoods that could include other South Boston neighborhoods and the Boston Convention and Exhibition Center. By the mid to late century, the 100 Acre Master Plan area is expected to flood at least monthly (Section L).

In the past, Boston has been impacted by coastal storms, such as Hurricane Sandy in 2012 and Winter Storms Riley and Grayson in 2018 that flooded the project area (Garfield 2018; Gray 2018).

1.4 Vegetation

The project area is primarily composed of hard infrastructure with limited areas of managed vegetation that includes Binford Street Park and sections parallel to the Harborwalk with grasses, ground cover, and some street trees. The greater 100 Acre Master Plan area contains some landscape vegetation, primarily grasses and street trees, in parks that include A Street and Wormwood Parks, and along the edges of buildings and parking lots.

1.5 Wildlife

The project area and 100 Acre Master Plan area are primarily characterized by built urban infrastructure with minimal wildlife habitat. The habitat in the project area is limited to landscape vegetation, including street trees, along the Harborwalk and in Binford Street Park. Habitat in the 100 Acre Master Plan area is also limited to landscape vegetation, primarily street trees, in parks and around buildings and parking lots. Species that occupy the area, such as squirrels, geese, and gulls, are adapted to urban levels of noise, activity, and habitat contamination.

1.6 Invasive Species

The Massachusetts Prohibited Plant List contains 143 invasive species and was developed by the Massachusetts Department of Agricultural Resources in conjunction with the Massachusetts Invasive Plants Advisory Group (Advisory Group). According to the Advisory Group, there are 35 species within Massachusetts that are designated as invasive, i.e., non-native species that have spread into native or minimally managed plant systems in Massachusetts (Massachusetts Invasive Plants Advisory Group 2017). It is not expected that many invasive plant species are present in the project area because vegetation in the project area is primarily managed landscape species.

Emerald ash borer inhabits ash trees, which may be present in the project area. Emerald ash borer infestations have been documented in the state of Massachusetts (USDA 2021). European gypsy moths are present in the state of Massachusetts and the city of Boston is within the federal EGM quarantine zone (USDA 2021). European gypsy moth caterpillars feed on over 300 tree and shrub species and prefer deciduous trees, particularly oak trees, which may be present in the project area (USDA 2021). Thus, both the European gypsy moth and emerald ash borer have the potential to occur in the project area. Invasive marine species, such as the colonial tunicates (*Botrylloides violaceus, Botryllus schlosseri, Didemnum vexillum, and Diplosoma listerianum*), may also occur in the channel or the Boston Harbor (MA CZM 2021).

2.0 Wetland Resource Areas, Habitat, and Waterways

The proposed project area consists of two wetland resource areas protected by the Massachusetts Wetlands Protection Regulations (310 CMR 10.00), including coastal bank and land subject to coastal storm flowage. Each of these resource areas is described in detail below. Estimated habitats of rare wildlife, essential fish habitat, species protected under the Endangered Species Act, and Chapter 91 Waterways jurisdiction are also discussed below.

2.1 Coastal Bank (310 CMR 10.30)

The coastal bank present at the site is primarily comprised of the wall of Fort Point Channel, running from the parking lot at the southern end of the channel to the Summer Street Bridge to the north (Figure C-3). Along approximately the middle of the coastal bank, around the SP+ parking lot, the location of the top of the bank shifts slightly landward. At this location, there is not a steep channel wall, but rather a gentler slopping cobble and riprap shoreline (Figure C-4). Cobble and riprap are bordered by grass and then a concrete sidewalk in the landward direction. An existing outfall and concrete headwall structure is within this portion of the bank. The entire length of the bank within the project area is approximately 2,380 feet. This resource area provides a buffer between the channel and inland areas from storm damage and flooding. The bank does not serve as a sediment source to any nearby coastal beach or dune systems.

The top of the coastal bank within the project area was delineated using the most recent aerial imagery from MassGIS (2019) to identify the location of the channel wall. In locations where the wall is not present, such as around the SP+ parking lot, LiDAR data from 2018 was utilized to determine the ground slopes. The top of coastal bank was delineated as areas where the slope leveled off and was less steep than a 10H:1V ratio.

Figure C-3. Top of coastal bank present within project area. Imagery was captured in 2019 and is from MassGIS.

Figure C-4. Coastal bank present at the project site, comprised of both sections of the channel wall and of a gentler, cobble and riprap slope (Coastal Resilience Solutions for South Boston 2018).

2.2 Land Subject to Coastal Storm Flowage (310 CMR 10.00)

The project area is located within a special flood hazard area (Zone AE 10) subject to inundation by the one percent annual chance flood, as shown on the FEMA Flood Insurance Rate Map panel 25025C0081J dated March 16, 2016 (Figure C-5).

The project area is within the Boston Harbor watershed and the Boston Harbor Coastal Drainage Area (MassDEP 2014). Water drains from the project area into the Fort Point Channel. There are 14 stormwater and combined sewer outfalls into the Fort Point Channel that carry stormwater runoff from the larger neighborhood under the project area into the Fort Point Channel immediately adjacent to the project area. Stormwater that runs off impervious surfaces adjacent to the channel, such as parking lots and buildings, is also conveyed to the channel either through surface runoff or drainage systems.

Figure C-5. Flood Insurance Rate Map for the project area.

2.3 Waterfront Area (City of Boston Wetlands Ordinance)

The project area is located within the City of Boston Waterfront Area, which is the portion of the buffer zone that extends twenty-five (25) feet horizontally from the edge of the coastal bank.

2.4 Estimated Habitats of Rare Wildlife (310 CMR 10.37)

The City of Boston sent a letter to the Natural Heritage and Endangered Species Program (NHESP) on January 2, 2019, requesting a regulatory review to identify threatened or endangered species or their critical habitat in the project area in addition to any potential effects on the Fort Point Channel. NHESP's response indicated that no Estimated or Priority Habitat of Rare Species, including rare plant species, are present in the project area. According to NHESP's online mapping tool, there are no natural communities or areas of biodiversity conservation interest in the project area (MassDEP 2017).

The project area is within the Atlantic Flyway and there is the potential for migratory bird species to occur in the project area because of the presence of vegetation, such as street trees. The USFWS Information for Planning and Consultation tool indicates that many migratory birds have the potential to occur in or near the project area including a number of urban-adapted species (USFWS 2021). Nesting habitat for migratory birds is limited to landscape vegetation and possibly some infrastructure in the project area, such as building ledges and roofs.

2.5 Essential Fish Habitat

Fort Point Channel is water quality impaired (see Section 1.2) and does not provide a high-quality aquatic habitat for fish or shellfish. In addition, there is no riparian or aquatic vegetation to provide shade or cover along the channel edges. Because of the channel's historical function as a wharf and shipping access, the channel sides are relatively steep and uniform and do not provide shallow water habitats or variations in depth and cover that provide diverse conditions for aquatic life. However, fish species such as winter flounder (*Pseudopleuronectes americanus*) and bluefish (*Pomatomus saltatrix*) occur in Boston Harbor and may use the Fort Point Channel (NMFS 2020). Fish species that do occur in the channel are expected to be adapted to poor water quality conditions or would only spend very short amounts of time in the channel.

According to the NMFS EFH online mapping tool, the Fort Point Channel potentially contains EFH for 25 fish species including, but not limited to, winter flounder, Atlantic wolffish (*Anarhichas lupus*), Atlantic cod (*Gadus morhua*), and yellowtail flounder (*Limanda ferruginea*). No Habitat Areas of Particular Concern (i.e., high-priority areas for EFH conservation) or special aquatic sites (e.g., submerged aquatic vegetation, saltmarsh, coral reefs) are in the project area (NMFS 2020).

2.6 Species Protected Under the Endangered Species Act

According to the USFWS Information for Planning and Consultation tool, no proposed, threatened, or endangered species under the jurisdiction of USFWS occur in the action area, including the project area and 100 Acre Master Plan area (USFWS 2021).

According to the National Oceanic and Atmospheric Administration (NOAA) Fisheries Greater Atlantic Region Section 7 Mapper, accessed September 7, 2021, there are two ESA-listed species of fish and four species of sea turtles that occur, or have the potential to occur, in the Fort Point Channel: Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), shortnose sturgeon (*Acipenser brevirostrum*), loggerhead turtle (*Caretta caretta*), leatherback turtle (*Dermochelys coriacea*), green turtle (*Chelonia mydas*), and Kemp's ridley turtle (*Lepidochelys kempii*). The presence of listed species in the project area is very unlikely because the Fort Point Channel is enclosed and highly developed (R. Mesa, NOAA, personal communication, September 8, 2021).

2.7 Chapter 91 Public Tidelands

According to the Public Waterfront Act (Chapter 91) Historic High Waterline (Figure C-6) the proposed project site is entirely within Commonwealth filled tidelands. A Chapter 91 license will be required. Two proposed interim measures are in landlocked tidelands.

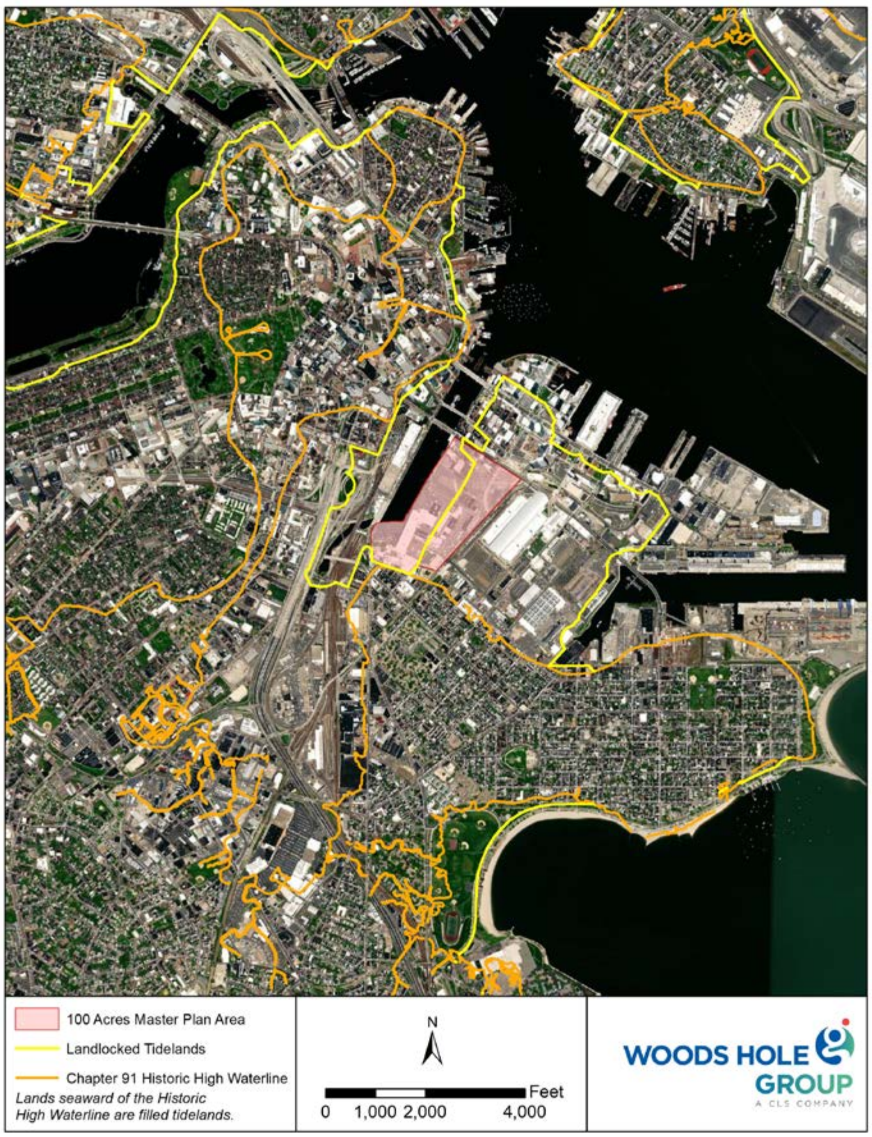

Figure C-6. Public Waterfront Act (Chapter 91) Historic High Waterline for the Fort Point Channel Project area.

The location of the Historic Low Waterline is being investigated for the project area, and therefore is not shown in Figure C-6.

3.0 Cultural Resources

Cultural resources are defined as prehistoric and historic sites, structures, districts, buildings, objects, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. As part of the permitting process the City of Boston Resilient Fort Point Channel project, will undergo Section 106 of the National Historic Preservation Act of 1966 (NHPA) consultation, including the Massachusetts Historical Commission (MHC). Section 106 of the NHPA, as amended and implemented by 36 CFR Part 800, outlines the required process for federal agencies to consider a project's effects to historic properties. According to 950 CMR 71.4(2), completed project review under the NHPA "shall ordinarily fulfill the requirements of compliance with M.G.L. c. 9, 26 through 27C, unless otherwise determined by the MHC." The NHPA defines a historic property as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register."

The project area is located within three (3) districts listed on the State Register of Historic Places, as described below.

3.1 Standing Historical Structures and Districts

The project area is located within the boundaries of the Fort Point Channel Historic District, a historic district listed on the NRHP and on the State Register of Historic Places (BOS.WZ). The Fort Point Channel Historic District comprises roughly 55-acres in South Boston located across Fort Point Channel from downtown Boston (Figure C-7). It contains 103 buildings and 11 structures, specifically four (4) bridges, a prominent chimney, two (2) sections of seawall (channel walls) along both sides of Fort Point Channel, a circa 1920s Boston Wharf Company roof sign, and a monumental milk bottle built to advertise a milk company. Eighty-nine (89) buildings and nine (9) structures are considered contributing to the historic district. Three (3) of the channel's historic bridges, Summer Street (1898-1899), Northern Avenue (1908), and Congress Street (1930) are rare examples of their types. The Fort Point Channel granite channel walls are contributing elements within the historic district.

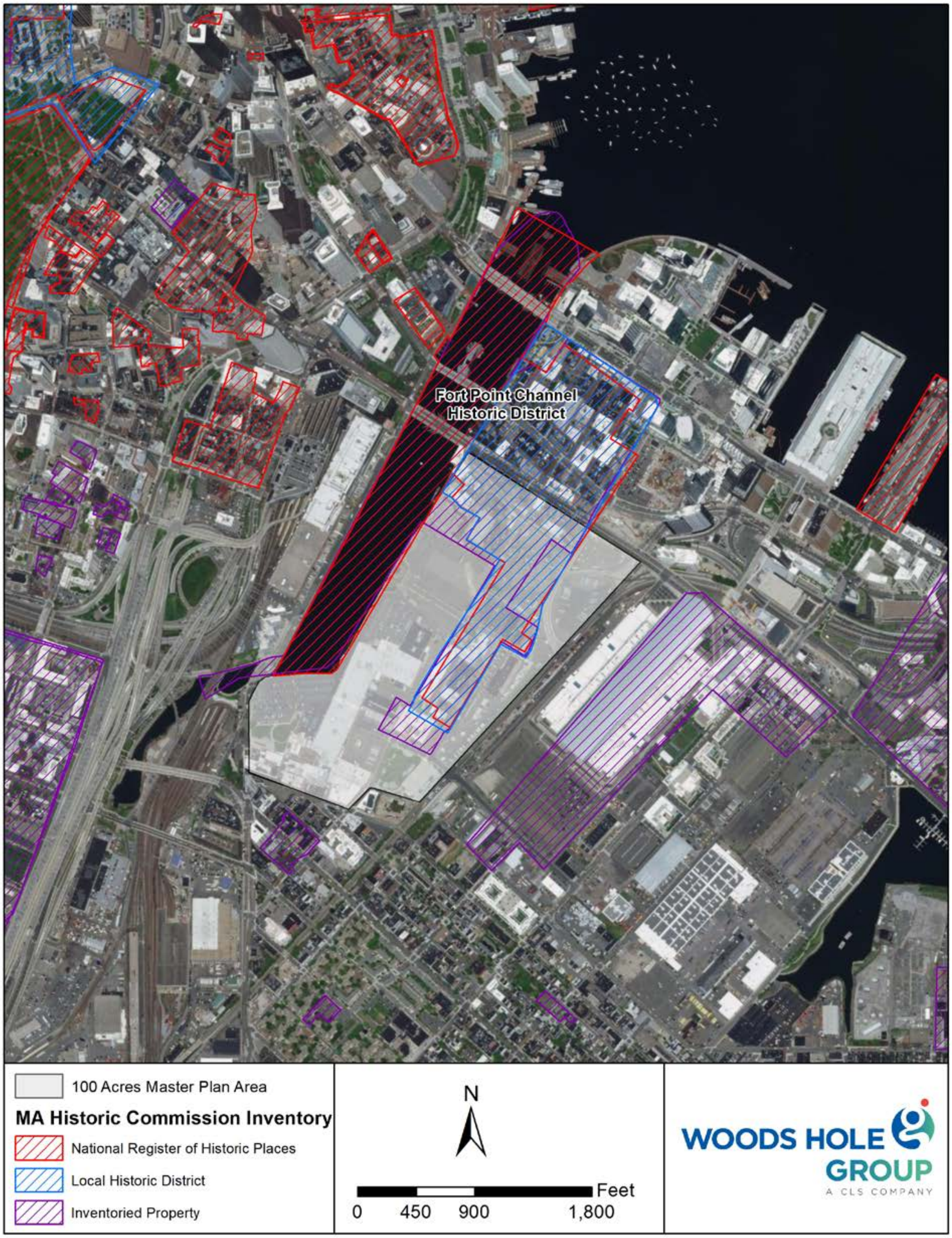

Figure C-7. Historic Districts within the project vicinity, including Fort Point Channel Historic District.

The Fort Point Channel District is a district listed on the State Register of Historic Places (BOS.CX). The boundary of this district overlaps almost entirely with the Fort Point Channel Historic District.

The Fort Point Channel Landmark District, a local historic landmark district listed on the State Register of Historic Places (BOS.ZG), is also located within the project area. The boundary of this district is within a portion of the Fort Point Channel Historic District and Fort Point Channel District. The project is also located directly adjacent to the historic Gillette World Shaving Headquarters Complex and its associated sign, which has been evaluated for eligibility as a listing in the NRHP. To the west on the Downtown Boston side, the U.S. Post Office General Mail Facility is within the viewshed of the project area.

3.1.1 Boston Wharf Company Warehouse

The Boston Wharf Company Warehouse, located at 11-17 Melcher Street, is a circa 1902 warehouse listed on the State Register of Historic Places (BOS.15350). The Historic Name for the warehouse is the New England Confectionary Company. The warehouse is situated along the east side of Fort Point Channel.

3.1.2 Boston Wharf Company Warehouse

The Boston Wharf Company Warehouse, located at 6 Necco Ct and 60 Necco Ct, is a circa 1907 warehouse listed on the State Register of Historic Places (BOS.15354). The Historic Name for the warehouse is the New England Confectionary Company. Substantial renovations of the 5 and 6 Necco Ct project to accommodate to General Electric headquarters was completed in 2019. The warehouse is situated along the east side of Fort Point Channel.

3.1.3 Boston Wharf Company Building

The Boston Wharf Company Building, located at 1 Necco Ct, 6 Necco Ct and 60 Necco Court, is a circa 1907 building listed on the State Register of Historic Places (BOS.5550). The Historic Name for the building is the New England Confectionary Company. Substantial renovations of the 5 and 6 Necco Ct project to accommodate to General Electric headquarters was completed in 2019. The building is situated along the east side of Fort Point Channel.

3.1.4 U.S. Post Office-General Mail Facility

The U.S. Post Office-General Mail Facility, located at 25 Dorchester Avenue, is a circa 1935 building which was subsequently renovated and added on to in the 1960s and further renovated in the 1980s. The building is situated along the west side of Fort Point Channel. While the building is currently encased in a steel frame with an aluminum panel skin, the original structure had a brick frame in a Neo-Classical style. Following extensive renovations over the years as described, the U.S. Post Office-General Mail Facility has lost its integrity of design, materials, workmanship, and feeling. The original structure from 1935 is no longer visible. Therefore, the U.S Post Officer-General Mail Facilities lacks the necessary integrity to be eligible for listing in the NRHP.

3.1.5 Gillette Manufacturing Complex

The South Boston campus of Gillette is the location where this internationally renowned company began operations. The Gillette Company and brand originated in 1895 when salesman and inventor King Camp Gillette invented a safety razor that used disposable blades. The American Safety Razor Company was founded on September 28, 1901 in Boston by Gillette and other members of the project, and the company was renamed the Gillette Safety Razor Company in 1904. As the BWCo began to sell off portions of its land in the Fort Point Channel area, Gillette and other industries expanded. Based on historic maps, Gillette gradually grew its plant footprint during the 1910s and 1920s in part by taking over portions of the former American Sugar Refinery Company, which held a large foothold on land along the southern portion of Fort Point Channel between West First and West Second streets. Some buildings were repurposed while others were torn down and new ones constructed in their place. In the 1920s, part of West First Street was reconstructed and named Gillette Park as Gillette began to occupy more of the buildings in the area.

During the time of urban renewal in the 1950s and 1960s, many companies were leaving cities. Gillette, however, showed a confidence in the future of Boston by investing extensively in its South Boston campus along Fort Point Channel. A Boston Globe article from August of 1960 announced plans for construction of a new $6 million Gillette plant. The Gillette Headquarters building (blade manufacturing building) facing Fort Point Channel was designed with a distinctive saw-tooth window configuration that represents the edge of a razor. The company sign bearing the words “Gillette World Shaving Headquarters” sits atop this edge of the building. The buildings included a new manufacturing plant, shipping and receiving building, and office facilities.

FEMA determined that the Gillette Manufacturing Complex is eligible for listing in the NRHP for its association with significant events and persons that have contributed to history, mainly the invention of the safety razor by King Camp Gillette which changed the world of shaving. The Gillette Manufacturing Complex is significant at both the local, state, and national levels for its associations with the history of manufacturing and industrial development in Boston (local significance), which affected the economy of both Massachusetts and New England as a whole (state significance). Gillette is an internationally recognized name that revolutionized the manufacturing of razors through the invention of the safety razor (national significance) and continues to maintain a presence and reputation around the world as a leader in the shaving industry.

The Gillette Manufacturing Complex has been a significant contributor to the economic growth and vitality of Boston throughout its more than 100 years of history in Fort Point Channel. As previously noted, during the time of urban renewal in the 1950s and 1960s when many companies were leaving cities, such as Boston, Gillette invested extensively in its South Boston campus and helped to bolster the local economy by staying in Fort Point Channel.

The Gillette Headquarters building is unique in its design with its razors edge facing Fort Point Channel that was designed to mimic the company’s product. Although the buildings within the Gillette complex have been greatly altered over the lifespan of the complex (demolitions, new construction, reuse of buildings), these changes have been made to allow the company to adapt to new manufacturing needs. The complex retains sufficient integrity of location, feeling, and association.

3.1.6 Gillette Sign

The large sign with illuminated letters reading "Gillette World Shaving Headquarters" sits atop the Gillette Complex facing Fort Point Channel. It is visible not only to pedestrians in the city, but also those traveling along Interstate-93 through the city and to those who take trains to and from South Station. The sign has been a Boston landmark for decades and has been associated with the history of Gillette in the Boston area since it was constructed in the 1960s when the Gillette plant was expanded.

The sign was constructed by the Donnelly Electric Manufacturing Company of Boston. The company was founded in 1850 was one of the first manufactures of neon advertising signs in New England. The use of large-scale illuminated displays intended to be seen over long distances were an innovation of the automobile era and the company designed and produced an array of signs in the Boston area, many of which have since been dismantled. Surviving signs in the area include the Gillette World Shaving Headquarters sign, the NRHP-listed Shell Oil Company sign in Cambridge, and the Stop & Shop sign on the building adjacent to the Shell sign site.

The Gillette sign was restored in 2010 as part of Gillette's multimillion-dollar renovation project for the aging plant. At the time of the restoration, the sign stretched 400 feet long, stood 16 feet tall, and contained 5,000 feet of neon tubing. When the sign was restored, the neon tubing was replaced within over 14,000 light emitting diode (LED) modules, which are still utilized presently. Although the inner workings of the original neon have been removed, and is no longer linked to the neon sign era, the sign still has the illuminated appearance as originally constructed. FEMA has determined that the sign is eligible as a contributing element within the eligible Gillette Complex as it adds to the overall significance of the complex.

3.2 Archaeological Resources

According to MACRIS, and other archaeological surveys (e.g., conducted for the construction of the Central Artery/Third Harbor Tunnel Project) there are no previously identified precontact or historic archaeological sites within the project area. Historic maps and atlases show that the Fort Point Channel area was previously disturbed by the following: demolition of a large manufacturing building along the channel during the Urban Renewal period of the 1950s and 1960s; construction of the central artery tunnel under a portion of the channel and the adjacent parcel where the Gillette pump house is located; construction of portions of the Gillette complex in the 1960s; and construction of the adjacent parking lots to service both Gillette and the surrounding properties.

3.3 Consultation

After consultation with the Massachusetts State Historic Preservation Office (SHPO), the Massachusetts Board of Underwater Archaeology (BUAR), and the Tribal Historic Preservation Officer (THPO), FEMA determined that the proposed action would have "No Adverse Effect" on historic properties. April 9, 2021, the SHPO's office concurred that the project would have no adverse effect on the historic resources within the project area. The SHPO's office also concurred that there are no archaeological concerns within the project area as the ground has been previously disturbed by construction and demolition activities throughout the history of the neighborhood (see Section K for consultation letters).

4.0 Socioeconomic Resources

Existing land uses in the project area are recreation, consisting of the Harborwalk and South Bay Harbor Trail, which is an urban trail system that runs parallel to the shoreline, and surface parking. Adjacent to the project area, land use is predominantly surface parking, with commercial and industrial uses farther inland. The recently redeveloped 5 Necco Street parcel (previously the GE facility) is located to the north, which is a science and technology center that includes raised landscaping features and open space fronting the Fort Point Channel (City of Boston 2021b). The Gillette pump house and industrial manufacturing facility are to the south.

5.0 Manmade Infrastructure and Land Use

5.1 Transportation

The project area is located in urban South Boston and encompasses the Harborwalk along the shoreline. The Harborwalk is a major trail that connects South Boston to other neighborhoods, such as the Seaport District, Downtown Waterfront, North End, and Charleston. East of the project area (inland) is A Street, a north-south minor arterial of South Boston (Massachusetts Department of Transportation 2021). A Street intersects with the local roadways—Necco Street, Binford Street, and Dorchester Avenue. Necco Street is located at the northern end of the project area but does not provide access to the project site or to proposed staging areas. Binford Street is located at the north-south halfway point in the project area and provides access to the project site as well as proposed staging areas, including the Channelside public parking lot. Dorchester Avenue is located at the southern end of the project area and provides access to the project site and proposed staging areas (Figure C-2). The I-90 Massachusetts Turnpike is buried roughly 25 feet or more below ground at the site. Rail lines are present west of the Fort Point Channel along the shoreline, and a rail yard is located southwest of Dorchester Avenue, adjacent to the 100 Acre Master Plan area.

The Massachusetts Bay Transportation Authority (MBTA) provides transit service to the City of Boston. No transit stops are located within the project area. East of the project area, A Street is used for bus route 11, which operates daily from 12:35 a.m. to 11:45 p.m. and connects the neighborhood of South Boston to the Financial District downtown (MBTA 2021a, 2021b). The closest subway station is located one block south of the project area at the intersection of West Broadway and Dorchester Avenue. No docks for ferries or ferry routes are located in or near the project area (MBTA 2021c).

5.2 Public Services and Utilities

The project area is characterized by large amounts of buried infrastructure including electrical lines, communication conduits, industrial raw water intakes and outfalls from the Gillette facility, stormwater infrastructure, and the I-90 Massachusetts Turnpike, which is buried approximately 25 feet underground (City of Boston 2020). The construction of the turnpike included concrete slurry walls close to the ground surface that are still present. There are a series of walkway lights and associated buried electrical lines along the Harborwalk. No overhead power lines or drinking water pipes are present.

The stormwater infrastructure includes 14 outfalls in the project area that flow into Fort Point Channel. Stormwater infrastructure in South Boston is part of a combined sewer overflow system that collects rainwater runoff, domestic sewage, and industrial wastewater in the same pipes (Massachusetts Water Resources Authority 2021). Thus, when stormwater levels are too high, such as when flooding occurs, the combined sewer overflows and can carry human and industrial waste into waterways or get backed up and flood sewers, streets, and buildings.

5.3 Public Health and Safety

The project area is within District C-6 for Boston Police Department and the Emergency Medical Services, which includes one ambulance located within the police station at 101 W Broadway, just south of the 100 Acre Master Plan area (City of Boston 2021a). The project area is within District 6 of the Boston Fire Department, which is located at 272 D Street, approximately 0.50 miles southeast of the project area (City of Boston 2008). The closest hospital is the Tufts Medical Center located west of the Fort Point Channel at 860 Washington Street.

6.0 Hazardous Materials

A review of the project area and 100 Acre Master Plan area was performed using EPA's NEPA Assist online tool. The NEPA Assist review identified one RCRA-regulated hazardous waste generator site that intersects the project area and 16 additional RCRA-regulated hazardous waste generator sites within the 100 Acre Master Plan area (EPA 2021a). The regulated site intersecting with the project area is the Gillette manufacturing facility. The Gillette manufacturing facility is a hazardous waste producer, and all hazardous materials are located within the Gillette manufacturing building. The project area is located on the portion of the Gillette property that is presently used for the existing Harborwalk. A review of the project area was also performed using MassDEP's Waste Sites and Reportable Releases/Spills online viewer, which identified multiple sites regulated by the Massachusetts Contingency Plan, including several with Activity and Use Limitations (AULs), within the 100 Acre Master Plan area (Figure C-8). These sites and their status are provided in the ENF Application.

Figure C-8. Massachusetts Contingency Plan Waste Sites and Reportable Releases/Spills within the project area.

There are no Superfund sites (site regulated under the Comprehensive Environmental Response, Compensation, and Liability Act) in or near the project area. There are no known contaminated soils or hazardous materials within the project footprint where ground disturbance and excavation will occur.

7.0 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires agencies to identify and address the disproportionately high and adverse human health or environmental effects its activities may have on minority or low-income populations. The state of Massachusetts also considers those with limited English proficiency during an environmental justice analysis. The EPA's Environmental Justice Screening and Mapping Tool (EJ Screen), the Massachusetts Environmental Justice Viewer, and census data were used to evaluate the demographic characteristics of the project area and surrounding community. The EJ Screening analysis is based on the U.S. Census Bureau 2015 to 2019 American Community Survey 5-year summary data at the census block group level (EPA 2021b). Massachusetts 2020 Environmental Justice Populations MassGIS data is based on the same data source (MassGIS 2021).

Environmental justice populations include minority, low-income, and limited English proficiency populations, and are defined by the state of Massachusetts as those that meet any of the following criteria:

- the annual median household income is not more than 65 per cent of the statewide annual median household income (income);
- minorities comprise 40 per cent or more of the population;
- 25 per cent or more of households lack English language proficiency; or
- minorities comprise 25 per cent or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 per cent of the statewide annual median household income.

7.1 Environmental Justice Populations in Project Area

The project area is located within a single block group (block group 250250612001) that also encompasses the 100 Acre Master Plan area. The population in the block group does not meet any of the criteria for environmental justice populations, as shown in Table C-1 (EPA 2021b, U.S. Census Bureau 2019).

Table C-1. Environmental Justice Demographics

Geographic Area	Census Block Group	Percent Minority (%)	Percent Limited English Proficiency (%)	Median Household Income	Earning Below 65% of State Median Income (Y/N)	Environmental Justice Population Present (Y/N)
100 Acre Master Plan area[1]	250250612001	14	1	$193,068	N	N
Commonwealth of Massachusetts	-	28	6	$81,215	Not Applicable	Y

7.2 Environmental Justice Populations within 1 Mile

There are forty (40) block groups within 1 mile of the project, shown on the map in Figure C-9 and listed in Table C-2 with their respective demographic data and EJ criteria. All forty (40) block groups meet EJ criteria for minority populations; two (2) meet criteria for English isolation and minority populations, and ten (10) meet criteria for income, English isolation, and minority populations. The two predominate languages other than English spoken in these areas are Chinese and Spanish/Spanish Creole. Seven (7) of these block groups are located in South Boston, south and east of the Fort Point Channel. The other thirty-three (33) are located west of the Fort Point Channel. None of the EJ block groups identified are within the area that the project will be independently effective at protecting from coastal flooding. Populations within 1 mile of the project, including Environmental Justice neighborhoods, will benefit indirectly from increased open space and associated environmental services provided by the project (see Section H – Environmental Justice Populations).

[1] Block group 250250612001 encompasses both the project area and the larger 100 Acre Master Plan area.

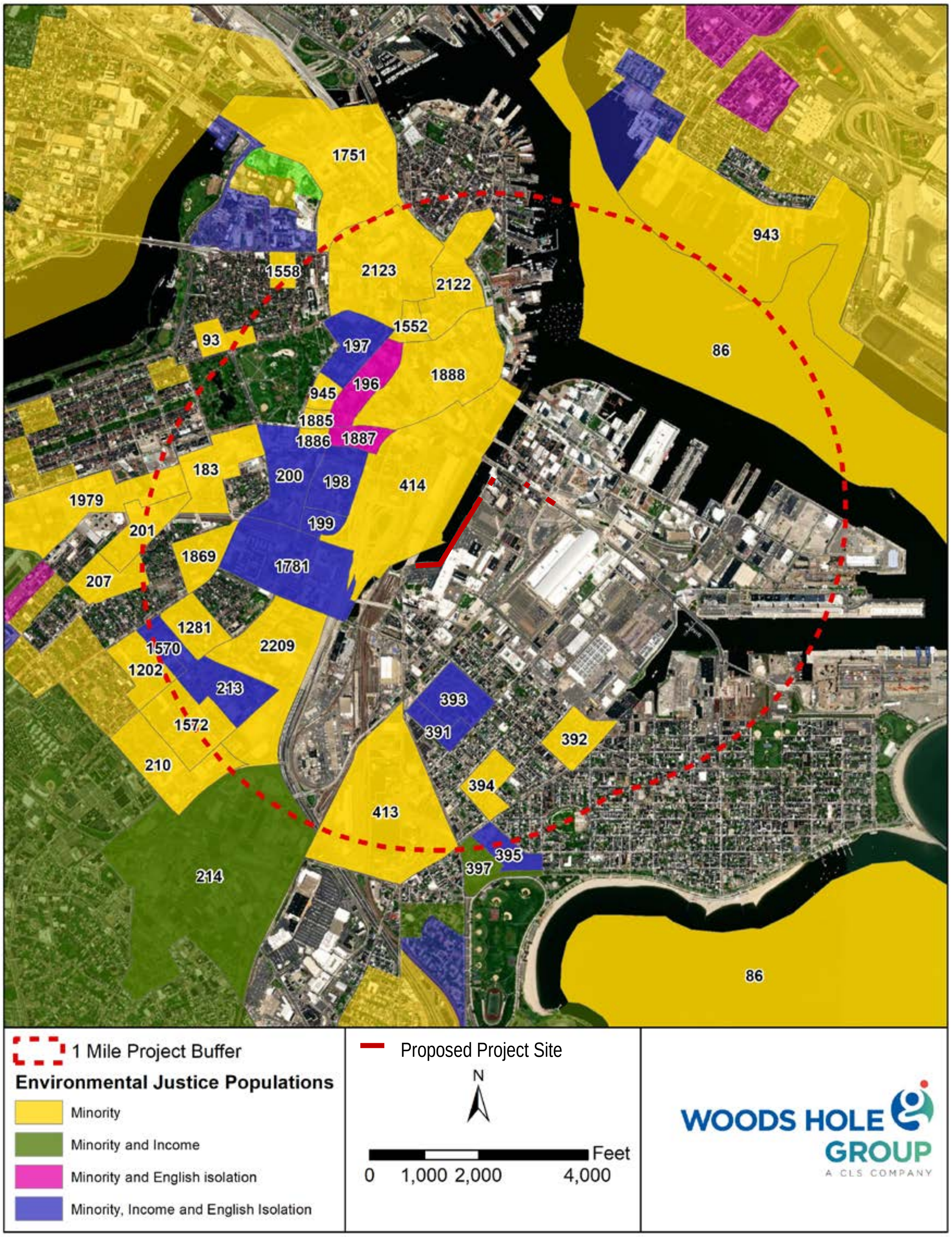

Figure C-9. EJ Communites within 1 mile of the project area.

Table C-2. Environmental Justice Demographics and Languages

Environmental Justice Population ID No.	Census Tract	Environmental Justice Criteria	Languages Spoken Other than English
86	Block Group 0, Census Tract 9901.01	Minority	
93	Block Group 1, Census Tract 201.01	Minority	
183	Block Group 1, Census Tract 703	Minority	
196	Block Group 2, Census Tract 701.01	Minority and English isolation	Chinese
197	Block Group 3, Census Tract 701.01	Minority, income and isolation	Chinese
198	Block Group 1, Census Tract 702	Minority, income and isolation	Chinese
199	Block Group 2, Census Tract 702	Minority, income and isolation	Chinese
200	Block Group 3, Census Tract 702	Minority, income and isolation	Chinese
201	Block Group 1, Census Tract 707	Minority	
207	Block Group 2, Census Tract 707	Minority	
210	Block Group 2, Census Tract 711.01	Minority	
213	Block Group 2, Census Tract 712.01	Minority, income and isolation	Spanish/Spanish Chinese
214	Block Group 1, Census Tract 801	Minority and income	
391	Block Group 2, Census Tract 607	Minority, income and isolation	Spanish/Spanish Chinese
392	Block Group 5, Census Tract 605.01	Minority	
393	Block Group 1, Census Tract 607	Minority, income and isolation	Spanish/Spanish Chinese
394	Block Group 2, Census Tract 608	Minority	
395	Block Group 2, Census Tract 610	Minority, income and isolation	Spanish/Spanish Chinese
397	Block Group 3, Census Tract 610	Minority and income	
413	Block Group 2, Census Tract 612	Minority	
414	Block Group 1, Census Tract 701.01	Minority	
943	Block Group 1, Census Tract 512	Minority	

Environmental Justice Population ID No.	Census Tract	Environmental Justice Criteria	Languages Spoken Other than English
945	Block Group 4, Census Tract 701.01	Minority	
1202	Block Group 4, Census Tract 705	Minority	
1281	Block Group 3, Census Tract 705	Minority	
1552	Block Group 4, Census Tract 303	Minority	
1558	Block Group 1, Census Tract 202	Minority	
1570	Block Group 2, Census Tract 705	Minority, income and isolation	Chinese
1572	Block Group 1, Census Tract 711.01	Minority	
1751	Block Group 2, Census Tract 203.03	Minority	
1781	Block Group 1, Census Tract 704.02	Minority, income and isolation	Chinese
1869	Block Group 4, Census Tract 703	Minority	
1885	Block Group 5, Census Tract 701.01	Minority	
1886	Block Group 6, Census Tract 701.01	Minority	
1887	Block Group 7, Census Tract 701.01	Minority and English isolation	Chinese
1888	Block Group 8, Census Tract 701.01	Minority	
1979	Block Group 1, Census Tract 106	Minority	
2122	Block Group 2, Census Tract 303	Minority	
2123	Block Group 3, Census Tract 303	Minority	
2209	Block Group 1, Census Tract 712.01	Minority	

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Section D

Alternatives Analysis & Associated Impacts

D. ALTERNATIVES ANALYSIS & ASSOCIATED IMPACTS

1.0 Proposed and Dismissed Project Actions

The City of Boston has evaluated alternatives for minimizing the potential for flooding along the eastern side of the Fort Point Channel. Alternatives considered included the No Action scenario, flood control segments and interim flood walls, and a flood gate scenario. The details of these alternatives are discussed below followed by the anticipated environmental impacts.

1.1 No Action

Under the No Action alternative, there would be no flood protection features along the Fort Point Channel. With no flood protection, high-water events compounded by sea level rise would continue to flood the 100 Acre Master Plan area and greater South Boston, damaging infrastructure and property and disrupting economic activity. During high-water events, water would continue to inundate streets, necessitating road closures and disrupting public transportation systems. Flooded sewage collection systems could back up, causing raw sewage to rise into streets and buildings. Water would continue to inundate buildings and basements, damaging electrical facilities and property. Debris, sediments, and contaminants collected by floodwaters could continue to flow out into the channel when floodwaters recede, resulting in water pollution.

1.2 Flood Control Segments and Interim Flood Walls (Proposed Action)

Under the Proposed Action, the City would construct approximately 2,090 feet of berm and floodwall mitigation features along a portion of the southeast edge of the Fort Point Channel shoreline, between approximately 15 Necco Street and Dorchester Avenue. Flood protection measures would be constructed in three segments that vary in the proposed type of measure to be built and would be constructed over the course of approximately two years.

Segment 1 would extend from approximately 15 Necco Street to the southern end of the Gillette pump house. The berm would be approximately 729 feet long and 45 feet wide and would result in permanent ground disturbance to a depth of 2 feet (Figure D-1). Ground disturbance may occur deeper than 2 feet at utility crossings if utilities need additional protection. Flood protection in Segment 1 would be an earthen berm with a 5-foot crown width and side slopes with a ratio of 4:1 (four horizontal units to one vertical unit). The earthen berm would be located landward of the existing Harborwalk and would be elevated to approximately 14.6 feet North American Vertical Datum of 1988 (NAVD88). The designed elevation height of 14.6 feet NAVD88 is based on the 100-year flood event in 2070 accounting for sea level rise and more intense storms based on the Boston Harbor Flood Risk Model and 1.3 feet of freeboard – additional height above the base flood elevation included for safety. A knee wall on the seaward side of the berm feature would be incorporated to minimize the lateral width required for the berm to 45 feet. The knee wall would be raised 2.5 feet relative to the existing Harborwalk, to an elevation of approximately 10.5 feet NAVD88. The northern end of the berm would tie into site grade on the Alexandria/National Development property, which has already been raised by the owner to 11.5 feet NAVD88. At the south end, the berm would end at the access driveway at the pump house and where a 15-foot-wide passive deployable flood gate would be installed to cross the driveway. The berm will be vegetated, contain salt and drought tolerant plantings, ensure the continuity of

Harborwalk, and connect to other green spaces throughout the neighborhood, providing both flood protection and co-benefits for residents. A temporary 30 ft wide zone along the landward side of Segment 1 would be used for construction access. All areas of the site outside the footprint of the earthen berm would be restored to pre-existing conditions upon completion of the project.

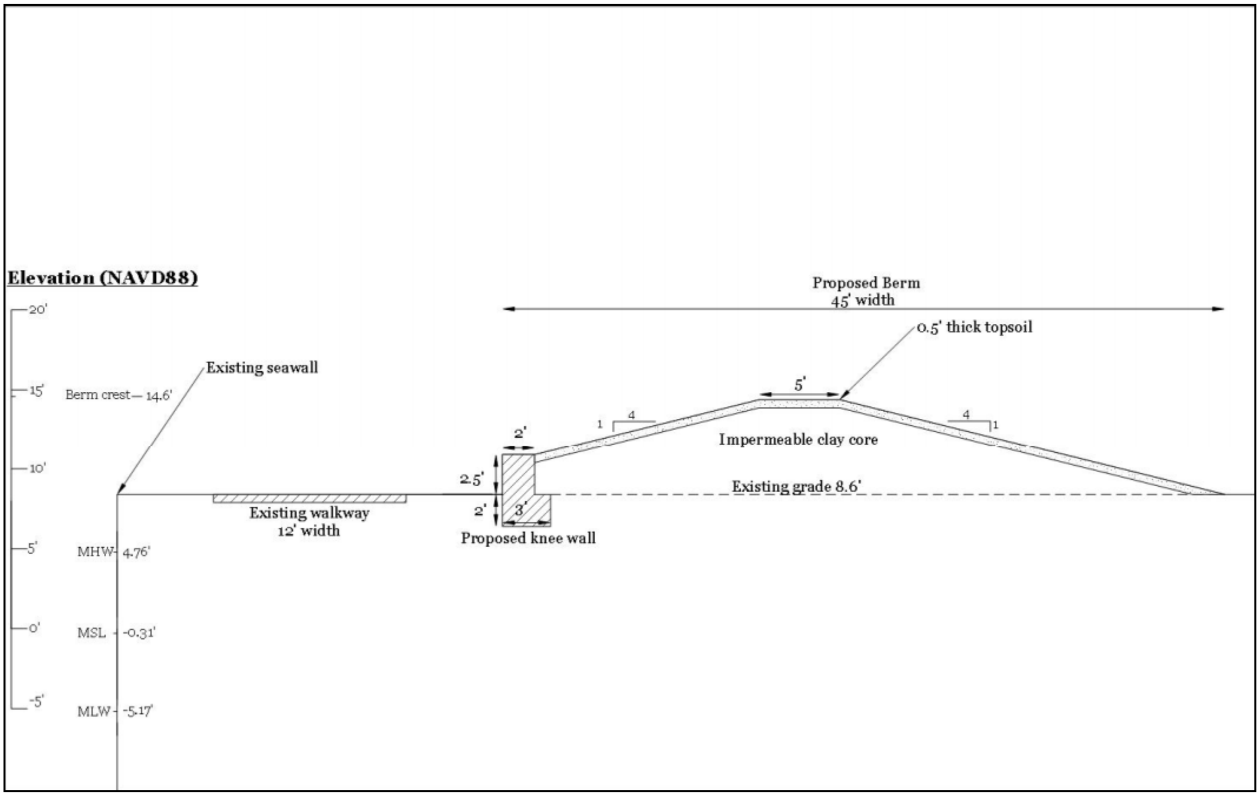

Figure D-1. Typical cross-section for Segments 1 and 3.

Segment 2 would extend from the Gillette pump house to where Fort Point Channel turns west and would be approximately 816 feet long. Segment 2 would consist of a double retaining wall of granite blocks that would match and be built on top of the blocks of the existing seawall. The seaward side of the retaining wall would raise the existing seawall's crest elevation approximately 6 vertical feet to reach 14.6 feet NAVD88 (Figure D-2). The landward side would also make use of granite blocks as a retaining wall feature, with impermeable clay fill in between the seaward and landward walls. This segment would be 18 feet wide, with a 12-foot-wide, shared-use path for the Harborwalk on top of the clay fill. The blocks would rest on a concrete footing. All blocks would be dowelled together with rebar rods. Permanent ground disturbance expected for this segment would be to a depth of approximately 2 feet but could be slightly deeper at utility crossings. A temporary 32 ft wide zone along the landward side of Segment 2 would be used for construction access. All areas of the site outside the footprint of the double retaining wall would be restored to pre-existing conditions upon completion of the project.

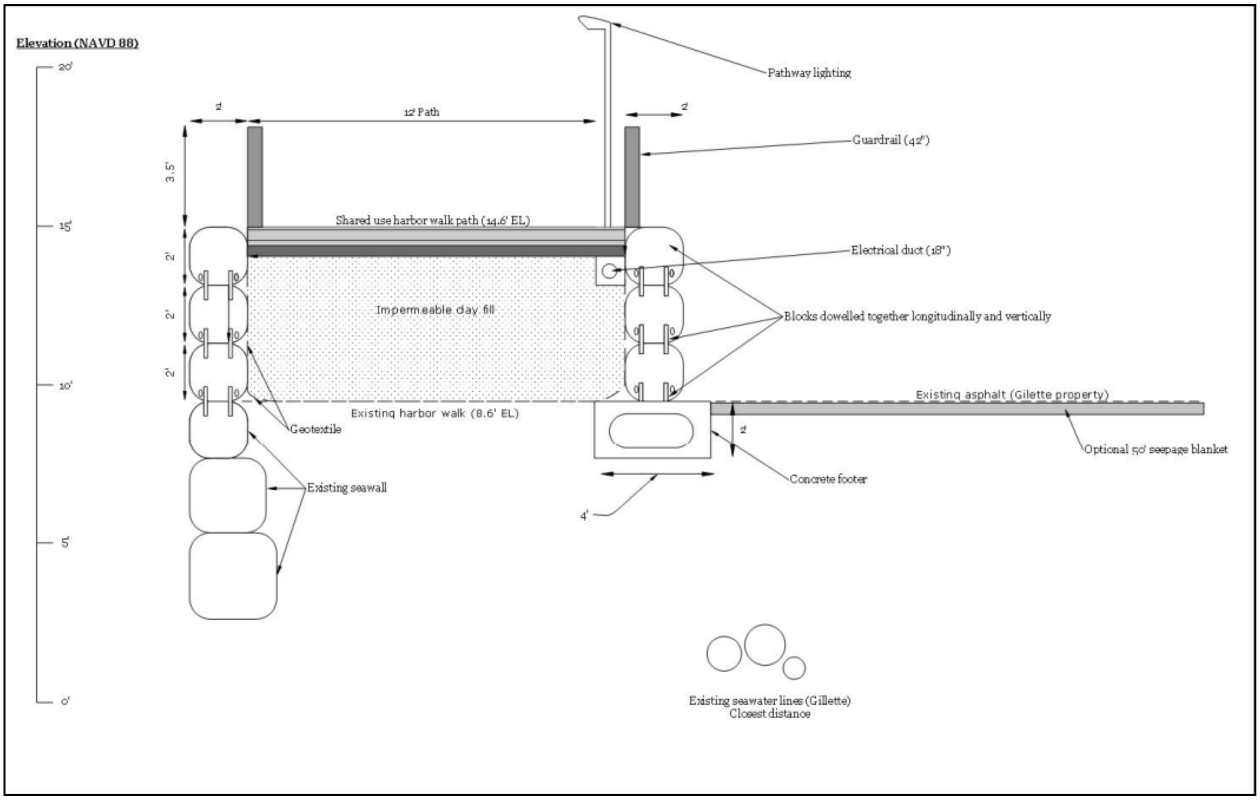

Figure D-2. Typical cross-section for Segment 2.

Segment 3 would extend from the western turn in the Fort Point Channel to Dorchester Avenue and would be 546 feet long and approximately 45 feet wide. Segment 3 would have a similar earthen berm as described for the Segment 1 flood protection that would run parallel to and landward of the existing Harborwalk (Figure D-1). The western end of the berm would tie into existing grades along Dorchester Avenue Segment 3 would require permanent ground disturbance to a depth of 2 feet but could be slightly deeper at utility crossings. A temporary 30 ft wide zone along the landward side of Segment 3 would be used for construction access. All areas of the site outside the footprint of the earthen berm would be restored to pre-existing conditions upon completion of the project.

In addition to the three flood control segments, the Proposed Action includes deployable interim flood walls and backflow mitigation improvements at the stormwater outfalls on the existing seawall. These three deployable floodwalls around the 100 Acre Master Plan area would ensure the Proposed Action would have independent utility from the other proposed flood control measures in the area by protecting both the primary flood pathway along the Fort Point Channel (mixed berm and floodwall feature) and minor flood pathways (interim flood measures) into the 100 Acre Master Plan area. These interim flood walls would be removed once other projects in the Climate Ready Boston plan are implemented. The interim flood walls are part of the Proposed Action and ensure it functions as designed independently of the completion of other projects in the plan. Below are the locations and descriptions of the three deployable flood walls, (see Figure D-3 for location map):

- **A Street** – Located under the Summer Street overpass on A Street. An approximate 31-foot-long stop log or flex wall system would tie into the Summer Street bridge abutments on the north and south sides of A Street.
- **West Service Road** – Located under the Summer Street overpass on West Service Road. A 300-foot-long stop log or flex wall system would tie into the bridge abutment on the northern end and into high ground located on private property on the south.
- **Necco Court** – Located on the end of Necco Court facing the Fort Point Channel. An approximate 25-foot-long stop log or flex wall system would be located between the two buildings flanking the roadway (27 Melcher Street and 5 Necco Court).

The deployable flood walls would be within rights-of-way and require regrading of sidewalks and roadways and constructing shallow ground anchor footings, and the stop logs would connect to permanent anchor points attached to the walls of existing structures. Implementation of the interim measures would require minimal ground disturbance. The flood walls would be transported to the areas in anticipation of a flood event and stored at the Boston Planning and Development Agency property at 22 Drydock Avenue when not in use.

The backflow prevention would include installing flap gates on each municipal and industrial outfall along the entire length of the project on the existing seawall. Sections of outfall pipe below the proposed berms and floodwalls may need to be strengthened to reduce the risk of misalignment or cracking during the natural settlement of the berms and floodwalls. Work on the outfalls would be accessed from land and the work area would be isolated with turbidity curtains. Thus, some in-water work from the implementation of the turbidity curtains would be needed to repair existing drainage outfalls. Work would also occur during low tides to minimize effects on water quality.

Equipment needed for the construction of the berms and floodwalls may include excavators, loaders, graders, concrete trucks, dump trucks and other large vehicles, hand tools, and potentially a crane. Staging and access would occur landward of the project area on the existing surface parking lots, such as the channel side lot west of A Street or the Gillette parking lot. Access to staging areas and the project area would likely occur via A Street and Binford Street. The entire proposed resilience feature would result in 74,859 square feet (1.7 acres) of permanent impacts to the site and 66,625 square feet (1.5 acres) of temporary impacts associated with construction.

Figure D-3. Components of the Proposed Action including flood control Segments 1, 2, and 3 and interim flood control measures.

1.3 Flood Gate Alternative

The Flood Gate alternative would include flood protection near the mouth of Fort Point Channel under the Seaport Boulevard Bridge. The alternative includes installing a flood gate or series of gates between the channel banks approximately 580 ft long that could be closed in advance of high-water events. The flood control gates would remain open most of the time for proper stormwater evacuation and daily tidal exchange. Construction would involve in-water work including dredging, pile driving, coffer dam installation/removal, and creation of a pile supported foundation. Natural areas of the seafloor under the tide gates would be replaced concrete as part of the construction process. This alternative would require more specialized engineering to construct, larger up-front costs than the Proposed Action, and more costly and specialized long-term operation and maintenance procedures and staff. This alternative would have a shorter design life and require more frequent closures of the gates over time as sea levels rise, limiting its effectiveness and increasing potential environmental effects as compared with the Proposed Action. Potential environmental effects would include impeding the movement of fish during gate closures and contributing to changes in nutrient and chemical concentrations in the channel, which could negatively affect aquatic life. The potential environmental effects of construction in the water and alterations to aquatic habitats and long-term aquatic processes would be substantially greater than under the Proposed Action. This alternative was determined to be technically and financially impracticable.

2.0 Environmental Impacts and Mitigation Measures

This section describes the environment potentially affected by the alternatives, evaluates potential environmental effects, and recommends measures to avoid or reduce those effects. Effects are changes to the existing environment including ecological, aesthetic, historic, cultural, economic, social, or health conditions.

When possible, quantitative information is provided to establish the magnitude of potential effects; otherwise, the potential effects are evaluated qualitatively based on the criteria listed in Table D-1.

Table D-1. Classification of Potential Effects

Effect Scale	Criteria
None/Negligible	Resource area would not be affected and there would be no effect, OR changes or benefits would either be nondetectable or, if detected, would have effects that would be slight and local. Effects would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, but the changes would be small and localized. Adverse or beneficial effects would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and have either localized or regional scale effects/benefits. Effects would be within or below regulatory standards, but historic conditions would be altered on a short-term basis. Mitigation measures would be necessary, and the measures would reduce any potential adverse effects.
Major	Changes to the resource would be readily measurable and would have substantial consequences/benefits on a local or regional level. Effects would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce effects, though long-term changes to the resource would be expected.

2.1 Topography and Soils

No Action

Under the No Action alternative, no berm would be constructed, and the existing seawall would not be raised; thus, no changes to topography would occur. Some ad hoc flood control efforts may be implemented that could disturb soils. The ad hoc flood control efforts would likely protect individual buildings and some infrastructure but would not protect the 100 Acre Master Plan area from flood-related soil loss. Because the project area and greater South Boston is developed urban land, soil disruption due to flooding would be minimal, as there are very few surface soils in the area. Therefore, there would be negligible short- and long-term effects from soil disruption during flood events.

Flood Control Segments and Interim Flood Walls (Proposed Action)

Under the Proposed Action**,** construction of the berm in Segment 1 and Segment 3 and raising the existing seawall in Segment 2, including the placement of artificial fill, would raise the project area topography by up to 5 feet to an elevation of 14.6 feet NAVD88. Because the project area and vicinity are presently composed of artificial fill, following a history of land reclamation practices, impacts on soils would be negligible. Construction of the mixed berm and floodwall features would permanently disturb 1.7 acres of developed land to a depth of approximately 2 feet. Interim flood control measures would not require excavation below what has been previously disturbed for urban development, including roads, buildings, and parking lots. The proposed construction materials, such as clay and concrete blocks, would be impermeable and resistant to erosion and would prevent the underlying soils from eroding. Sod would be planted over areas where permeable soils are proposed, such as the 6 inches of topsoil in Segment 1 and Segment 3, thus reducing the risk of erosion. Therefore, there would be a negligible short-term impact on topography and a minor short-term effect on soils during construction.

Post-construction, the Proposed Action would reduce flooding in the 100 Acre Master Plan area that could cause topsoil erosion; however, this beneficial effect on soils would be negligible because the project area is already heavily developed, and there is only a small risk of soil disruption during flooding. The presence of compressible soil layers could lead to consolidation settlement of the berm and floodwall features over time. The design and construction sequencing of the Proposed Action would prevent settlement and periodic maintenance would occur to maintain the designed elevation height. Therefore, there would be no effect long term on topography because the design height of 14.6 feet NAVD88 would be maintained. There would be no long-term effect on soils because of the history of artificial fill, reduced soil loss from floodwaters, and the developed nature of the project area.

Flood Gate Alternative

The flood gate alternative would have minor impacts on topography along the edges of the Fort Point Channel under the Seaport Boulevard Bridge where the flood gate would tie into the existing topography. Since this area is already heavily developed, the impacts to soils would be negligible. Post-construction the flood gate alternative would reduce flooding in the 100-Acre Master Plan area that could cause topsoil erosion; however, this beneficial effect on soils would be negligible because the project area is already heavily developed, and there is only a small risk of soil disruption during flooding.

2.2 Air Quality

No Action

Under the No Action alternative, some ad hoc flood control efforts may be implemented that could require construction-related emissions. However, the 100 Acre Master Plan area would remain at risk of flooding and flood damage, which could require road closures. Therefore, there would be a negligible, recurring, short-term, and adverse effect on air quality from vehicle and equipment emissions resulting from equipment used for flood-related repairs and additional vehicle emissions generated by road detours.

Flood Control Segments and Interim Flood Walls (Proposed Action)

Under the Proposed Action, the use of construction equipment and vehicles would result in the short-term release of air pollutant emissions. All construction equipment would be required to meet current EPA emissions standards (EPA 2016). Post-construction, the Proposed Action would reduce flood hazards in the project area and associated emissions from roadway detours and repairs. The deployment of stop logs at interim flood control measure sites would require temporary road closures that could increase vehicle emissions. However, the deployment of interim measures would protect larger areas of roadway from becoming inundated, which would reduce roadway detours due to damage and repairs. The project would not create a new source of permanent air emissions. Therefore, the Proposed Action would have a negligible short-term effect on air quality from temporary construction-related emissions that would be mitigated through the application of EPA emissions standards. There would be a negligible, long-term, and beneficial effect from the reduced risk of flooding that avoids flood-related emissions from roadway detours and repairs.

Flood Gate Alternative

During construction, the use of equipment, vehicles, and marine vessels would result in the short-term release of air pollutant emissions. All construction equipment would be required to meet current EPA emissions standards (EPA 2016). Post-construction the Flood Gate alternative would reduce flood hazards in the project area and associated emissions from roadway detours and repairs. Emergency generators and pumps associated with the flood gate alternative would result in short-term release of air pollutant emissions during closure of the flood gates; however, given the low frequency of use these impacts would be negligible. As sea levels rise and the gates are used more frequently, impacts from higher emissions could increase to minor. Therefore, the flood gate alternative would have negligible short-term effect on air quality from temporary construction-related emissions that would be mitigated through the application of EPA emissions standards. Post construction impacts on air quality could range from negligible to minor.

2.3 Water Quality

No Action

Under the No Action alternative, ad hoc flood control measures could potentially result in short-term minor effects on water quality from construction-related runoff. In the long term, the risk of flooding would not be reduced substantially within the 100 Acre Master Plan area and additional construction may be required to address damage after flooding. Water would continue to inundate the area during flood events, entering the drainage system and reducing the system's ability to convey stormwater to outfalls and causing backwater conditions, surcharging, and flow reversal in some locations. As flood waters recede, they would transport debris, sediments, and contaminants such as sewage from backed up collection systems or combined overflows and petroleum-based pollutants such as motor oil, which may contribute polychlorinated biphenyls to surface waters. Sewage contributes bacteria such as fecal coliform and enterococcus to stormwater and flood discharges (EPA 2012). Sewage also contributes excess nutrients, such as phosphorus, which can result in algae growth and die-off that consumes oxygen leading to lowered dissolved oxygen levels (Minnesota Pollution Control Agency 2009). Thus, the No Action alternative could adversely affect conformance with TMDLs for polychlorinated biphenyls, fecal coliform, enterococcus, and dissolved oxygen in the Fort Point Channel. Because the project area is already contributing these pollutants to Fort Point Channel during storm events, future flood events would result in a negligible change in water contamination in the channel and on TMDL compliance. The No Action alternative would have a negligible effect on water quality.

Flood Control Segments and Interim Flood Walls (Proposed Action)

Construction of the Proposed Action has the potential for negligible to minor water quality impacts. Construction of the mixed berm and floodwall features would include approximately 1.7 acres of ground disturbance near the Fort Point Channel, which could result in storm-generated erosion that transports sediments into the channel via surface runoff. The interim deployable floodwalls would require minimal ground disturbance during construction and would thus have minimal potential for generating soil erosion. The Proposed Action would not place fill in water and all project components, including work on existing outfalls, would be accessed from land. The construction contractor would use silt curtains to isolate the area during work on the outfalls and turbidity curtains to minimize sedimentation. Construction activities near or in water may lead to the release of other pollutants into surface waters, such as trash and debris from the construction site or oils, fuels, and lubricants from equipment near or over water. Because the project area is highly urbanized, construction may reveal previously unknown underground sources of contamination and risk spreading this contamination to nearby surface waters. Contamination risks during construction will be minimized through the development and implementation of Soil and Groundwater Management Plans and Health and Safety Plans, if required under the Massachusetts Contingency Plan.

Post-construction, the Proposed Action would reduce the risk of flooding within the 100 Acre Master Plan area. The earthen berms would prevent flood waters from entering the Master Planning area and could route runoff and debris to catch basins rather than directly into the channel during precipitation and flood events. The amount of impervious surface within the project area would decrease by about 1.3 acres, and the earthen berms would replace parking lots in the project area that collect oils, lubricants, fuels, dirt and asphalt wear deposits, and other hazardous materials from parked vehicles, which can then be transported into the channel via runoff (Trumbull and Bae 2000). Because flood waters would inundate a smaller area, they would be less likely to transport pollutants such as oils, fuels, and sewage into the channel. Therefore, the Proposed Action would result in negligible beneficial effects by improving compliance with TMDLs for bacteria and dissolved oxygen in the channel. Thus, the Proposed Action would have a negligible long-term beneficial effect on water quality compared with existing conditions in the Fort Point Channel by reducing the spread of flood waters, increasing vegetative filtration, and improving stormwater drainage in the project area.

<u>Flood Gate Alternative</u>

Construction of the flood gates would result in temporary impacts to water quality, as vessels would be needed to bring supplies to the site and heavy machinery would be needed to install the gates. Potential release of oils, fuels, and other pollutants into surface waters could occur that would have an adverse impact on water quality. The construction contractor would be required to install coffer dams, drive piles, dredge, and place a concrete foundation on the natural sea floor. These activities would cause increased turbidity at the site during the period of construction that would adversely impact water quality. Impacts could be minimized through the use of siltation curtains.

Post-construction, the flood gates would limit tidal exchange between Fort Point Channel and greater Boston Harbor. In the near-term, the time period over which the gates would be closed would be relatively short, likely no more than 2-6 tidal cycles, and therefore adverse impacts associated with limited tidal flushing would be minor. Significant changes in water quality parameters such as salinity, dissolved oxygen, temperature, and pH would not be expected with closure of the flood gates for 2-6 tidal cycles; however, minor increases in nutrient levels within the Fort Point Channel waters could result as flood waters from the stormwater management CSO system drain into the restricted channel area. During future sea level rise scenarios 30- and

50-years from present, the tide gates would be closed more often and there would be a greater potential to limit tidal exchange, resulting in minor to moderate adverse impacts to key water quality parameters. The flood gates could temporarily prevent water borne contaminants in other areas of Boston Harbor from entering the waters of Fort Point Channel and therefore provide a short-term benefit to water quality during storms.

2.4 Floodplains

No Action

Under the No Action alternative, ad hoc flood protection measures could still be implemented to reduce localized flooding. These ad hoc measures would potentially have some minor short-term construction-related effects on the floodplain because ground disturbance could result in erosion of exposed soils that are washed into nearby surface waters and equipment use may release oils, fuels, and other hazardous materials. Because the project area is highly urbanized, construction may encounter previously unknown underground sources of contamination and risk spreading this contamination to nearby surface waters. The ad hoc flood protection measures may have negligible to minor long-term benefits by reducing localized flood damage to protected buildings and infrastructure. If these measures were not implemented in a coordinated manner, they could also have moderate long-term effects by creating barriers or directing floodwaters to unanticipated areas, resulting in increased flooding in some parts of the 100 Acre Master Plan area and South Boston. Under the No Action alternative, there would be a minor long-term adverse effect on people and property within the floodplain and the effect could become moderate as the frequency and severity of flooding increases because of climate change and sea level rise.

Flood Control Segments and Interim Flood Walls (Proposed Action)

The Proposed Action would result in a minor short-term adverse effect on the 100-year floodplain because of construction in the floodplain. Construction activities could result in accidental releases of hazardous waste during the construction period from previously unknown underground sources or minor leaks from construction equipment, and ground disturbance could cause sediment to run off into nearby water systems. Contamination risks during construction will be minimized through the development and implementation of Soil and Groundwater Management Plans and Health and Safety Plans, if required under the Massachusetts Contingency Plan.

Because the project area is already developed, many of the traditional approaches for minimizing and avoiding effects on floodplains are not practicable for this project. The Proposed Action is functionally dependent on its location in the floodplain (44 C.F.R. 9.11(d)(1)(i)) and potential effects would be minimized (44 C.F.R. 9.11(d)(5)).

FEMA would require the following conditions to avoid and minimize potential adverse effects:

- The City must obtain a local certificate that demonstrates that the cumulative effect of the Proposed Action when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community (44 C.F.R. 60.3 and 44 C.F.R. 9.11(d)(4)).

- Before construction begins, the City must obtain approval from the local permitting official responsible for floodplain development to demonstrate that the Proposed Action is consistent with the criteria of the National Flood Insurance Program (44 CFR part 59 et seq.) or any more restrictive federal, state, or local floodplain management standards (44 C.F.R. 9.11(d)(6)). A copy of the approval/permit, or documentation from the permitting official that an approval/permit is not required, shall be forwarded to the state and FEMA for inclusion in the administrative record.
- Before Construction begins, the City must submit a conditional letter of map revision ("CLOMR") request pursuant to 44 C.F.R. § 65.8 and part 72 (FEMA 2021a).
- Following construction of the Proposed Action, the City must apply for a Letter of Map Revision in accordance with 44 C.F.R. 65.6.

Post-construction, the Proposed Action would result in a minor long-term adverse effect on the 100-year floodplain due to the placement of fill in the floodplain that would alter the natural path of water during high water events. Ground disturbance and the potential biological effects of building the flood control structures in the floodplain would be minimal because the area has been developed and redeveloped for more than 100 years (BLC 1982). Areas that are currently paved and used as parking lots would be converted to flood protection structures. The interim flood control measures would be deployed in rights-of-way during flood events and stored in an industrial park when not needed. The Proposed Action would not discharge fill or riprap within waters of the U.S. and the project would not alter flow patterns of the Fort Point Channel.

The Proposed Action would have a negligible beneficial effect on water quality and floodplain functions from the conversion of parking lots into earthen berms. Impervious surface within the project area would decrease by 1.3 acres, and the project area would no longer be a paved surface that collects oils, lubricants, fuels, dirt and asphalt wear deposits, and other hazardous materials from parked vehicles (Trumbull and Bae 2000). The earthen berms would also redirect stormwater runoff in portions of the 100 Acre Master Plan area into catch basins rather than directly into the channel.

The Proposed Action would have a minor, long-term beneficial effect through a decreased risk of flood damage. The Proposed Action would decrease the risk of flood damage from high water events and sea level rise in the 100 Acre Master Plan area by protecting existing structures and utilities while protecting the public's health and safety. The mixed berm and floodwall features would address the primary flood pathway into the 100 Acre Master Plan area and the interim flood mitigation measures would address remaining flood pathways from Fort Point Channel. The Proposed Action would enhance and protect portions of the Harborwalk, as section 2 would be located on the landward side of the protection. The Proposed Action would reduce the potential for debris to be carried into the channel when floodwaters recede and would work in conjunction with existing flood mitigation measures implemented at the former GE site north of the project area to protect the larger South Boston area.

The Proposed Action would not directly support any specific development within the floodplain; however, it could indirectly support future redevelopment. Because the area that would benefit from the Proposed Action is already developed and covered with impervious surfaces, redevelopment would not increase impervious surface area or the effects of impervious surfaces on natural floodplain functions. The Proposed Action does not include the addition of, or improvements to, roadways or utilities that would support expanded urban uses of the project area. Any redevelopment that might occur would be subject to local and state floodplain development regulations, as well as the stipulations of the 100 Acre Master Plan, which requires additional greenspace and the creation of permeability along the channel's edge (approximately 2.18 acres). Therefore, the Proposed Action may have a negligible long-term effect on floodplains by indirectly supporting future redevelopment.

Flood Gate Alternative

The flood gate alternative would potentially have minor short-term construction-related effects on the floodplain because ground disturbance could result in erosion of exposed soils that are washed into nearby surface waters and equipment use may release oils, fuels, and other hazardous materials. Because the project area is highly urbanized, construction may encounter previously unknown underground sources of contamination and risk spreading this contamination to nearby surface waters. Contamination risks during construction will be minimized through the development and implementation of Soil and Groundwater Management Plans and Health and Safety Plans, if required under the Massachusetts Contingency Plan.

The flood gate alternative would have a moderate, long-term beneficial effect through a decreased risk of flood damage. The gates would decrease the risk of flood damage from high water events and sea level rise in the 100 Acre Master Plan area by protecting existing structures and utilities while protecting the public's health and safety. The flood gates would also address the primary flood pathways from Fort Point Channel and would reduce the potential for debris to be carried into the channel when floodwaters recede.

Post-construction, the flood gate alternative would result in a minor long-term adverse effect on the 100-year floodplain due to alterations in the natural paths of water flow during high water events. Over time these impacts could increase as sea levels rise and the frequency of storms increases. To minimize these adverse impacts, FEMA would the City to obtain a local certificate that demonstrates that the cumulative effect of the flood gates, when combined with all other existing and anticipated development, would not increase the water surface elevation of the base flood more than one foot at any point within the community (44 C.F.R. 60.3 and 44 C.F.R. 9.11(d)(4)).

The Proposed Action would not directly support any specific development within the floodplain; however, it could indirectly support future redevelopment. Because the area that would benefit from the flood gates is already developed and covered with impervious surfaces, redevelopment would not increase impervious surface area or the effects of impervious surfaces on natural floodplain functions. The flood gate alternative does not include the addition of, or improvements to, roadways or utilities that would support expanded urban uses of the project area. Any redevelopment that might occur would be subject to local and state floodplain development regulations, as well as the stipulations of the 100 Acre Master Plan, which requires additional greenspace and the creation of permeability along the channel's edge (approximately 2.18 acres).

Therefore, the flood gate alternative may have a negligible long-term effect on floodplains by indirectly supporting future redevelopment.

2.5 Wetlands

No Action

Under the No Action alternative, ad hoc flood protection measures could still be implemented within wetland resource areas to reduce localized flooding. These ad hoc measures would have negligible short-term construction-related effects on the ability of land subject to coastal storm flowage and coastal bank resources to serve the interests of storm damage protection and flood control. Long-term impacts of the ad hoc flood protection measures on wetland resources would be minor as the measures would be localized to protected buildings and infrastructure. There would be small reductions in the storage volume of land subject to coastal storm flowage with minor impacts on the surrounding resource. As such, the ad hoc measures would have only minor impacts on the ability of land subject to coastal storm flowage and the coastal bank resources to serve the interests of storm damage protection and flood control.

Flood Control Segments and Interim Flood Walls (Proposed Action)

The flood control segments and interim flood walls would be constructed within land subject to coastal storm flowage and coastal bank resource areas. There would be negligible short-term construction related impacts to the ability of these resources to serve the interests of the Wetlands Protection Act. It is expected that during construction the resources will continue to provide the same level of storm damage protection and flood control as currently exists, and therefore the impacts are negligible.

Post construction the flood control segments and interim flood walls alternative will have a moderate long-term benefit on the ability of the resources to provide storm damage protection and flood control. Construction of the berms in Segments 1 and 3 and double retaining wall in Segment 2 will serve to improve the storm damage protection and flood control functions of land subject to coastal storm flowage by reducing vulnerability of more landward areas to flooding. Similar benefits will result from work on the coastal bank. Fill placed to create the berms will result in a small reduction in the storage volume of land subject to coastal storm flowage; however, impacts to surrounding areas are expected to be negligible as flood waters will be distributed across the larger Fort Point Channel. Because of this, surge elevations are not expected to increase in adjacent areas.

Flood Gate Alternative

The flood gate alternative would be constructed in land under the ocean and coastal bank resources that are protected by the Massachusetts Wetlands Protection Regulations (310 CMR 10.00). During construction, the project would have short-term minor impacts to these resources. Vessels and equipment used for construction could result in release of oils, fuels, and other hazardous materials that could adversely impact the ability of land under the ocean to provide feeding areas, spawning and nursery grounds and shelter for coastal organisms related to marine fisheries. Dredging would disturb the sea floor sediments and associated benthic communities in land under the ocean, and the installation of the pile supported structure would replace natural areas of the sea floor with concrete. Construction related impacts to the coastal bank could also temporarily impact the ability of the coastal banks to provide storm damage prevention and flood control as portions of the coastal bank would have to be altered during construction.

Post construction, the flood gate alternative has the potential to result in long-term minor impacts to land under the ocean. The flood gates could have an influence on the sediment characteristics in the vicinity of the structure, that could adversely impact marine fisheries. Habitat for benthic communities would also be removed in areas where concrete is placed on the sea floor to install the pile supported structure. With more frequent use of the flood gates in the future, the alternative may also impact the topography of the sea floor which could affect the ability of land under the ocean to reduce storm damage and flooding by diminishing and buffering the high energy effects of storms.

2.6 Vegetation

No Action

Under the No Action alternative, some ad hoc flood control efforts may be implemented that could potentially result in short-term negligible adverse effects on existing vegetation if the projects remove or trample the vegetation with construction equipment. Although ad hoc measures may reduce the risk of flood damage for specific areas, these measures would not substantially reduce the risk of flooding over the entire 100 Acre Master Plan area. In the long term, the 100 Acre Master Plan area would remain at risk of flood damage and larger areas of South Boston would flood over time because of climate change-related sea level rise. Flood waters would continue to deposit debris and sediments on the ground surface that could physically damage soil, which could smother and kill vegetation (Soil Science Society of America and American Society of Agronomy 2021). Construction may be required to address future flood damage, which could result in additional temporary effects on vegetation. Therefore, under the No Action alternative, continued flooding could have a long-term negligible adverse effect on vegetation within the project area and the greater 100 Acre Master Plan area.

Flood Control Segments and Interim Flood Walls (Proposed Action)

The Proposed Action may require removal of up to approximately 0.75 acres of vegetation along the Harborwalk. Vegetation along the Harborwalk that cannot be avoided would be restored following construction. Some shrubs and trees may be salvaged. Any healthy trees within the public way would only be removed with permission of the tree warden or Parks and Recreation Department after an inspection and public hearing (City of Boston 2020c). The deployable flood control measures are not expected to affect vegetation, as they would be deployed in roadways and sidewalks and would be stored in a warehouse in an industrial park. Vegetation may be removed to access the outfalls and install the backflow mitigation measures from land. All vegetation affected by the Proposed Action would be restored post construction. Therefore, there would be short-term negligible effects on vegetation in the project area from the construction of the Proposed Action.

The Proposed Action would create earthen berms with a 6-inch layer of topsoil and sod that would be planted with vegetation. In the long term, the Proposed Action would have a negligible beneficial effect on vegetation because it would increase vegetative cover in the project area and reduce the risk of flood damage to vegetation further inland.

Flood Gate Alternative

The flood gate alternative would have no impact on vegetation, as the gates would be constructed in waters of the Fort Point Channel where land-based vegetation does not exist. Tie-ins at the shoreline would take place in previously developed areas that do not support vegetation. Therefore, the flood gate alternative would have no short-term construction related impacts on vegetation. Post-construction, the elimination of flood waters from vegetated areas around Fort Point Channel could have a long-term minor benefit, by decreasing periods of saline inundation that tend to result in vegetation die off.

2.7 Wildlife and Fish

No Action

Under the No Action alternative, some ad hoc flood control measures could be implemented. This could potentially result in an adverse short-term negligible effect on wildlife and fish in and near the project area and the 100 Acre Master Plan area from construction-related noise and activity disturbances, both on land and in water, and erosion from ground disturbance that affects water quality. Additionally, vegetation may be removed during construction, which could affect the limited wildlife habitat in the area. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, these measures would not substantially reduce the risk of flooding over the entire 100 Acre Master Plan area in the long term. Construction may be required to address continued flood damage, resulting in additional construction effects on wildlife and fish. Flood-related pollutants would continue to enter nearby water bodies. Therefore, the No Action alternative would have a negligible long-term adverse effect on wildlife and fish species.

Construction of the ad hoc flood control measures could have a short-term negligible effect on EFH from construction-derived pollutants entering the channel, such as sediments, metals, and trash, as well as noise or vibration caused by any in-water work. In the long term, ongoing flood damage would trigger periodic construction activities that could cause additional construction-derived pollutants to enter the channel. Flood waters would continue to periodically inundate the area, which could transport debris and contaminants into the channel as well. Contamination from continued flood events would have a long-term negligible adverse effect on EFH.

Construction of ad hoc flood control measures and flood-related repairs may require vegetation removal or building repairs, which would have the potential to affect birds and their nests if the work is done during the breeding season. Thus, under the No Action alternative, construction of ad hoc flood control measures and flood-related repairs could have short and long-term negligible adverse effects on migratory bird species.

<u>Flood Control Segments and Interim Flood Walls (Proposed Action)</u>
Construction-related noise and activity disturbances would be short-term and would not substantially affect wildlife because wildlife in the project area is accustomed to urban levels of noise and activity. Vegetation removal may reduce the limited wildlife habitat in the project area; however, vegetation would be restored following construction. Construction activities would be conducted in accordance with applicable permits. With the implementation of permit required BMPs, there would be negligible potential for effects on fish in the Fort Point Channel. Thus, the Proposed Action would have a negligible short-term adverse effect on wildlife and fish habitat from construction-related activities both in and out of water. Post-construction, the Proposed Action would have a negligible long-term beneficial effect on wildlife because of the small amount of additional vegetated open space (sod on the berms) that would be added to the project area. There would also be a negligible long-term beneficial effect on fish in the channel from the reduction in contaminates and debris carried by storm and floodwater runoff into the channel.

Construction of the Proposed Action has the potential to affect water quality within EFH by temporarily increasing erosion and siltation into the channel, potentially generating turbidity during in-water work, and inadvertently releasing hazardous fuels, oils, and lubricants from equipment used near or in the channel. In accordance with required permits, the City would need to implement construction BMPs and conditions to protect water quality including, but not limited to, measures to control erosion and sedimentation, reduce turbidity, and prevent the spread of hazardous waste. Furthermore, the area is filled and developed with no intended future opportunity for inland migration of habitat. To avoid and minimize adverse effects to EFH and in conformance with 50 C.F.R. Part 600, Subpart J (600.905 – 600.930), FEMA initiated consultation with the National Marine Fisheries Service Habitat and Ecosystem Services Division on September 10, 2021 (FEMA 2021b). The consultation process is still ongoing, and no Conservation Recommendations have been provided at this time. Details of the consultation response and any provided Conservation Recommendations would be updated and included in the Final Environmental Assessment. At this time, FEMA anticipates that the Proposed Action would have a minor short-term adverse effect on EFH.

Post-construction, the Proposed Action would reduce contaminants and debris in flood-related runoff that enters the channel and potentially affects EFH. However, the change in contaminant levels in the channel resulting from the Proposed Action would not be measurable; thus, the Proposed Action would have a negligible long-term beneficial effect on EFH.

Construction activities have the potential to affect migratory birds from vegetation removal for the creation of the mixed berm and floodwall features if the vegetation is removed during the breeding season. Construction of the deployable floodwalls would not affect potential nesting sites or migratory birds. If vegetation removal occurs between April 1 and September 15, the migratory bird breeding season, construction of the mixed berm and floodwall features may disturb vegetation and potentially affect migratory birds (USFWS 2021). If vegetation removal occurs during the migratory bird nesting season, the City would coordinate with USFWS to obtain any required authorization and provide documentation of coordination with USFWS to FEMA.

Therefore, there would be a temporary negligible effect on migratory birds if vegetation removal is required within the breeding season and all potential USFWS conditions are followed. Post-construction, the Proposed Action would have a negligible long-term beneficial effect on wildlife because vegetation affected by the project would be restored and a small amount of additional vegetated open space (i.e., sod on the berms) would be added to the project area.

Flood Gate Alternative

The flood gate alternative could result in an adverse short-term minor effects on wildlife and fish in and near the project area and the Fort Point Channel area from construction-related noise and activity disturbances, both on land and in water, and erosion from ground disturbance that affects water quality. However, noise related impacts during construction would be minor to negligible because wildlife in the project area is accustomed to urban levels of noise and increased activity. Construction of the flood gates has the potential to affect water quality within EFH by temporarily increasing erosion and siltation into the channel, potentially generating turbidity during in-water work, and inadvertently releasing hazardous fuels, oils, and lubricants from equipment used near or in the channel. In accordance with required permits, the City would need to implement construction BMPs and conditions to protect water quality including, but not limited to, measures to control erosion and sedimentation, reduce turbidity, and prevent the spread of hazardous waste. Furthermore, the area is filled and developed with no intended future opportunity for inland migration of habitat. Overall, construction of the flood gates would have minor short-term adverse impacts on wildlife and fisheries.

Post construction short-term minor to moderate adverse impacts to wildlife and fish could also take place during periods when the gates are closed and stormwater from the CSO system drains into the channel causing increased pollutants to enter the water column. Reduced salinity and DO during closure of the flood gates could also have short-term minor to moderate adverse impacts on wildlife and fisheries.

2.8 Invasive Species

No Action

Under the No Action alternative, implementation of ad hoc flood control measures could result in soil and vegetation disturbance that creates suitable conditions for the establishment of invasive plant species (USDA and University of Georgia 2018). However, since the project area is highly developed, there would be minimal opportunities for invasive species to become established. There would be no effect on the potential presence or spread of emerald ash borer and European gypsy moth. Some trees could be lost under the No Action alternative, which might reduce available habitat for these invasive species, other trees would be planted to replace those lost.

If the implementation of ad hoc flood control measures requires in-water work, the transfer of equipment used in the water from one area to another could spread invasive marine plants and animal species if the equipment is not cleaned properly between locations. Therefore, the No Action alternative would result in short-term negligible adverse effects from the potential spread of invasive terrestrial and marine species.

Although ad hoc flood-control measures may reduce the risk of flood damage for specific areas, these measures would not substantially reduce the risk of flooding over the entire 100 Acre Master Plan area in the long term. Construction may be required to address continued flood damage, resulting in additional areas of disturbance. Flood waters would continue to damage and kill vegetation, such as trees, which could lead to the introduction and expansion of invasive plant species that thrive in newly disturbed areas (USDA and University of Georgia 2018). Thus, under the No Action alternative, there could be a long-term negligible adverse effect from the spread of invasive plant species.

Flood Control Segments and Interim Flood Walls (Proposed Action)
Construction of the Proposed Action would temporarily disturb soils and vegetation, creating suitable conditions for the growth and spread of invasive plant species. Equipment used for in-water work could also spread aquatic invasive species into the Fort Point Channel if the equipment is not cleaned properly before entering the channel and after being removed from the channel. The City would follow all conditions in forthcoming CWA permits for in-water work, which would minimize the spread of aquatic invasive species. The Proposed Action would include the placement of sod on top of exposed topsoil on the berms, covering areas of disturbance in which invasives could otherwise become established. Vegetation along the Harborwalk would be regularly maintained by the City, which would prevent the spread of invasives within the project area. No soil or vegetation disturbance would be required to implement or store the deployable flood control measures. Thus, the Proposed Action would result in a negligible short-term effect on the spread of invasive species.

Post-construction, the Proposed Action would reduce the risk of flood damage to existing vegetation, such as trees, within the 100 Acre Master Plan area, resulting in fewer opportunities for invasive plant species to become established. The Proposed Action would therefore have a negligible long-term beneficial effect by reducing the risk of invasive plant species spread. However, the protection of large deciduous trees may also preserve the preferred habitat for emerald ash borer and European gypsy moth in the project area, resulting in a potential negligible adverse effect.

Flood Gate Alternative
The flood gate alternative could result in an adverse short-term minor effects on invasive species. Equipment used for in-water work could spread aquatic invasive species into the Fort Point Channel if the equipment is not cleaned properly before entering the channel and after being removed from the channel. Other construction impacts related to invasive species are not expected. Post construction impacts to marine borne invasive species are expected to be minor as well. The introduction of invasive species once the flood gate alternative is constructed is not expected to be any greater than currently exists for this area of Fort Point Channel.

2.9 Threatened and Endangered Species

No Action
As discussed above, listed species are very unlikely to occur in the Fort Point Channel because the channel is enclosed and highly developed. On September 8, 2021, NMFS confirmed that the presence of listed species in the project area is very unlikely; therefore, the No Action alternative would likely have no effect on listed species.

Flood Control Segments and Interim Flood Walls (Proposed Action)
FEMA requested technical assistance from NMFS on the potential for the Proposed Action to affect the listed species on September 7, 2021 (FEMA 2021). On September 8, 2021, NMFS confirmed that the presence of listed species in the project area is very unlikely because the Fort Point Channel is enclosed and highly developed (NMFS 2021). Additionally, project work would be conducted from land and turbidity controls would be used for outfall flap gate installation, which would further limit any potential effects of the Proposed Action on these species. Thus, FEMA determined the Proposed Action would have "No Effect" on listed species.

Flood Gate Alternative
On September 8, 2021, NMFS confirmed that the presence of listed species in the project area is very unlikely; therefore, the tide gate alternative would have no short-term construction related impacts on listed species. However, it is possible that future habitat changes could be suitable for threatened and endangered species, and therefore the flood gate alternative could have negligible to minor adverse impacts on habitat for listed species. Operation of the flood gates could cause disruptions in bottom habitat, and/or changes in sediment characteristics that could impact listed species.

2.10 Cultural Resources

2.10.1 Standing Historic Structures

No Action
If no federal action is taken, the implementation of ad hoc flood control measures would continue to be constructed. Adjacent commercial, institutional, and residential properties within Fort Point Channel would remain at risk of flood damage with potential damage to historic properties in the neighborhood. Both short- and long-term effects to historic structures would be minor with this alternative.

Flood Control Segments and Interim Flood Walls (Proposed Action)
Under the Proposed Action, there would be no direct physical construction effects to any buildings within the project area. Both historic and non-historic resources within the Fort Point Channel neighborhood would be protected from the 100-year flood event. The construction of these flood mitigation measures will not adversely affect the characteristics of the historic properties within the project area as determined through consultation with the SHPO's office. However, based on the condition of the existing channel walls as assessed during the construction phase, additional work could be necessary to stabilize or repair the walls. To

mitigate the effects of such repairs FEMA would add a special condition to the project that the City of Boston must notify FEMA of the repair work and all repair or replacement work must be in-kind. In-kind shall mean that it is either the same or similar material, and the result shall match all physical and visual aspects, including form, color, and workmanship. Therefore, any new stones or mortar, or repair work on the channel walls will match the existing channel walls in materials, size, and color to minimize the effect to the historic channel walls.

As many parcels to the east of the project area are paved parking lots, minor visual effects would be anticipated. To the west on the Downtown Boston side, the only building with possible views of the project area is the U.S. Post Office General Mail Facility, with its loading docks facing Fort Point Channel. The Gillette World Shaving Headquarters complex, which is located adjacent to the Harborwalk, is also visible from parts of Interstate 93 (expressway) and the railroad tracks to the west.

Construction related effects to historic (standing) structures would be none and there would be minor long-term beneficial effects to historic structures from avoided flood-related damages.

Flood Gate Alternative

The flood gate alternative would be built under the Seaport Blvd bridge, which is a structure that was included in the National Register of Historic Places on 09/10/2004 (BOS.9512). The bridge is also located within the Fort Point Channel Historic District and in the Fort Point Channel District. Activities associated with construction of the flood gates could have short-term minor impacts on the designated structure, as there would be heavy equipment, materials, and other construction debris in the Districts and on the bridge superstructure. Siting of the flood gates under the bridge could also have long-term moderate impacts on the designated structure. The flood gates would be attached to the bridge and would therefore require structural modifications to portions of the bridge superstructure. Operation of the flood gates could also have an impact of the aesthetics of the historic structure, with temporary interruptions in the viewshed. Further Section 106 consultation would be required to proceed with the flood gate alternative.

2.10.2 Archeological Resources

No Action

There are no known archaeological resources within the project area. As such, there would be no short- or long-term effects at the project site from ad hoc flood mitigation projects.

Flood Control Segments and Interim Flood Walls (Proposed Action)

No effect to any archaeological resources is expected resulting from the proposed project because there are no known archaeological resources identified within or adjacent to the project area, and the areas where ground disturbance will occur are previously disturbed as confirmed by the SHPO's office.

The extent of ground disturbance for the Proposed Action would be limited to the construction areas of the earthen berm and elevated Harborwalk. The width of ground disturbance for the berm in Segments 1 and 3 would be limited to 45 feet along the length of the segments with a depth of two feet. This depth is minor and would be likely limited to previously disturbed soils. The ground disturbance for the elevated Harborwalk in Segment 2 would be limited to areas that have been previously disturbed by construction on the existing Harborwalk. Therefore, FEMA has determined that the Proposed Action would unlikely effect any unknown archaeological resources as the soils are previously disturbed and no further identification efforts are necessary. FEMA would condition the project in the event of unanticipated archeological discoveries.

Flood Gate Alternative

Impacts on archaeological resources from construction and operation of the flood gate alternative are not expected, as the ground around the site has been previously disturbed by construction and demolition activities throughout the history of the neighborhood. Previous correspondence with the SHPO's office for the flood control segment alternative confirmed there are no known archaeological resources near or adjacent to the flood control segment alternative. Further consultation with the SHPO office would be required to proceed with the flood gate alternative; however, given the extent of previous ground disturbance, no short- and long-term impacts are expected to archaeological resources.

2.11 Socioeconomic Resources

No Action

Under the No Action alternative, some ad hoc flood control efforts may be implemented that could temporarily reduce access to existing buildings and parking during construction or implementation. Redevelopment that is likely to occur could include flood protection measures in alignment with the 100 Acre Master Plan, such as the raised landscaped berm incorporated into the recently approved 15 Necco Street redevelopment project (City of Boston 2020b). The inclusion of flood-protection measures during redevelopment could temporarily reduce access to existing adjacent buildings and parking during construction and/or during implementation. Thus, there would be a negligible short-term effect on land use as ad hoc measures are constructed and implemented.

In the long term, measures implemented during redevelopment or on an ad hoc basis may reduce the risk of flood damage for the specific areas that they protect; however, these measures would not substantially reduce the risk of flooding for the entire 100 Acre Master Plan area. Some ad hoc measures may be consistent with the Climate Ready Boston plan and the 100 Acre Master Plan, while other measures may not be. However, neither plan envisions an ad hoc patchwork of flood protection measures, and flood protection measures may be constructed in places envisioned for other land uses in the plans. The No Action alternative would not be consistent with existing land-use plans and would have a minor long-term effect on land use in the 100 Acre Master Plan area.

Flood Control Segments and Interim Flood Walls (Proposed Action)

Under the Proposed Action, construction activity would reduce access to existing surface parking in the project vicinity and the Harborwalk, as work areas would be blocked off. Alternative routing for the Harborwalk would be provided, as needed, and access to the Gillette Pump House and manufacturing facility would be maintained. Some areas that are currently paved and used as parking lots would be converted to flood protection structures and open space. Deployment of the interim flood control measures would temporarily require street closures, which could reduce access to streets and buildings directly adjacent to closures. However, this would only occur during flooding events when access would already be reduced and would not alter current land use. Therefore, there would be minor short-term adverse effects from reduced access to existing buildings and streets directly adjacent to the project site during construction and from deployment of the interim flood control measures during floods.

Post construction, some surface parking areas would be converted to the mixed berm and floodwall feature. The Proposed Action would reduce the risk of flood hazards in the 100 Acre Master Plan area. The mixed berm/floodwall is a component of the adopted 100 Acre Master Plan and is consistent with the Climate Ready Boston plan. The Proposed Action would enhance and maintain the Harborwalk, an existing public space, consistent with the 100 Acre Master Plan. Thus, the Proposed Action would result in a moderate long-term benefit by implementing a substantial component of adopted land use plans that enhance recreational resources, open space, and increase South Boston's resilience to climate change.

Flood Gate Alternative

Construction of the flood gate alternative would have short-term moderate impacts to socioeconomic resources, as work areas around the Seaport Blvd. bridge would have to be blocked off. Alternative routing for Seaport Blvd. would be provided, although there would be a prolonged period of disruption to traffic for the duration of construction. This would reduce access to streets and buildings directly adjacent to the closures.

Post construction, the flood gate alternative would provide moderate long-term benefits to areas around Fort Point Channel resulting from reduced coastal flooding. Commercial and residential socioeconomic resources around the channel would benefit from reduced disruptions and damages caused by flooding. During closure of the flood gates there could be adverse impacts on surrounding communities from reduced water quality in the channel, however, this would be expected to be temporary and minor.

2.12 Noise

No Action

Under the No Action alternative, some ad hoc flood control efforts may be implemented that could temporarily increase noise levels during construction. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, the 100 Acre Master Plan area would remain at risk of flooding, which could result in damage that must be repaired. Construction activities to repair flood damage would temporarily increase noise levels in the immediate vicinity of the work, but the effects would not extend very far because of the urban nature of South Boston. Any construction that may occur would not exceed EPA standards or regulatory thresholds for noise established by the Federal Highway Administration, the Occupational Safety and Health Administration, and the City. There would be a negligible long-term adverse effect because the continued risk of flooding would periodically generate associated construction noise from repairs.

Flood Control Segments and Interim Flood Walls (Proposed Action)
Under the Proposed Action, construction activities would temporarily increase noise levels in the project vicinity but would not exceed EPA standards or regulatory thresholds established by the Federal Highway Administration, the Occupational Safety and Health Administration, and the City. Adherence with these standards would minimize sound exposure and ensure noise levels would not cause hearing impairment or permanent damage for workers. Based on the type of construction equipment proposed for use, construction noise would be expected to attenuate with distance to the background noise levels expected in an urban commercial/industrial area within 500 feet of the equipment. No noise sensitive receptors are present within the project vicinity (within 500 feet). Therefore, there would be a negligible short-term increase in noise levels during construction. Post-construction, noise levels would return to pre-construction levels and the risk of flooding would be reduced thus reducing occasional increases in noise from flood-related repairs. Deployment of interim flood control measures would not produce noise levels that exceed the existing ambient noise levels. Therefore, the Proposed Action would have a negligible long-term beneficial effect on noise levels.

Flood Gate Alternative
Noise impacts from the flood gate alternative associated with construction would be temporary and minor. Noise levels would not exceed EPA standards or regulatory thresholds established by the Federal Highway Administration, the Occupational Safety and Health Administration, and the City of Boston. Adherence with these standards would minimize sound exposure and ensure noise levels would not cause hearing impairment or permanent damage for workers. Based on the type of construction equipment proposed for use, construction noise would be expected to attenuate with distance to the background noise levels expected in an urban commercial/industrial area within 500 feet of the equipment.

Post construction, noise impacts would be negligible to minor and temporary during periods when the flood gates are deployed. Noise levels associated with equipment required to close the gates, generators, and pumps would not exceed EPA standards or regulatory thresholds established by the Federal Highway Administration, the Occupational Safety and Health Administration, and the City of Boston. Adherence with these standards would minimize sound exposure and ensure noise levels would not cause hearing impairment or nuisance noise for the public.

2.13 Transportation

No Action
Under the No Action alternative, some ad hoc flood control efforts may be implemented that could require street and sidewalk closures. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, these measures would not substantially reduce the risk of flooding for the entire 100 Acre Master Plan area in the long term. Flooding would continue to inundate the Harborwalk and streets, resulting in roadway and sidewalk closures, rerouting of transit services, and could inhibit use of the rail yard (Boston Harbor Now 2021). Construction for flood-related repairs may result in increases in traffic and congestion,

road closures, or disrupted transit services that could worsen with sea level rise. Therefore, periodic construction activities for ad hoc flood control measures would have minor short-term effects on motorized and nonmotorized transportation. Continued flooding and flood damage that requires repair would result in a minor long-term adverse effect from road closures, transit service cancellation, and rerouting of both motorized and nonmotorized transportation modes.

Flood Control Segments and Interim Flood Walls (Proposed Action)

Under the Proposed Action, construction activities for the mixed berm and floodwall features would require the temporary closure and rerouting of Harborwalk users but would not require street closures. Construction for interim flood control measures would require temporary roadway and sidewalk closures in proximity to the work. Construction equipment and materials would be staged and stored on existing surface parking lots off Binford Street, which may reduce the availability of parking. Vehicles, equipment, and personnel would access staging sites and the project area via A Street and Binford Street. The project would likely require numerous trucks to transport materials such as concrete blocks and earth and thus could result in additional traffic on nearby streets. Although over 11,000 cubic yards of material would need to be imported, it would be brought to the site over the course of the construction (approximately 2 years), and the truck traffic to and from the site would not be noticeable in the average daily traffic on surrounding streets. Trucks would be staged off existing streets so that there would not be an increase in congestion from trucks waiting to access the construction zone. No rerouting of transit services or rail services would occur. Therefore, the Proposed Action would have a minor short-term effect on transportation from trail closures and rerouting, reduced available parking, and some additional traffic during construction.

Deployment of the interim flood control measures would temporarily require street and sidewalk closures, which would affect both motorized and non-motorized access. Street closures could also reduce emergency response times but would only occur during flooding events when streets would likely already be closed because of flood water inundation. Post-construction, the Proposed Action would reduce the risk of flooding in the 100 Acre Master Plan area that currently results in repeated street closures and reduced transit services. Rail services would not be affected by or benefit from the Proposed Action. Therefore, the Proposed Action would have a minor long-term beneficial effect from reduced risk of trail, road, and transit closures caused by flooding and flood damage.

Flood Gate Alternative

Construction of the flood gate alternative would have short-term moderate impacts to transportation, as work areas around the Seaport Blvd. bridge would have to be blocked off. Alternative routing for Seaport Blvd. would be provided, although there would be a prolonged period of disruption to traffic for the duration of construction. This would reduce access to streets and buildings directly adjacent to the closures. Equipment and materials for construction would be also staged and stored on existing surface parking lots and roadways in the vicinity of the bridge, which could reduce the availability of parking.

Post construction, the flood gate alternative would eliminate marine access to/from Fort Point Channel during periods when the flood gates are deployed. Affected parts of Fort Point Channel where vessels currently dock include the Atlantic Wharf Docks, the Fort Point Pier, and the Children's Wharf facility. In the near-term these impacts would be temporary and infrequent; however, as sea levels rise and storm frequency increases, disruptions to marine traffic would occur more often. Overall, the flood gate alternative would present temporary and minor impacts to marine transportation.

2.14 Public Services and Utilities

No Action

Under the No Action alternative, some ad hoc flood control efforts may be constructed; however, they would be unlikely to disrupt or increase demand on public services and utilities. Thus, there would be no short-term effect. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, these measures would not substantially reduce the risk of flooding for the entire 100 Acre Master Plan area in the long term. Flooding could continue to disrupt electric services; overflow combined sewer lines, causing water quality effects and potentially backing up pipes; and damage drainage outflows. Continued flooding could require repairs that may disrupt or increase demand on public services and utilities. Therefore, there would be a minor long-term effect on public services and utilities from flood-related damage and disruptions.

Flood Control Segments and Interim Flood Walls (Proposed Action)

Under the Proposed Action, construction activities would include the temporary support of utilities running along the Harborwalk to ensure that no utilities would be disrupted during project implementation. The construction equipment would be self-contained and thus not increase demand on utilities and services. Underground electrical lines that power Harborwalk lighting would be relocated as needed for project implementation but would not affect Harborwalk users, as they would be rerouted during construction. Interim flood control measure implementation would not disrupt or increase demand on public services or utilities and thus would have no effect. Fourteen drainage outfalls in the project area would be fitted with backflow preventers to inhibit seawater intake and might be replaced if the pipes are found to be aged and/or damaged. The backflow preventers would reduce the risk of the combined stormwater pipes from backing up in the event of high water and flooding in the channel. Ground disturbance would not reach depths that would affect the buried I-90 turnpike or supportive slurry walls. Overall, there would be a negligible short-term effect on public services and utilities during construction activities.

Post construction, the Proposed Action would not require ongoing use of public services or utilities, and thus no long-term increase in demand for services and utilities would occur. Deployment of interim flood control measures would not disrupt or alter public services and utilities, as they would not be attached where utilities are located and would not require connection to utilities to operate. The Proposed Action would reduce the risk of flooding and flood related damage, reducing potential disruption to public services and utilities. Therefore, under the Proposed Action, there would be a minor long-term beneficial effect from the reduced risk of flooding and associated power outages and sewage backup.

Flood Gate Alternative

Construction of the flood gate alternative would be unlikely to cause disruptions in public utilities, as backup and redundant services would be put into place prior to construction. Utilities running under the current Seaport Blvd bridge would be relocated or elevated as needed during project construction and would therefore cause no interruptions in service. During periods when the bridge is closed, there would be an increased demand on public services, as police details would be needed to direct traffic and ensure safety of the workers. Impacts to the public services would be temporary and minor.

Post construction the flood gate alternative would have minor long-term benefits on public services and utilities. During periods when the gates are closed and flooding risks along the Fort Point Channel are eliminated, there would be a decreased demand on police, fire, and emergency response crews in the areas served by the flood gates. Public utilities would also be protected from damages caused by flooding. Overall, the flood gate alternative would have a positive and minor long-term benefit on public services and utilities.

2.15 Public Health and Safety

No Action

Under the No Action alternative, construction of ad hoc flood control efforts could affect emergency response times from construction-related detours or lane closures. However, potential closures would be temporary, and rerouting would be provided, resulting in a negligible short-term effect on response times. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, these measures would not substantially reduce the risk of flooding over the entire 100 Acre Master Plan area in the long term. Flooding would continue to occur in the 100 Acre Master Plan area, and it could be exacerbated by sea level rise, potentially effecting a larger portion of the South Boston area over time. Flooding would continue to require road closures, which could increase emergency response times, cause power outages, and back up sewage lines, thus exposing people to health hazards. Therefore, there would be a minor recurring long-term effect on public health and safety from periodic flooding.

Flood Control Segments and Interim Flood Walls (Proposed Action)

Under the Proposed Action, both the berm and floodwall construction area and the staging areas would be located away from streets on existing parking lots. Construction would not require street closures that could increase emergency response times. Construction of the interim flood control measures would require the temporary closure of streets and sidewalks in the vicinity of the work. Construction activities would not require police or emergency vehicle presence. Thus, the short-term effect on public health and safety would be none.

Post construction, the Proposed Action would reduce the risk of flooding and associated public health and safety concerns such as the rerouting of emergency vehicles around flooded areas, backup of combined sewer systems, and other health hazards from flooding. Deployment of the interim flood control measures would temporarily require street closures but would only occur during flooding events when streets would likely already be closed for safety. Therefore, there would be a minor long-term beneficial effect from the reduced risk of flooding and associated public health and safety concerns.

Flood Gate Alternative

Construction of the flood gate alternative would have a negligible to minor impact on public health and safety. Construction activities could affect emergency response times from construction-related detours or lane closures. However, potential closures would be temporary, and rerouting would be provided, resulting in a negligible to minor short-term effects on response times. Because the project area is highly urbanized, construction may encounter previously unknown underground sources of contamination with risk of exposure to the public. Construction protocols would be required by the City to notify a Licensed Site Professional in the event the project encounters unexpected contamination, and therefore risks to the public would be minor. Safety of the construction workers would be governed by the Occupational Safety and Health Administration and impacts to public safety would be short-term and negligible to minor.

Post construction the flood gate alternative would have moderate long-term benefits on public health and safety. Commercial and residential facilities around the Fort Point Channel would be protected from flooding during current day and future flooding events. During periods when the gates are closed and flooding risks along the Fort Point Channel are eliminated, there would be a benefit to public health and safety in the areas served by the flood gates. Depending on deployment times and water levels in the channel, the flood gates would improve public health by facilitating drainage of upland areas through the CSO system into the channel. Current risks associated with backflow through the CSO system during periods of high water would be reduced, and therefore public health concerns would be alleviated.

2.16 Environmental Justice

No Action

Under the No Action alternative, some ad hoc flood control efforts may be implemented that would produce noise and emissions. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, these measures would not substantially reduce the risk of flooding for the entire 100 Acre Master Plan area in the long term. Since there are no environmental justice communities in project area, they would not be affected. There are several environmental justice populations further inland of the proposed project, in the South Boston area, however. In extreme events, which are predicted to increase with climate change, these communities may experience flooding and storm damage if no action were taken.

Flood Control Segments and Interim Flood Walls (Proposed Action)

Under the Proposed Action, construction noise and activity would not be expected to effect environmental justice populations, as they are not present within hearing distance of the project area. After construction, environmental justice populations may see a minor benefit from the added storm and flood protection offered by the project as well as increased public open space along the channel, especially for populations that work in or travel through affected areas.

Flood Gate Alternative

The flood gate alternative would result in temporary and minor impacts to environmental justice populations during project construction. Noise, construction related road closures, increased demand on public services, and possible health and safety issues associated with construction activities could present minor impacts to environmental justice populations living and working on the west side of the Fort Point Channel. After construction of the flood gate alternative environmental justice populations along the west side of the Fort Point Channel would see a long-term moderate benefit. The flood gates would eliminate coastal flood risks to these neighborhoods under current and future flood scenarios.

2.17 Hazardous Materials

No Action

Under the No Action alternative, some ad hoc flood control efforts could occur, resulting in the potential for construction-related hazardous waste spills that would be avoided through compliance with federal, state, and local laws. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, these measures would not substantially reduce the risk of flooding over the entire 100 Acre Master Plan area in the long term. Flooding could affect RCRA-regulated sites within the project vicinity and pose a risk to human health and safety by causing accidental releases of hazardous materials. Floodwaters that inundate streets and buildings could contain hazardous substances such as commercial and industrial chemicals (Brennan et al. 2021). Receding floodwaters could carry hazardous wastes and materials into the Fort Point Channel. Thus, there would be a minor long-term adverse effect from the continued risk of flooding and damage that could lead to the dispersal of hazardous materials.

Flood Control Segments and Interim Flood Walls (Proposed Action)

The Proposed Action would include the use of mechanical equipment, such as graders and excavators, which could release fuels, oils, and lubricants through inadvertent leaks and spills. Construction activities would be temporary, and the use of equipment in good condition, while following BMPs and conditions specified in the NPDES permit, would reduce the threat of leaks and spills. Therefore, there would be a negligible short-term effect from the use of vehicles and equipment and the associated risk of hazardous leaks and spills. The Proposed Action would not include any work on or in the Gillette manufacturing facility building and all of the work on the Gillette property would occur within the existing footprint of the Harborwalk. Contamination risks during construction will be minimized through the development and implementation of Soil and Groundwater Management Plans and Health and Safety Plans, if required under the Massachusetts Contingency Plan (MCP). Therefore, there would be no potential for the release of hazardous materials located within the building or negligible risk of releases onsite. Deployment of interim flood control measures would not affect RCRA- or MCP-regulated sites, as the flood control measures would not direct floodwaters to those sites or be connected to them in any way. Post-construction, the Proposed Action would reduce the risk of flooding and associated potential damage to facilities regulated by the RCRA and sites regulated by the MCP, reducing the potential for flood-related spills and release of hazardous materials. Thus, the Proposed Action would have a minor long-term beneficial effect from the reduced risk of flood-related release of hazardous waste and damage to RCRA-regulated facilities and MCP-regulated sites.

Flood Gate Alternative

Under the flood gate alternative there would be temporary and minor to negligible impacts associated with exposure and/or release of hazardous materials. Equipment needed for construction could release fuels, oils, and lubricants through inadvertent leaks and spills. Because the project area is highly urbanized, construction may encounter previously unknown underground sources of contamination with risk of exposure to the public. However, adverse impacts from these scenarios would be controlled by well establish construction protocols designed to minimize impacts to the public and environment.

Post construction the flood gate alternative would result in minor to negligible long-term impacts associated with exposure and/or release of hazardous materials. Mechanical equipment used to operate the flood gates could potentially malfunction and release fuels, oils, and lubricants. An operations and maintenance plan and spill continency plan would be required by the State as part of the permitting process, and therefore the potential impacts are expected to be temporary and minor. Additionally, the flood gate alternative would reduce the risk of flooding and associated potential damage to facilities in the Fort Point Channel area regulated by the RCRA and MCP, reducing the potential for flood-related spills and release of hazardous materials. Overall, the flood gate alternative would have a minor long-term beneficial effect from the reduced risk of flood-related release of hazardous waste and damage to RCRA-regulated facilities and MCP-regulated sites.

2.18 Environmental Impact Summary

Table D-2 provides a summary of the short- and long-term environmental, cultural, and socioeconomic impacts associated with the project alternatives based on the previous discussion (color key shown in D-3). Adverse short-term impacts are greater with the flood gate alternative, and adverse long-term impacts are greater with both the no action and flood gate alternatives. Both the Proposed Action and flood gate alternative have greater long-term benefits than the no action alternative. When considered together, the flood control segments and interim flood walls alternative (Proposed Action) presents the least short- and long-term impacts while achieving socioeconomic benefit criteria and was therefore selected as the Proposed Action for the City of Boston's Resilient Fort Point Channel Infrastructure Project.

Table D-2. Summary of Project Impacts.

	No Action		Proposed Action		Flood Gate Alternative	
Term	Short-Term	Long-Term	Short-Term	Long-Term	Short-Term	Long-Term
Topography and Soils	*None/ Negligible*	*Negligible*	*Negligible/ Minor*	*None/ Negligible*	*Negligible/ Minor*	*None/ Negligible*
Air Quality	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Negligible/ Minor*	*Negligible*
Water Quality	*Negligible*	*Negligible*	*Negligible/ Minor*	*Negligible*	*Minor*	*Minor/ Moderate*
Floodplains	*Minor*	*Minor/ Moderate*	*Minor*	*Negligible/ Minor*	*Minor*	*Moderate*
Wetlands	*Negligible*	*Minor*	*Negligible*	*Moderate*	*Minor*	*Minor*
Vegetation	*Negligible*	*Negligible*	*Negligible/ Minor*	*Negligible*	*None*	*Minor*
Wildlife and Fish	*Negligible*	*Negligible*	*Negligible/ Minor*	*Negligible*	*Negligible/ Minor*	*Moderate*
Invasive Species	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Minor*	*Minor*
Threatened and Endangered Species	*None*	*None*	*None*	*None*	*None*	*Negligible/ Minor*
Historic Structures	*Minor*	*Minor*	*None*	*Minor*	*Minor*	*Moderate*
Archeological Resources	*None*	*None*	*None*	*None*	*None*	*None*
Socioeconomic Resources	*Negligible*	*Minor*	*Minor*	*Moderate*	*Moderate*	*Moderate*
Noise	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Minor*	*Negligible/ Minor*
Transportation	*Minor*	*Minor*	*Minor*	*Minor*	*Moderate*	*Minor*
Public Services and Utilities	*None*	*Minor*	*Negligible*	*Minor*	*Minor*	*Minor*
Public Health and Safety	*Negligible*	*Minor*	*None*	*Minor*	*Negligible/ Minor*	*Moderate*
Environmental Justice	*None*	*Negligible*	*None*	*Minor*	*Minor*	*Moderate*
Hazardous Materials	*Negligible*	*Minor*	*Negligible*	*Minor*	*Negligible/ Minor*	*Minor*

Table D-3. Color Key for Summary of Project Impacts.

	Impact	Benefit
Major		
Moderate		
Minor/Negligible		
None		

3.0 Cumulative Effects

The assessment of impacts and mitigation measures discussed in the preceding section considered individual impacts of the project alternatives on environmental, cultural, and socioeconomic resources. Cumulative effects of the Proposed Action are addressed in this section. Cumulative effects represent the "effect on the environment which results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 C.F.R. 1508.7 pre-2020). In the context of evaluating the scope of a proposed action, direct, indirect, and cumulative effects must be considered.

The City's Resilient Fort Point Channel Infrastructure Project is two of eight proposed flood mitigation measures at the Fort Point Channel as part of an ongoing effort through the City of Boston's Climate Ready Boston plan (Green Ribbon Commission 2016). The mitigation measures comprise three near-term and five mid-term projects. The three near-term projects, anticipated to be completed by 2025, include the flood control segments and interim flood walls (Proposed Action), as well as two additional projects. The second project includes the partially completed flood mitigation features by the Alexandria Real Estate Equities Inc. property. This project includes additional planned improvements between the Alexandria Real Estate Equities Inc. improvements and the northern end of the Proposed Action. The Alexandria Real Estate Equities flood defense system would connect to the Proposed Action by having matching design flood elevations and would be completed during or shortly after the construction of the Proposed Action. The third project includes additional mitigation measures at the Arcade along Fort Point Channel between Summer Street and the completed portion of the Alexandria Real Estate Equities Inc. development mitigation measures. Designs have not been completed for this portion, but it has an anticipated completion date of 2025.

The remaining five mitigation measure projects are not anticipated to be completed until 2040. Three of the projects are located along the Fort Point Channel between Seaport Boulevard and Summer Street at Martin's Park, the Boston Children's Museum, and between Congress Street and Summer Street. The fourth project includes a proposed stormwater park space east and adjacent to the northern section of the Proposed Action. The park would likely extend up to Hull Road between the National Alexandria Real Estate Equities Inc. development and the Gillette property. The fifth project would be located on the south end of the Fort Point Channel on the south side of Dorchester Avenue. Because the projects are not anticipated to begin the design phase until 2025, there is insufficient information to provide more than a generalized evaluation that the projects would contribute to reductions in flooding in South Boston and would make the area more resilient against sea level rise. Any construction-related effects would be separated temporarily and spatially, and there would not be any cumulative effects related to short-term construction activities. Therefore, they are not considered in the cumulative effect analysis.

The three near-term projects are designed as stand-alone improvements to reduce flooding within a defined area and each project has independent utility. However, the projects as a whole are expected to be physically connected once complete and may have a cumulative effect on environmental resources throughout the 100 Acre Master Plan Area. Water quality and floodplain resources could be affected when considering all the projects as a whole.

- **Water Quality** – Implementation of the Proposed Action in combination with the other near-term projects would reduce the risk of flood damage to a larger area that includes the area south of Summer Street to the 100 Acre Master Plan area. The flood control measures would likely further reduce the potential to transport debris, sediments, and contaminants such as raw sewage directly into Fort Point Channel. The Alexandria Real Estate Equities Inc. flood control measures would be at the same elevation as the Proposed Action and connect to it. This would potentially eliminate a source of runoff when flooding occurs, as the connected projects would prevent runoff from a larger area. The project at the arcade may also connect at the northern end of the Alexander Real Estate Equities Inc. flood berm, potentially reducing further runoff from flood related wash. Therefore, there would be a negligible, cumulative, long-term beneficial effect on water quality.

- **Floodplain** – The other near-term projects in addition to the Proposed Action would be likely to provide protection to a larger area that includes the infrastructure between Summer Street and the Gillette property that could reduce further inland flooding, as they would likely be linked together. The extra flood protection would likely reduce the amount of runoff and debris entering the floodplain. Therefore, there would be a minor long-term beneficial effect on the protection of infrastructure in the floodplain and a negligible long-term beneficial effect on the health of the floodplain.

Within the 100 Acre Master Plan area, Related Beal submitted a Letter of Intent to construct an approximately 6.5-acre residential and commercial building at the 244–284 A Street lot (Boston Planning and Development Agency 2021). There could be concurrent construction occurring with this project and the Proposed Action, which could cause a short-term effect on traffic, noise, and temporary air emissions in the area. However, the effect would be negligible because of the built-up urban area already contributing to those resources. The proposed development would be built regardless of whether the Proposed Action would take place and would likely have its own flood mitigation measures. The project site would likely not affect the harbor trail, as the construction would remain within the footprint of the 6.5-acre lot. As a result, there would be no long-term cumulative effect because of the 244–284 A Street development, as there would be no connecting infrastructure with the Proposed Action.

4.0 References

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Section E

Performance Standards Compliance Narrative

E. PERFORMANCE STANDARDS COMPLIANCE NARRATIVE

The proposed project is located within the jurisdiction of the Wetlands Protection Act, M.G.L. c. 131, s. 40 and Boston wetlands regulations. As such, all work for the proposed project was designed to comply with the requirements of the State and local wetland regulations (310 CMR 10.00, Boston Wetlands Regulations, and Boston Wetlands Ordinance). All attempts have been made to design a project that will have the least impact, both temporary and permanent, on the site's resources. The project will have impacts on the following Wetland Resources:

- Coastal Bank

<u>Excerpts from 310 CMR 10.30 – Coastal Bank</u>

(2) <u>Definition</u>. Coastal Bank means 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.

WHEN A COASTAL BANK IS DETERMINED TO BE SIGNIFICANT TO STORM DAMAGE PREVENTION OR FLOOD CONTROL BECAUSE IT SUPPLIES SEDIMENT TO COASTAL BEACHES, COASTAL DUNES OR BARRIER BEACHES, 310 CMR 10.30(3) through (5) SHALL APPLY:

(3) No new bulkhead, revetment, seawall, groin or other coastal engineering structure shall be permitted on such a coastal bank except that such a coastal engineering structure shall be permitted when required to prevent storm damage to buildings constructed prior to the effective date of 310 CMR10.21 through 10.37 or constructed pursuant to a Notice of Intent filed prior to the effective date of 310 CMR 21 through 10.37 (August 10, 1978), including reconstructions of such buildings subsequent to the effective date of 310 CMR 10.21 through 10.37, provided that the following requirements are met:

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

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

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

The coastal bank present at the proposed project site does not supply sediment to any surrounding coastal beaches, coastal dunes, or barrier beaches. In addition, since the majority of the coastal bank makes up the wall of Fort Point Channel, flood protection offered by the bank is limited by its existing height and leaves the project area vulnerable to flooding and damage during storms. The proposed flood control segments and interim flood walls are proposed in order to provide increased storm damage protection to the Fort Point Channel area, which is a registered historic area with many structures predating August 10, 1978. As there are no nearby coastal beaches, the proposed project will not have any adverse effects on beaches by altering wave action. Due to the high risk of severe flooding and damage to the

Fort Point Channel area, the proposed coastal engineering structures are necessary as opposed to another method of flood protection, which may not withstand the storm conditions present at the site or would have greater adverse effects and fewer benefits.

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

The coastal bank present at the project site does not serve as a sediment source to nearby coastal beaches or land subject to tidal action.

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

The proposed project does not include any new buildings. The majority of the coastal bank present at the project site is comprised of large stones cemented together to form the wall of Fort Point Channel and is not made up of a natural, undisturbed environment, and is therefore not experiencing significant erosion. The proposed coastal engineering structures will offer increased flood protection to existing highly developed urban areas.

WHEN A COASTAL BANK IS DETERMINED TO BE SIGNIFICANT TO STORM DAMAGE PREVENTION OR FLOOD CONTROL BECAUSE IT IS A VERTICAL BUFFER TO STORM WATERS, 310 CMR 10.30(6) through (8) SHALL APPLY:

(6) Any project on a coastal bank or within 100-ft. landward of the top of such coastal bank shall have no adverse effects on the stability of the coastal bank.

The majority of the coastal bank is currently made up of large stones cemented together to form the wall of Fort Point Channel and is not made up a natural, undisturbed environment. Due to the high stability of the existing coastal bank, the proposed project will not negatively affect stability and will provide an increased vertical buffer against storm waters.

(7) Bulkheads, revetments, seawalls, groins or other coastal engineering structures may be permitted on such a coastal bank 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.

The coastal bank present at the proposed project site does not supply sediment to any surrounding coastal beaches, coastal dunes, or barrier beaches. In addition, since the majority of the coastal bank makes up the wall of Fort Point Channel, flood protection offered by the bank is limited by its existing height and leaves the project area vulnerable to flooding and damage during storms. The proposed flood control segments and interim flood walls are proposed in order to provide increased storm damage protection to the Fort Point Channel area.

> *(8) Notwithstanding the provision of310 CMR 10.30(3) through (7), no project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.*

The proposed project area does not include any specified habitat site of rare vertebrate or invertebrate species.

<u>Wetlands Protection and Climate Adaptation Ordinance, City of Boston Code of Ordinances, Chapter 7-1.4</u>

Boston's Wetlands Protection and Climate Adaptation Ordinance, created in December 2019, created additional resource areas that fall within the Conservation Commission's jurisdiction, including Waterfront Area and Coastal Flood Resilience Zone. The proposed project is located within both of these resource areas. Local regulations for these and other resource areas included in the ordinance are currently being developed. The proposed project will not result in any adverse impact on the functions provided by these additional resource areas, rather it will increase the level of protection from flooding and storm damage to inland areas taking climate change into account. The Boston Wetlands Protection and Climate Adaptation Ordinance was specifically enacted in order to accommodate and encourage projects such as these.

Section F

Review of Consistency w/ CZM Policies

F. REVIEW OF CONSISTENCY WITH CZM POLICIES

The Proponent's proposed flood control segments and interim flood walls project complies with the enforceable program policies of the Massachusetts approved coastal management program and will be conducted in a manner consistent with such policies.

The proposed project complies with the following Coastal Zone Management policies:

COASTAL HAZARDS

COASTAL HAZARD POLICY #1 - Preserve, protect, restore, and enhance the beneficial functions of storm damage prevention and flood control provided by natural coastal landforms, such as dunes, beaches, barrier beaches, coastal banks, land subject to coastal storm flowage, salt marshes, and land under the ocean.

> **Natural coastal landforms within the project area are limited to coastal bank and land subject to coastal storm flowage. The bank, although technically meeting the definitions of a coastal bank, consists primarily of the wall of the channel and is made of large stones. There is one small section of coastal bank that is slightly more natural, made of stones as well as gravel and some vegetation such as grass. This section contains an outfall and concrete headwall structure. Although the current coastal bank is higher than the average water level within the channel, storm surge can result in significantly elevated water levels higher than the existing coastal bank. Events during which water levels exceed the elevation of the current coastal bank will become more frequent with sea level rise. Once storm surge has topped the coastal bank, the inland is completely flat, offering no flood protection. Land subject to coastal storm flowage within the project area is primarily impervious surfaces such as parking lots, and therefore flood water attenuation is limited. The proposed project will help to preserve and protect the remaining function of the natural landforms within the project area, while also providing significantly more flood protection for the project area, which includes significant development and a high population density.**

COASTAL HAZARD POLICY #2 - Ensure construction in water bodies and contiguous land areas will minimize interference with water circulation and sediment transport. Flood or erosion control projects must demonstrate no significant adverse effects on the project site or adjacent or downcoast areas.

> **In order to minimize sediment transport, construction of the proposed project will not include placing any fill within the channel. All construction activities will take place from land and will not require utilizing the channel for construction access, including the proposed work on the existing outfalls. The construction contractor will use erosion control and sedimentation measures, such as silt curtains, to isolate the construction area, and during work on the outfalls will use turbidity curtains to**

minimize sedimentation. Overall, the proposed project would have a small long-term beneficial effect on water quality compared with existing conditions in the Fort Point Channel by reducing the spread of flood waters, reducing parking lot areas and associated non-point source pollution, increasing vegetative filtration, and improving stormwater drainage in the project area.

COASTAL HAZARD POLICY #3 - Ensure that state and federally funded public works projects proposed for location within the coastal zone will:

- Not exacerbate existing hazards or damage natural buffers or other natural resources.
- Be reasonably safe from flood and erosion-related damage.
- Not promote growth and development in hazard-prone or buffer areas, especially in velocity zones and ACECs.
- Not be used on Coastal Barrier Resource Units for new or substantial reconstruction of structures in a manner inconsistent with the Coastal Barrier Resource/Improvement Acts.

The proposed project will not result in exacerbation of existing hazards or in any damage to natural buffers or resources in the project area, such as the coastal bank. The proposed project will result in increased protection against the existing flood hazard present within the project area. Proposed flood control measures have also been designed to withstand reasonably predicted flood and erosion-related damage. For instance, flood control segment 2 will be compromised of granite and will therefore be highly resistant to erosion and flood damage. The proposed flood control measures will not directly contribute to any further development within the project area, but rather is primarily designed to protect existing development and infrastructure. The project does not involve Coastal Barrier Resource Units.

COASTAL HAZARD POLICY #4 - Prioritize acquisition of hazardous coastal areas that have high conservation and/or recreation values and relocation of structures out of coastal high hazard areas, giving due consideration to the effects of coastal hazards at the location to the use and manageability of the area.

NA – This project does not involve land acquisition or structure relocation.

<u>ENERGY</u>

ENERGY POLICY #1 - For coastally dependent energy facilities, access siting in alternative coastal locations. For non-coastally dependent energy facilities, assess siting in areas outside of the coastal zone. Weigh the environmental and safety impacts of locating proposed energy facilities at alternative sites.

NA – This project does not involve energy facilities.

ENERGY POLICY #2 - Encourage energy conservation and the use of alternative sources such as solar and wind power in order to assist in meeting the energy needs of the Commonwealth.

NA – This project does not involve energy facilities.

GROWTH MANAGEMENT

GROWTH MANAGEMENT POLICY #1 - Encourage sustainable development that is consistent with state, regional, and local plans and supports the quality and character of the community.

NA – This project does not involve community development. The project is consistent with existing plans.

GROWTH MANAGEMENT POLICY #2 - Ensure that state and federally funded infrastructure projects in the coastal zone primarily serve existing developed areas, assigning highest priority to projects that meet the needs of urban and community development centers.

The proposed flood control segments and interim flood walls will primarily serve to protect existing development and infrastructure within the Fort Point/South Boston neighborhood area, which is a densely populated urban area that is highly vulnerable to coastal flooding.

GROWTH MANAGEMENT POLICY #3 - Encourage the revitalization and enhancement of existing development centers in the coastal zone through technical assistance and financial support for residential, commercial and industrial development.

NA – This project does not involve economic or community development.

HABITAT

HABITAT POLICY #1 - Protect coastal, estuaries, and marine habitats - including salt marshes, shellfish beds, submerged aquatic vegetation, dunes, beaches, barrier beaches, banks, salt ponds, eelgrass beds, tidal flats, rocky shores, bays, sounds, and other ocean habitats – and coastal freshwater streams, ponds, and wetlands to preserve critical wildlife habitat and other important functions and services including nutrient and sediment attenuation, wave and storm damage protection, and landform movement and processes.

Coastal habitats within the project area are limited, although there is a coastal bank present. Because the current coastal bank does not provide sufficient flood protection, the proposed project has been designed to address the significant and growing flood hazard within the project area. No new fill is proposed within the Fort Point Channel. The proposed work will take place in a highly urban environment and

will not result in any damage to natural landforms, their functions, or habitat they provide for wildlife.

HABITAT POLICY #2 – Advance the restoration of degraded or former habitats in coastal and marine areas.

Coastal habitat within the project area is limited due to the urban nature of the South Boston area, which is highly developed. While the proposed project does not directly contribute to the restoration of the coastal bank present, the increased flood protection from the proposed flood walls will prevent further degradation of any inland natural environment that results from flooding.

OCEAN RESOURCES

OCEAN RESOURCES POLICY #1 - Support the development of sustainable aquaculture, both for commercial and enhancement (public shellfish stocking) purposes. Ensure that the review process regulating aquaculture facility sites (and access routes to those areas) protects significant ecological resources (salt marshes, dunes, beaches, barrier beaches, and salt ponds) and minimizes adverse effects on the coastal and marine environment and other water-dependent uses.

NA – This project does not involve aquaculture.

OCEAN RESOURCES POLICY #2 – Except where such activity is prohibited by the Ocean Sanctuaries Act, the Mass. Ocean Management Plan, or other applicable provision of law, the extraction of oil, natural gas, or marine minerals (other than sand and gravel) in or affecting the coastal zone must protect marine resources, marine water quality, fisheries and navigational, recreational and other uses.

NA – This project does not involve oil, gas, or mineral extraction.

OCEAN RESOURCES POLICY #3 - Accommodate offshore sand and gravel extraction needs in areas and in ways that will not adversely affect marine resources, navigation, or shoreline areas due to alteration of wave direction and dynamics. Extraction of sand and gravel, when and where permitted, will be primarily for the purpose of beach nourishment or shoreline stabilization.

NA – This project does not involve offshore sand or gravel extraction.

PORTS AND HARBORS

PORTS AND HARBORS POLICY #1 - Ensure that dredging and disposal of dredged material minimize adverse effects on water quality, physical processes, marine productivity and public health and take full advantage of opportunities for beneficial re-use.

NA – The project does not involve dredging or disposal of dredged material.

PORTS AND HARBORS POLICY #2 - Obtain the widest possible public benefit from channel dredging and ensure that Designated Ports Areas and developed harbors are given highest priority in the allocation resources.

NA – The project does not involve channel dredging.

PORTS AND HARBORS POLICY #3 - Preserve and enhance the capacity of Designated Port Areas (DPAs) to accommodate water-dependent industrial uses and prevent the exclusion of such uses from tidelands and any other DPA lands over which an EEA agency exerts control by virtue of ownership or other legal authority.

NA – This project is not located within a Designated Port Area and will not interfere with the capacity of nearby Designated Port Areas in any way.

PORTS AND HARBORS POLICY #4 – For development on tidelands and other coastal waterways, preserve and enhance the immediate waterfront for vessel-related activities that require sufficient space and suitable facilities along the water's edge for operational purposes.

NA – The proposed project is limited to construction of flood protection structures along Fort Point Channel, which will not interfere with or effect vessel-related activities or decrease available space for vessel operations.

PORTS AND HARBORS POLICY #5 - Encourage, through technical and financial assistance, expansion of water dependent uses in Designated Port Areas and developed harbors, re-development of urban waterfronts, and expansion of physical and visual access.

Although the proposed project is not located within a Designated Port Area, it is within a developed, urban waterfront. The proposed project will contribute to expansion of water dependent uses (flood protection) and will not directly contribute to any re-development of the waterfront. However, the increased flood protection resulting from the project will protect existing waterfront development and physical access to the channel.

<u>PROTECTED AREAS</u>

PROTECTED AREAS POLICY #1 - Preserve, restore, and enhance coastal Areas of Critical Environmental Concern, which are complexes of natural and cultural resources of regional or statewide significance.

NA – This project is not located in an Area of Critical Environmental Concern.

PROTECTED AREAS POLICY #2 - Protect state designated scenic rivers in the coastal zone.

NA – This project is not located in a designated scenic river.

PROTECTED AREAS POLICY #3 - Ensure that proposed developments in or near designated or registered historic places respect the preservation intent of the designation and that potential adverse effects are minimized.

The proposed project area includes the Fort Point Channel Historic District, registered with the Massachusetts Cultural Resource Information System (MACRIS) and National Register of Historic Places (NRHP). This historic district includes a number of historic features, such as bridges and the seawall, and buildings. The proposed project will not have any adverse effects on historic features or buildings within the project area but will rather offer increased protection against flood damage, helping to preserve the historic character of the Fort Point Channel area.

PUBLIC ACCESS

PUBLIC ACCESS POLICY #1 - Ensure that development (both water-dependent or non water-dependent) of coastal sites subject to state waterways regulation will promote general public use and enjoyment of the water's edge, to an extent commensurate with the Commonwealth's interests in flowed and filled tidelands under the Public Trust Doctrine.

The flood wall segments and interim flood walls included in the proposed project will not interfere with public access to parking lots, buildings, the Harborwalk, or any other recreational areas within the project area. The proposed project will help to maintain public access within the project area during and after storm events resulting in high water levels that would cause flooding without the added protection of the proposed project. In addition, the project will also result in an increase in open space by converting some parking areas into berms.

PUBLIC ACCESS POLICY #2 - Improve public access to existing coastal recreation facilities and alleviate auto traffic and parking problems through improvements in public transportation and trail links (land or water-based) to other nearby facilities. Increase capacity of existing recreation area by facilitating multiple use and by improving management, maintenance, and public support facilities. Ensure that the adverse impacts of developments proposed near existing public access and recreation sites are minimized.

The only existing recreation area within the project area is the Harborwalk. The proposed project will protect existing and future inland recreational areas from flood damage and maintain their use during and after storm events. There will not be any permanent effect on traffic flow or on land or water-based trail links, however, there may be some temporary impact on traffic flow during construction.

PUBLIC ACCESS POLICY #3 - Expand existing recreation facilities and acquire and develop new public areas for coastal recreational activities, giving highest priority to regions of high need or limited site availability. Provide technical assistance to developers of both public and private recreation facilities and sites that increase public access to the shoreline to ensure that both transportation access and the recreational facilities are compatible with social and environmental characteristics of surrounding communities.

> **The project will result in some expansion of the existing recreation facilities present at the site, as the footprint of the proposed berm is larger than the existing Harborwalk footprint. In the case that future projects create new inland recreation areas, the proposed project will provide flood protection.**

<u>WATER QUALITY</u>

WATER QUALITY POLICY #1 - Ensure that point-source discharges and withdrawals in or affecting the coastal zone do not compromise water quality standards and protect designated uses and other interests.

> **Short-term effects on water quality may occur during the construction period required to install flap gates on industrial outfalls along the channel walls in order to address backflow. However, in order to mitigate construction effects on water quality within the channel, the construction contractor will use silt curtains to isolate the construction area and turbidity curtains to minimize sedimentation. In addition, all construction access will be from the upland and all work will be conducted during low tide. The proposed project will not result in any long-term effects on water quality.**

WATER QUALITY POLICY #2 – Ensure the implementation of nonpoint source pollution controls to promote the attainment of water quality standards and protect designated uses and other interests.

> **There will be no long-term effects on water quality as a result of the proposed project. Work on the existing channel wall outfalls will result in temporary impacts to water quality during construction, which will be mitigated using silt curtains and turbidity curtains. There will be no additional effect on pollution sources at the project site and no lasting effects on water quality.**

WATER QUALITY POLICY #3 - Ensure that subsurface waste discharges conform to applicable standards, including the siting, construction, and maintenance requirements for on-site wastewater disposal systems, water quality standards, established Total Maximum Daily Load limits, and prohibitions on facilities in high-hazard areas.

> **Subsurface discharge is limited to that of the existing channel wall outflows. The proposed project includes the addition of flap gates to prevent backflow but will not have any lasting effect on water quality at the project site.**

Section G

RMAT Climate Resilience Design Standards Tool Report

RMAT Climate Resilience Design Standards Tool Project Report

City of Boston Resilient Fort Point Channel Infrastructure Project
Date Created: 11/5/2021 1:14:16 PM   Created By: nbrahim

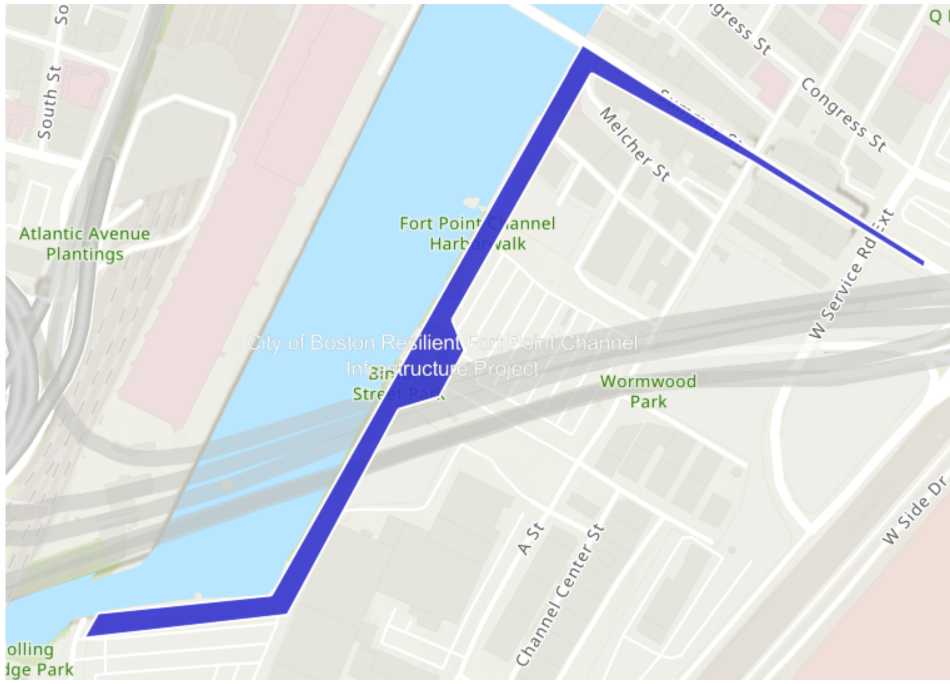
Project Summary

Link to Project

Estimated Construction Cost: $20500000.00
Useful Life: 2060 - 2069

Ecosystem Benefits	Scores
Project Score	Moderate

Exposure	Scores
Sea Level Rise/Storm Surge	High Exposure
Extreme Precipitation - Urban Flooding	Moderate Exposure
Extreme Precipitation - Riverine Flooding	Not Exposed
Extreme Heat	High Exposure



Asset Summary

Number of Assets: 1

Asset Risk	Sea Level Rise/Storm Surge	Extreme Precipitation - Urban Flooding	Extreme Precipitation - Riverine Flooding	Extreme Heat
Mixed Flood Control System - Berms/Floodwall/Barriers	High Risk	Moderate Risk	Low Risk	High Risk

Project Outputs

	Target Planning Horizon	Intermediate Planning Horizon	Percentile	Return Period	Tier
Sea Level Rise/Storm Surge					
Mixed Flood Control System - Berms/Floodwall/Barriers	2070	2050		50-yr (2%)	Tier 2
Extreme Precipitation					
Mixed Flood Control System - Berms/Floodwall/Barriers	2070			25-yr (4%)	Tier 2
Extreme Heat					
Mixed Flood Control System - Berms/Floodwall/Barriers	2070		50th		Tier 2

Scoring Rationale - Exposure

Sea Level Rise/Storm Surge

This project received a "High Exposure" because of the following:

- Located within the predicted mean high water shoreline by 2030
- Exposed to the 1% annual coastal flood event as early as 2030
- Historic coastal flooding at project site

Extreme Precipitation - Urban Flooding

This project received a "Moderate Exposure" because of the following:

- Projected increase in rainfall within project's useful life
- No historic flooding at project site
- No increase to impervious area

Extreme Precipitation - Riverine Flooding

This project received a "Not Exposed" because of the following:

- No historic riverine flooding at project site
- Not exposed to riverine flooding within the project's useful life

Extreme Heat

This project received a "High Exposure" because of the following:

- 30+ days increase in days over 90 deg. F within project's useful life
- Tree removal
- Located within 100 ft of existing water body

Scoring Rationale - Asset Risk Scoring

Asset - Mixed Flood Control System - Berms/Floodwall/Barriers
Primary asset criticality factors influencing risk ratings for this asset:

- Asset can be inaccessible/inoperable more than a week after natural hazard event without consequences
- Less than 100,000 people would be directly affected by the loss/inoperability of the asset
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is between $10 million and $30 million
- There are no hazardous materials in the asset

Project Design Standards Output

Asset: Mixed Flood Control System - Berms/Floodwall/Barriers — Infrastructure

Sea Level Rise/Storm Surge — High Risk

Target Planning Horizon: 2070
Intermediate Planning Horizon: 2050
Return Period: 50-yr (2%)

Applicable Design Criteria

Tiered Methodology: Tier 2 (Link)

Tidal Benchmarks: Yes
Stillwater Elevation: Yes
Design Flood Elevation (DFE): Yes
Wave Heights: No
Duration of Flooding: Yes
Design Flood Velocity: Yes
Wave Forces: No
Scour or Erosion: Yes

Extreme Precipitation — Moderate Risk

Target Planning Horizon: 2070
Return Period: 25-yr (4%)

Applicable Design Criteria

Tiered Methodology: Tier 2 (Link)

Total Precipitation Depth for 24-hour Design Storms: Yes
Peak Intensity for 24-hour Design Storms: Yes
Riverine Peak Discharge: No
Riverine Peak Flood Elevation: No

Duration of Flooding for Design Storm: Yes
Flood Pathways: No

Extreme Heat	High Risk

Target Planning Horizon: 2070
Percentile: 50th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 2 (Link)

Annual/Summer/Winter Average Temperature: Yes
Heat Index: Yes
Days Per Year With Max Temperature > 95°F: Yes
Days Per Year With Max Temperature > 90°F: Yes
Days Per Year With Max Temperature < 32°F: Yes
Number of Heat Waves Per Year: Yes
Average Heat Wave Duration (Days): Yes
Cooling Degree Days (Base = 65°F): No
Heating Degree Days (Base = 65°F): No
Growing Degree Days: No

Project Inputs

Core Project Information

Name:	City of Boston Resilient Fort Point Channel Infrastructure Project
Given the expected useful life of the project, through what year do you estimate the project to last (i.e. before a major reconstruction/renovation)?	2060 - 2069
Location of Project:	Boston
Estimated Capital Cost:	$20,500,000
Entity Submitting Project:	Boston
Is this project being submitted as part of a state grant application?	No
Which grant program?	
Is climate resiliency a core objective of this project?	Yes
Is this project being submitted as part of the state capital planning process?	No
Is this project being submitted as part of a regulatory review process?	Yes
Brief Project Description:	MEPA ENF

Project Ecosystem Benefits

Provides flood protection through green infrastructure or nature-based solutions	Yes
Provides storm damage mitigation	Yes
Provides groundwater recharge	No
Protects public water supply	No
Filters stormwater	No
Improves water quality	Yes
Promotes decarbonization	No
Enables carbon sequestration	Yes
Provides oxygen production	Yes
Improves air quality	Yes
Prevents pollution	Yes
Remediates existing sources of pollution	No
Protects fisheries, wildlife, and plant habitat	No
Protects land containing shellfish	No
Provides pollination	No
Provides recreation	Yes
Provides cultural resources/education	Yes

Project Climate Exposure

Does the project site have a history of coastal flooding?	Yes
Does the project site have a history of flooding during extreme precipitation events (unrelated to water/sewer damages)?	No
Does the project site have a history of riverine flooding?	No
Does the project result in a net increase in impervious area of the site?	No
Are existing trees being removed as part of the proposed project?	Yes

Project Assets

Asset: Mixed Flood Control System - Berms/Floodwall/Barriers
Asset Type: Dams and Flood Control Structures
Asset Sub-Type: Other Flood Barrier
Construction Type: New Construction
Construction Year: 2023

Useful Life: 43
Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure may be inaccessible/inoperable more than a week after natural hazard event without consequences.
Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts would be limited to local area and/or municipality
Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 100,000 people
Identify if the infrastructure is located within an environmental justice community or provides services to vulnerable populations.
The infrastructure is not located in an environmental justice community and does not provide services to vulnearble populations
Will the infrastructure reduce the risk of flooding?
Yes
If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would not be expected to result in injuries
If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
There are no hazardous materials in the infrastructure
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Minor – Inoperability will not likely affect other facilities, assets, or buildings
If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Between $10 million and $30 million
Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
No impact on surrounding natural resources is expected
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure is not expected to reduce the ability to maintain government services
What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
Reduced morale and public support

Section H

Environmental Justice Populations

H. ENVIRONMENTAL JUSTICE POPULATIONS

1.0 Environmental Justice and Equity in Climate Ready Boston Initiatives

The City of Boston's *Climate Ready Boston* (2016) vulnerability assessment integrated social vulnerability, including Environmental Justice (EJ) indicators, in the analysis of potential impacts and identification of priority neighborhoods and strategies for different climate hazards. Based on that assessment, the City has prioritized enhancing the climate resilience of EJ populations and carrying out equitable public participation processes in the implementation of new Climate Ready Boston programs, policies, and physical projects.

The first neighborhood for which the City planned solutions to sea level rise and coastal flooding was East Boston, the neighborhood with the highest near/medium/long-term exposure of EJ populations to coastal flooding risks. Following that planning process, which included multi-lingual outreach and engagement in partnership with community organizations, the City implemented its first physical adaptation project, a deployable flood barrier across the East Boston Greenway designed to provide significant coastal flood protection to EJ neighborhoods. The City has advanced several other recommended initiatives and continues to pursue State and Federal funding for design and construction of coastal flood hazard mitigation projects in East Boston.

Similarly, the City has carried out equitable outreach and engagement processes and invested City and outside funding to advance sea level rise/storm surge and extreme heat resilience initiatives in other EJ neighborhoods. This includes open space design projects that have coastal flood protection and other benefits for EJ neighborhoods around South Boston and Dorchester (Moakley Park) and the North End (Langone Park and Puopolo Playground). The City's ongoing Heat Resilience Study is developing a clear set of strategies to address heat risk and climate change in the EJ neighborhoods of East Boston, Chinatown, Mattapan, Roxbury, and Dorchester. The Heat Resilience Study is being undertaken in collaboration with a Community Advisory Board and through extensive multi-lingual and equitable public outreach and participation efforts.

As the City advances Climate Ready Boston initiatives in all neighborhoods of Boston, it will continue to address priorities for Environmental Justice populations and integrate equitable outreach and engagement processes to facilitate their involvement.

2.0 Project Benefits

Central to the City's approach for prioritizing and implementing climate resilience initiatives for all neighborhoods of Boston is to consider which hazards socially vulnerable populations, economic assets, and critical infrastructure are most exposed to and the time horizons in which exposure and risks are projected to occur.

The proposed project will protect the area in the South Boston neighborhood with the greatest near/medium/long-term risk of exposure to coastal flooding (Figure H-1). This flood protection area does not include EJ neighborhoods. The flood pathways affecting this area originate from the Fort Point Channel's low east shoreline and are separate and independent from the flood pathways that affect EJ neighborhoods within 1 mile of the project.

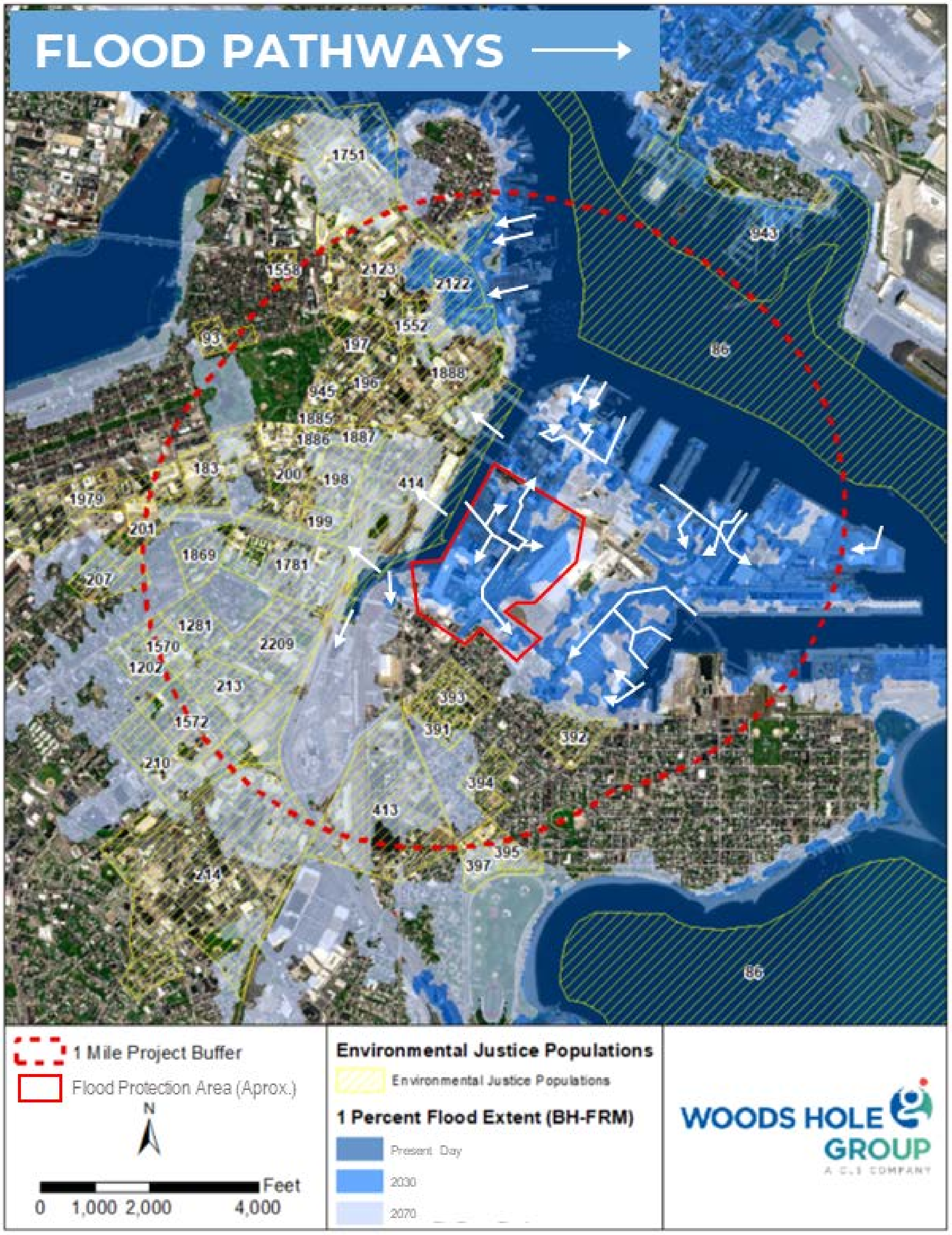


Figure H-1. Map showing Environmental Justice populations within 1 mile of the proposed project overlaid with present and future coastal flood extents and associated flood pathways.

EJ neighborhoods within South Boston and within 1 mile of the proposed project have limited near/medium-term exposure to coastal flooding risk. Even so, the City is already advancing the Moakley Park resiliency project to provide long-term protection to some of those areas. Over the long-term, as sea level rises and storms become more intense, additional projects like the one proposed and the Moakley Park project will be needed to mitigate other coastal flood pathways to EJ neighborhoods in South Boston and beyond. However, these are not immediately necessary.

While this project is not expected to benefit EJ neighborhoods directly in terms of providing independent protection from coastal flooding, it may indirectly provide benefits for EJ populations who use the South Bay Harbor Trail and Harborwalk and/or work within or commute through the flood protection area. The conversion of impervious paved areas to green open space is expected to cool the adjacent public waterfront trails and improve stormwater and air quality, relative to existing conditions, with associated public health and comfort benefits for trail users. It will also protect important job centers, transportation infrastructure, and historic resources from coastal flooding, all of which may indirectly benefit EJ populations nearby.

3.0 Project Impacts

The project impacts are not expected to result in a direct adverse effect on EJ populations within 1 mile or exacerbate their existing environmental burdens. The proposed project is expected to have only minor, localized environmental impacts. Most impacts are temporary impacts during construction. For example, access to a portion of the Harborwalk will be temporarily rerouted around the project site while the berm and floodwall segments are under construction. The City decided against using barges for material removal/delivery to avoid potential wetland impacts, so the project will generate some new truck trips during construction. The number of new average daily trips of diesel vehicle traffic will be well below the MEPA review thresholds. To minimize the impacts of construction equipment and vehicles, the Project will implement measures to limit emissions from construction equipment to the extent practicable, including retrofitting diesel construction vehicles, or utilizing vehicles that use alternative fuels, such as ultra-low-sulfur diesel fuel to reduce emissions during construction activities. In addition, the Massachusetts anti-idling law will be enforced during the construction phase of the Project with the installation of on-site anti-idling signage. Once construction is complete, temporary construction phase impacts will cease and the public will benefit continuously from the improved conditions. Given that the proposed project site is in and immediately surrounded by non-EJ neighborhoods, temporary construction impacts are not expected to disproportionally impact EJ neighborhoods.

4.0 Enhanced Public Participation

Despite the lack of direct adverse impacts, disproportionate impacts, or exacerbation of existing environmental burdens on EJ neighborhoods, the City is incorporating enhanced EJ outreach and public participation methods for the proposed project. These align with the City's existing practice of inclusive and equitable engagement of EJ populations throughout its Climate Ready Boston initiatives.

The City has created a project webpage where documents, notices, public comments, and responses will be posted. The City has created and, during MEPA review, will post to the project webpage a brief project summary document incorporating information from the draft MEPA EJ Screening Form. The project summary will be translated to Chinese and Spanish, the languages other than English that are predominantly spoken by EJ populations within 1 mile of the project site. The project summary will provide the instructions for submitting public comments and state that the City will hold a community meeting upon request by anyone contacted through advance notification provided or upon further dissemination of the project summary. The City will disseminate the project summary electronically to community-based organizations with EJ constituencies within 1 mile of the proposed project site and others listed on the MEPA EJ Reference List, as well as more broadly through social media. During MEPA review, the City will hold requested community meetings and compile public comments received, post them to the project webpage, and forward them to the MEPA Office.

Section I

Public Notice and ENF Distribution List

PUBLIC NOTICE OF ENVIRONMENTAL REVIEW

PROJECT: Proposed City of Boston Resilient Fort Point Channel Infrastructure Project

LOCATION: Fort Point Channel Southeast Shoreline Between 15 Necco St and Dorchester Ave, South Boston

PROPONENT: Boston Planning & Development Agency

The undersigned is submitting an Environmental Notification Form ("ENF") to the Secretary of Energy and Environmental Affairs on or before December 31, 2021.

This will initiate review of the above project pursuant to the Massachusetts Environmental Policy Act ("MEPA", M.G.L. c. 30, s.s. 61-62I). Copies of the ENF may be obtained from:

Boston Planning & Development Agency, Proponent
c/o Woods Hole Group, Inc.
Attn: Beth Gurney
107 Waterhouse Road, Bourne, MA 02532
(508) 495-6240
email: bgurney@woodsholegroup.com

Electronic copies of the ENF are also being sent to the City of Boston's Conservation Commission and Planning & Development Agency.

The Secretary of Energy & Environmental Affairs will publish notice of the ENF in the Environmental Monitor, will receive public comments on the project for 20 days, and will then decide, within ten days, if an Environmental Impact Report is needed. A site visit and/or remote consultation session on the project may also be scheduled. All persons wishing to comment on the project, or to be notified of a site visit and/or remote consultation session, should email MEPA@mass.gov. Mail correspondence will continue to be accepted, though responses may be delayed. Mail correspondence should be direct to the Secretary of Energy & Environmental Affairs, 100 Cambridge St., Suite 900, Boston, Massachusetts 02114, Attention: MEPA Office, referencing the above project.

Boston Planning & Development Agency, Proponent

Distribution List for City of Boston Resilient Fort Point Channel Infrastructure Project, Boston, MA
ENF Section I - Page 1 of 1

Dept. Of Environmental Protection
Commissioner's Office
One Winter Street
Boston, MA 02108
helena.boccadoro@mass.gov

Massachusetts Historic Commission
The MA Archives Building
220 Morrissey Boulevard
Boston, MA 02125

DEP/Northeast Regional Office
Attn: MEPA Coordinator
205B Lowell Street
Wilmington, MA 01887
john.d.viola@mass.gov

Mass. Department of Transportation
Public/Private Development Unit
10 Park Plaza, Suite 4150
Boston, MA 02116
MassDOTPPDU@dot.state.ma.us

MA DOT – District #6
Attn: MEPA Coordinator
185 Kneeland Street
Boston, MA 02111
michael.garrity@dot.state.ma.us

Metropolitan Area Planning Council
60 Temple Place, 6th Floor
Boston, MA 02111
mpillsbury@mapc.org

City of Boston
Health Division
1010 Mass. Ave., 4th Floor
Boston, MA 02118
isdhealth@boston.gov

City of Boston
Planning & Development Agency
1 City Hall Square
Boston, MA 02201
bpdamarketing@boston.gov

City of Boston
City Council
1 City Hall Square, Suite 550
Boston, MA 02201
city.council@boton.gov

City of Boston
Conservation Commission
1 City Hall Square, Room 709
Boston, MA 02201
cc@boston.gov

Coastal Zone Management
Attn: Project Review Coordinator
251 Causeway St., Suite 800
Boston, MA 02114
robert.boeri@mass.gov
patrice.bordonaro@mass.gov

Mass. Water Resource Authority
Attn: MEPA Coordinator
100 First Avenue
Charlestown Navy Yard
Boston, MA 02129
katherine.ronan@mwra.com

DMF -South Shore
Attn: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930
DMF.EnvReview-North@mass.gov

Section J

List of Required Permits & Reviews

J. LIST OF REQUIRED PERMITS & REVIEWS

Issuing Agency	Application	Application or File No.	Permit Name
Executive Office of Energy and Environmental Affairs (EEA)	Environmental Notification Form (ENF)	TBD	Certificate of the Secretary of EEA for ENF
Boston Conservation Commission	Notice of Intent	TBD	Order of Conditions
Boston Public Improvement Commission	Specific Repairs	TBD	License, Maintenance, and Indemnification Agreement
Boston Landmarks Commission	Design Review	TBD	Certificate of Design Approval
Boston Water and Sewer Commission	Site Plan Review, Groundwater Conservation Overlay District	TBD	Site Plan Approval
Advisory Council on Historic Preservation / MA Historical Commission	Section 106 Review	RC.65717	Determination of Adverse Effect Finding Concurrence
DEP Waterways Regulations Program	Chapter 91 License Application	TBD	Chapter 91 License
MA Coastal Zone Management (CZM)	Request for CZM Federal Consistency Review	TBD	Federal Consistency Determination
Army Corps of Engineers (if necessary)	Self-Verification or General Permit (TBD)	TBD	Permit
Environmental Protection Agency	National Pollution Discharge Elimination System Application	TBD	Section 402 National Pollution Discharge Elimination System Construction General Permit

Section K

Pre-Filing Agency Consultation Correspondence

From:	Joe Christo
To:	Reddick, Kelli; Bradley, Rachel
Subject:	Fwd: DEP info re: Fort Point Channel Resiliency Infrastructure Project
Date:	Wednesday, February 13, 2019 2:24:38 PM

Hi Kelli and Rachel - I spoke with Holly today, and wanted to send this your way!

Thanks,
Joe

---------- Forwarded message ---------
From: **Johnson, Holly S (DEP)** <holly.s.johnson@state.ma.us>
Date: Wed, Feb 13, 2019 at 1:54 PM
Subject: DEP info re: Fort Point Channel Resiliency Infrastructure Project
To: joe.christo@boston.gov <joe.christo@boston.gov>
Cc: Kerigan, Kathleen (DEP) <kathleen.kerigan@state.ma.us>

Joe,

Below are some responses from staff in various DEP program areas regarding the information you provided in your letter about seeking funds under FEMA's Pre-Disaster Mitigation Grant Program. As we discussed on the phone, if you receive funding for the project, we highly recommend that you arrange to meet with DEP staff so we can assist you in determining a permitting pathway and timeline. For now, here are some thoughts from our staff.

C.91 Waterways – the proposed berm and wall are within c.91 jurisdiction and would require Licensing in accordance with 310 CMR 9.00

401 Water Quality Certification – based upon what is described in the text and proposed alignment plan, it is highly likely a 401 WQC is NOT needed. Assuming there might be some dredging activities to support the construction and building in nearby water, the dredging volume is not likely to be > 100 Cubic Yards which is the threshold for a 401 WQC. If greater than 100 cubic yards or dredging is proposed, a 401 WQC will be required.

Bureau of Waste Site Cleanup – based upon the information provided there do not appear to be any BWSC permits necessary for the work. However, be aware that (a) you may, of course, come across notifiable releases that would trigger site assessment and cleanup. This is an unknown you should recognize. If soil is to be managed offsite, it should be sampled and managed appropriately. Also, while there are no (known) sites in the disturbance area, you may be doing work within an area covered by an AUL - depending on how broadly the AULs were written. (Sometimes the AUKL covers the entire property, not just the area of contamination.) Confirm the work is being done outside any AUL areas. Work can proceed in an AUL area, of course, with appropriate determinations by an LSP and management of any contaminated soil. All of the above can go forward without DEP BWSC approval/permit.

Wetlands Protection Act – *I am still waiting to hear directly from the program, but given the anticipated work in wetland resource areas, review under 310 CMR 10.00 is required. It is unclear if special provisions, such as a variance, may apply.*

I hope this is a helpful higher-level review of what DEP's oversight may be re: the project. Best of luck with your funding request and please be in touch if you need clarification or if you'd like to set up a meeting.

Holly

Holly Johnson

Massachusetts Department of Environmental Protection

One Winter Street - 2nd Floor | Boston, MA 02108

☎ 617-574-6895 | Email - holly.s.johnson@mass.gov

Visit MassDEP on the Web: http://mass.gov/dep

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Joe Christo
Senior Resilience and Waterfront Planner
Climate Change and Environmental Planning
Boston Planning and Development Agency

617-918-4447
joe.christo@boston.gov
Pronouns: he | his | him

From:	Waterways, DEP (DEP)
To:	Bradley, Rachel; Information, BWSC (DEP)
Cc:	joe.christo@boston.gov; Richard.mcguinness@boston.gov; Thurson, Kelli; Hopps, Christine (DEP); Lynch, Ben (DEP)
Subject:	Re: [RESPONSE REQUESTED] FEMA Pre-Disaster Mitigation Grant Environmental and Historic Preservation Coordination
Date:	Friday, January 11, 2019 12:06:36 PM
Attachments:	image001.png

Hello Rachel,

The proposed project is located within an area subject to Chapter 91 (c.91) jurisdiction and will require authorization through a c.91 Waterways License.

Information on the c.91 licensing process is available at the following link:
https://www.mass.gov/waterways-program-chapter-91

Thank you,
Hannah

Hannah Reardon
Massachusetts Department of Environmental Protection
One Winter Street – 5th Floor | Boston, MA 02108
617-556-1134 | Email - hannah.reardon@mass.gov

Visit MassDEP on the Web: http://mass.gov/dep

From: Bradley, Rachel <Rachel.Bradley@arcadis.com>
Sent: Wednesday, January 2, 2019 9:42 PM
To: Information, BWSC (DEP); Waterways, DEP (DEP)
Cc: joe.christo@boston.gov; Richard.mcguinness@boston.gov; Thurson, Kelli
Subject: [RESPONSE REQUESTED] FEMA Pre-Disaster Mitigation Grant Environmental and Historic Preservation Coordination

Hello,

This email is being sent on behalf of The City of Boston regarding its application for Federal grant funding under the Federal Emergency Management Agency's (FEMA's) Pre-Disaster Mitigation Program. FEMA requires coordination with regulatory agencies as part of the grant application process. At this time, the City of Boston would like to inform the Massachusetts Department Environmental Protection of the proposed project, which is in the preliminary stages of design, and kindly **requests a response regarding the need for a permit to comply with state and federal applicable or relevant and appropriate requirements (ARARs) under the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).** An email response to this request is sufficient.

The relevant **attachments** listed in the attached letter can be found at the following link: https://we.tl/t-pju35ZdvWw

Thank you for your assistance in this matter.

Rachel E. Bradley, MPP | Resilience and Mitigation Lead **|** Rachel.bradley@arcadis.com
Arcadis | Arcadis U.S., Inc.
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ARCADIS Design & Consultancy for natural and built assets

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

January 9, 2019

Boston Planning & Development Agency
ATTN: Joe Christo, Climate Change & Environmental Planning
One City Hall Square, 9th Floor
Boston, MA 02201

Dear Mr. Christo:

The Massachusetts Office of Coastal Zone Management (CZM) has received your request for guidance relative to federal consistency determinations for Federal Emergency Management Agency (FEMA)-funded projects within the Massachusetts coastal zone, namely Pre-Disaster Mitigation Grant Program funds for the proposed Resilient Fort Point Channel Infrastructure Project, which consists of the construction of a mixed berm and floodwall along the Fort Point Channel in Boston.

FEMA is not required to submit consistency determinations for providing financial support for projects within the Massachusetts coastal zone, though individual project proponents are required to undergo federal consistency review if their project requires a federal authorization listed in the Coastal Zone Management Plan ("Plan") and implementing regulations at 301 CMR 20.04. To that end, we appreciate the Boston Planning and Development Agency's efforts to coordinate with CZM to ensure that projects are consistent with the objectives of the Plan and will comply with CZM's enforceable policies relative to coastal hazards, energy, growth management, habitat, ocean resources, ports and harbors, protected areas, public access, and water quality. Without more specific information on the design of the project and its potential environmental impacts, CZM cannot provide a comprehensive list of federal authorizations necessary to implement the proposed project. However, any "modification to water bodies and wetlands" as proposed would require a Section 10 permit from the U.S. Army Corps of Engineers (USACE) for the excavating or dredging from or depositing of material in any navigable water of the United States and a Section 404 permit from USACE for the discharge or dredged or fill materials in waters of the United States. CZM routinely participates in inter-agency meetings to review permit applications submitted to USACE and is therefore enabled to make determinations for these projects of their consistency.

If you have any further questions, please do not hesitate to contact Robert Boeri, Project Review Coordinator, at robert.boeri@mass.gov or (617) 626-1050, or Erikk Hokenson, Boston Harbor Regional Coordinator, at erikk.hokenson@mass.gov or (617) 616-1234.

Thank you for your cooperation with CZM.

Sincerely,

Robert Boeri
Project Review Coordinator

LBE/rb/elh

From:	Holt, Emily (FWE)
To:	Bradley, Rachel
Cc:	joe.christo@boston.gov; Richard.mcguinness@boston.gov
Subject:	RE: [RESPONSE REQUESTED] FEMA Pre-Disaster Mitigation Grant Environmental and Historic Preservation Coordination
Date:	Thursday, January 3, 2019 2:39:02 PM
Attachments:	image001.png

Good Afternoon,

Thank you for submitting information regarding the Fort Point Channel Infrastructure Project. I have reviewed the submitted information and have determined that this project, as currently proposed, does not occur within Estimated Habitat of Rare Wildlife or Priority Habitat as indicated in the *Massachusetts Natural Heritage Atlas* (14th Edition). Therefore, the project is not required to be reviewed for compliance with the rare wildlife species section of the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.37, 10.59 & 10.58(4)(b)) or the MA Endangered Species Act Regulations (321 CMR 10.18).

Best,

Emily Holt
Endangered Species Review Assistant
Natural Heritage & Endangered Species Program
Massachusetts Division of Fisheries & Wildlife
1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6385 | f: (508) 389-7890
mass.gov/nhesp

From: Bradley, Rachel <Rachel.Bradley@arcadis.com>
Sent: Wednesday, January 2, 2019 7:10 PM
To: Heritage, Natural (FWE)
Cc: joe.christo@boston.gov; Richard.mcguinness@boston.gov; Thurson, Kelli
Subject: [RESPONSE REQUESTED] FEMA Pre-Disaster Mitigation Grant Environmental and Historic Preservation Coordination

Hello,

This email is being sent on behalf of The City of Boston regarding its application for Federal grant funding under the Federal Emergency Management Agency's (FEMA's) Pre-Disaster Mitigation Program. FEMA requires coordination with regulatory agencies as part of the grant application process. At this time, the City of Boston would like to inform the MassWildlife Natural Heritage and Endangered Species Program of the proposed project, which is in the preliminary stages of design, and kindly **requests a regulatory review to identify threatened or endangered species or their**

critical habitat in the project area in addition to any potential impacts to the Fort Point Channel. An email response to this request is sufficient.

The relevant **attachments** listed in the attached letter can be found at the following link: https://we.tl/t-nPQgDF1IRJ

Thank you for your assistance in this matter.

Rachel E. Bradley, MPP | Resilience and Mitigation Lead **|** Rachel.bradley@arcadis.com
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ARCADIS Design & Consultancy for natural and built assets

Be green, leave it on the screen.

U.S. Department of Homeland Security
FEMA Region I, Mitigation Division
Environmental & Historic Preservation Program
99 High Street, 6th Floor
Boston, MA 02110

FEMA

RC. 65717

March 8, 2021

CONCURRENCE: Brona Simon
4/9/2021
BRONA SIMON
STATE HISTORIC
PRESERVATION OFFICER
MASSACHUSETTS
HISTORICAL COMMISSION

Ms. Brona Simon
Executive Director and State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125-3314

RE: Section 106 Consultation: *Finding of "No Adverse Effect" on Historic Properties*
Undertaking: *Resilient Fort Point Channel Infrastructure Project*
Grant Recipient: *Massachusetts Emergency Management Agency (MEMA)*
Sub-Recipient: *City of Boston*
FEMA Grant Program: *Pre-Disaster Mitigation Program (PDM), PDMC-PJ-01-MA-2018-008*

Dear Ms. Simon:

This letter is to notify you that, in accordance with Section 106 of the National Historic Preservation Act (NHPA), the Federal Emergency Management Agency (FEMA) has determined that the above referenced proposed project constitutes a federally assisted undertaking. The City of Boston (Subrecipient), through the Massachusetts Emergency Management Agency (MEMA/Recipient), has submitted an application to FEMA for Pre-Disaster Mitigation Grant Program (PDM) funding to complete the Resilient Fort Point Channel Infrastructure Project.

The purpose of this letter is to provide project details, examine the area's historic context, establish the eligibility of any resources that may be present, provide FEMA's finding of effect, and obtain concurrence from your office on the determinations and findings made by FEMA, contained herein.

DESCRIPTION OF THE UNDERTAKING [36 CFR § 800.11(e)1]

Project Location
The project is located on the eastern shoreline of Fort Point Channel in the South Boston neighborhood, City of Boston, Suffolk County, MA (N 42.3455490, W -71.0568498; UTM: Zone 19T Easting 330577.84 Northing 4690192.19 south to N 42.3491118, W -71.0521356; UTM Zone 19T Easting 330975.69, Northing 4690578.45). Fort Point Channel is a man-made maritime channel that separates South Boston (east side) from downtown Boston (west side) and connects to Boston Harbor (*see Attachment 1*). This project focuses on the east and south sides of Fort Point Channel, which is dominated by private land ownership including large and small businesses, non-profit organizations, cultural groups and landmarks, and connections to critical transportation routes and infrastructure.

Project Description

Climate Ready Boston is the City's ongoing initiative to adapt to climate change and sea level rise. The initiative's *Citywide Vulnerability Assessment* (2016) and *Neighborhood Resilience Plan for South Boston* (2018) identify Fort Point Channel's east bank as a high priority opportunity to reduce existing and future flood risk within the City.

The Resilient Fort Point Channel Infrastructure Project proposes approximately 2,300 linear feet of mixed berm and floodwall mitigation features (elevated Harbor Walk) along the channel shoreline (*see Attachment 2*).

The project consists of three (3) interconnected segments:

- *Segment 1*- consists of a knee wall and earthen berm which spans the channel side parking lots on A Street (N 42.3455490, W -71.0568498 to N 42.3457195, W -71.0547908); Segment 1 is 728.5 feet long with an average existing ground elevation of 8.3 feet; the northern edge of Segment 1 begins at the General Electric (GE) property line and will tie into elevated features on the GE property and run south parallel to the existing Harbor Walk, ending at the Gillette company' pumphouse where Segment 2 will begin;
- *Segment 2*- will elevate the existing channel walls and Harbor Walk adjacent to the Gillette Headquarters building, beginning south of the company's pumphouse (N 42.3457638, W -71.0549170) and ending where the channel shoreline turns west (N 42.3474564, W -71.0533691); Segment 2 is 816 feet long with an average existing ground elevation of 9.4 feet. As there are large buried industrial pipes and electrical conduit running underground from the Gillette pump house parallel to the Harbor Walk, limited space is available for an earthen berm, which is why an elevated Harbor Walk will be utilized at this segment to replace the existing at-grade Harbor Walk; the flood protection feature in this segment will consist of a double retaining wall of granite veneer blocks matching the appearance of the existing seawall along the channel; the walls be will approximately 9.5 feet in height above the existing seawall height, with six (6) feet of solid blocks and 3.5 feet of railing on top; the blocks will be dowelled into the top course of the existing channel walls; and
- *Segment 3*- will transform back to a knee wall and earthen berm at N 42.3474564, W -71.053691 and at Dorchester Avenue where it crosses the channel (N 42.3491118, W -71.0521356); Segment 3 is 774.5 feet long with an average existing ground elevation of 9.4 feet.

The berm itself will be six (6) feet in height and 40 feet in width, and therefore will be a gradual mound. The width of ground disturbance for the berm in Segments 1 and 2 will be limited to 45 feet along the length of the segments with a depth of approximately two (2) feet. Proposed features in all three (3) segments have no permanent intrusions into the channel itself. Intermittent barge access in the channel may be required for backflow preventer installation on outfalls and for some seawall modifications.

As a further flood protection measure, an aluminum deployable flood gate will be stored at the Gillette pump house. The gate can be deployed at the mouth of the channel if necessary, during severe storm events.

While no work to reconstruct or stabilize the existing channel walls is anticipated by the City of Boston, there is the potential for additional work to become necessary during the construction phase if the walls are determined to be deteriorated or unstable. If this work is necessary, FEMA has included a project condition that the channel walls must be repaired or replaced in-kind and FEMA must be notified of this work prior to project completion.

Area of Potential Effect (APE)

As defined in the Advisory Council on Historic Preservation's (ACHP) regulations, the APE for a project is defined as the "geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR 800.16[d]). The APE is based upon the "potential" for effect, which may differ for aboveground resources (historic structures and landscapes) and subsurface resources (archaeological sites). Factors with potential to cause effects include but are not limited to: noise, vibration, visual (setting), traffic, atmosphere, construction, indirect and cumulative.

The APE for this undertaking consists of the area of ground disturbance associated with construction of the berm and the elevated Harbor Walk. Visual impacts are limited to the surrounding properties from which the berm and elevated Harbor Walk are visible. There will be no direct physical impacts to any buildings within the APE; however, the channel walls will be extended to create the elevated Harbor Walk and therefore minor direct physical impacts are anticipated. As many parcels to the east are paved parking lots, minor visual impacts are anticipated. To the west on the Downtown Boston side, the only building with possible views of the project area is the U.S. Post Office General Mail Facility (BOS.1694), with its loading docks facing Fort Point Channel. The Gillette complex is also visible from parts of Interstate 93 (expressway) and the railroad tracks to the west (*see Attachment 3*).

STEPS TAKEN TO IDENTIFY HISTORIC PROPERTIES [36 CFR § 800.4(a) & (b)]

A FEMA SOI-qualified Historic Preservation Specialist has conducted a search of the Massachusetts Cultural Resources Information System (MACRIS), the National Register of Historic Places National Resources Information Service (NRHP NRIS) database and reviewed historical aerial images and historic maps and atlases to assess the potential for eligible resources within the APE for the undertaking.

Standing Structures
According to the NRHP NRIS, the APE is located within the boundaries of the Fort Point Channel Historic District (NR#04000959). Within the historic district, the channel walls are the only contributing element within the APE.

Table 1: Closest Listed Resources

NRHP ID #	Resource Name	Resource Address	Approximate Distance to APE
04000959	Fort Point Channel Historic District	South Boston, MA	Within APE

According MACRIS, there are two (2) inventoried areas within the APE and one (1) inventoried property (*see Table 2 below*).

Table 2: Closest Inventoried Properties

MACRIS ID #	Resource Name	Resource Address	Approximate Distance to APE
BOS.WZ	Fort Point Channel Historic District	Boston, MA	Within APE
BOS.ZG	Fort Point Channel Landmark District	Boston, MA	Within APE
BOS.1694	U.S. Post Office- General Mail Facility	25 Dorchester Avenue, Boston, MA	Within APE

The boundaries of the Fort Point Channel Landmark District (BOS.ZG), a local historic landmark district, almost entirely overlap with the Fort Point Channel Historic District boundaries; however, there is one (1) notable exception. The Fort Point Channel Historic District includes the entirety of the channel footprint and its associated features (bridges and seawalls), while the landmark district does not. Therefore, FEMA will evaluate impacts to the districts together.

The U.S. Post Office-General Mail Facility and the Gillette Headquarters building, which are within the APE, are over 45 years of age and need to be evaluated for NRHP eligibility. A review of historic maps and aerial images of the area did not reveal any additional properties that may be impacted by the proposed undertaking (*see Attachment 4*).

Archaeological Resources

According to MACRIS, there are no previously identified precontact or historic archaeological sites within the APE. The table below shows the closest previously identified sites located within one (1) mile of the APE.

Table 3: Previously Identified Archaeological Sites within 1 Mile of APE

Site No.	Site Name	Description	Approximate Distance from APE
[redacted]			

[redacted]

There are four (4) archaeological survey areas which overlap with the APE as noted below in Table 4.

Table 4: Archaeological Reports within APE

Site No.	Report Name	Abstract
RPTNO.426	1982 Archaeological Survey of the Third Harbor Tunnel Crossing Boston, Massachusetts (Draft Final Report). 77 pages. Lewis, Scott, Paul, Nancy S. Seasholes and Greg Laden.	[redacted]
RPTNO.898	1988 Phase 1 Archaeological Report on the Central Artery/Third Harbor Tunnel Project in Boston, Massachusetts. 381 pages. Elia, Ricardo J., and Nancy S. Seasholes.	[redacted]
RPTNO.2974	2008 Circumferential Transportation Improvements Urban Ring Corridor: Phase 2 Archaeological Reconnaissance Survey and Supplemental	[redacted]

	Sensitivity Assessment of the Four Preliminary Build Alternatives, Boston, Brookline, Cambridge, Chelsea, Everett, Medford, and Somerville, Massachusetts. 242 pages. Cherau, Suzanne, Jennifer Banister, A. Peter Mair, II, and Ben Ford.	[redacted]
RPTNO.3003	1996 North-South Rail Link, Boston, Cambridge, and Somerville, Massachusetts, Cultural Resources Survey. 100 pages. Adams, Virginia H., Maureen A. Cavanaugh, Beth P. Miller, Stephen Mrozowski, and Catherine deJ Vieth.	[redacted]

A FEMA Historic Preservation Specialist also reviewed the United States Department of Agriculture National Natural Resources Conservation Service (USDA NRCS) Soil Web Survey for this undertaking. There is one (1) soil type within the APE (*see Attachment 5*):

- *Urban land, west substratum, found on 0 to 3 percent slopes-* the soils are composed of excavated and filled land over herbaceous organic material and/or alluvium and/or marine deposits.

Historic maps and atlases show that the Fort Point Channel area within the APE has been previously disturbed by the following: demolition of a large manufacturing building along the channel during the Urban Renewal period of the 1950s and 1960s; construction of the central artery tunnel under a portion of the channel and the adjacent parcel where the Gillette pump house is located; construction of portions of the Gillette complex in the 1960s; and construction of the adjacent parking lots to service both Gillette and the surrounding properties. Based on the archaeological surveys conducted for the Central Artery/Third Harbor Tunnel Project (*noted in Table 4 above*), no archaeological sites were identified within the parcels where the tunnel was constructed. The other surveys noted in Table 4 did not uncover any archaeological resources within the APE.

The extent of ground disturbance for the undertaking is limited to the areas where the earthen berm and elevated Harbor Walk will be constructed. The width of ground disturbance for the berm in Segments 1 and 3 will be limited to 45 feet along the length of the segments with a depth of two (2) feet. This depth is minor and is likely limited to previously disturbed soils. The ground disturbance for the elevated Harbor Walk in Segment 2 is limited to areas that have been previously disturbed by construction on the existing Harbor Walk. Therefore, FEMA has determined that the undertaking is unlikely to impact any unknown archaeological resources as the soils are previously disturbed and no further identification efforts are necessary.

EVALUATION OF HISTORIC SIGNIFICANCE [36 CFR § 800.4(c)]
FEMA has determined that there is one (1) previously listed historic resource within the APE: Fort Point Channel Historic District. Additionally, there are two (2) resources within the APE which need to be evaluated for NRHP eligibility: the U.S. Post Office-General Mail Facility and the Gillette World Shaving Headquarters complex (*see Attachment 6)*.

Historic Context and Description of Fort Point Channel
From the start of its construction and continuing to present day, the Fort Point Channel area in South Boston has been a place of business and a location for activities oriented to water transportation, industry, and commerce. The Fort Point area was first developed in the 1830s by the Boston Wharf Company (BWCo) and was one of the nation's leading marketplaces for wool. Today, many of the Fort Point area's extant manufacturing and warehouse buildings have been preserved as a local landmarks district, with several buildings converted into artists' studios and lofts. Other original BWCo buildings now house office space, hotels, restaurants, and commercial businesses. The area derives its historic significance from being a large and remarkably intact example of the kind of warehousing and manufacturing areas that were once vital to the economies of cities across the nation. Buildings in Fort Point Channel area date predominately from 1870-1915.

Incorporated in 1836 for the purpose of building and operating wharves, BWCo evolved into an industrial real estate company at the end of the nineteenth century, as business conditions and opportunities changed. Between 1837 and 1882, BWCo filled in the marshes of South Boston to which it had rights in phases, advancing from south to north. BWCo not only made the land but also built the streets. The BWCo filled the land on the east side of the channel then built streets, laid out lots, and also erected most of the buildings which were designed by the company's staff architects. The streets follow the grid pattern typical of South Boston with the notable exception of curving Melcher Street, which slopes from an elevated Summer Street at the end of the Summer Street Bridge down to grade at "A" Street. Three (3) bridges connect the Fort Point Channel area to downtown Boston: from north to south these are the Northern Avenue, Summer Street, and Congress Street bridges. "A" Street is the main north-south street through the district and connects it with the residential neighborhood to the south, around West Broadway. Summer and Congress Streets are the main east-west streets.

By the 1840s, the company had built a wharf with two (2) huge arms in South Boston. Filing continued to the north and led to the construction of the Mt. Washington Avenue Bridge in 1855. Until this time, no bridge served the BWCo site. When the Mt. Washington Avenue Bridge (no longer extant) opened, it connected the company's land to Boston proper at Kneeland Street. Around this time, the Midland Railroad (Boston, Hartford & Erie Railroad by 1863 and the New York and New England Railroad by 1875) obtained a right-of-way through the BWCo site. Its tracks came from the south along the eastern edge of the BWCo's property and then crossed on a pile viaduct and continued on a bridge over the channel, roughly where today's Summer Street bridge crosses, ending at a depot in the newly filled South Cove area.

The BWCo continued to extend its land north by filling an L-shaped site up to the Summer Street railroad tracks in the 1850s, except for an inlet perpendicular to Fort Point Channel. The inlet extended across the BWCo lands in the vicinity of Binford Street and was greatly reduced in size between 1874 and the early 1880s as the result of land-making on the east side of A Street. It completely disappeared west of A Street by circa 1920.

After the Civil War, the Commonwealth of Massachusetts focused on improving and developing Boston Harbor. The configuration of landfill from Summer Street to Fan Pier was determined by the Board of Harbor Commissioners, which formed in 1866. The Commissioners adopted a plan that called for building a seawall and filling in the South Boston flats in order to concentrate the force of the tides. In 1871, BWCo began filling its flats with dirt excavated from Fort Hill on the Boston side of the channel. The fort was a wooden, colonial-era fortification that once crowned a hill in the vicinity of present-day High and Oliver streets. The area surrounding the fort was once a fashionable residential neighborhood that had deteriorated into impoverished tenement houses. Beginning in 1868, the City cut down the hill to both remove substandard housing and address the pressing need to create developable land along Boston harbor. In addition to the Fort Hill materials, a great deal of debris from the Boston fire of 1872 was used to fill the BWCo flats.

In 1873, an agreement was reached between the Board of Harbor Commissioners, the Boston & Albany Railroad, the BWCo and the City of Boston concerning the filling of the area north and east of the line of South Boston's future Summer Street extension. The board agreed to build a "heavy" 18-foot-high seawall composed of battered granite set on a broad foundation of broken stones that began 23 feet below mean low water. The seawall wrapped around 25 acres of landfill at the junction of Fort Point and main channels, now the site of the Moakley Federal Courthouse. The wall itself, built of large granite blocks, began 11 feet below mean low water and was 27 feet high, battered on both faces and ballasted at the back with gravel and oyster shells. Similarly, the Boston & Albany Railroad agreed to enclose their 50-acre parcel east of Fan Pier with a seawall.

The BWCo enclosed their 25-acre parcel with a "light" seawall- a masonry barrier that extended from Summer Street to the future path of Northern Avenue. The present seawalls between the Summer and Congress street bridges, on both sides of Fort Point Channel, date from the mid to late 1870s and exemplify "light" seawall construction. The seawalls were set in a trench excavated two (2) feet below mean water and on a foundation of piles drive two-and-a-half feet apart. The walls themselves are constructed of granite and have a battered face with a notch at the top to support a platform. The backs of the walls were to be ballasted with oyster shells and the trench and the space between the piles were also filled with shells. The work to fill the BWCo's parcel was completed by 1882.

The Fort Point Channel area was once home to several well-known manufacturing names in the region during the late nineteenth through the early twentieth centuries. Both the American Sugar Refinery Company, one of many sugar processors in the area at the time, and New England Confectionary Company (NECCO) occupied large parcels in the neighborhood. Gillette World Shaving Headquarters has been in Fort Point Channel for over 100 years and continues to play an important role in the development of the area.

The Fort Point Channel National Register Historic District comprises roughly 55-acres in South Boston located across Fort Point Channel from downtown Boston in. It contains 103 buildings and 11 structures, specifically four (4) bridges, a prominent chimney, two (2) sections of seawall along both sides of Fort Point Channel, a circa 1920s Boston Wharf Company roof sign, and a monumental milk bottle built to advertise a milk company. Eighty-nine buildings and nine (9) structures are considered contributing to the historic district. The channel's three (3) historic bridges, the Summer Street (1898-1899), Northern Avenue (1908), and Congress Street (1930) bridges are rare examples of their types.

U.S. Post Office-General Mail Facility

The U.S. Post Office-General Mail Facility, located at 25 Dorchester Avenue, is a circa 1935 building which was subsequently renovated and added on to in the 1960s and further renovated in the 1980s. The building is situated along the west side of Fort Point Channel. While the building is currently encased in a steel frame with an aluminum panel skin, the original structure had a brick frame in a Neo-Classical style.

Gillette Manufacturing Complex

The Gillette Company and brand originated in the late nineteenth century when salesman and inventor King Camp Gillette invented a safety razor that used disposable blades. While Gillette came up with the idea in 1895, developing the concept into a working model and drawings that could be submitted to the Patent Office took six (6) years. Gillette encountered trouble finding anyone capable of developing a method to manufacture blades from thin sheet steel, but finally found William Emery Nickerson, a Massachusetts Institute of Technology (MIT) graduate with a degree in chemistry, who was able to manufacture the blades.

Razors were once an item passed down from father to son through generations. Men's facial trends were changing rapidly in the late 1800s as long beards were no longer fashionable and clean-shaven chins, cheeks, and a well-manicured mustache were popular. To achieve this look, men could go to a barber two (2) to three (3) times per week or shave themselves, which could be a dangerous undertaking given the personal razors in use at the time. King Camp Gillette realized that the only necessary part of his permanent razor was the finest part of the tip of the blade. By producing a new type of blade at a low cost that was easily and quickly replaceable, the Gillette disposable razor blade and handle promised men safety and personal freedom to achieve the looks they desired without going to a barber. Gillette quickly became an internationally recognized name.

The American Safety Razor Company was founded on September 28, 1901 in Boston by Gillette and other members of the project. The company was unable to get funding until Gillette's old friend John Joyce invested the necessary amount for the company to begin manufacturing. Production began slowly in 1903 but the following year, William Emery Nickerson, now a machinist working with Gillette, changed the original model by improving the handle and frame of the razor so it could better support the thin metal blade. During its first year of operation, the company had sold only 51 razors and 168 blades; however, the second year saw sales rise to 90,884 razors and 123,648 blades.

The company was renamed the Gillette Safety Razor Company in 1904 and quickly began to expand outside the United States. In 1905, the company opened a sales office in London and a blade manufacturing plant in Paris, and by 1906 Gillette had a blade plant in Canada, a sales operation in Mexico, and a European distribution network that sold in many nations, including Russia. When the United States entered World War I in 1917, the company provided all American soldiers with a field razor set paid for by the government.

As the company grew, King Camp Gillette vetoed a plan to sell the patent rights of the company in Europe, believing correctly that Europe would eventually provide a very large market. During this time, Gillette and John Joyce, as a fellow director, battled for control of the company. Gillette eventually sold out his rights to the company to Joyce, but the brand retained his name. In the 1920s, as the patent on the safety razor expired, the Gillette Safety Razor Company emphasized research to design ever-improved models, realizing that even a slight improvement could convince men to use the product. By the 1930s, it was estimated that Gillette produced 20,000,000 razors and nearly a billion blades each year.

As the BWCo began to sell off portions of its land in the Fort Point Channel area, Gillette and other industries expanded. Based on historic maps, Gillette gradually grew its plant footprint during the 1910s and 1920s in part by taking over portions of the former American Sugar Refinery Company, which held a large foothold on land along the southern portion of Fort Point Channel between West First and West Second streets. Some buildings were repurposed while others were torn down and new ones constructed in their place. In the 1920s, part of West First Street was reconstructed and named Gillette Park as Gillette began to occupy more of the buildings in the area.

During the time of urban renewal in the 1950s and 1960s, many companies were leaving cities. Gillette, however, showed a confidence in the future of Boston by investing extensively in its South Boston campus along Fort Point Channel. A *Boston Globe* article from August of 1960 announced plans for construction of a new $6 million Gillette plant. The plant expansion included three (3) one (1)-story steel framework buildings covering 227,599 square feet just north of the firm's main factory (the current Gillette Headquarters building within the APE). The buildings, which were constructed by Turner Construction Company, included a new manufacturing plant, shipping and receiving building, and office facilities. Turner Construction Company previously constructed Gillette Park in 1925 and also constructed the Gillette chiller plant on the campus. Gantaeume & McMullen of Boston were the engineers who designed the new plant.

The blade manufacturing building was approximately 200 feet wide by 1,000 feet long, containing 200,000 square feet of floor area. The shipping and receiving building had an area of 35,000 square feet and the office building covered 13,800 square feet. The whole building is one-story with a structural steel frame and exterior brick masonry walls. During this time of massive investment in the neighborhood, building records show that

Gillette also repurposed and renovated other buildings to expand its campus by purchasing adjacent properties in the neighborhood.

The Gillette Headquarters building (blade manufacturing building) facing Fort Point Channel was designed with a distinctive saw-tooth window configuration that represents the edge of a razor. The company sign bearing the words "Gillette World Shaving Headquarters" sits atop this edge of the building. The saw-tooth design is comprised of a brick framed edge with large multi-pane windows on the recess of the façade.

The Gillette Company has continued to thrive and sell products under a variety of brand names including Gillette, Braun, Oral B, and Duracell. The company merged into Procter and Gamble (P&G) in 2005, while still retaining the Gillette name and is presently owned by P&G.

Gillette Sign

According to the City of Boston building records dated November 27, 1962, a permit was issued to erect illuminated letters reading "Gillette World Shaving Headquarters" on the roof of the building at 15 Gillette Park (Gillette Headquarters building). The sign was constructed by "Donnelly Elec. Mfg. Co." The Donnelly Electric Manufacturing Company of Boston also designed and erected another iconic sign in the area: the NRHP-listed Shell Oil Company sign in Cambridge. The company is one of the foremost manufactures of neon advertising signs in New England. The company was founded in 1850 as John Donnelly & Sons Company. The company's early work consisted of painted exterior signs. In the late 1920s, the firm created the Donnelly Electric Manufacturing Company (DEMCO) to promote electrified outdoor advertising displays. DEMCO designed, engineered, and maintained all the signs they constructed, including numerous theater marquees and displays in the New England area and as far south as Miami, Florida. The company designed and produced an array of signs in the Boston area, many of which have since been dismantled. Extant signs in the area include the Gillette World Shaving Headquarters sign, the Shell Oil Company sign, and the Stop & Shop sign on the building adjacent to the Shell sign site.

The Gillette sign was restored in 2010 as part of Gillette's multimillion-dollar renovation project for the aging plant. At the time of the restoration, the sign stretched 400 feet long, stood 16 feet tall, and contained 5,000 feet of neon tubing. When the sign was restored, the neon tubing was replaced within over 14,000 light emitting diode (LED) modules, which are still utilized presently.

<u>Determinations of Eligibility</u>

When determining the eligibility of properties, FEMA considered NRHP *Criteria for Evaluation* (36 CFR Part 63) and National Register Bulletin 15 *"How to Apply the National Register Criteria."* The criteria are as follows: Criterion A, associated with events that have made a significant contribution to broad patterns of our history; Criterion B, associated with the lives of significant persons in our past; Criterion C, embodiment of distinctive characteristics of a type, period, or method of construction or that represents the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, and Criterion D, have yielded or may be likely to yield information important in history or prehistory. In addition to possessing significance under the Criteria, a property must also possess integrity in order to be eligible for the NRHP. The seven components of integrity are location, design, setting, materials, workmanship, feeling, and association.

U.S. Post Office-General Mail Facility

Following extensive renovations over the years as described, the U.S. Post Office-General Mail Facility has lost its integrity of design, materials, workmanship, and feeling. The original structure from 1935 is no longer visible. Therefore, the U.S Post Officer-General Mail Facilities lacks the necessary integrity to be eligible for listing in the NRHP.

Fort Point Channel Historic District
The historic district continues to meet Criteria A and C at the local, state, and national levels in the areas of architecture, commerce, community planning and development, industry, engineering, maritime history, and transportation. The district exemplifies land-making and real estate development that was characteristics of Boston and the region, and important to the economic and physical development of both the city and the region. The district is also an excellent example of the kind of urban loft district found in and near city centers across the country and played a vital role in the nation's economic life.

Gillette Manufacturing Complex
The Gillette Manufacturing Complex appears eligible for listing in the NRHP for its association with significant events (Criterion A) and person(s) (Criterion B) that have made a contribution to history, mainly the invention of the safety razor by King Camp Gillette which changed the world of shaving. The Gillette Manufacturing Complex is significant at both the local, state, and national levels under Criterion A for its associations with the history of manufacturing and industrial development in Boston (local significance), which impacted the economy of both Massachusetts and New England as a whole (state significance). Gillette is an international recognized name that revolutionized the manufacturing of razors through the invention of the safety razor (national significance) and continues to maintain a presence and reputative around the world as a leader in the shaving industry.

The Gillette Manufacturing Complex has been a significant contributor to the economic growth and vitality of Boston throughout its more than 100 years of history in Fort Point Channel. As previously noted, during the time of urban renewal in the 1950s and 1960s when many companies were leaving cities, such as Boston, Gillette invested extensively in its South Boston campus and helped to bolster the local economy by staying in Fort Point Channel (Criterion A).

The South Boston campus of Gillette is the location where this internationally renowned company began operations. The Gillette Headquarters building is unique in its design with its razors edge facing Fort Point Channel that was designed to mimic the company's product (Criterion C). Although the buildings within the Gillette complex have been greatly altered over the lifespan of the complex (demolitions, new construction, reuse of buildings), these changes have been made to allow the company to adapt to new manufacturing needs. The complex retains sufficient integrity of location, feeling, and association. While more research is necessary to further develop the history of the complex and the contributing buildings within the complex, for the purposes of this review FEMA has determined that the complex as a whole is eligible for listing in the NRHP.

Gillette Sign
The Gillette World Shaving Headquarters sign itself appears significant as an iconic landmark for the City of Boston. The large sign sits atop the Gillette Complex facing Fort Point Channel. It is visible not only to pedestrians in the city, but also those traveling along Interstate-93 (expressway) through the city and those who take trains to and from South Station. The sign has been a Boston landmark for decades since it was constructed in the 1960s.

The sign has been associated with the history of Gillette in the Boston area since it was constructed in the 1960s when the Gillette plant was expanded (Criterion A). The use of large-scale illuminated displays intended to be seen over long distances were an innovation of the automobile era. Neon in particular gave a highly visible glow which enabled signs to be read easily by motorists driving by, as is the case of the Gillette sign. As previously noted, DEMCO, who designed the sign, was one of the foremost manufactures of neon advertising signs in New England (Criterion C). However, as the sign has been altered by the replacement of its original neon with LEDs in 2010, it is no longer directly linked to the neon sign era. Although the inner workings of the original neon have been removed, the sign still has the illuminated appearance as originally constructed. While FEMA believes the sign is not eligible for listing individually, FEMA believes the sign is eligible as a contributing element within the eligible Gillette Complex as it adds to the overall significance of the complex.

APPLICABILITY OF THE CRITERIA OF ADVERSE EFFECT [36 CFR § 800.11(e)5]

Adverse effects occur when an undertaking may directly or indirectly alter characteristics of a historic property that qualify it for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Reasonably foreseeable effects caused by the undertaking that may occur later in time, are farther removed in distance, or are cumulative must also be considered.

FEMA has determined that there are two (2) historic resources within the APE: the NRHP-listed Fort Point Channel Historic and the Gillette World Shaving Headquarters complex (including its associated sign), which FEMA has determined eligible for listing on the NRHP. As such FEMA has applied the criteria of adverse effect as follows to determine effects:

- Construction of the earthen berm will have no physical impact on the channel walls, which are contributing elements within the Fort Point Channel Historic District, as the berm will be constructed southeast of the Harbor Walk, away from the channel walls.
- While the raised Harbor Walk will be constructed overtop the existing channel walls and tied into the top course of blocks, it will have only minor physical impacts on the historic material of the channel walls themselves as many were replaced when the Harbor Tunnel was constructed underneath this stretch of the channel. The new elevated Harbor Walk will be tied into the existing top course of the channel walls using dowels. The granite veneer blocks used to construct the raised Harbor Walk will match the appearance of existing top course of channel blocks in terms of material, color, texture, and size; the City will utilize granite veneer as previously utilized to reconstruct portions of the channel walls when the harbor tunnel was constructed beneath Fort Point Channel; therefore, the visual impacts will be minor and will not adversely affect the character defining features of the Fort Point Channel Historic District.
- While measures will be taken to minimize the visual impacts of the elevated Harbor Walk (matching the blocks to the channel walls as noted previously), the elevated Harbor Walk will also be differentiated from the existing historic channel walls as they will be granite veneer, not solid granite blocks, and the raised portion will feature new railings and lighting so as not to create a false sense of history in relation to the historic district.
- The west side of the channel (Downtown Boston side) will view the berm and elevated Harbor Walk from a considerable distance (approximately 1,500 feet), therefore there will be only minor visual impacts across the channel.
- Based on the earthen berm's height of six (6) feet and the proposed gradual nature of the mound, visual impacts will be limited to the adjacent parcels, which are predominately paved parking lots; therefore, the berm will not adversely impact the character defining features of the Fort Point Channel Historic District and eligible Gillette Complex.
- The Gillette sign will still be clearly visible behind the elevated Harbor Walk, as the west side of the channel (Downtown Boston side) is raised in elevation and the Harbor Walk will only be approximately 9.5 feet in height. Therefore, the sign will continue to be a visibly prominent feature within the surrounding landscape (whether viewed from the expressway or from the trains leaving South Station), and the raised Harbor Walk will not impact the character defining features of the Gillette Complex.
- The Gillette Complex itself will not be physically impacted by the construction of the berm or raised Harbor Walk. Visually, the complex will still have views of the surrounding neighborhood, and the complex itself will still be visible from adjacent properties.
- The proposed work will have minimal or negligible viewshed impacts on Fort Point Channel Historic District as the berm and elevated Harbor Walk will be viewed from a distance from any standing structures within both the NRHP-listed historic district and the local landmark district.

Therefore, FEMA has determined that the undertaking will not adversely impact the character-defining features of the Fort Point Channel Historic District and the Gillette Complex.

FINDING OF EFFECT [36 CFR § 800.4(d)]

Request for Concurrence
FEMA has determined that there is one (1) NRHP listed resource and one (1) NRHP eligible resource within the APE. Additionally, based on FEMA's assessment of the APE, FEMA has determined that there is very limited potential for impact to archaeological resources within the APE as the undertaking is confined to previously disturbed soils. FEMA has determined that the Fort Point Channel Infrastructure project will result in a finding of ***"No Adverse Effect"*** to historic properties. However, in the unlikely event of an inadvertent discovery, FEMA will include the following grant conditions:

1. NHPA CONDITION #1 (artifacts): In the event of the discovery of archaeological deposits (e.g. Native American pottery, stone tools, shell, old house foundations, old bottles) the Subrecipient and their contractor shall immediately stop all work in the vicinity of the discovery and take reasonable measures to avoid or minimize harm to the finds. The Subrecipient and their contractor shall secure all archaeological discoveries and restrict access to discovery sites. The Subrecipient shall immediately report the archaeological discovery to the Recipient (MEMA, 508-820-2033) and the FEMA Deputy Regional Environmental Officer (Mary Shanks, 617-901-2204); FEMA will determine the next steps.

2. NHPA CONDITION #2 (human remains): In the event of the discovery of human remains, the Subrecipient and their contractor shall immediately stop all work in the vicinity of the discovery and take reasonable measures to avoid or minimize harm to the finds. The Subrecipient and their contractor shall secure all human remains discoveries and restrict access to discovery sites. The Subrecipient and their contractor shall follow the provisions of applicable state laws or any amendments or supplanting laws and regulations. Violation of state law will jeopardize FEMA funding for this project. The Subrecipient will inform the Office of the Chief Medical Examiner, the State Archaeologist, the Recipient (MEMA, 508-820-2033), and the FEMA Deputy Regional Environmental Officer (Mary Shanks, 617-901-2204). FEMA will consult with the SHPO and Tribes, if remains are of tribal origin. Work in sensitive areas may not resume until consultation is completed and appropriate measures have been taken to ensure that the project is in compliance with the National Historic Preservation Act.

3. NHPA Condition #3 (borrow sources): All borrow or fill material must come from pre-existing stockpiles, material reclaimed from maintained roadside ditches (provided the designed width or depth of the ditch is not increased), or commercially procured material from a source existing prior to the event. For any FEMA-funded project requiring the use of a non-commercial source or a commercial source that was not permitted to operate prior to the event (e.g. a new pit, agricultural fields, road ROWs, etc.) in whole or in part, regardless of cost, the Applicant must notify FEMA and the Recipient prior to extracting material. FEMA must review the source for compliance with all applicable federal environmental planning and historic preservation laws and executive orders prior to a subrecipient or their contractor commencing borrow extraction. Consultation and regulatory permitting may be required. Non-compliance with this requirement may jeopardize receipt of federal funding. Documentation of borrow sources utilized is required at closeout.

4. NHPA Condition #4 (channel walls): Based on the condition of the existing channel walls as assessed during the construction phase, additional work may be necessary to stabilize or repair the walls. If such repairs are necessary, the City of Boston will notify FEMA of the repair work and all repair or replacement work will be in-kind. In-kind shall mean that it is either the same or similar material, and the result shall match all physical and visual aspects, including form, color,

and workmanship. Therefore, any new stones or mortar, or repair work on the channel walls will match the existing channel walls in materials, size, and color.

In accordance with 36 C.F.R. Part 800 and pursuant to Stipulation I.E.2.c. of the *Massachusetts Prototype Programmatic Agreement* (2018), this undertaking is associated with a disaster grant project, therefore FEMA requests SHPO concurrence with its finding of "***No Adverse Effect***" within **thirty (30) calendar days from receipt of this transmittal**. Please let us know in advance if additional time is needed.

Should you have any questions, please do not hesitate to contact me at Mary.Shanks@fema.dhs.gov or 617-901-2204, or our Historic Preservation Specialist, Kathleen Philp at Kathleen.Philp@fema.dhs.gov or 202-655-8748.

Thank you,

for Mary K. Shanks
Deputy Regional Environmental Officer
FEMA Region 1, New England

Attachments:

Attachment 1: Project Location Map
Attachment 2: Project Plans
Attachment 3: APE Map
Attachment 4: Historic Resources Map
Attachment 5: NRCS Soil Map
Attachment 6: Photographs

cc: Mashpee Wampanoag Tribe
Wampanoag Tribe of Gay Head (Aquinnah)
Bureau of Underwater Archaeological Resources (BUAR)
Boston Landmarks Commission
Historic Boston Inc.
Friends of Fort Point Channel
Boston Preservation Alliance
Boston Tea Party Ships & Museum

From:	Amelia Croteau
To:	Bradley, Rachel
Cc:	cc@boston.gov; joe.christo@boston.gov; Richard.mcguinness@boston.gov; Thurson, Kelli
Subject:	Re: [RESPONSE REQUESTED] FEMA Pre-Disaster Mitigation Grant Environmental and Historic Preservation Coordination
Date:	Tuesday, January 8, 2019 8:50:57 AM
Attachments:	image001.png

Hi Rachel,

Thank you for sending this along, it must have gotten lost in the shuffle of the first email. This project will require filing a Notice of Intent. Information on how to file and what is required can be found here. Please let me know if you have any questions.

Best regards,

Amelia Croteau
Executive Secretary, Boston Conservation Commission
Floodplain Manager, City of Boston
Mayor's Office of Environment, Energy and Open Space
Boston City Hall - Room 709
(617) 635-3850

On Mon, Jan 7, 2019 at 3:53 PM Bradley, Rachel <Rachel.Bradley@arcadis.com> wrote:

> Hi Amelia,
>
> Thanks for your response! Were you able to access the attachments at the link I included? There is a narrative explanation of the scope of work and project figures in those attachments. Here it is again below:
>
> https://we.tl/t-Ntzw3Z6gnj
>
> Please let me know if this addresses your question, or if additional information is needed.
>
> Thank you so much,

Rachel E. Bradley

Rachel.bradley@arcadis.com
T. +1 703 214 2749

M. +1 410 236 7064

From: Amelia Croteau <amelia.croteau@boston.gov>
Sent: Monday, January 7, 2019 3:47 PM
To: Bradley, Rachel <Rachel.Bradley@arcadis.com>
Cc: cc@boston.gov; joe.christo@boston.gov; Richard.mcguinness@boston.gov; Thurson, Kelli <Kelli.Thurson@arcadis.com>
Subject: Re: [RESPONSE REQUESTED] FEMA Pre-Disaster Mitigation Grant Environmental and Historic Preservation Coordination

Hi Rachel,

Thank you for reaching out. I believe this would require the filing of a Notice of Intent, however it is hard for me to get an idea of the entire scope of the project without a set of site plans or narrative detailing the extent of the work. If you have those on hand, please forward.

Best regards,

Amelia Croteau

Executive Secretary, Boston Conservation Commission

Floodplain Manager, City of Boston

Mayor's Office of Environment, Energy and Open Space

Boston City Hall - Room 709

(617) 635-3850

On Wed, Jan 2, 2019 at 7:23 PM Bradley, Rachel <Rachel.Bradley@arcadis.com> wrote:

Hello Ms. Croteau,

This email is being sent on behalf of The City of Boston regarding its application for Federal grant funding under the Federal Emergency Management Agency's (FEMA's) Pre-Disaster Mitigation Program. FEMA requires coordination with regulatory agencies as part of the grant application process. At this time, the City of Boston would like to inform the Boston Conservation Commission of the proposed project, which is in the preliminary stages of design, and **kindly requests a response regarding the need for filing a Notice of Intent and issuance of an Order of Conditions in accordance with the Wetlands Protection Act.** An email response to this request is sufficient.

The relevant **attachments** listed in the attached letter can be found at the following link:

https://we.tl/t-Ntzw3Z6gnj

Thank you for your assistance in this matter.

Rachel E. Bradley, MPP | Resilience and Mitigation Lead **|** Rachel.bradley@arcadis.com

Arcadis | Arcadis U.S., Inc.

2101 L St., NW, Washington, DC **|** 20037 **|** USA
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From:	Rosanne Foley
To:	Bradley, Rachel; Nicholas Armata
Cc:	Richard.mcguinness@boston.gov; joe.christo@boston.gov; Thurson, Kelli
Subject:	Re: [BLC] [RESPONSE REQUESTED] FEMA Pre-Disaster Mitigation Grant Environmental and Historic Preservation Coordination
Date:	Wednesday, January 9, 2019 12:48:46 PM
Attachments:	image001.png 20190102 Letter to Boston Landmarks Commission.pdf

---

Hello Rachel,
The locally designated Fort Point Channel Landmark District (FPCLD) includes the seawall of the Channel.
Any proposed changes require review by the FPCLD Commission.
I have cced the Commission's Preservation Planner, Nick Armata, so he is aware.

Best,
Rosanne Foley

Rosanne Foley
Director of Historic Preservation
Executive Director, Boston Landmarks Commission
Environment Department, Room 709
617-635-3850 (w)
facebook | twitter | instagram

PLEASE NOTE: Design review applications are accepted on a rolling basis.
To be added to a public hearing agenda, an application must be determined to be complete by staff fifteen business days prior to the hearing date.
Incomplete applications cannot be added to a hearing agenda. Please check our website for information.

On Wed, Jan 2, 2019 at 6:54 PM Bradley, Rachel <Rachel.Bradley@arcadis.com> wrote:

> Hello Ms. Foley,
>
> This email is being sent on behalf of The City of Boston regarding its application for Federal grant funding under the Federal Emergency Management Agency's (FEMA's) Pre-Disaster Mitigation Program. FEMA requires coordination with regulatory agencies as part of the grant application process. At this time, the City of Boston would like to inform the Boston Landmarks Commission of the proposed project, which is in the preliminary stages of design, and kindly **requests a response regarding the need for a permit to address potential impacts to historic resources.** An email response to this request is sufficient.
>
> The relevant **attachments** listed in the attached letter can be found at the following link:
>
> https://we.tl/t-R5mrPYUFG1

Please note that the City will be delivering hard copies of the letter and attachments shortly.

Thank you for your assistance in this matter.

Rachel E. Bradley, MPP | Resilience and Mitigation Lead **|** Rachel.bradley@arcadis.com

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

David Robbins
FEMA Region 1
Regional Environmental Officer
99 High Street, 6th Floor
Boston, MA 02110

City of Boston Resilient Fort Point Channel Infrastructure Project/PDMC-PJ-01-MA-2018-008

FEMA Region 1 Project NEPA Scoping Document

Thank you for the opportunity to comment on the City of Boston Resilient Fort Point Channel Infrastructure Project/PDMC-PJ-01-MA-2018-008 scoping document. Boston Harbor and the Fort Point channel serve as important habitat for a variety of living marine resources, including the federally-managed winter flounder (*Pseudopleuronectes americanus*). As noted within the EFH source document, adult winter flounder generally migrate into estuaries in the fall and early winter, and spawn in late winter and early spring. Essential fish habitat for adult winter flounder occurs on muddy and sandy substrates, and on hard bottom on offshore banks. In inshore spawning areas, essential fish habitat includes a variety of substrates where eggs are deposited on the bottom. While project specifics are currently unclear, it is important to note that we recommend that projects sequentially avoid, minimize, and mitigate for adverse effects to Essential Fish Habitat. We look forward to reviewing the project once project plans are available, however we do have general comments which are provided as technical assistance in response to the scoping document.

The proposed project is the construction of approximately 2,300 linear feet of mixed berm and floodwall mitigation features along the Fort Point Channel shoreline within an area referred to as the 100 Acres Master Planning Area, which is bounded by the Fort Point Channel and A Street to the west, Summer Street to the north, the South Boston Bypass Road/Haul Road to the east, and West First Street and Mt. Washington Avenue to the south. The purpose of the project is to reduce flood hazards within the 100 Acres Master Planning Area and portions of South Boston. The Fort Point Channel is a flood pathway into Boston and the project site is at the lowest elevation along the channel.

Boston Climate Ready Now indicates that the railroad crossing on the western extent of the Fort Point channel as a flood entry point (ie. a narrow entry point that will produce flooding over a large urban area in the 2070 to 2100 timeframe). While the railroad crossing was not identified in the scoping document as a project component, we encourage consideration of this site in the current Fort Point Channel infrastructure project, as flooding at this location may lead to the berm trapping floodwaters entering from this flood entry point.

Flood control and shoreline protection structures alter sediment transport processes and hydrologic, temperature, and salinity regimes, which can exacerbate climate related effects; in particular, hardened shorelines and flood control structures can exacerbate the problems associated with sea level rise (SLR) by increasing erosion and preventing inland migration of habitat.

100 Acres Master Planning documents note that SLR assessments and subsequent proposed structure heights employed scenarios from Parris et al. (2012). We recommend that SLR assessments employee the intermediate-high (1.5 m) or high (2.0 m) SLR scenarios from Sweet et al. (2017), due to the probability of exceeding the low and intermediate-low scenarios is 100% and 96%, respectively.

Project documents also indicate that "a Flood Gate Alternative was considered by the City and is included in this scoping analysis. The Flood Gate Alternative would feature flood protection at the mouth of the Fort Point Channel in the form of a flood gate or series of gates that could be closed in advance of high-water events. The flood control gates would be constructed within the channel's banks and would remain open most of the time to allow storm water evacuation and daily tidal exchange". A monitoring and maintenance plan should be developed for the proposed deployable tide gates and provided to resource agencies for review and comment.

Upon submittal of an EFH assessment, NOAA Fisheries will provide official EFH Conservation Recommendations for the proposed project. Again, we appreciate the opportunity to comment on the provided scoping document. Please contact me if you have further questions at Kaitlyn.shaw@noaa.gov.

Sincerely,

Christopher Boelke
Chief, New England Branch
Habitat and Ecosystem Services Division

Works Cited

Parris A, Bromirski P, Burkett V, Cayan D, Culver M, Hall J, Horton R, Knuuti K, Moss R, Obeysekera J, Sallenger A, Weiss J. 2012. Global sea level rise scenarios for the U.S. National Climate Assessment. Department of Commerce, National Oceanic and Atmospheric Administration. p. 1-37.

Sweet WV, Kopp RE, Weaver CP, Obeysekera J, Horton RM, Thieler ER, Zervas C. 2017. Global and regional sea level rise scenarios for the United States. National Oceanic and Atmospheric Administration, National Ocean Service. NOAA Technical Report NOS CO-OPS 083. p. 1-56.

U.S. Department of Homeland Security
FEMA Region I, Mitigation Division
Environmental & Historic Preservation Program
99 High Street, 6th Floor
Boston, MA 02110

March 10, 2021

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

RE: **Section 106 Consultation**: *Finding of "No Adverse Effect" on Historic Properties*
Undertaking: *Resilient Fort Point Channel Infrastructure Project*
Grant Recipient: *Massachusetts Emergency Management Agency (MEMA)*
Sub-Recipient: *City of Boston*
FEMA Grant Program: *Pre-Disaster Mitigation Program (PDM), PDMC-PJ-01-MA-2018-008*

Dear Mr. Robinson:

This letter is to notify you that, in accordance with Section 106 of the National Historic Preservation Act (NHPA), the Federal Emergency Management Agency (FEMA) has determined that the above referenced proposed project constitutes a federally assisted undertaking. The City of Boston (Subrecipient), through the Massachusetts Emergency Management Agency (MEMA/Recipient), has submitted an application to FEMA for Pre-Disaster Mitigation Grant Program (PDM) funding to complete the Resilient Fort Point Channel Infrastructure Project.

The purpose of this letter is to provide project details, examine the area's historic context, establish the eligibility of any resources that may be present, provide FEMA's finding of effect, and obtain concurrence from your office on the determinations and findings made by FEMA, contained herein.

DESCRIPTION OF THE UNDERTAKING [36 CFR § 800.11(e)1]

Project Location
The project is located on the eastern shoreline of Fort Point Channel in the South Boston neighborhood, City of Boston, Suffolk County, MA (N 42.3455490, W -71.0568498; UTM: Zone 19T Easting 330577.84 Northing 4690192.19 south to N 42.3491118, W -71.0521356; UTM Zone 19T Easting 330975.69, Northing 4690578.45). Fort Point Channel is a man-made maritime channel that separates South Boston (east side) from downtown Boston (west side) and connects to Boston Harbor (*see Attachment 1*). This project focuses on the east and south sides of Fort Point Channel, which is dominated by private land ownership including large and small businesses, non-profit organizations, cultural groups and landmarks, and connections to critical transportation routes and infrastructure.

<u>Project Description</u>

Climate Ready Boston is the City's ongoing initiative to adapt to climate change and sea level rise. The initiative's *Citywide Vulnerability Assessment* (2016) and *Neighborhood Resilience Plan for South Boston* (2018) identify Fort Point Channel's east bank as a high priority opportunity to reduce existing and future flood risk within the City.

The Resilient Fort Point Channel Infrastructure Project proposes approximately 2,300 linear feet of mixed berm and floodwall mitigation features (elevated Harbor Walk) along the channel shoreline (*see Attachment 2*).

The project consists of three (3) interconnected segments:

- *Segment 1*- consists of a knee wall and earthen berm which spans the channel side parking lots on A Street (N 42.3455490, W -71.0568498 to N 42.3457195, W -71.0547908); Segment 1 is 728.5 feet long with an average existing ground elevation of 8.3 feet; the northern edge of Segment 1 begins at the General Electric (GE) property line and will tie into elevated features on the GE property and run south parallel to the existing Harbor Walk, ending at the Gillette company' pumphouse where Segment 2 will begin;
- *Segment 2*- will elevate the existing channel walls and Harbor Walk adjacent to the Gillette Headquarters building, beginning south of the company's pumphouse (N 42.3457638, W -71.0549170) and ending where the channel shoreline turns west (N 42.3474564, W -71.0533691); Segment 2 is 816 feet long with an average existing ground elevation of 9.4 feet. As there are large buried industrial pipes and electrical conduit running underground from the Gillette pump house parallel to the Harbor Walk, limited space is available for an earthen berm, which is why an elevated Harbor Walk will be utilized at this segment to replace the existing at-grade Harbor Walk; the flood protection feature in this segment will consist of a double retaining wall of granite veneer blocks matching the appearance of the existing seawall along the channel; the walls be will approximately 9.5 feet in height above the existing seawall height, with six (6) feet of solid blocks and 3.5 feet of railing on top; the blocks will be dowelled into the top course of the existing channel walls; and
- *Segment 3*- will transform back to a knee wall and earthen berm at N 42.3474564, W -71.053691 and end at Dorchester Avenue where it crosses the channel (N 42.3491118, W -71.0521356); Segment 3 is 774.5 feet long with an average existing ground elevation of 9.4 feet.

The berm itself will be six (6) feet in height and 40 feet in width, and therefore will be a gradual mound. The width of ground disturbance for the berm in Segments 1 and 2 will be limited to 45 feet along the length of the segments with a depth of approximately two (2) feet. Proposed features in all three (3) segments have no permanent intrusions into the channel itself. Intermittent barge access in the channel may be required for backflow preventer installation on outfalls and for some seawall modifications.

As a further flood protection measure, an aluminum deployable flood gate will be stored at the Gillette pump house. The gate can be deployed at the mouth of the channel if necessary, during severe storm events.

While no work to reconstruct or stabilize the existing channel walls is anticipated by the City of Boston, there is the potential for additional work to become necessary during the construction phase if the walls are determined to be deteriorated or unstable. If this work is necessary, FEMA has included a project condition that the channel walls must be repaired or replaced in-kind and FEMA must be notified of this work prior to project completion.

<u>Area of Potential Effect (APE)</u>

As defined in the Advisory Council on Historic Preservation's (ACHP) regulations, the APE for a project is defined as the "geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 CFR 800.16[d]). The APE is based upon the "potential" for effect, which may differ for aboveground resources (historic structures and landscapes) and subsurface resources (archaeological sites). Factors with potential to cause effects include but are not limited to: noise, vibration, visual (setting), traffic, atmosphere, construction, indirect and cumulative.

The APE for this undertaking consists of the area of ground disturbance associated with construction of the berm and the elevated Harbor Walk. Visual impacts are limited to the surrounding properties from which the berm and elevated Harbor Walk are visible. There will be no direct physical impacts to any buildings within the APE; however, the channel walls will be extended to create the elevated Harbor Walk and therefore minor direct physical impacts are anticipated. As many parcels to the east are paved parking lots, minor visual impacts are anticipated. To the west on the Downtown Boston side, the only building with possible views of the project area is the U.S. Post Office General Mail Facility (BOS.1694), with its loading docks facing Fort Point Channel. The Gillette complex is also visible from parts of Interstate 93 (expressway) and the railroad tracks to the west (*see Attachment 3*).

STEPS TAKEN TO IDENTIFY HISTORIC PROPERTIES [36 CFR § 800.4(a) & (b)]

A FEMA SOI-qualified Historic Preservation Specialist has conducted a search of the Massachusetts Cultural Resources Information System (MACRIS), the National Register of Historic Places National Resources Information Service (NRHP NRIS) database and reviewed historical aerial images and historic maps and atlases to assess the potential for eligible resources within the APE for the undertaking.

Standing Structures
According to the NRHP NRIS, the APE is located within the boundaries of the Fort Point Channel Historic District (NR#04000959). Within the historic district, the channel walls are the only contributing element within the APE.

Table 1: Closest Listed Resources

NRHP ID #	Resource Name	Resource Address	Approximate Distance to APE
04000959	Fort Point Channel Historic District	South Boston, MA	Within APE

According MACRIS, there are two (2) inventoried areas within the APE and one (1) inventoried property (*see Table 2 below*).

Table 2: Closest Inventoried Properties

MACRIS ID #	Resource Name	Resource Address	Approximate Distance to APE
BOS.WZ	Fort Point Channel Historic District	Boston, MA	Within APE
BOS.ZG	Fort Point Channel Landmark District	Boston, MA	Within APE
BOS.1694	U.S. Post Office- General Mail Facility	25 Dorchester Avenue, Boston, MA	Within APE

The boundaries of the Fort Point Channel Landmark District (BOS.ZG), a local historic landmark district, almost entirely overlap with the Fort Point Channel Historic District boundaries; however, there is one (1) notable exception. The Fort Point Channel Historic District includes the entirety of the channel footprint and its associated features (bridges and seawalls), while the landmark district does not. Therefore, FEMA will evaluate impacts to the districts together.

The U.S. Post Office-General Mail Facility and the Gillette Headquarters building, which are within the APE, are over 45 years of age and need to be evaluated for NRHP eligibility. A review of historic maps and aerial images of the area did not reveal any additional properties that may be impacted by the proposed undertaking (*see Attachment 4*).

<u>Archaeological Resources</u>
According to MACRIS, there are no previously identified precontact or historic archaeological sites within the APE. The table below shows the closest previously identified sites located within one (1) mile of the APE.

Table 3: Previously Identified Archaeological Sites within 1 Mile of APE

Site No.	Site Name	Description	Approximate Distance from APE
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

There are four (4) archaeological survey areas which overlap with the APE as noted below in Table 4.

Table 4: Archaeological Reports within APE

Site No.	Report Name	Abstract
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

A FEMA Historic Preservation Specialist also reviewed the United States Department of Agriculture National Natural Resources Conservation Service (USDA NRCS) Soil Web Survey for this undertaking. There is one (1) soil type within the APE (*see Attachment 5*):

- *Urban land, west substratum, found on 0 to 3 percent slopes*- the soils are composed of excavated and filled land over herbaceous organic material and/or alluvium and/or marine deposits.

Historic maps and atlases show that the Fort Point Channel area within the APE has been previously disturbed by the following: demolition of a large manufacturing building along the channel during the Urban Renewal period of the 1950s and 1960s; construction of the central artery tunnel under a portion of the channel and the adjacent parcel where the Gillette pump house is located; construction of portions of the Gillette complex in the 1960s; and construction of the adjacent parking lots to service both Gillette and the surrounding properties. Based on the archaeological surveys conducted for the Central Artery/Third Harbor Tunnel Project (*noted in Table 4 above*), no archaeological sites were identified within the parcels where the tunnel was constructed. The other surveys noted in Table 4 did not uncover any archaeological resources within the APE.

The extent of ground disturbance for the undertaking is limited to the areas where the earthen berm and elevated Harbor Walk will be constructed. The width of ground disturbance for the berm in Segments 1 and 3 will be limited to 45 feet along the length of the segments with a depth of two (2) feet. This depth is minor and is likely limited to previously disturbed soils. The ground disturbance for the elevated Harbor Walk in Segment 2 is limited to areas that have been previously disturbed by construction on the existing Harbor Walk. Therefore, FEMA has determined that the undertaking is unlikely to impact any unknown archaeological resources as the soils are previously disturbed and no further identification efforts are necessary.

EVALUATION OF HISTORIC SIGNIFICANCE [36 CFR § 800.4(c)]

FEMA has determined that there is one (1) previously listed historic resource within the APE: Fort Point Channel Historic District. Additionally, there are two (2) resources within the APE which need to be evaluated for NRHP eligibility: the U.S. Post Office-General Mail Facility and the Gillette World Shaving Headquarters complex (*see Attachment 6)*.

Historic Context and Description of Fort Point Channel

From the start of its construction and continuing to present day, the Fort Point Channel area in South Boston has been a place of business and a location for activities oriented to water transportation, industry, and commerce. The Fort Point area was first developed in the 1830s by the Boston Wharf Company (BWCo) and was one of the nation's leading marketplaces for wool. Today, many of the Fort Point area's extant manufacturing and warehouse buildings have been preserved as a local landmarks district, with several buildings converted into artists' studios and lofts. Other original BWCo buildings now house office space, hotels, restaurants, and commercial businesses. The area derives its historic significance from being a large and remarkably intact example of the kind of warehousing and manufacturing areas that were once vital to the economies of cities across the nation. Buildings in Fort Point Channel area date predominately from 1870-1915.

Incorporated in 1836 for the purpose of building and operating wharves, BWCo evolved into an industrial real estate company at the end of the nineteenth century, as business conditions and opportunities changed. Between 1837 and 1882, BWCo filled in the marshes of South Boston to which it had rights in phases, advancing from south to north. BWCo not only made the land but also built the streets. The BWCo filled the land on the east side of the channel then built streets, laid out lots, and also erected most of the buildings which were designed by the company's staff architects. The streets follow the grid pattern typical of South Boston with the notable exception of curving Melcher Street, which slopes from an elevated Summer Street at the end of the Summer Street Bridge down to grade at "A" Street. Three (3) bridges connect the Fort Point Channel area to downtown Boston: from north to south these are the Northern Avenue, Summer Street, and Congress Street bridges. "A" Street is the main north-south street through the district and connects it with the residential neighborhood to the south, around West Broadway. Summer and Congress Streets are the main east-west streets.

By the 1840s, the company had built a wharf with two (2) huge arms in South Boston. Filing continued to the north and led to the construction of the Mt. Washington Avenue Bridge in 1855. Until this time, no bridge served the BWCo site. When the Mt. Washington Avenue Bridge (no longer extant) opened, it connected the company's land to Boston proper at Kneeland Street. Around this time, the Midland Railroad (Boston, Hartford & Erie Railroad by 1863 and the New York and New England Railroad by 1875) obtained a right-of-way through the BWCo site. Its tracks came from the south along the eastern edge of the BWCo's property and then crossed on a pile viaduct and continued on a bridge over the channel, roughly where today's Summer Street bridge crosses, ending at a depot in the newly filled South Cove area.

The BWCo continued to extend its land north by filling an L-shaped site up to the Summer Street railroad tracks in the 1850s, except for an inlet perpendicular to Fort Point Channel. The inlet extended across the BWCo lands in the vicinity of Binford Street and was greatly reduced in size between 1874 and the early 1880s as the result of land-making on the east side of A Street. It completely disappeared west of A Street by circa 1920.

After the Civil War, the Commonwealth of Massachusetts focused on improving and developing Boston Harbor. The configuration of landfill from Summer Street to Fan Pier was determined by the Board of Harbor Commissioners, which formed in 1866. The Commissioners adopted a plan that called for building a seawall and filling in the South Boston flats in order to concentrate the force of the tides. In 1871, BWCo began filling its flats with dirt excavated from Fort Hill on the Boston side of the channel. The fort was a wooden, colonial-era fortification that once crowned a hill in the vicinity of present-day High and Oliver streets. The area surrounding the fort was once a fashionable residential neighborhood that had deteriorated into impoverished tenement houses. Beginning in 1868, the City cut down the hill to both remove substandard housing and address the pressing need to create developable land along Boston harbor. In addition to the Fort Hill materials, a great deal of debris from the Boston fire of 1872 was used to fill the BWCo flats.

In 1873, an agreement was reached between the Board of Harbor Commissioners, the Boston & Albany Railroad, the BWCo and the City of Boston concerning the filling of the area north and east of the line of South Boston's future Summer Street extension. The board agreed to build a "heavy" 18-foot-high seawall composed of battered granite set on a broad foundation of broken stones that began 23 feet below mean low water. The seawall wrapped around 25 acres of landfill at the junction of Fort Point and main channels, now the site of the Moakley Federal Courthouse. The wall itself, built of large granite blocks, began 11 feet below mean low water and was 27 feet high, battered on both faces and ballasted at the back with gravel and oyster shells. Similarly, the Boston & Albany Railroad agreed to enclose their 50-acre parcel east of Fan Pier with a seawall.

The BWCo enclosed their 25-acre parcel with a "light" seawall- a masonry barrier that extended from Summer Street to the future path of Northern Avenue. The present seawalls between the Summer and Congress street bridges, on both sides of Fort Point Channel, date from the mid to late 1870s and exemplify "light" seawall construction. The seawalls were set in a trench excavated two (2) feet below mean water and on a foundation of piles drive two-and-a-half feet apart. The walls themselves are constructed of granite and have a battered face with a notch at the top to support a platform. The backs of the walls were to be ballasted with oyster shells and the trench and the space between the piles were also filled with shells. The work to fill the BWCo's parcel was completed by 1882.

The Fort Point Channel area was once home to several well-known manufacturing names in the region during the late nineteenth through the early twentieth centuries. Both the American Sugar Refinery Company, one of many sugar processors in the area at the time, and New England Confectionary Company (NECCO) occupied large parcels in the neighborhood. Gillette World Shaving Headquarters has been in Fort Point Channel for over 100 years and continues to play an important role in the development of the area.

The Fort Point Channel National Register Historic District comprises roughly 55-acres in South Boston located across Fort Point Channel from downtown Boston in. It contains 103 buildings and 11 structures, specifically four (4) bridges, a prominent chimney, two (2) sections of seawall along both sides of Fort Point Channel, a circa 1920s Boston Wharf Company roof sign, and a monumental milk bottle built to advertise a milk company. Eighty-nine buildings and nine (9) structures are considered contributing to the historic district. The channel's three (3) historic bridges, the Summer Street (1898-1899), Northern Avenue (1908), and Congress Street (1930) bridges are rare examples of their types.

U.S. Post Office-General Mail Facility

The U.S. Post Office-General Mail Facility, located at 25 Dorchester Avenue, is a circa 1935 building which was subsequently renovated and added on to in the 1960s and further renovated in the 1980s. The building is situated along the west side of Fort Point Channel. While the building is currently encased in a steel frame with an aluminum panel skin, the original structure had a brick frame in a Neo-Classical style.

Gillette Manufacturing Complex

The Gillette Company and brand originated in the late nineteenth century when salesman and inventor King Camp Gillette invented a safety razor that used disposable blades. While Gillette came up with the idea in 1895, developing the concept into a working model and drawings that could be submitted to the Patent Office took six (6) years. Gillette encountered trouble finding anyone capable of developing a method to manufacture blades from thin sheet steel, but finally found William Emery Nickerson, a Massachusetts Institute of Technology (MIT) graduate with a degree in chemistry, who was able to manufacture the blades.

Razors were once an item passed down from father to son through generations. Men's facial trends were changing rapidly in the late 1800s as long beards were no longer fashionable and clean-shaven chins, cheeks, and a well-manicured mustache were popular. To achieve this look, men could go to a barber two (2) to three (3) times per week or shave themselves, which could be a dangerous undertaking given the personal razors in use at the time. King Camp Gillette realized that the only necessary part of his permanent razor was the finest part of the tip of the blade. By producing a new type of blade at a low cost that was easily and quickly replaceable, the Gillette disposable razor blade and handle promised men safety and personal freedom to achieve the looks they desired without going to a barber. Gillette quickly became an internationally recognized name.

The American Safety Razor Company was founded on September 28, 1901 in Boston by Gillette and other members of the project. The company was unable to get funding until Gillette's old friend John Joyce invested the necessary amount for the company to begin manufacturing. Production began slowly in 1903 but the following year, William Emery Nickerson, now a machinist working with Gillette, changed the original model by improving the handle and frame of the razor so it could better support the thin metal blade. During its first year of operation, the company had sold only 51 razors and 168 blades; however, the second year saw sales rise to 90,884 razors and 123,648 blades.

The company was renamed the Gillette Safety Razor Company in 1904 and quickly began to expand outside the United States. In 1905, the company opened a sales office in London and a blade manufacturing plant in Paris, and by 1906 Gillette had a blade plant in Canada, a sales operation in Mexico, and a European distribution network that sold in many nations, including Russia. When the United States entered World War I in 1917, the company provided all American soldiers with a field razor set paid for by the government.

As the company grew, King Camp Gillette vetoed a plan to sell the patent rights of the company in Europe, believing correctly that Europe would eventually provide a very large market. During this time, Gillette and John Joyce, as a fellow director, battled for control of the company. Gillette eventually sold out his rights to the company to Joyce, but the brand retained his name. In the 1920s, as the patent on the safety razor expired, the Gillette Safety Razor Company emphasized research to design ever-improved models, realizing that even a slight improvement could convince men to use the product. By the 1930s, it was estimated that Gillette produced 20,000,000 razors and nearly a billion blades each year.

As the BWCo began to sell off portions of its land in the Fort Point Channel area, Gillette and other industries expanded. Based on historic maps, Gillette gradually grew its plant footprint during the 1910s and 1920s in part by taking over portions of the former American Sugar Refinery Company, which held a large foothold on land along the southern portion of Fort Point Channel between West First and West Second streets. Some buildings were repurposed while others were torn down and new ones constructed in their place. In the 1920s, part of West First Street was reconstructed and named Gillette Park as Gillette began to occupy more of the buildings in the area.

During the time of urban renewal in the 1950s and 1960s, many companies were leaving cities. Gillette, however, showed a confidence in the future of Boston by investing extensively in its South Boston campus along Fort Point Channel. A *Boston Globe* article from August of 1960 announced plans for construction of a new $6 million Gillette plant. The plant expansion included three (3) one (1)-story steel framework buildings covering 227,599 square feet just north of the firm's main factory (the current Gillette Headquarters building within the APE). The buildings, which were constructed by Turner Construction Company, included a new manufacturing plant, shipping and receiving building, and office facilities. Turner Construction Company previously constructed Gillette Park in 1925 and also constructed the Gillette chiller plant on the campus. Gantaeume & McMullen of Boston were the engineers who designed the new plant.

The blade manufacturing building was approximately 200 feet wide by 1,000 feet long, containing 200,000 square feet of floor area. The shipping and receiving building had an area of 35,000 square feet and the office building covered 13,800 square feet. The whole building is one-story with a structural steel frame and exterior brick masonry walls. During this time of massive investment in the neighborhood, building records show that

Gillette also repurposed and renovated other buildings to expand its campus by purchasing adjacent properties in the neighborhood.

The Gillette Headquarters building (blade manufacturing building) facing Fort Point Channel was designed with a distinctive saw-tooth window configuration that represents the edge of a razor. The company sign bearing the words “Gillette World Shaving Headquarters” sits atop this edge of the building. The saw-tooth design is comprised of a brick framed edge with large multi-pane windows on the recess of the façade.

The Gillette Company has continued to thrive and sell products under a variety of brand names including Gillette, Braun, Oral B, and Duracell. The company merged into Procter and Gamble (P&G) in 2005, while still retaining the Gillette name and is presently owned by P&G.

Gillette Sign

According to the City of Boston building records dated November 27, 1962, a permit was issued to erect illuminated letters reading “Gillette World Shaving Headquarters” on the roof of the building at 15 Gillette Park (Gillette Headquarters building). The sign was constructed by “Donnelly Elec. Mfg. Co.” The Donnelly Electric Manufacturing Company of Boston also designed and erected another iconic sign in the area: the NRHP-listed Shell Oil Company sign in Cambridge. The company is one of the foremost manufactures of neon advertising signs in New England. The company was founded in 1850 as John Donnelly & Sons Company. The company’s early work consisted of painted exterior signs. In the late 1920s, the firm created the Donnelly Electric Manufacturing Company (DEMCO) to promote electrified outdoor advertising displays. DEMCO designed, engineered, and maintained all the signs they constructed, including numerous theater marquees and displays in the New England area and as far south as Miami, Florida. The company designed and produced an array of signs in the Boston area, many of which have since been dismantled. Extant signs in the area include the Gillette World Shaving Headquarters sign, the Shell Oil Company sign, and the Stop & Shop sign on the building adjacent to the Shell sign site.

The Gillette sign was restored in 2010 as part of Gillette’s multimillion-dollar renovation project for the aging plant. At the time of the restoration, the sign stretched 400 feet long, stood 16 feet tall, and contained 5,000 feet of neon tubing. When the sign was restored, the neon tubing was replaced within over 14,000 light emitting diode (LED) modules, which are still utilized presently.

Determinations of Eligibility

When determining the eligibility of properties, FEMA considered NRHP *Criteria for Evaluation* (36 CFR Part 63) and National Register Bulletin 15 *“How to Apply the National Register Criteria.”* The criteria are as follows: Criterion A, associated with events that have made a significant contribution to broad patterns of our history; Criterion B, associated with the lives of significant persons in our past; Criterion C, embodiment of distinctive characteristics of a type, period, or method of construction or that represents the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, and Criterion D, have yielded or may be likely to yield information important in history or prehistory. In addition to possessing significance under the Criteria, a property must also possess integrity in order to be eligible for the NRHP. The seven components of integrity are location, design, setting, materials, workmanship, feeling, and association.

U.S. Post Office-General Mail Facility

Following extensive renovations over the years as described, the U.S. Post Office-General Mail Facility has lost its integrity of design, materials, workmanship, and feeling. The original structure from 1935 is no longer visible. Therefore, the U.S Post Officer-General Mail Facilities lacks the necessary integrity to be eligible for listing in the NRHP.

Fort Point Channel Historic District
The historic district continues to meet Criteria A and C at the local, state, and national levels in the areas of architecture, commerce, community planning and development, industry, engineering, maritime history, and transportation. The district exemplifies land-making and real estate development that was characteristics of Boston and the region, and important to the economic and physical development of both the city and the region. The district is also an excellent example of the kind of urban loft district found in and near city centers across the country and played a vital role in the nation's economic life.

Gillette Manufacturing Complex
The Gillette Manufacturing Complex appears eligible for listing in the NRHP for its association with significant events (Criterion A) and person(s) (Criterion B) that have made a contribution to history, mainly the invention of the safety razor by King Camp Gillette which changed the world of shaving. The Gillette Manufacturing Complex is significant at both the local, state, and national levels under Criterion A for its associations with the history of manufacturing and industrial development in Boston (local significance), which impacted the economy of both Massachusetts and New England as a whole (state significance). Gillette is an international recognized name that revolutionized the manufacturing of razors through the invention of the safety razor (national significance) and continues to maintain a presence and reputative around the world as a leader in the shaving industry.

The Gillette Manufacturing Complex has been a significant contributor to the economic growth and vitality of Boston throughout its more than 100 years of history in Fort Point Channel. As previously noted, during the time of urban renewal in the 1950s and 1960s when many companies were leaving cities, such as Boston, Gillette invested extensively in its South Boston campus and helped to bolster the local economy by staying in Fort Point Channel (Criterion A).

The South Boston campus of Gillette is the location where this internationally renowned company began operations. The Gillette Headquarters building is unique in its design with its razors edge facing Fort Point Channel that was designed to mimic the company's product (Criterion C). Although the buildings within the Gillette complex have been greatly altered over the lifespan of the complex (demolitions, new construction, reuse of buildings), these changes have been made to allow the company to adapt to new manufacturing needs. The complex retains sufficient integrity of location, feeling, and association. While more research is necessary to further develop the history of the complex and the contributing buildings within the complex, for the purposes of this review FEMA has determined that the complex as a whole is eligible for listing in the NRHP.

Gillette Sign
The Gillette World Shaving Headquarters sign itself appears significant as an iconic landmark for the City of Boston. The large sign sits atop the Gillette Complex facing Fort Point Channel. It is visible not only to pedestrians in the city, but also those traveling along Interstate-93 (expressway) through the city and those who take trains to and from South Station. The sign has been a Boston landmark for decades since it was constructed in the 1960s.

The sign has been associated with the history of Gillette in the Boston area since it was constructed in the 1960s when the Gillette plant was expanded (Criterion A). The use of large-scale illuminated displays intended to be seen over long distances were an innovation of the automobile era. Neon in particular gave a highly visible glow which enabled signs to be read easily by motorists driving by, as is the case of the Gillette sign. As previously noted, DEMCO, who designed the sign, was one of the foremost manufactures of neon advertising signs in New England (Criterion C). However, as the sign has been altered by the replacement of its original neon with LEDs in 2010, it is no longer directly linked to the neon sign era. Although the inner workings of the original neon have been removed, the sign still has the illuminated appearance as originally constructed. While FEMA believes the sign is not eligible for listing individually, FEMA believes the sign is eligible as a contributing element within the eligible Gillette Complex as it adds to the overall significance of the complex.

APPLICABILITY OF THE CRITERIA OF ADVERSE EFFECT [36 CFR § 800.11(e)5]

Adverse effects occur when an undertaking may directly or indirectly alter characteristics of a historic property that qualify it for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Reasonably foreseeable effects caused by the undertaking that may occur later in time, are farther removed in distance, or are cumulative must also be considered.

FEMA has determined that there are two (2) historic resources within the APE: the NRHP-listed Fort Point Channel Historic and the Gillette World Shaving Headquarters complex (including its associated sign), which FEMA has determined eligible for listing on the NRHP. As such FEMA has applied the criteria of adverse effect as follows to determine effects:

- Construction of the earthen berm will have no physical impact on the channel walls, which are contributing elements within the Fort Point Channel Historic District, as the berm will be constructed southeast of the Harbor Walk, away from the channel walls.
- While the raised Harbor Walk will be constructed overtop the existing channel walls and tied into the top course of blocks, it will have only minor physical impacts on the historic material of the channel walls themselves as many were replaced when the Harbor Tunnel was constructed underneath this stretch of the channel. The new elevated Harbor Walk will be tied into the existing top course of the channel walls using dowels. The granite veneer blocks used to construct the raised Harbor Walk will match the appearance of existing top course of channel blocks in terms of material, color, texture, and size; the City will utilize granite veneer as previously utilized to reconstruct portions of the channel walls when the harbor tunnel was constructed beneath Fort Point Channel; therefore, the visual impacts will be minor and will not adversely affect the character defining features of the Fort Point Channel Historic District.
- While measures will be taken to minimize the visual impacts of the elevated Harbor Walk (matching the blocks to the channel walls as noted previously), the elevated Harbor Walk will also be differentiated from the existing historic channel walls as they will be granite veneer, not solid granite blocks, and the raised portion will feature new railings and lighting so as not to create a false sense of history in relation to the historic district.
- The west side of the channel (Downtown Boston side) will view the berm and elevated Harbor Walk from a considerable distance (approximately 1,500 feet), therefore there will be only minor visual impacts across the channel.
- Based on the earthen berm’s height of six (6) feet and the proposed gradual nature of the mound, visual impacts will be limited to the adjacent parcels, which are predominately paved parking lots; therefore, the berm will not adversely impact the character defining features of the Fort Point Channel Historic District and eligible Gillette Complex.
- The Gillette sign will still be clearly visible behind the elevated Harbor Walk, as the west side of the channel (Downtown Boston side) is raised in elevation and the Harbor Walk will only be approximately 9.5 feet in height. Therefore, the sign will continue to be a visibly prominent feature within the surrounding landscape (whether viewed from the expressway or from the trains leaving South Station), and the raised Harbor Walk will not impact the character defining features of the Gillette Complex.
- The Gillette Complex itself will not be physically impacted by the construction of the berm or raised Harbor Walk. Visually, the complex will still have views of the surrounding neighborhood, and the complex itself will still be visible from adjacent properties.
- The proposed work will have minimal or negligible viewshed impacts on Fort Point Channel Historic District as the berm and elevated Harbor Walk will be viewed from a distance from any standing structures within both the NRHP-listed historic district and the local landmark district.

Therefore, FEMA has determined that the undertaking will not adversely impact the character-defining features of the Fort Point Channel Historic District and the Gillette Complex.

FINDING OF EFFECT [36 CFR § 800.4(d)]

Request for Concurrence
FEMA has determined that there is one (1) NRHP listed resource and one (1) NRHP eligible resource within the APE. Additionally, based on FEMA's assessment of the APE, FEMA has determined that there is very limited potential for impact to archaeological resources within the APE as the undertaking is confined to previously disturbed soils. FEMA has determined that the Fort Point Channel Infrastructure project will result in a finding of ***"No Adverse Effect"*** to historic properties. However, in the unlikely event of an inadvertent discovery, FEMA will include the following grant conditions:

1. NHPA CONDITION #1 (artifacts): In the event of the discovery of archaeological deposits (e.g. Native American pottery, stone tools, shell, old house foundations, old bottles) the Subrecipient and their contractor shall immediately stop all work in the vicinity of the discovery and take reasonable measures to avoid or minimize harm to the finds. The Subrecipient and their contractor shall secure all archaeological discoveries and restrict access to discovery sites. The Subrecipient shall immediately report the archaeological discovery to the Recipient (MEMA, 508-820-2033) and the FEMA Deputy Regional Environmental Officer (Mary Shanks, 617-901-2204); FEMA will determine the next steps.

2. NHPA CONDITION #2 (human remains): In the event of the discovery of human remains, the Subrecipient and their contractor shall immediately stop all work in the vicinity of the discovery and take reasonable measures to avoid or minimize harm to the finds. The Subrecipient and their contractor shall secure all human remains discoveries and restrict access to discovery sites. The Subrecipient and their contractor shall follow the provisions of applicable state laws or any amendments or supplanting laws and regulations. Violation of state law will jeopardize FEMA funding for this project. The Subrecipient will inform the Office of the Chief Medical Examiner, the State Archaeologist, the Recipient (MEMA, 508-820-2033), and the FEMA Deputy Regional Environmental Officer (Mary Shanks, 617-901-2204). FEMA will consult with the SHPO and Tribes, if remains are of tribal origin. Work in sensitive areas may not resume until consultation is completed and appropriate measures have been taken to ensure that the project is in compliance with the National Historic Preservation Act.

3. NHPA Condition #3 (borrow sources): All borrow or fill material must come from pre-existing stockpiles, material reclaimed from maintained roadside ditches (provided the designed width or depth of the ditch is not increased), or commercially procured material from a source existing prior to the event. For any FEMA-funded project requiring the use of a non-commercial source or a commercial source that was not permitted to operate prior to the event (e.g. a new pit, agricultural fields, road ROWs, etc.) in whole or in part, regardless of cost, the Applicant must notify FEMA and the Recipient prior to extracting material. FEMA must review the source for compliance with all applicable federal environmental planning and historic preservation laws and executive orders prior to a subrecipient or their contractor commencing borrow extraction. Consultation and regulatory permitting may be required. Non-compliance with this requirement may jeopardize receipt of federal funding. Documentation of borrow sources utilized is required at closeout.

4. NHPA Condition #4 (channel walls): Based on the condition of the existing channel walls as assessed during the construction phase, additional work may be necessary to stabilize or repair the walls. If such repairs are necessary, the City of Boston will notify FEMA of the repair work and all repair or replacement work will be in-kind. In-kind shall mean that it is either the same or similar material, and the result shall match all physical and visual aspects, including form, color,

and workmanship. Therefore, any new stones or mortar, or repair work on the channel walls will match the existing channel walls in materials, size, and color.

Should you have any questions, please do not hesitate to contact me at Mary.Shanks@fema.dhs.gov or 617-901-2204, or our Historic Preservation Specialist, Kathleen Philp at Kathleen.Philp@fema.dhs.gov or 202-655-8748.

Thank you,

Mary K. Shanks
Deputy Regional Environmental Officer
FEMA Region 1, New England

Attachments:

Attachment 1: Project Location Map
Attachment 2: Project Plans
Attachment 3: APE Map
Attachment 4: Historic Resources Map
Attachment 5: NRCS Soil Map
Attachment 6: Photographs

cc: State Historic Preservation Office (SHPO)
Mashpee Wampanoag Tribe
Wampanoag Tribe of Gay Head (Aquinnah)
Boston Landmarks Commission
Historic Boston Inc.
Friends of Fort Point Channel
Boston Preservation Alliance
Boston Tea Party Ships & Museum

Attachment 1: Project Location Map


Boston Resilient Fort Point Channel
FEMA PDMC-PJ-01-MA-2018-008
Legend
Project Limit
Fort Point Channel
Project Limit
Project Limit
India St
Broad St
Franklin St
High St
Surface Rd
Northern Ave
Seaport Blvd
Thomson Pl
Congress St
Harborwalk
Massachusetts Turnpike
Oak St
Curve St
Charles St S
Church St
Berkeley St
Paul Pl
Millicent Way
Dwight St
Milford St
Washington St
Harrison Ave
Albany St
I-93 Frontage Rd
W 2nd St
W Broadway
W 4th St
Silver St
W 3rd St
W First St
Cypher St
A St
Yard Way
West Side Dr
East Side Dr
Claflin St
Fargo St
Channel St
Harbor St
Park Ln
D St
E St
Pappas Way
Summer St
3000 ft
N
Google Earth
© 2020 Google

Attachment 2: Project Plans

PROPOSED ALIGNMENT PLAN OF FEATURE AND EXISTING UTILITIES CITY OF BOSTON FORT POINT CHANNEL INFRASTRUCTURE PROJECT

Legend

- Knee wall
- Berm Flood Slope
- Berm Crest
- Berm Protected Slope
- Altered Path
- Unaltered Path
- Ramp
- Apron
- Wall
- AccessGate
- Seawall
- RetainingWall
- Electrical Duct
- Stormwater Pipes
- Electric and Telecom
- Seawater Pipes
- Outfalls
- Manholes
- Parcels

ARCADIS

0 70 140 280 420 Feet

Date:	Project No.:
12/21/2018	LA003330.0006

Figure No.:
3

**PROPOSED SEGMENT 1
PLAN OF FEATURE
AND EXISTING UTILITIES
CITY OF BOSTON
FORT POINT CHANNEL
INFRASTRUCTURE PROJECT**

Legend

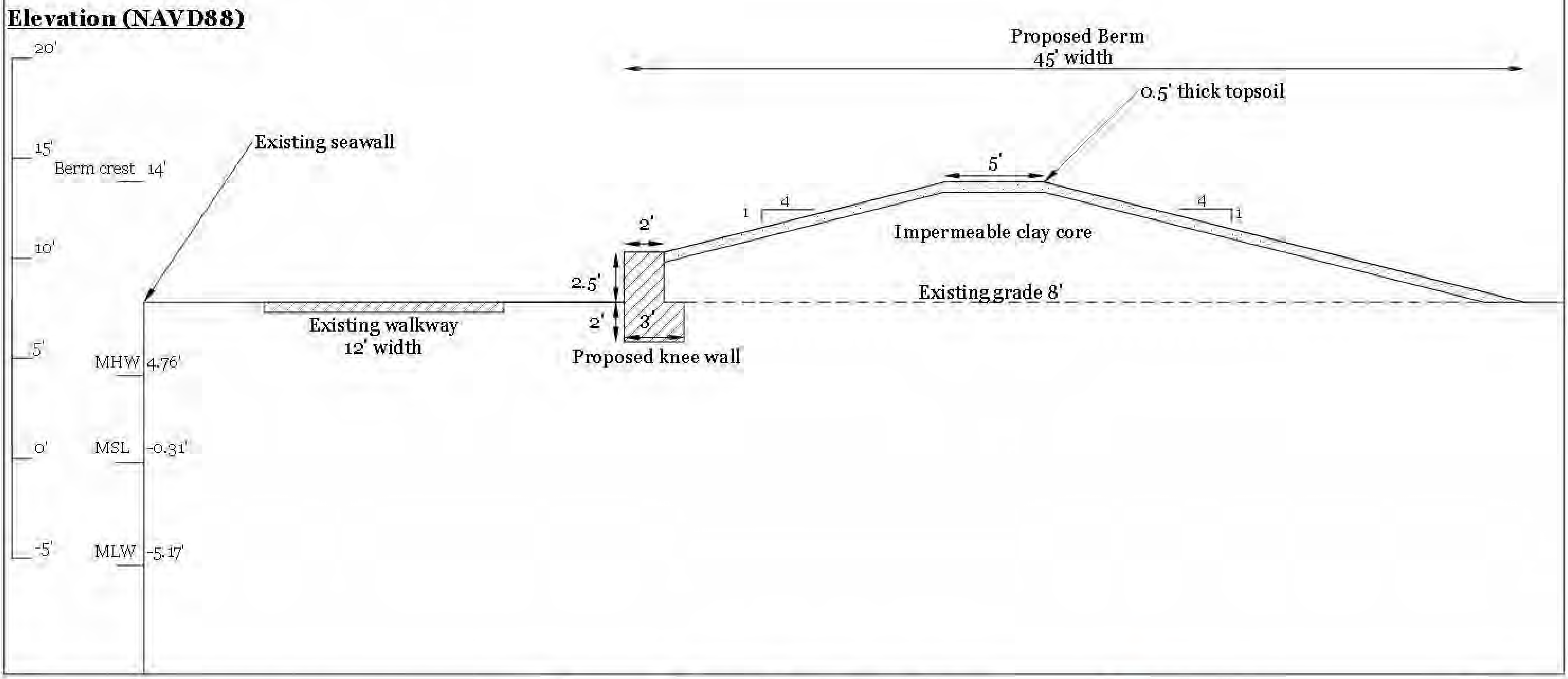
- Knee wall
- Berm Flood Slope
- Berm Crest
- Berm Protected Slope
- Altered Path
- Unaltered Path
- Ramp
- Apron
- Wall
- AccessGate
- Seawall
- RetainingWall
- Electrical Duct
- Stormwater Pipes
- Electric and Telecom
- Seawater Pipes
- Outfalls
- Manholes
- Parcels

ARCADIS

0 20 40 80 120 Feet

Date:	Project No.:
12/21/2018	LA003330.0006

Figure No.:
5



Notes:
Elevations in reference to North American Vertical Datum of 1988 (NAVD88)

0' 5' 10'

Horizontal and vertical scale

Proposed Berm Cross Section

ARCADIS

Figure: 4

City of Boston, Fort Point Channel Infrastructure Project

Date: 12/20/18

Proj No: LA003330.0006

PROPOSED SEGMENT 2
PLAN OF FEATURE
AND EXISTING UTILITIES
CITY OF BOSTON
FORT POINT CHANNEL
INFRASTRUCTURE PROJECT

Legend

- Knee wall
- Berm Flood Slope
- Berm Crest
- Berm Protected Slope
- Altered Path
- Unaltered Path
- Ramp
- Apron
- Wall
- AccessGate
- Seawall
- RetainingWall
- Electrical Duct
- Stormwater Pipes
- Electric and Telecom
- Seawater Pipes
- Outfalls
- Manholes
- Parcels

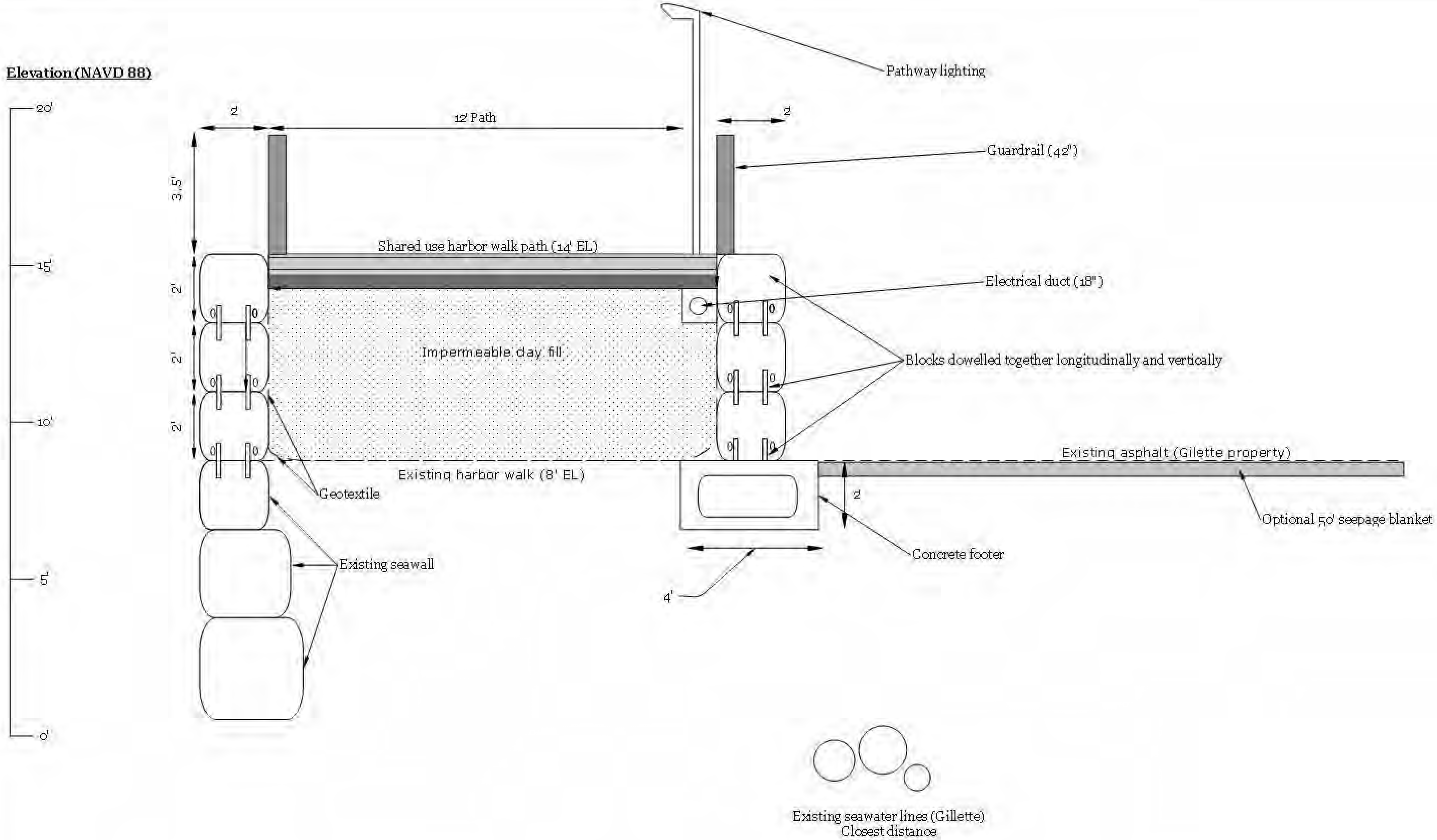
ARCADIS

0 25 50 100 150 Feet

Date: 12/21/2018

Project No.: LA003330.0006

Figure No.: 7



Notes:
Elevations in reference to North American Vertical Datum of 1988 (NAVD88)

0' 2' 4'
Horizontal and vertical scale

Proposed Seawall Cross Section

City of Boston, Fort Point Channel Infrastructure Project

ARCADIS

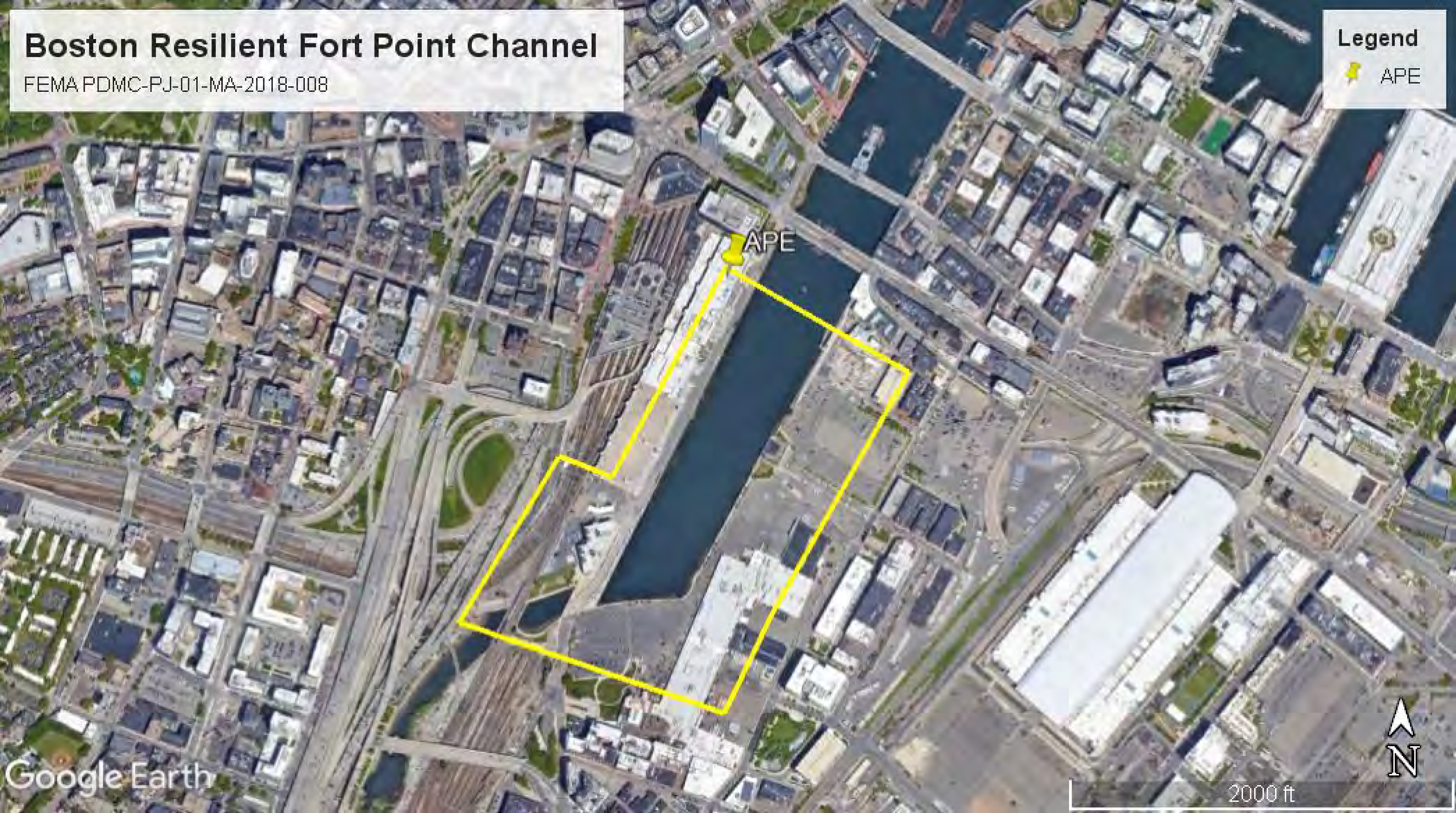
Figure: 6

Date: 12/21/18

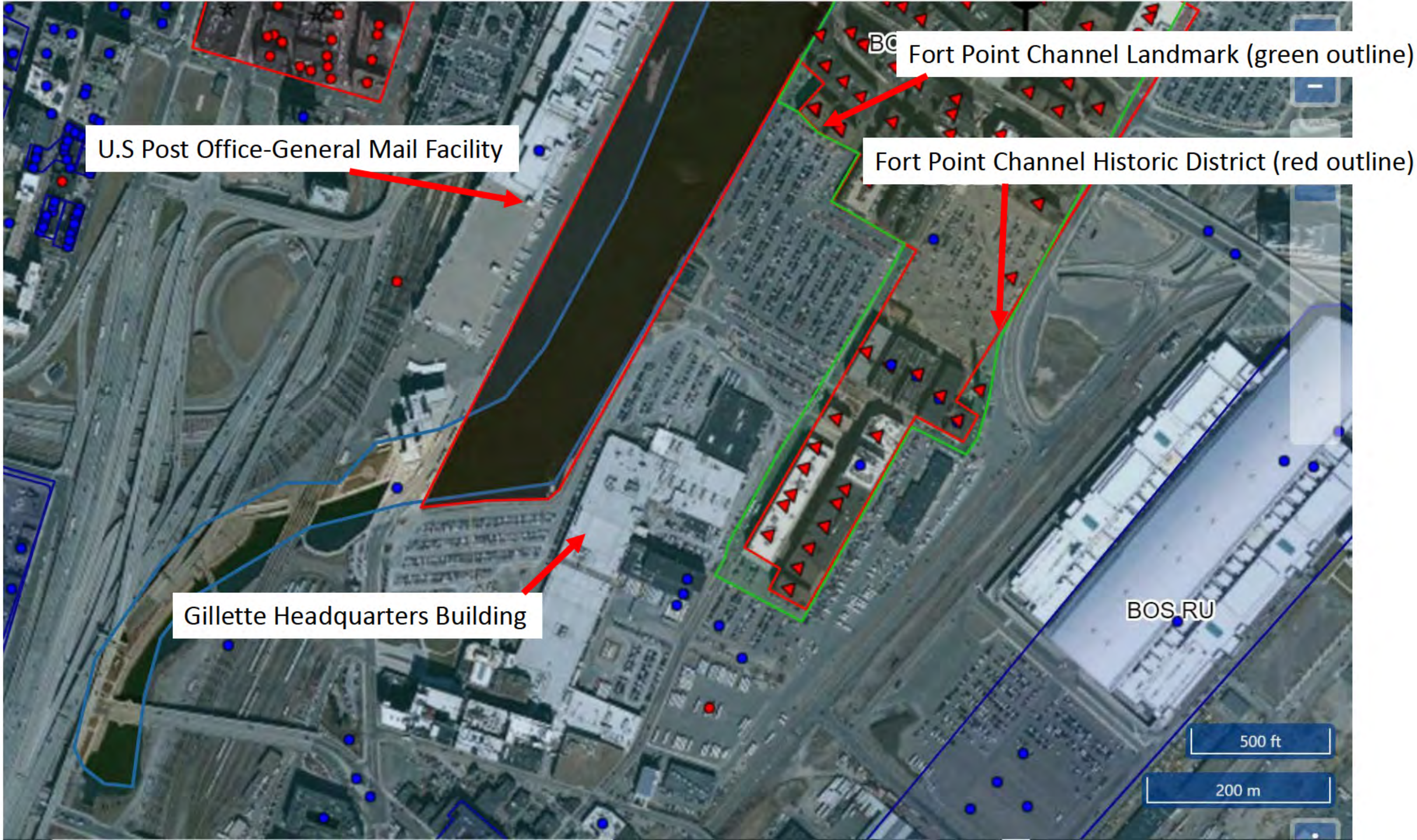
Proj No: LA003330.0006

PROPOSED SEGMENT 3
PLAN OF FEATURE
AND EXISTING UTILITIES
CITY OF BOSTON
FORT POINT CHANNEL
INFRASTRUCTURE PROJECT
Legend
Knee wall
Berm Flood Slope
Berm Crest
Berm Protected Slope
Altered Path
Unaltered Path
Ramp
Apron
Wall
AccessGate
Seawall
RetainingWall
Electrical Duct
Stormwater Pipes
Electric and Telecom
Seawater Pipes
Outfalls
Manholes
Parcels
Project Area
Cambridge
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community
P5365-15
P1170-5
P1170
P1169
STA 22+00
STA 25+00
STA26+15
STA 27+00
STA 28+00
STA 29+00
Reach 3:
774.5' length
45' width
2' disturbance depth
0.80 acres ground disturbance
42.3491118°, -71.0521356°
42.3474343°, -71.0533083°
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
ARCADIS
0 15 30 60 90 Feet
Date:
12/21/2018
Project No.:
LA003330.0006
Figure No.:
8

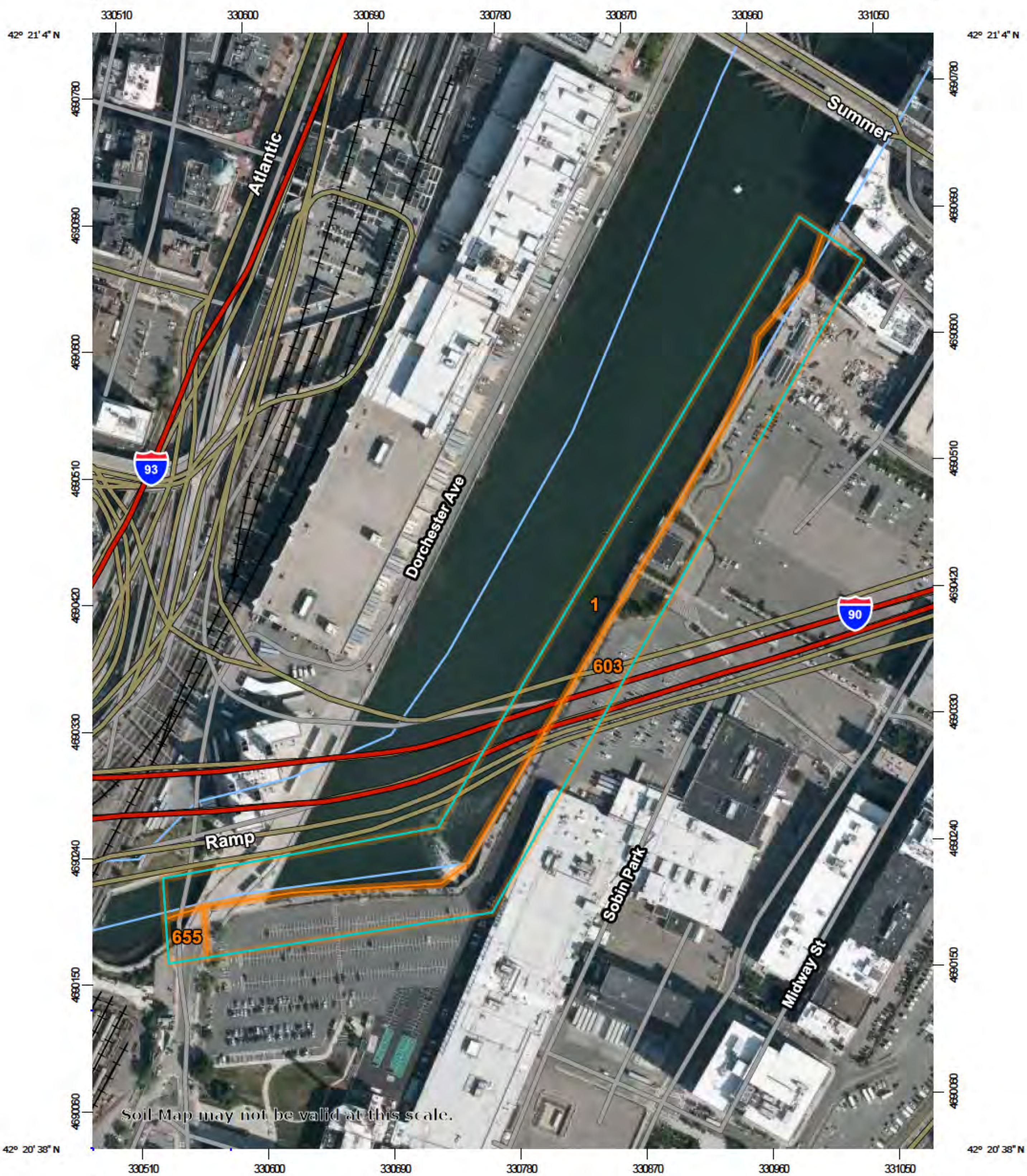
Attachment 3: APE Map


Boston Resilient Fort Point Channel
FEMA PDMC-PJ-01-MA-2018-008
Legend
APE
APE
Google Earth
N
2000 ft

Attachment 4: Resources Map


Fort Point Channel Landmark (green outline)
U.S Post Office-General Mail Facility
Fort Point Channel Historic District (red outline)
Gillette Headquarters Building
BOS.RU
500 ft
200 m

Attachment 5: NRCS Soil Map



Map Scale: 1:3,860 if printed on A portrait (8.5" x 11") sheet.

N

0 50 100 200 300 Meters

0 150 300 600 900 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 16, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 11, 2019—Oct 5, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	5.2	47.2%
603	Urban land, wet substratum, 0 to 3 percent slopes	5.6	50.6%
655	Udorthents, wet substratum	0.2	2.1%
Totals for Area of Interest		**11.0**	**100.0%**

Norfolk and Suffolk Counties, Massachusetts

603—Urban land, wet substratum, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: vkyl
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Excavated and filled land over herbaceous organic material and/or alluvium and/or marine deposits

Minor Components

Udorthents

Percent of map unit: 13 percent
Hydric soil rating: Unranked

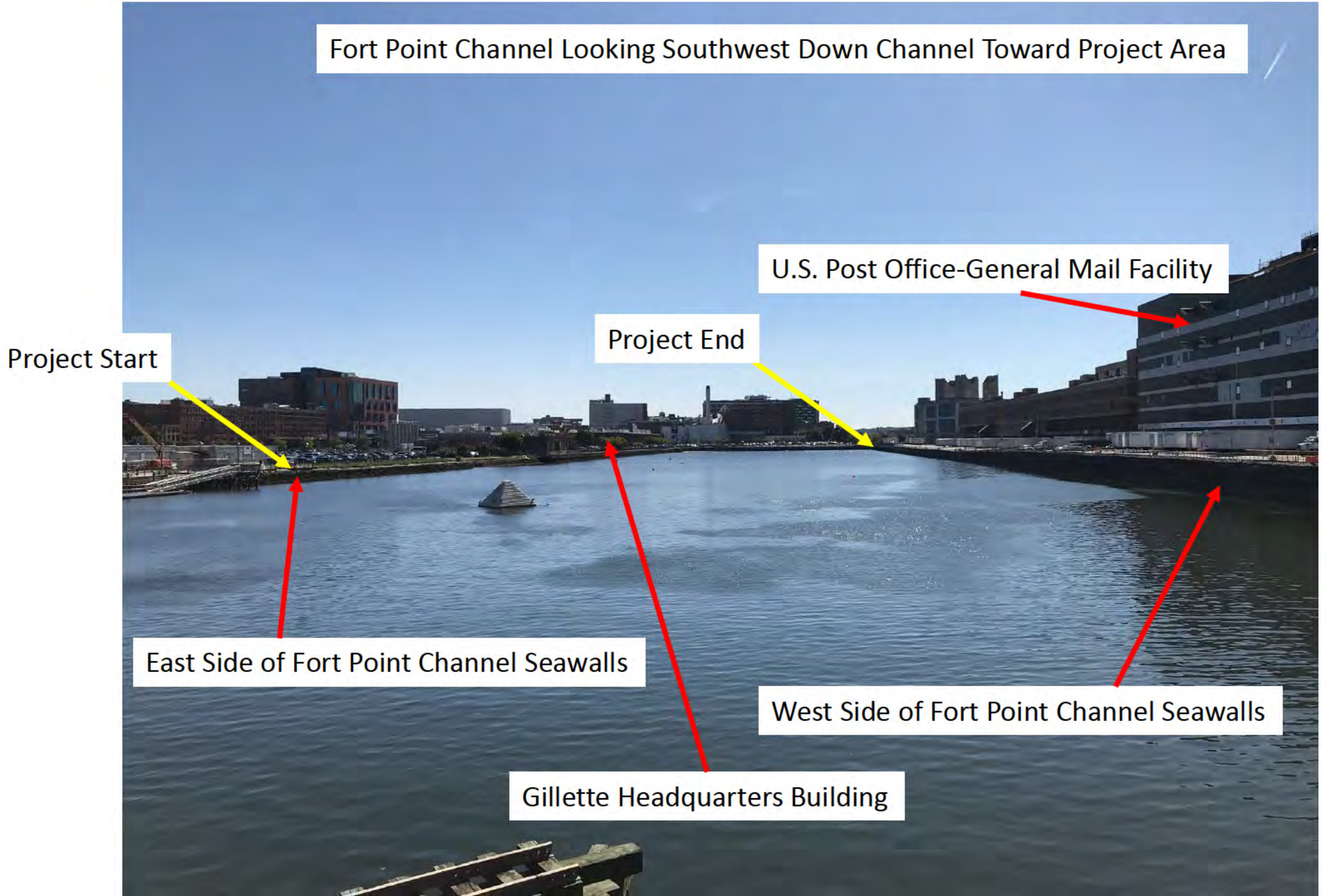
Beaches

Percent of map unit: 2 percent
Hydric soil rating: Unranked

Data Source Information

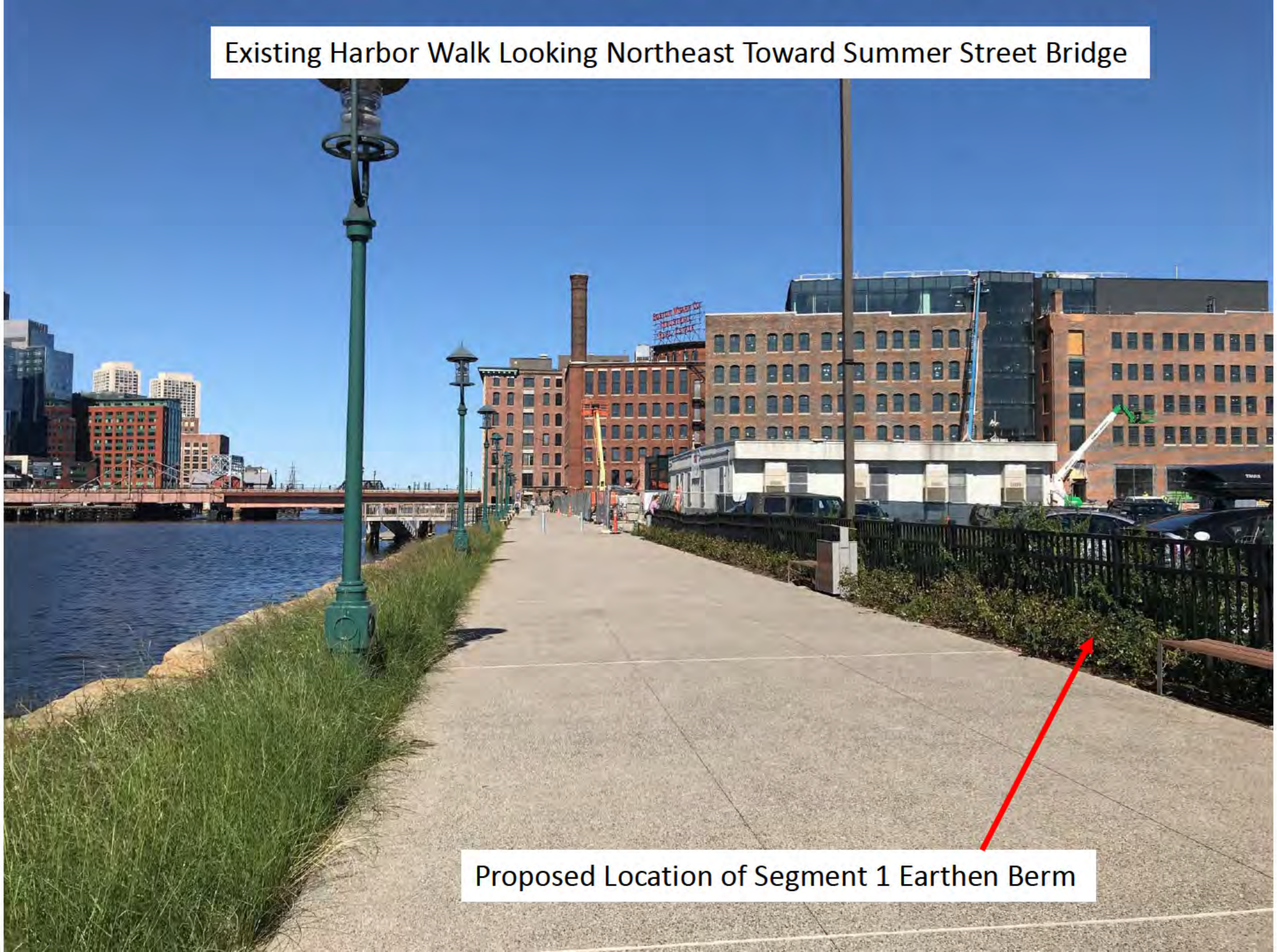
Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 16, Jun 11, 2020

Attachment 6: Photographs


Fort Point Channel Looking Southwest Down Channel Toward Project Area
U.S. Post Office-General Mail Facility
Project End
Project Start
East Side of Fort Point Channel Seawalls
West Side of Fort Point Channel Seawalls
Gillette Headquarters Building

U.S. Post Office-General Mail Facility

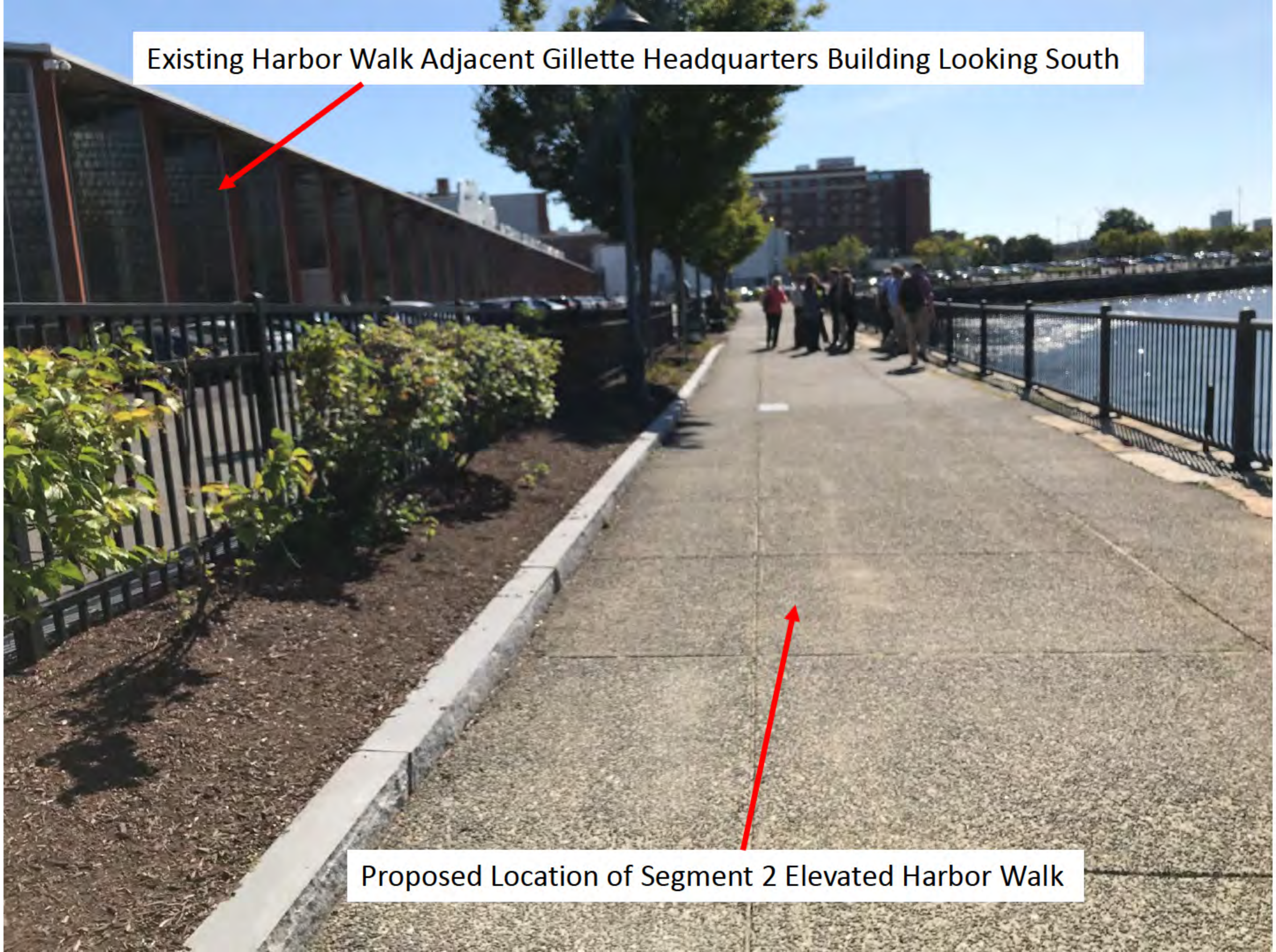
West Side of Fort Point Channel Seawalls


Existing Harbor Walk Looking Northeast Toward Summer Street Bridge
Proposed Location of Segment 1 Earthen Berm


Existing Harbor Walk Looking Southwest Toward Gillette Pump House
Proposed Location of Segment 1 Earthen Berm

Existing Harbor Walk and Channel Walls Looking Northeast toward Summer Street


Existing Harbor Walk (just south of Gillette Pump House) Looking Southeast toward Gillette
Proposed Location of Segment 2 Elevated Harbor Walk

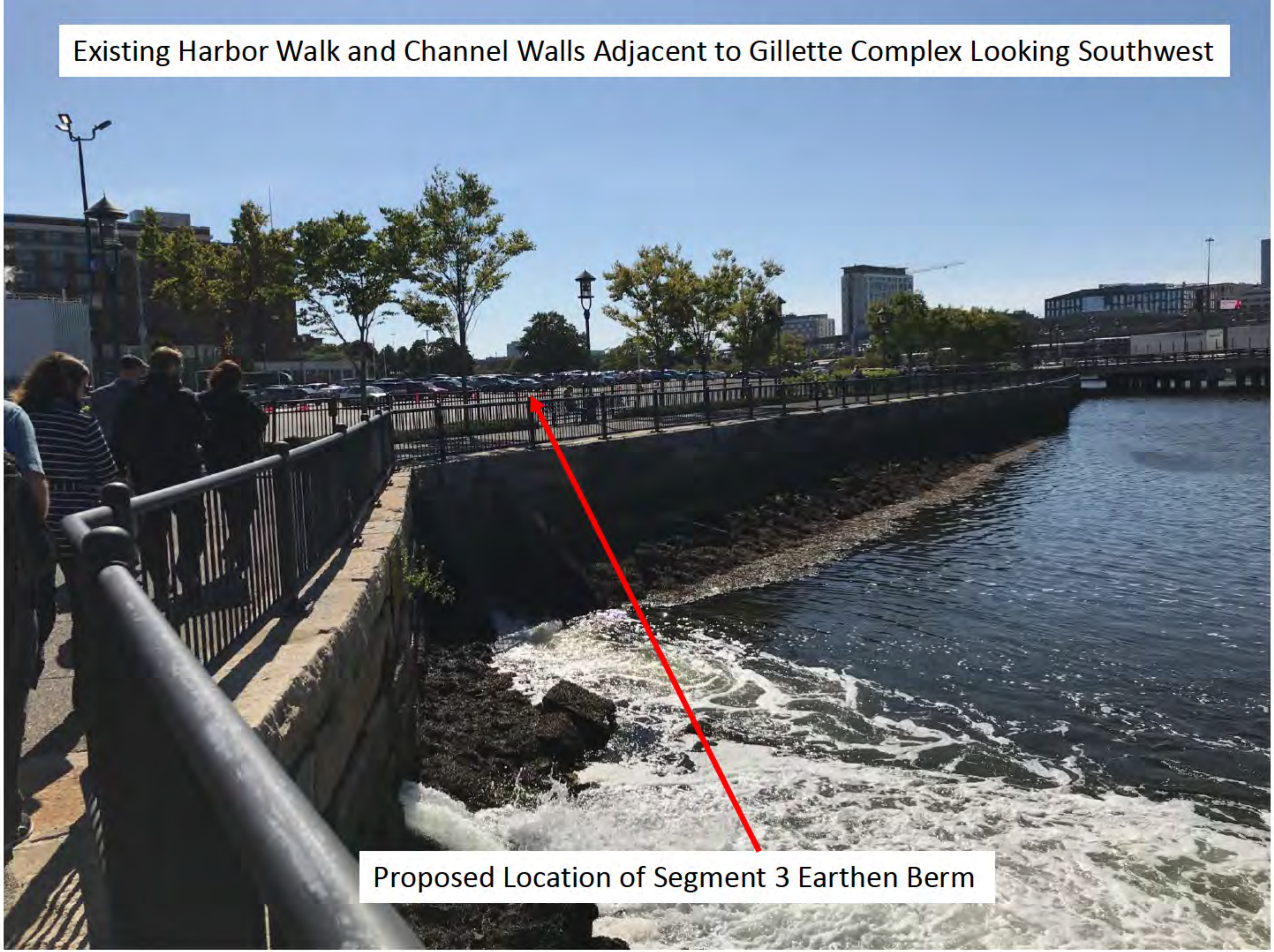

Existing Harbor Walk Adjacent Gillette Headquarters Building Looking South
Proposed Location of Segment 2 Elevated Harbor Walk


Existing Harbor Walk Adjacent Gillette Headquarters Building Looking Northeast
Proposed Location of Segment 2 Elevated Harbor Walk

Existing Harbor Walk and Channel Walls Adjacent Gillette Headquarters Building Looking Northeast

Existing Harbor Walk and Channel Walls Adjacent Gillette Headquarters Building Looking Northeast

Existing Harbor Walk Adjacent to Gillette Headquarters Building and Parking Lot Looking Northeast


Existing Harbor Walk and Channel Walls Adjacent to Gillette Complex Looking Southwest
Proposed Location of Segment 3 Earthen Berm

Gillette Headquarters Building with Illuminated Sign

Proposed Location of Segment 2 Elevated Harbor Walk

Gillette Headquarters Building Sign Before and After Restoration in 2010

Gillette Headquarters Building Sign During and After Restoration in 2010

Section L

Accompanying Documents

Section L

FEMA Region 1 Project NEPA Draft Environmental Assessment

Draft Environmental Assessment

City of Boston Resilient Fort Point Channel Infrastructure Project

City of Boston, Suffolk County, Massachusetts

PDMC-PJ-01-MA-2019-008

October 2021 ***– DRAFT***

U.S. Department of Homeland Security
Federal Emergency Management Agency, Region I
99 High Street, Sixth Floor
Boston, MA 02110

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

ACRONYMS

ACEC	Areas of Critical Environmental Concern
APE	Area of Potential Effect
BMP	Best Management Practices
BUAR	Massachusetts Board of Underwater Archaeology
BWCo	Boston Warf Company
C.F.R.	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
CWA	Clean Water Act
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
MACRIS	Massachusetts Cultural Resource Information System
MA CZM	Massachusetts Coastal Zone Management
MassDEP	Massachusetts Department of Environmental Protection
MBTA	Massachusetts Bay Transportation Authority
MHC	Massachusetts Historical Commission
NAVD88	North American Vertical Datum of 1988
NECCO	New England Confectionary Company
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHESP	Natural Heritage & Endangered Species Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NRIS	National Resources Information Service
PDM	Pre-Disaster Mitigation Grant
RCRA	Resource Conservation and Recovery Act
THPO	Tribal Historic Preservation Officer
TMDL	Total Maximum Daily Loads
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service

1.0 INTRODUCTION

The Massachusetts Emergency Management Agency submitted a Pre-Disaster Mitigation (PDM) grant application to the Federal Emergency Management Agency (FEMA) on the behalf of the City of Boston (City). The PDM Grant Program is authorized under Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Under the PDM grant program, FEMA may provide technical and financial assistance to states and local governments to assist in the implementation of pre-disaster hazard mitigation measures that are cost effective and designed to reduce injuries, loss of life, and damage and destruction of property, including damage to critical services and facilities resulting from natural disasters.

The Proposed Action would construct approximately 2,300 feet of mixed berm and floodwall mitigation features along a portion of the southeast edge of Fort Point Channel to reduce flood damage and provide protection to nearby infrastructure, utilities, and structures in the 100 Acres Master Plan area.

The National Environmental Policy Act (NEPA) requires FEMA to follow a specific planning process to ensure that it has considered, and the general public is fully informed about, the consequences of a proposed federal action, such as the approval of a mitigation project under the PDM grant program authorized by the Stafford Act. To meet its NEPA requirements, FEMA has prepared this Environmental Assessment to analyze the potential effects of the Proposed Action and alternatives to determine whether the project warrants preparation of an environmental impact statement or a Finding of No Significant Impact (FONSI). FEMA has prepared this Environmental Assessment in accordance with NEPA, its implementing regulations, and FEMA and Department of Homeland Security policy.

2.0 PURPOSE AND NEED

FEMA's PDM program provides grants to eligible state, territory, and local governments and federally recognized tribes to implement sustained pre-disaster natural hazard mitigation programs. The objective of the PDM program is to reduce overall risk to the population and structures from future hazard events and reduce reliance on federal funding from future disasters. The purpose of the proposed PDM project is to reduce flood hazards within the 100 Acres Master Plan area. The project is needed because of repetitive flooding from storm surge and associated damage, which is expected to increase in frequency and severity as a result of climate change and future sea level rise (EPA 2021a).

3.0 PROJECT LOCATION AND BACKGROUND

The proposed project is in Boston, Suffolk County, Massachusetts, in the urban South Boston Fort Point neighborhood (**Appendix A, Figure 1**). The project area is along the southeast edge of Fort Point Channel and is at the lowest elevation along the channel. The northern end of the project area is immediately south of the old General Electric facility at the southwest corner of Necco Street and Necco Court and extends approximately 2,300 feet south along the Fort Point Channel to Dorchester Avenue (**Appendix A, Figure 2**).

The project area encompasses the existing coastline and seawall, extends approximately 70 feet inland, and includes a portion of the Boston Harborwalk (Harborwalk). The shoreline is presently protected by a concrete seawall and riprap at the northern edge and includes 14 drainage outfalls. The Harborwalk is a ground-level, paved pathway with minimal vegetation that runs parallel to the shoreline. At the north end of Segment 1 is the former General Electric facility property, recently purchased by Alexandria Real Estate Equities Inc. (15 Necco Street). The 15 Necco Street redevelopment includes raised landscaping features inland of the Harborwalk to mitigate flooding of areas northeast of the project area, which would tie into the Proposed Action (see **Section 5.7)**. Adjacent to Segments 2 and 3 is the Gillette facility and paved surface parking. The nearest portion of the Gillette facility is approximately 60 feet inland of the project area. There are several private redevelopment projects underway or proposed for the area, including the proposed Related Beal mixed-use development adjacent to the proposed berm in Segment 2. These projects would eventually convert the paved parking areas into buildings, structures, and open spaces, which is discussed in the Cumulative Effects section (Section 5.7).

Boston is subject to coastal storms, such as Hurricane Sandy in 2012 and nor'easter Riley in 2018 that flooded South Boston and submerged streets and vehicles in water. During these storms and flood events, many Boston residents were evacuated, streets were closed, transit services were interrupted (including flooding of some of Boston's subway stations), and other residents were left without power (Garfield 2018; Gray 2018).

South Boston was identified as a focus area for climate resilience initiatives in the Climate Ready Boston plan (Green Ribbon Commission 2016). The plan modeled projected effects of climate change and future sea level rise and determined the vulnerability of neighborhoods to extreme heat, urban stormwater flooding, and coastal and riverine flood hazards. South Boston is considered vulnerable to flooding, and modeling shows Fort Point Channel is a flood entry pathway that, if left unprotected, could contribute to even larger areas of South Boston flooding as climate change increases storm severity and raises sea levels (Green Ribbon Commission 2016). The Proposed Action is two of eight proposed flood mitigation measures at the Fort Point Channel identified in the Climate Ready Boston plan (Green Ribbon Commission 2016). Each of the projects would address a specific set of flood entry points and provide flood reduction benefits independently of the other projects. The 15 Necco Street redevelopment being constructed by Alexandria Real Estate Equities, Inc. under the 100 Acres Master Plan is one of these projects. The projects are described in more detail in **Section 5.7**. The project area is within the 100 Acres Master Plan area (**Appendix A, Figure 3**), which is bounded by Fort Point Channel on the west, Summer Street to the north, South Boston Bypass Road to the east, and West Second Street to the south. The 100 Acres Master Plan provides a framework for steering future redevelopment that would occur at the initiative of private landowners and investors. The 100 Acres Master Plan emphasizes the need for protection against flooding and flood damage along Fort Point Channel and includes the Proposed Action as part of the solution. Additional measures in the 100 Acres Master Plan include the designation of land approximately 60 feet inland of the existing Harborwalk, between Binford Street and Necco Court (adjacent to Segment 1 of the Proposed Action) as vegetated open space where impermeable surfaces are currently present.

4.0 ALTERNATIVES

NEPA regulations state that an agency must explore and objectively evaluate all reasonable alternatives, and for alternatives that were eliminated from detailed study, briefly discuss the reasons for their elimination (40 C.F.R. 1502.14). Additionally, a No Action alternative must be included. This section describes the No Action alternative, the Proposed Action (that would provide for the purpose and need), and other alternatives that were considered but eliminated from the full analysis.

4.1 No Action Alternative

Under the No Action alternative, there would be no federal financial assistance provided for the construction of flood protection features along the Fort Point Channel. With no flood protection, high-water events compounded by sea level rise would continue to flood the 100 Acres Master Plan area and greater South Boston, damaging infrastructure, and property. During high-water events, water would continue to inundate streets, necessitating road closures and disrupting public transportation systems. Flooded sewage collection systems could back up, causing raw sewage to rise into streets and buildings. Water would continue to inundate buildings and basements, damaging electrical facilities and property. Debris, sediments, and contaminants collected by floodwaters could continue to flow out into the channel when floodwaters recede, resulting in water pollution.

4.2 Proposed Action

Under the Proposed Action, the City would construct approximately 2,300 feet of berm and floodwall mitigation features along a portion of the southeast edge of the Fort Point Channel shoreline, between approximately Necco Street and Dorchester Avenue. Flood protection measures would be constructed in three segments that vary in the proposed type of measure to be built and would be constructed over the course of approximately two years (**Appendix B, Document 1**).

Segment 1 would extend from approximately Necco Street to the southern end of the Gillette pump house and would be approximately 729 feet long and 45 feet wide, resulting in approximately 32,800 square feet (0.75 acres) of ground disturbance to a depth of 2 feet. Ground disturbance may occur deeper than 2 feet at utility crossings if utilities need additional protection. Flood protection in Segment 1 would be an earthen berm with a 5-foot crown width and side slopes with a ratio of 4:1 (four horizontal units to one vertical unit). The earthen berm would be located landward of the existing Harborwalk, currently at 8 feet North American Vertical Datum of 1988 (NAVD88)and would be elevated to approximately 14.6 feet NAVD88. The designed elevation height of 14.6 feet NAVD88 is based on the 100-year flood event accounting for 27.9 inches of sea level rise (based on the Boston Harbor Flood Risk Model for a design life to 2058) and two feet of freeboard–additional height above the base flood elevation included for safety. A knee wall on the seaward side of the berm feature would be incorporated to minimize the lateral width required for the berm to 45 feet. The knee wall would be raised 2.5 feet relative to the existing Harborwalk, to an elevation of approximately 10.5 feet NAVD88. The berm would end at the access driveway at the pump house and where a 15-foot-wide passive deployable flood gate would be installed to cross the driveway.

Segment 2 would extend from the Gillette pump house to where Fort Point Channel turns west and would be approximately 816 feet long. Segment 2 would consist of a double retaining wall of granite blocks that would match and be built on top of the blocks of the existing seawall. The seaward side of the retaining wall would raise the existing seawall’s crest elevation approximately 6 vertical feet to reach 14.6 feet

NAVD88. The landward side would also make use of granite blocks as a retaining wall feature, with impermeable clay fill in between the seaward and landward walls. This segment would be 18 feet wide, with a 12-foot-wide, shared-use path for the Harborwalk on top of the clay fill. The blocks would rest on a concrete footing. All blocks would be dowelled together with rebar rods. Ground disturbance expected for this segment would be approximately 40,800 square feet (0.94 acres) to a depth of approximately 2 feet but could be slightly deeper at utility crossings.

Segment 3 would extend from the western turn in the Fort Point Channel to Dorchester Avenue and would be 774.5 feet long and approximately 45 feet wide. Segment 3 would have a similar earthen berm as described for the Segment 1 flood protection that would run parallel to and landward of the existing Harborwalk. Segment 3 would require ground disturbance of 34,853 square feet (0.80 acres) to a depth of 2 feet but could be slightly deeper at utility crossings.

In addition to the three flood control segments, the Proposed Action includes deployable interim flood walls and backflow mitigation improvements. These three deployable floodwalls around the 100 Acres Master Plan area would ensure the Proposed Action would have independent utility from the other proposed flood control measures in the area by protecting both the primary flood pathway along the Fort Point Channel (mixed berm and floodwall feature) and minor flood pathways (interim flood measures) into the 100 Acres Master Plan area. These interim floodwalls would be removed once other projects in the Climate Ready Boston plan are implemented (see **Section 5.7**). The interim floodwalls are part of the Proposed Action and ensure it functions as designed independently of the completion of other projects in the plan. Below are the locations and descriptions of the three deployable floodwalls, (see **Appendix A, Figure 4** for location map):

- **A Street** – Located under the Summer Street overpass on A Street. An approximate 31-foot-long stop log or flex wall system would tie into the Summer Street bridge abutments on the north and south sides of A Street.
- **West Service Road** – Located under the Summer Street overpass on West Service Road. A 300-foot-long stop log or flex wall system would tie into the bridge abutment on the northern end and into high ground located on private property on the south.
- **Necco Court** – Located on the end of Necco Court facing the Fort Point Channel. An approximate 25-foot-long stop log or flex wall system would be located between the two buildings flanking the roadway (27 Melcher Street and 5 Necco Court).

The deployable floodwalls would be within the City's right-of-way and require regrading of sidewalks and roadways, and the stop logs would connect to permanent anchor points. Implementation of the interim measures would require minimal ground disturbance. The floodwalls would be transported to the areas in anticipation of a flood event and stored at the Boston Planning and Development Agency property at 22 Drydock Avenue when not in use.

Backflow prevention would include installing flap gates on each municipal and industrial outfall along the entire length of the project on the channel walls. Sections of outfall pipe below the proposed berms and floodwalls may need to be strengthened to reduce the risk of misalignment or cracking during the natural settlement of the berms and floodwalls. Work on the outfalls would be accessed from land and the work area would be isolated with cofferdams. Thus, some in-water work from the implementation of the cofferdam would be needed to repair existing drainage outfalls. Work would also occur during low tides to minimize effects on water quality.

Equipment needed for the construction of the berms and floodwalls may include excavators, loaders, graders, concrete trucks, dump trucks and other large vehicles, hand tools, and potentially a crane. Staging and access would occur landward of the project area on the existing surface parking lots, such as the channel side lot west of A Street or the Gillette parking lot. Access to staging areas and the project area would likely occur via A Street and Binford Street. The entire proposed resilience feature would disturb 108,435 square feet, or approximately 2.5 acres.

4.3 Alternative Considered but Dismissed – Flood Gate Alternative

The Flood Gate alternative would construct flood protection near the mouth of Fort Point Channel under the Seaport Boulevard Bridge. The alternative included installing a flood gate or series of gates between the channel banks that could be closed in advance of high-water events. The flood control gates would remain open most of the time for proper stormwater evacuation and daily tidal exchange. This alternative would require more specialized engineering to construct, larger up-front costs than the Proposed Action, and more costly and specialized long-term operation and maintenance procedures and staff. This alternative would have a shorter design life and require more frequent closures of the gates over time as sea levels rise, limiting its effectiveness and increasing potential environmental effects as compared with the Proposed Action. Potential environmental effects would include impeding the movement of fish during gate closures and contributing to changes in nutrient and chemical concentrations in the channel, which could negatively affect aquatic life. The potential environmental effects of construction in the water and alterations to aquatic habitats and long-term aquatic processes would be substantially greater than under the Proposed Action. This alternative was determined to be technically and financially impracticable and was dismissed from further analysis.

5.0 AFFECTED ENVIRONMENT AND POTENTIAL EFFECTS

This section describes the environment potentially affected by the alternatives, evaluates potential environmental effects, and recommends measures to avoid or reduce those effects. Effects are changes to the existing environment including ecological, aesthetic, historic, cultural, economic, social, or health conditions. Effects may also include consequences resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial (40 C.F.R. 1508.1(g)(1)).

When possible, quantitative information is provided to establish the magnitude of potential effects; otherwise, the potential effects are evaluated qualitatively based on the criteria listed in Error! Reference source not found..

Table 5.1. Classification of Potential Effects

Effect Scale	Criteria
None/Negligible	Resource area would not be affected and there would be no effect, OR changes or benefits would either be nondetectable or, if detected, would have effects that would be slight and local. Effects would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, but the changes would be small and localized. Adverse or beneficial effects would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and have either localized or regional scale effects/benefits. Effects would be within or below regulatory standards, but historic conditions would be altered on a short-term basis. Mitigation measures would be necessary, and the measures would reduce any potential adverse effects.
Major	Changes to the resource would be readily measurable and would have substantial consequences/benefits on a local or regional level. Effects would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce effects, though long-term changes to the resource would be expected.

Based on a preliminary screening of resources and the project's geographic location, **Table 5.2** identifies resources that do not require a detailed assessment and the reasons why.

Table 5.2. Resources Not Present

Resource	Reason for Elimination from EA
Geology	Project activities would not reach bedrock depths, because fill and layers of clay, sand, and shell extend at least 70 feet below the surface (City of Boston 2020a).
Designated Farmland Soils (Farmland Policy Protection Act)	The project area is in an urbanized and developed area and does not contain farmland. No conversion of farmland would occur per Title 7, Code of Federal Regulations (C.F.R.), Part 658.2(a).
Executive Order 12699: Seismic Safety	According to the U.S. Geological Survey Earthquake Hazard Program, the project area is not in a seismically active area; therefore, the alternatives would not affect seismic activity or be affected by seismic hazards.
Climate Change	The release of greenhouse gasses would be negligible and not result in a measurable effect on climate.
Federally Designated Wild and Scenic Rivers (Wild and Scenic Rivers Act)	The closest wild and scenic rivers are the Sudbury, Assabet, and Concord Rivers, all approximately 16 miles to the west. The alternatives would have no effect on a wild or scenic river.
Sole Source Aquifers (Safe Drinking Water Act)	According to the U.S. Environmental Protection Agency's (EPA) Sole Source Aquifer mapper, the project area is not located above a sole source aquifer; therefore, the alternatives would have no effect on a sole source aquifer.
Coastal Barrier Resources System (Coastal Barrier Resource Act)	The project area is not within a Coastal Barrier Resource Unit, an Otherwise Protected Area, or associated buffer zones, based on a review of the U.S. Fish and Wildlife Service (USFWS) Coastal Barrier Resource System mapper.

5.1 Physical Resources

5.1.1 Topography and Soils

5.1.1.1 Existing Conditions

The project area is located in the Boston Basin ecoregion, which is characterized by low rolling topography and includes the hilly urbanized Boston area and outlying lowlands on metamorphic and volcanic rock types (EPA 2009a). Topography in the project area is generally flat with a slope ranging between 0 and 3 percent (USDA 2021c).

Much of the Boston shoreline, including the project area, is composed of artificial fill material from land reclamation practices dating back to the 1600s (Mason 2017). According to geotechnical borings performed by the City, the project area is composed of soft clay and mud fill to approximately 25-30 feet below the surface and below that is composed of alternating layers of hard and soft compressible clays, mixed with sporadic sand and shell lenses to approximately 70 feet below existing grade (City of Boston 2020a).

5.1.1.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, no berm would be constructed, and the existing seawall would not be raised; thus, no changes to topography would occur. Some ad hoc flood control efforts may be implemented that could disturb soils. The ad hoc flood control efforts would likely protect individual buildings and some infrastructure but would not protect the 100 Acres Master Plan area from flood-related soil loss. Because the project area and greater South Boston is developed urban land, soil disruption due to flooding would be minimal, as there are very few surface soils in the area. Therefore, there would be negligible short- and long-term effects from soil disruption during flood events.

Proposed Action

Under the Proposed Action, construction of the berm in Segment 1 and Segment 3 and raising the existing seawall in Segment 2, including the placement of artificial fill, would raise the project area topography by up to 5 feet to an elevation of 14.6 feet NAVD88. Because the project area and vicinity are presently composed of artificial fill, following a history of land reclamation practices, impacts on soils would be negligible. Construction of the mixed berm and floodwall features would disturb approximately 108,435 square feet, or 2.48 acres, to a depth of approximately 2 feet. Interim flood control measures would not require excavation below what has been previously disturbed for urban development, including roads, buildings, and parking lots. Construction of the Proposed Action would likely require a National Pollutant Discharge Elimination System (NPDES) Construction General permit because it would be larger than one acre. An NPDES permit would be administered by EPA and would include conditions to reduce erosion and sediment loss during construction activities. The proposed construction materials, such as clay and concrete blocks, would be impermeable and resistant to erosion and would prevent the underlying soils from eroding. Sod would be planted over areas where permeable soils are proposed, such as the 6 inches of topsoil in Segment 1 and Segment 3, thus reducing the risk of erosion. Therefore, there would be a negligible short-term impact on topography and a minor short-term effect on soils during construction.

Post-construction, the Proposed Action would reduce flooding in the 100 Acres Master Plan area that could cause topsoil erosion; however, this beneficial effect on soils would be negligible because the project area is already heavily developed, and there is only a small risk of soil disruption during flooding. The presence of compressible soil layers could lead to consolidation settlement of the berm and floodwall features over time. The design and construction sequencing of the Proposed Action would prevent settlement and periodic maintenance would occur to maintain the designed elevation height. Therefore, there would be no effect long term on topography because the design height of 14.6 feet NAVD88 would be maintained. There would be no long-term effect on soils because of the history of artificial fill, reduced soil loss from floodwaters, and the developed nature of the project area.

5.1.2 Clean Air Act

The Clean Air Act regulates air emissions from area, stationary, and mobile sources. Air quality standards have been set for lead, nitrogen dioxide, ozone, carbon monoxide, sulfur dioxide, and particulate matter to protect public health and the environment. Areas where the monitored concentration of a pollutant exceeds air quality standards are designated as nonattainment areas. Areas where all pollutants are below the standards are classified as in attainment areas.

5.1.2.1 Existing Conditions

The project area is located in Suffolk County, Massachusetts. Suffolk County is in attainment status for all criteria pollutants (EPA 2021c).

5.1.2.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, some ad hoc flood control efforts may be implemented that could require construction-related emissions. However, the 100 Acres Master Plan area would remain at risk of flooding and flood damage, which could require road closures. Therefore, there would be a negligible, recurring, short-term, and adverse effect on air quality from vehicle and equipment emissions resulting from equipment used for flood-related repairs and additional vehicle emissions generated by road detours. There would be no long-term effect on air quality because there would be no new permanent air emissions source.

Proposed Action

Under the Proposed Action, the use of construction equipment and vehicles would result in the short-term release of air pollutant emissions. All construction equipment would be required to meet current EPA emissions standards (EPA 2016a). Post-construction, the Proposed Action would reduce flood hazards in the project area and associated emissions from roadway detours and repairs. The deployment of stop logs at interim flood control measure sites would require temporary road closures that could increase vehicle emissions. However, the deployment of interim measures would protect larger areas of roadway from becoming inundated, which would reduce roadway detours due to damage and repairs. The project would not create a new source of permanent air emissions. Therefore, the Proposed Action would have a negligible short-term effect on air quality from temporary construction-related emissions that would be mitigated through the application of EPA emissions standards. There would be a negligible, long-term, and beneficial effect from the reduced risk of flooding that avoids flood-related emissions from roadway detours and repairs.

5.2 Water Resources

5.2.1 Water Quality

The Clean Water Act (CWA) regulates the discharge of pollutants into water and is administered by the U.S. Army Corps of Engineers (USACE) and EPA. Section 404 of the CWA establishes the requirements for discharging dredged or fill materials into waters of the United States. USACE also administers Section 10 of the Rivers and Harbors Act of 1899, which prohibits obstructions in navigable waterways. Massachusetts Department of Environmental Protection (MassDEP) administers Section 401 of the CWA and issues water quality certifications for the discharge of dredged materials, dredging, and dredged material disposal in waters of the United States. Under Section 402 of the CWA, NPDES regulates both point and nonpoint pollutant sources including stormwater and stormwater runoff. Activities that involve one or more acres of ground disturbance require an NPDES Construction General Permit issued by EPA (see **Section 5.1.1**).

CWA Section 303(d) requires states to identify waters that do not or are not expected to meet applicable water quality standards with current pollution control technologies alone. Under Section 303(d), states must develop Total Maximum Daily Loads (TMDLs) for impaired waterbodies. A TMDL establishes the maximum amount of a pollutant or contaminant allowed in a water body and serves as a planning tool for restoring water quality. In Massachusetts, MassDEP is responsible for compliance with Section 303(d) of the CWA.

MassDEP administers the regulatory provisions of the Massachusetts Public Waterfront Act, commonly called “Chapter 91.” The program issues licenses for projects in waterways and ensures that projects meet public-access requirements (310 Code of Massachusetts Regulations [CMR] 9.01(2)).

The Massachusetts Wetlands Protection Act (Massachusetts General Laws Chapter 131, Section 40) protects wetlands and the public interests they provide, including flood control, prevention of pollution and storm damage, and protection of public and private water supplies, groundwater supply, fisheries, land containing shellfish, and wildlife habitat. In addition to wetlands, the law protects other resource areas, such as 100-year floodplains, riverfront areas, and land under water bodies, waterways, salt ponds, fish runs, and the ocean. MassDEP oversees the administration of the law and the Boston Conservation Commission administers the law for the City of Boston. The Boston Conservation Commission is responsible for reviewing projects on a case-by-case basis according to 310 CMR 10.00; these regulations describe how each type of resource area provides one or more of the public interests and the type and extent of work allowed in resource areas (MassDEP 2021).

5.2.1.1 Existing Conditions

The project area is adjacent to Fort Point Channel; Segments 1 and 2 of the Proposed Action are directly east of the channel and Segment 3 is directly south of the channel (**Appendix A, Figure 2**). The project area is within the Boston Harbor watershed and the Boston Harbor Coastal Drainage Area (MassDEP 2014). Water drains from the project area into the Fort Point Channel. There are 14 stormwater and combined sewer outfalls into the Fort Point Channel that carry stormwater runoff under the project area into the water immediately adjacent to the project area. Stormwater that runs off impervious surfaces adjacent to the channel, such as parking lots and buildings, is also conveyed to the channel either through surface runoff or drainage systems.

The *Massachusetts Year 2016 Integrated List of Waters* issued by MassDEP contains a list of waters requiring a TMDL, which is also known as the 303(d) list or Category 5 waters. The Boston Inner Harbor, including Fort Point channel, is included on the 303(d) list, as it is an impaired water requiring a TMDL. Categories of impairment include lack of dissolved oxygen, enterococcus, fecal coliform, polychlorinated biphenyls in fish tissue, and contaminants in fish and/or shellfish from unknown causes (MassDEP 2019). EPA Region 1 has issued a guidance document with mitigation measures addressing pathogen pollution in Massachusetts surface waters from various sources of pollutants such as stormwater and combined sewer overflows (EPA 2016b).

In February 2019, MassDEP issued a response to the City of Boston's request for guidance stating that the Proposed Action is subject to jurisdiction under the Wetlands Protection Act because it is within 100 feet of a bank bordering on the ocean.

5.2.1.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, ad hoc flood control measures could potentially result in short-term minor effects on water quality from construction-related runoff. In the long term, the risk of flooding would not be reduced substantially within the 100 Acres Master Plan area and additional construction may be required to address damage after flooding. Water would continue to inundate the area during flood events, entering the drainage system and reducing the system's ability to convey stormwater to outfalls and causing backwater conditions, surcharging, and flow reversal in some locations. As flood waters recede, they would transport debris, sediments, and contaminants such as sewage from backed up collection systems or combined overflows and petroleum-based pollutants such as motor oil, which may contribute polychlorinated biphenyls to surface waters. Sewage contributes bacteria such as fecal coliform and enterococcus to stormwater and flood discharges (EPA 2012). Sewage also contributes excess nutrients, such as phosphorus, which can result in algae growth and die-off that consumes oxygen leading to lowered dissolved oxygen levels (Minnesota Pollution Control Agency 2009). Thus, the No Action alternative could adversely affect conformance with TMDLs for polychlorinated biphenyls, fecal coliform, enterococcus, and dissolved oxygen in the Fort Point Channel. Because the project area is already contributing these pollutants to Fort Point Channel during storm events, future flood events would result in a negligible change in water contamination in the channel and on TMDL compliance. The No Action alternative would have a negligible effect on water quality.

Because the area is subject to jurisdiction under the Wetlands Protection Act, any construction required to implement ad hoc flood control measures or repairs from recurring flood damage would require permission from the Boston Conservation Commission. Continued flooding, which could become worse because of climate change-related sea level rise, would likely damage lands subject to jurisdiction under the Wetlands Protection Act and have negligible effects on water quality, as discussed above. Thus, the No Action alternative could have negligible to minor adverse effects on lands subject to jurisdiction under the Wetlands Protection Act.

Proposed Action

Construction of the Proposed Action has the potential to affect water quality. Construction of the mixed berm and floodwall features would include approximately 2.5 acres of ground disturbance near the Fort Point Channel, which could result in erosion that transports sediments into the channel via surface runoff. The interim deployable floodwalls would require minimal ground disturbance during construction and would thus have minimal potential for generating soil erosion. The Proposed Action would not place fill in water and all project components, including work on existing outfalls, would be accessed from land. The construction contractor would use cofferdams and silt curtains to isolate the area during work on the outfalls and turbidity curtains to minimize sedimentation. Construction activities near or in water may lead to the release of other pollutants into surface waters, such as trash and debris from the construction site or oils, fuels, and lubricants from equipment near or over water. Because the project area is highly urbanized, construction may reveal previously unknown underground sources of contamination and risk spreading this contamination to nearby surface waters.

The City is currently coordinating with USACE on requirements for compliance with Section 10 of the Rivers and Harbors Act and Section 404 of the CWA. The City would obtain a Section 402 NPDES Construction General Permit from the EPA, as the total amount of ground disturbance during construction is expected to exceed 1 acre. Additionally, MassDEP confirmed that a Chapter 91 Waterway License would be required for the project, as the project is within Chapter 91 jurisdiction. A 401 Water Quality Certification from MassDEP would be issued with the Chapter 91 Waterway License. An individual Section 401 Water Quality Certification would likely not be needed because fill would not be placed in the water and dredging would not occur. Any work on the outfalls would be assessed for the need for authorization under the various sections of the CWA. These permits would include conditions to avoid, minimize, and mitigate effects on water quality, such as:

- Siltation and erosion control measures (e.g., silt fences)
- Turbidity controls
- Site restoration measures (e.g., replanting exposed soils with native vegetation)
- Minimizing work within water
- Prevention of accidental releases of hazardous waste, including spills and leaks from construction equipment

With the implementation of these permit conditions, construction, including in-water work, would have a **minor** short-term adverse effect on water quality.

Post-construction, the Proposed Action would reduce the risk of flooding within the 100 Acres Master Plan area. The earthen berms would prevent flood waters from entering the Master Planning area and could route runoff and debris to catch basins rather than directly into the channel during precipitation and flood events. While the amount of impervious surface within the project area would not appreciably decrease, the earthen berms would replace parking lots in the project area that collect oils, lubricants, fuels, dirt and asphalt wear deposits, and other hazardous materials from parked vehicles, which can then be transported into the channel via runoff (Trumbull and Bae 2000). Because flood waters would inundate a smaller area, they would be less likely to transport pollutants such as oils, fuels, and sewage into the channel. Therefore, the Proposed Action would result in negligible beneficial effects by improving compliance with TMDLs for bacteria and dissolved oxygen in the channel. Thus, the Proposed Action would have a **negligible** long-term beneficial effect on water quality compared with existing conditions in the Fort Point Channel by reducing the spread of flood waters, increasing vegetative filtration, and improving stormwater drainage in the project area.

In their February 2019 response letter, MassDEP confirmed that the Proposed Action appears permissible under the Wetlands Protection Act, as it is designed in a way that would not affect land under the ocean or the seaward face of the existing elevated landform. The City would be required to file a Notice of Intent with the Boston Conservation Commission seeking a negative determination that the Proposed Action would affect an area subject to protection under the Wetlands Protection Act. Thus, the Proposed Action would not affect lands subject to jurisdiction under the Wetlands Protection Act.

5.2.2 Floodplains

Executive Order 11988 Floodplain Management requires federal agencies to avoid, to the extent possible, the long- and short-term effects associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. Each federal agency must provide leadership and take action to reduce the risk of flood loss; minimize the effect of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities. FEMA uses an 8-Step analysis to evaluate potential effects on and mitigate effects to floodplains in compliance with Executive Order 11988 and 44 C.F.R. Part 9 (see **Appendix B, Document 3)**. Initial public notice for the project was published April 13, 2021, in *The Herald* and the City's newsletter. FEMA will issue a final notice as part of the EA public notification process in accordance with 44 C.F.R. 9.8 and 9.12. The purpose of the notices is to inform and solicit feedback from the public regarding the potential effects on floodplains and notify the public of FEMA’s final decision when it has been made.

The Massachusetts Department of Conservation and Recreation Flood Hazard Management Program is the State Coordinating Office for the National Flood Insurance Program (NFIP). The City of Boston participates in the NFIP (City of Boston 2020d).

The Wetlands Protection Act protects a number of resource areas in addition to wetlands, including 100-year floodplains. Compliance with this law is discussed in **Section 5.2.1**.

5.2.2.1 Existing Conditions

The project area is located within a special flood hazard area (Zone AE) subject to inundation by the one percent annual chance flood, as shown on the FEMA Flood Insurance Rate Map panel 25025C0081J dated March 16, 2016 (**Appendix A**, **Figure 5**). The project area is also in a coastal area that is subject to wave action and future sea level rise that could increase flooding. The project area has the lowest elevations along Fort Point Channel, and water from the channel frequently overtops the existing shoreline during unusually high tides and coastal storm events (**Appendix B, Document 1**). In the future, considering sea level rise, it is likely that flood waters entering through this area would extend further inland toward neighborhoods that could include other South Boston neighborhoods and the Boston Convention and Exhibition Center. By the mid to late century, the 100 Acres Master Plan area is expected to flood at least monthly (**Appendix B, Document 1**).

5.2.2.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, ad hoc flood protection measures could still be implemented to reduce localized flooding. These ad hoc measures would potentially have some minor short-term construction-related effects on the floodplain because ground disturbance can result in erosion of exposed soils that are washed into nearby surface waters and equipment use may release oils, fuels, and other hazardous materials. Because the project area is highly urbanized, construction may encounter previously unknown underground sources of contamination and risk spreading this contamination to nearby surface waters. The ad hoc flood protection measures may have negligible to minor long-term benefits by reducing localized flood damage to protected buildings and infrastructure. If these measures were not implemented in a coordinated manner, they could also have moderate long-term effects by creating barriers or directing floodwaters to unanticipated areas, resulting in increased flooding in some parts of the 100 Acres Master Plan area and South Boston. Under the No Action alternative, there would be a minor long-term adverse effect on people and property within the floodplain and the effect could become moderate as the frequency and severity of flooding increases because of climate change and sea level rise.

Proposed Action

The Proposed Action would result in a **minor** short-term adverse effect on the 100-year floodplain because of construction in the floodplain. Construction activities could result in accidental releases of hazardous waste during the construction period from previously unknown underground sources or minor leaks from construction equipment, and ground disturbance could cause sediment to run off into nearby water systems.

Through the 8-Step analysis, FEMA determined that the Proposed Action was the only practicable alternative, and there were no practicable alternatives outside the floodplain (see **Appendix B, Document 3).** Because the project area is already developed, many of the traditional approaches for minimizing and avoiding effects on floodplains are not practicable for this project. The Proposed Action is functionally dependent on its location in the floodplain (44 C.F.R. 9.11(d)(1)(i)) and potential effects would be minimized (44 C.F.R. 9.11(d)(5)).

FEMA would require the following conditions to avoid and minimize potential adverse effects:

- The City must obtain a local certificate that demonstrates that the cumulative effect of the Proposed Action when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community (44 C.F.R. 60.3 and 44 C.F.R. 9.11(d)(4)).
- Before construction begins, the City must obtain approval from the local permitting official responsible for floodplain development to demonstrate that the Proposed Action is consistent with the criteria of the National Flood Insurance Program (44 CFR part 59 et seq.) or any more restrictive federal, state, or local floodplain management standards (44 C.F.R. 9.11(d)(6)). A copy of the approval/permit, or documentation from the permitting official that an approval/permit is not required, shall be forwarded to the state and FEMA for inclusion in the administrative record.
- Before Construction begins, the City must submit a conditional letter of map revision (“CLOMR”) request pursuant to 44 C.F.R. § 65.8 and part 72 (FEMA 2021a).

- Following construction of the Proposed Action, the City must apply for a Letter of Map Revision in accordance with 44 C.F.R. 65.6.

Post-construction, the Proposed Action would result in a **minor** long-term adverse effect on the 100-year floodplain due to the placement of fill in the floodplain that would alter the path of water during high water events. Ground disturbance and the potential biological effects of building the flood control structures in the floodplain would be minimal because the area has been developed and redeveloped for more than 100 years (BLC 1982). Areas that are currently paved and used as parking lots would be converted to flood protection structures. The interim flood control measures would be deployed in rights-of-way during flood events and stored in an industrial park when not needed. The Proposed Action would not discharge fill or riprap within waters of the U.S. and the project would not alter flow patterns of the Fort Point Channel.

The Proposed Action would have a **negligible** beneficial effect on water quality and floodplain functions from the conversion of parking lots into earthen berms. While the amount of impervious surface within the project area would not appreciably decrease, the project area would no longer be a paved surface that collects oils, lubricants, fuels, dirt and asphalt wear deposits, and other hazardous materials from parked vehicles (Trumbull and Bae 2000). The earthen berms would also redirect stormwater runoff in portions of the 100 Acres Master Plan area into catch basins rather than directly into the channel.

The Proposed Action would have a **minor**, long-term beneficial effect through a decreased risk of flood damage. The Proposed Action would decrease the risk of flood damage from high water events and sea level rise in the 100 Acres Master Plan area by protecting existing structures and utilities while protecting the public's health and safety. The mixed berm and floodwall features would address the primary flood pathway into the 100 Acres Master Plan area and the interim flood mitigation measures would address remaining flood pathways from Fort Point Channel. The Proposed Action would enhance and protect portions of the Harborwalk, as section 2 would be located on the landward side of the protection. The Proposed Action would reduce the potential for debris to be carried into the channel when floodwaters recede and would work in conjunction with existing flood mitigation measures implemented at the former GE site north of the project area to protect the larger South Boston area (see **Section 3**).

The Proposed Action would not directly support any specific development within the floodplain; however, it could indirectly support future redevelopment. Because the area that would benefit from the Proposed Action is already developed and covered with impervious surfaces, redevelopment would not increase impervious surface area or the effects of impervious surfaces on natural floodplain functions. The Proposed Action does not include the addition of, or improvements to, roadways or utilities that would support expanded urban uses of the project area. Any redevelopment that might occur would be subject to local and state floodplain development regulations, as well as the stipulations of the 100 Acres Master Plan, which requires additional greenspace and the creation of permeability along the channel’s edge (approximately 2.18 acres). Therefore, the Proposed Action may have a **negligible** long-term effect on floodplains by indirectly supporting future redevelopment, which could include increased pervious surfaces.

5.2.3 Wetlands

Executive Order 11990 Protection of Wetlands requires federal agencies to avoid to the extent possible the long- and short-term adverse effects associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. Each federal agency shall take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities. FEMA uses an 8-Step analysis to evaluate potential effects on and mitigate effects to wetlands, in compliance with Executive Order 11990 and 44 C.F.R. Part 9.

The Wetlands Protection Act protects wetlands and the public interests they provide, such as flood control and pollution and storm damage prevention. Compliance with the Wetlands Protection Act is discussed in detail in **Section 5.2.1**.

5.2.3.1 Existing Conditions

According to the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory, no federally designated wetlands are present in the project area or vicinity (USFWS 2021). Furthermore, existing conditions in the project area are not conducive to supporting wetlands, as the project area is primarily composed of built infrastructure and pavement with minimal areas of landscape vegetation and large amounts of buried infrastructure. Historically, the project area was open water and marsh lands that have been filled to reclaim the land for development. The existing hard seawall edge protects the fill from the tidal waters of Fort Point Channel and prevents the formation of wetlands along the channel edge.

5.2.3.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, because there are no wetlands in the project area or vicinity, effects to wetlands would be **none**.

Proposed Action

Under the Proposed Action, because there are no wetlands in the project area or vicinity, effects to wetlands would be **none**.

5.3 Coastal Resources

5.3.1 Coastal Zone Management Act

The Coastal Zone Management Act, enacted in 1972, was established to preserve, protect, develop, and, where possible, restore or enhance the resources of the nation’s coastal zone. Section 307 of the act requires federal actions, within (or outside of, but with the potential to affect) the coastal zone, to be consistent with the enforceable policies of a state’s federally approved coastal management program. The Massachusetts Coastal Zone Management (MA CZM) is responsible for managing the state’s coastal program, which includes four main objectives, as described in the *Massachusetts Coastal Management Policy Guide*: (1) prevent, eliminate, or significantly reduce threats to public safety, property, and environmental resources resulting from hazards such as erosion, flooding, and storm damage; (2) allow natural physical coastal processes to continue while allowing appropriately sited coastal development and economic growth and promote the use of nonstructural alternatives for shore protection, where appropriate and to the extent feasible; (3) limit, prohibit, or condition public expenditures in coastal high-hazard areas to ensure that increased exposure to coastal hazards is not encouraged; and (4) prioritize public expenditures for acquisition and relocation of structures out of hazardous coastal areas (MA CZM 2011).

5.3.1.1 Existing Conditions

The project area is entirely within the Massachusetts Coastal Zone, specifically the Boston Harbor coastal zone region (MA CZM 2021b). The project area encompasses a portion of the existing Fort Point coastline, which is presently protected by a concrete block seawall and riprap at the northern edge and includes 14 drainage outfalls. Based on site visits to the project area in spring 2021 and a review of aerial imagery, there are no natural beaches in the project area or vicinity. The project area contains a portion of the Boston Harborwalk, which runs parallel to the coastline and includes piers overlooking and providing access to the water. The project area vicinity is primarily developed infrastructure, such as buildings and parking lots with minimal areas of landscape vegetation.

5.3.1.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, ad hoc flood protection measures may be implemented, potentially resulting in short-term construction-related effects on existing coastal infrastructure, including access to the Harborwalk due to construction-related closures. Although ad hoc measures may reduce the risk of flood damage for specific areas, these measures would not substantially reduce the risk of flooding for the entire 100 Acres Master Plan area and may even cause areas of increased flooding if not implemented in a coordinated manner as discussed in **Section 5.2.2**.

Continued flooding could create hazardous conditions by damaging coastal infrastructure, depositing debris, and spreading contaminants, such as sewage. Public access to the shoreline would be limited if floods inundate and/or damage trails, piers, and roads in the area. Runoff from floodwaters entering the Fort Point Channel would continue to impair the water quality of the channel resulting in a negligible effect on water quality. Thus, the No Action alternative would have a **moderate** long-term adverse effect on coastal resources from continued flooding and would be inconsistent with MA CZM coastal policies.

Proposed Action

Construction of the Proposed Action would have a minor short-term adverse effect on coastal resources. Construction activities for Segment 2 of the mixed berm and floodwall features would require the temporary closure and re-routing of Harborwalk users and short-term visual effects from earth-moving equipment and disturbed ground. The interim flood control measures would require minimal construction in the project area, including sidewalk and roadway regrading, which could have temporary visual effects. Installation of the interim measures at A Street and West Service Road may require temporary street closures and detours. As discussed in Section 5.2.1, construction activities may affect water quality by causing erosion near the channel from ground-disturbing activities and generate turbidity by stirring up sediments during work on the outfalls on the face of the seawall. Water quality permits from MassDEP and USACE would likely require Best Management Practices (BMPs) that would reduce the risks of construction-related erosion and sedimentation and would be consistent with MA CZM coastal policies.

The Proposed Action would likely have a minor beneficial effect on the visual aspect of the area because surface parking would be replaced with earthen berms. These berms would not block views of the water as they would be located landward of the Harborwalk. Furthermore, the berms could hide many of the remaining parking lots from the view of users along Harborwalk. The interim flood control measures would be stored in an industrial park and would only be deployed during flood events, thus resulting in negligible visual effects and no effect on public access to the shoreline. Although the Proposed Action may reduce runoff from floodwaters, the change in contamination from runoff would likely be negligible.

In January 2019 MA CZM issued a response letter to the City's request for guidance, explaining that FEMA is not required to submit consistency determinations when providing financial support for projects in the coastal zone; although individual project proponents are required to undergo federal consistency review if their project requires a federal authorization listed in the Coastal Zone Management Plan and implementing regulations (301 CMR 20.04). Thus, the City would need to confirm the need for a federal consistency review with the MA CZM.

The Proposed Action is expected to be consistent with objectives 1 and 3 of the *Massachusetts Coastal Management Policy Guide*. Objective 2 would not apply, as the Proposed Action does not include the construction of permanent coastal engineering structures, such as groins or revetments, and the project area is not within or near natural beaches that allow for the littoral transport of sand. Objective 4 would not apply, as structures would not be acquired and removed from the coastal hazard area. The Proposed Action would mitigate flood hazards in the project area and greater 100 Acres Master Plan area. Therefore, the Proposed Action would support compliance with the 100 Acres Master Plan, which would be in alignment with objectives 1 and 3 of the guide. Therefore, it is anticipated that the Proposed Action would be consistent with MA CZM program policies and would result in a minor long-term beneficial effect on coastal resources. This finding would be confirmed after the City consults with MA CZM and the MA CZM issues a favorable Coastal Consistency Determination for the project.

5.4 Biological Resources

5.4.1 Vegetation

Massachusetts Division of Fisheries and Wildlife's Natural Heritage & Endangered Species Program (NHESP) manages state-designated rare plants and natural communities (Massachusetts Division of Fisheries and Wildlife 2021) under the Massachusetts Endangered Species Act (Massachusetts General Laws, Chapter 131A). NHESP is responsible for the conservation and protection of hundreds of species that are not hunted, fished, trapped, or commercially harvested in the state, as well as the protection of the natural communities that make up their habitats.

Massachusetts General Laws, Chapter 87 protects public shade trees, or all trees within or on the boundaries of a public way. Under this law, public shade trees cannot be cut, trimmed, or removed by any person other than the tree warden or deputy, unless permission from the tree warden is granted. If a healthy tree is requested to be removed in the city of Boston, the city's tree warden or member of the Boston Parks and Recreation Department must inspect the site to assess the tree and potential effect from its removal. After the inspection, a public hearing must be held to determine whether the tree can be removed and if yes, the party requesting removal of the tree must pay for its removal. This money is added to the Fund for Parks and Recreation (City of Boston 2020c).

5.4.1.1 Existing Conditions

The project area is primarily composed of hard infrastructure with limited areas of managed vegetation that includes Binford Street Park and sections parallel to the Harborwalk with grasses, ground cover, and some street trees. The greater 100 Acres Master Plan area contains some landscape vegetation, primarily grasses and street trees, in parks that include A Street and Wormwood Parks, and along the edges of buildings and parking lots.

The City of Boston sent a letter to NHESP on January 2, 2019, requesting a regulatory review to identify threatened or endangered species or their critical habitat in the project area in addition to any potential effects on the Fort Point Channel. NHESP's response indicated that no Estimated or Priority Habitat of Rare Species, including rare plant species, is present in the project area. According to NHESP's online mapping tool, there are no natural communities or areas of biodiversity conservation interest in the project area (MassDEP 2017).

5.4.1.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, some ad hoc flood control efforts may be implemented that could potentially result in short-term negligible adverse effects on existing vegetation if the projects remove or trample the vegetation with construction equipment. Although ad hoc measures may reduce the risk of flood damage for specific areas, these measures would not substantially reduce the risk of flooding over the entire 100 Acres Master Plan area. In the long term, the 100 Acres Master Plan area would remain at risk of flood damage and larger areas of South Boston would flood over time because of climate change-related sea level rise. Flood waters would continue to deposit debris and sediments on the ground surface that could physically damage soil, which could smother and kill vegetation (Soil Science Society of America and American Society of Agronomy 2021). Construction may be required to address future flood damage, which could result in additional temporary effects on vegetation. Therefore, under the No Action alternative, continued flooding could have a long-term **negligible** adverse effect on vegetation within the project area and the greater 100 Acres Master Plan area.

Proposed Action

The Proposed Action may require removal of up to approximately 0.75 acres of vegetation along the Harborwalk. Vegetation along the Harborwalk that cannot be avoided would be restored following construction. Some shrubs and trees may be salvaged. Any healthy trees within the public way would only be removed with permission of the tree warden or Parks and Recreation Department after an inspection and public hearing (City of Boston 2020c). The deployable flood control measures are not expected to affect vegetation, as they would be deployed in roadways and sidewalks and would be stored in a warehouse in an industrial park. Vegetation may be removed to access the outfalls and install the backflow mitigation measures from land. All vegetation affected by the Proposed Action would be restored post construction. Therefore, there would be short-term negligible effects on vegetation in the project area from the construction of the Proposed Action.

The Proposed Action would create earthen berms with a 6-inch layer of topsoil and sod that would be planted with vegetation. In the long term, the Proposed Action would have a **negligible** beneficial effect on vegetation because it would increase vegetative cover in the project area and reduce the risk of flood damage to vegetation further inland.

5.4.2 Wildlife and Fish

NHESP is responsible for the conservation and protection of hundreds of species of wildlife and fish that are not hunted, fished, trapped, or commercially harvested in the state, as well as the protection of the natural communities that make up their habitats. The Department of Conservation and Recreation administers the Areas of Critical Environmental Concern (ACEC) program; ACECs are characterized by their quality, uniqueness, and significance of their natural and cultural resources (DCR 2021).

The Magnuson-Stevens Fishery Conservation and Management Act is the primary law governing marine fisheries management in U.S. federal waters and designates the National Marine Fisheries Service (NMFS) as the lead federal agency responsible for its implementation. First passed in 1976, the act fosters the long-term biological and economic sustainability of our nation's marine fisheries. One primary provision of the act is the designation of Essential Fish Habitat (EFH) for all species managed under the act. All federal agencies are required to assess the potential effects of proposed actions and alternatives on EFH, and federal agencies are to consult on any actions that could adversely affect EFH.

The Migratory Bird Treaty Act provides a program for the conservation of migratory birds that fly through lands of the United States. A migratory bird is any species or family of birds that live, reproduce, or migrate within or across international borders at some point during their annual life cycle. Most species native to North America are covered by the Migratory Bird Treaty Act. The lead federal agency for implementing the Migratory Bird Treaty Act is USFWS. The law makes it unlawful at any time, by any means, or in any manner to take any part, nest, or egg of migratory birds. "Take" is defined in regulation (50 C.F.R. 10.12) as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities."

5.4.2.1 Existing Conditions

The project area and 100 Acres Master Plan area are primarily characterized by built urban infrastructure with minimal wildlife habitat. The habitat in the project area is limited to landscape vegetation, including street trees, along the Harborwalk and in Binford Street Park. Habitat in the 100 Acres Master Plan area is also limited to landscape vegetation, primarily street trees, in parks and around buildings and parking lots. Species that occupy the area, such as squirrels, geese, and gulls, are adapted to urban levels of noise, activity, and habitat contamination.

The City of Boston sent a letter to NHESP on January 2, 2019, requesting guidance about effects of the Proposed Action. NHESP's response indicated that no Estimated or Priority Habitat is present in the project area and the project does not require review for compliance with rare wildlife species section of the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.37, 10.59, and 10.58(4)(b)). According to NHESP's online mapping tool, there are no natural communities or areas of biodiversity conservation interest in the project area (MassDEP 2017). Furthermore, the project area is not designated as an ACEC (DCR 2021).

Fort Point Channel is water quality impaired (see **Section 5.2.1**) and does not provide a high-quality aquatic habitat for fish or shellfish. In addition, there is no riparian or aquatic vegetation to provide shade or cover along the channel edges. Because of the channel's function as a wharf and shipping access, the channel sides are relatively steep and uniform and do not provide shallow water habitats or variations in depth and cover that provide diverse conditions for aquatic life. However, fish species such as winter flounder (*Pseudopleuronectes americanus*) and bluefish (*Pomatomus saltatrix*) occur in Boston Harbor and may use the Fort Point Channel (NMFS 2020). Fish species that do occur in the channel are expected to be adapted to poor water quality conditions or would only spend very short amounts of time in the channel.

According to the NMFS EFH online mapping tool, the Fort Point Channel potentially contains EFH for 25 fish species including, but not limited to, winter flounder, Atlantic wolffish (*Anarhichas lupus*) Atlantic cod (*Gadus morhua*), and yellowtail flounder (*Limanda ferruginea*). No Habitat Areas of Particular Concern (i.e., high-priority areas for EFH conservation) or special aquatic sites (e.g., submerged aquatic vegetation, saltmarsh, coral reefs) are in the project area (NMFS 2020).

The project area is within the Atlantic Flyway and there is the potential for migratory bird species to occur in the project area because of the presence of vegetation, such as street trees. The USFWS Information for Planning and Consultation tool indicates that many migratory birds have the potential to occur in or near the project area including a number of urban-adapted species (USFWS 2021). Nesting habitat for migratory birds is limited to landscape vegetation and possibly some infrastructure in the project area, such as building ledges and roofs.

5.4.2.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, some ad hoc flood control measures could be implemented. This could potentially result in an adverse short-term negligible effect on wildlife and fish in and near the project area and the 100 Acres Master Plan area from construction-related noise and activity disturbances, both on land and in water, and erosion from ground disturbance that affects water quality. Additionally, vegetation may be removed during construction, which could affect the limited wildlife habitat in the area. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, these measures would not substantially reduce the risk of flooding over the entire 100 Acres Master Plan area in the long term. Construction may be required to address continued flood damage, resulting in additional construction effects on wildlife and fish. Flood-related pollutants would continue to enter nearby water bodies. Therefore, the No Action alternative would have a **negligible** long-term adverse effect on wildlife and fish species.

Construction of the ad hoc flood control measures could have a short-term negligible effect on EFH from construction-derived pollutants entering the channel, such as sediments, metals, and trash, as well as noise or vibration caused by any in-water work. In the long term, ongoing flood damage would trigger periodic construction activities that could cause additional construction-derived pollutants to enter the channel. Flood waters would continue to periodically inundate the area, which could transport debris and contaminants into the channel as well. Contamination from continued flood events would have a long-term **negligible** adverse effect on EFH.

Construction of ad hoc flood control measures and flood-related repairs may require vegetation removal or building repairs, which would have the potential to affect birds and their nests if the work is done during the breeding season. Thus, under the No Action alternative, construction of ad hoc flood control measures and flood-related repairs could have short and long-term **negligible** adverse effects on migratory bird species.

Proposed Action

Construction-related noise and activity disturbances would be short-term and would not substantially affect wildlife because wildlife in the project area is accustomed to urban levels of noise and activity. Vegetation removal may reduce the limited wildlife habitat in the project area; however, vegetation would be restored following construction. As discussed in **Section 5.2.1**, construction activities would be conducted in accordance with applicable permits. With the implementation of permit required BMPs, there would be negligible potential for effects on fish in the Fort Point Channel. Thus, the Proposed Action would have a negligible short-term adverse effect on wildlife and fish habitat from construction-related activities both in and out of water. Post-construction, the Proposed Action would have a **negligible** long-term beneficial effect on wildlife because of the small amount of additional vegetated open space (sod on the berms) that would be added to the project area. There would also be a **negligible** long-term beneficial effect on fish in the channel from the reduction in contaminates and debris carried by storm and floodwater runoff into the channel.

Construction of the Proposed Action has the potential to affect water quality within EFH by temporarily increasing erosion and siltation into the channel, potentially generating turbidity during in-water work, and inadvertently releasing hazardous fuels, oils, and lubricants from equipment used near or in the channel. In accordance with required permits (see **Section 5.2.1**), the City would need to implement construction BMPs and conditions to protect water quality including, but not limited to, measures to control erosion and sedimentation, reduce turbidity, and prevent the spread of hazardous waste. Construction of the Proposed Action may also generate underwater noise and result in benthic community disturbance from installation of the cofferdam. It is expected that installation of the cofferdam would require pile driving, not vibratory driving. Furthermore, the area is filled and developed with no intended future opportunity for inland migration of habitat. To avoid and minimize adverse effects to EFH and in conformance with 50 C.F.R. Part 600, Subpart J (600.905 – 600.930), FEMA initiated consultation with the NMFS Habitat and Ecosystem Services Division on September 10, 2021 (FEMA 2021b). NMFS provided a response on October 12th, 2021 that the proposed action may adversely affect EFH, specifically winter flounder. In order to avoid adverse effects to winter flounder spawning and egg development habitat, NMFS requested cofferdam installation and removal should take place outside of the winter flounder time of year from January 15 – June 30 of any year. Work may take place behind dewatered cofferdams during this time. As long as this condition is followed, there would be a **negligible** short-term adverse effect on EFH. Post-construction, the Proposed Action would reduce contaminants and debris in flood-related runoff that enters the channel and potentially affects EFH. However, the change in contaminant levels in the channel resulting from the Proposed Action would not be measurable; thus, the Proposed Action would have a **negligible** long-term beneficial effect on EFH.

Construction activities have the potential to affect migratory birds from vegetation removal for the creation of the mixed berm and floodwall features if the vegetation is removed during the breeding season. Construction of the deployable floodwalls would not affect potential nesting sites or migratory birds. If vegetation removal occurs between April 1 and September 15, the migratory bird breeding season, construction of the mixed berm and floodwall features may disturb vegetation and potentially affect migratory birds (USFWS 2021). If vegetation removal occurs during the migratory bird nesting season, the City would coordinate with USFWS to obtain any required authorization and provide documentation of coordination with USFWS to FEMA. Therefore, there would be a temporary negligible effect on migratory birds if vegetation removal is required within the breeding season and all potential

USFWS conditions are followed. Post-construction, the Proposed Action would have a **negligible** long-term beneficial effect on wildlife because vegetation affected by the project would be restored and a small amount of additional vegetated open space (i.e., sod on the berms) would be added to the project area.

5.4.3 Invasive Species

Executive Order 13112, Invasive Species, requires federal agencies to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health effects that invasive species cause to the extent practicable. Invasive species often prefer disturbed habitats and generally possess high dispersal abilities, enabling them to outcompete native species.

The Massachusetts Department of Agricultural Resources is the lead state agency responsible for the management of invasive plant species in accordance with state law. Invasive plant species are regulated by the state through the Massachusetts Prohibited Plant List, which prohibits the importation, sale, and trade of plants determined to be invasive in Massachusetts (Massachusetts Department of Agricultural Resources 2021).

In addition to invasive plant species, USDA establishes quarantines for invasive animal species that include the European gypsy moth (*Lymantria dispar*) (USDA 2021b). The quarantine for the emerald ash borer (*Agrilus planipennis*) was rescinded in January 2021 (USDA 2021a). MA CZM works to monitor and reduce the spread of invasive marine species in coastal waters of Massachusetts through the marine invasive species program (MA CZM 2021a).

5.4.3.1 Existing Conditions

The Massachusetts Prohibited Plant List contains 143 invasive species and was developed by the Massachusetts Department of Agricultural Resources in conjunction with the Massachusetts Invasive Plants Advisory Group (Advisory Group). According to the Advisory Group, there are 35 species within Massachusetts that are designated as invasive, i.e., non-native species that have spread into native or minimally managed plant systems in Massachusetts (Massachusetts Invasive Plants Advisory Group 2017). It is not expected that many invasive plant species are present in the project area because vegetation in the project area is primarily managed landscape species (see **Section 5.4.1**).

Emerald ash borer inhabits ash trees, which may be present in the project area. Emerald ash borer infestations have been documented in the state of Massachusetts (USDA 2021a). European gypsy moths are present in the state of Massachusetts and the city of Boston is within the federal EGM quarantine zone (USDA 2021b). European gypsy moth caterpillars feed on over 300 tree and shrub species and prefer deciduous trees, particularly oak trees, which may be present in the project area (USDA 2021b). Thus, both the European gypsy moth and emerald ash borer have the potential to occur in the project area. Invasive marine species, such as the colonial tunicates (B*otrylloides violaceus, Botryllus schlosseri, Didemnum vexillum, and Diplosoma listerianum*), may also occur in the channel or the Boston Harbor (MA CZM 2021a).

5.4.3.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, implementation of ad hoc flood control measures could result in soil and vegetation disturbance that creates suitable conditions for the establishment of invasive plant species (USDA and University of Georgia 2018). However, since the project area is highly developed, there would be minimal opportunities for invasive species to become established. There would be no effect on the potential presence or spread of emerald ash borer and European gypsy moth. Some trees could be lost under the No Action alternative, which might reduce available habitat for these invasive species, other trees would be planted to replace those lost.

If the implementation of ad hoc flood control measures requires in-water work, the transfer of equipment used in the water from one area to another could spread invasive marine plants and animal species if the equipment is not cleaned properly between locations. Therefore, the No Action alternative would result in short-term **negligible** adverse effects from the potential spread of invasive terrestrial and marine species.

Although ad hoc flood-control measures may reduce the risk of flood damage for specific areas, these measures would not substantially reduce the risk of flooding over the entire 100 Acres Master Plan area in the long term. Construction may be required to address continued flood damage, resulting in additional areas of disturbance. Flood waters would continue to damage and kill vegetation, such as trees, which could lead to the introduction and expansion of invasive plant species that thrive in newly disturbed areas (USDA and University of Georgia 2018). Thus, under the No Action alternative, there could be a long-term **negligible** adverse effect from the spread of invasive plant species.

Proposed Action

Construction of the Proposed Action would temporarily disturb soils and vegetation, creating suitable conditions for the growth and spread of invasive plant species. Equipment used for in-water work could also spread aquatic invasive species into the Fort Point Channel if the equipment is not cleaned properly before entering the channel and after being removed from the channel. The City would follow all conditions in forthcoming CWA permits for in-water work, which would minimize the spread of aquatic invasive species. The Proposed Action would include the placement of sod on top of exposed topsoil on the berms, covering areas of disturbance in which invasives could otherwise become established. Vegetation along the Harborwalk would be regularly maintained by the City, which would prevent the spread of invasives within the project area. No soil or vegetation disturbance would be required to implement or store the deployable flood control measures. Thus, the Proposed Action would result in a **negligible** short-term effect on the spread of invasive species.

Post-construction, the Proposed Action would reduce the risk of flood damage to existing vegetation, such as trees, within the 100 Acres Master Plan area, resulting in fewer opportunities for invasive plant species to become established. The Proposed Action would therefore have a negligible long-term beneficial effect by reducing the risk of invasive plant species spread. However, the protection of large deciduous trees may also preserve the preferred habitat for emerald ash borer and European gypsy moth in the project area, resulting in a potential **negligible** adverse effect.

5.4.4 Threatened and Endangered Species

The Endangered Species Act (ESA) provides for the conservation of threatened and endangered plants and animals and the habitats in which they are found. USFWS and NMFS are the lead federal agencies for implementing the ESA. The law requires federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a taking of any listed species of endangered fish or wildlife. “Take” under the ESA is defined as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities (50 C.F.R. 10.12). Because the ESA defines an action area as “all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action” (50 C.F.R. 402.02), the action area where effects on listed species must be evaluated may be larger than the project area where project activities would occur.

5.4.4.1 Existing Conditions

According to the USFWS Information for Planning and Consultation tool, no proposed, threatened, or endangered species under the jurisdiction of USFWS occur in the action area, including the project area and 100 Acres Master Plan area (USFWS 2021). According to the National Oceanic and Atmospheric Administration (NOAA) Fisheries Greater Atlantic Region Section 7 Mapper, accessed September 7, 2021, there are two ESA-listed species of fish and four species of sea turtles that occur, or have the potential to occur, in the Fort Point Channel: Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), shortnose sturgeon (*Acipenser brevirostrum*), loggerhead turtle (*Caretta caretta*), leatherback turtle (*Dermochelys coriacea*), green turtle (*Chelonia mydas*) and Kemp’s ridley turtle (*Lepidochelys kempii*). The presence of listed species in the project area is very unlikely because the Fort Point Channel is enclosed and highly developed (R. Mesa, NOAA, personal communication, September 8, 2021).

The City of Boston sent a letter to NHESP on January 2, 2019, requesting a regulatory review to identify State-listed threatened or endangered species and their critical habitat in the project area. NHESP's response indicated that the project does not require review for compliance with the Massachusetts Endangered Species Act.

5.4.4.2 Potential Effects and Proposed Mitigation

No Action Alternative

As discussed above, listed species are very unlikely to occur in the Fort Point Channel because the channel is enclosed and highly developed. On September 8, 2021, NMFS confirmed that the presence of listed species in the project area is very unlikely; therefore, the No Action alternative would likely have no effect on listed species.

Proposed Action

FEMA requested technical assistance from NMFS on the potential for the Proposed Action to affect the listed species on September 7, 2021 (FEMA 2021c). On September 8, 2021, NMFS confirmed that the presence of listed species in the project area is very unlikely because the Fort Point Channel is enclosed and highly developed (NMFS 2021). Additionally, project work would be conducted from land and turbidity controls would be used for cofferdam installation, which would further limit any potential effects of the Proposed Action on these species. Thus, FEMA determined the Proposed Action would have "No Effect" on listed species.

5.5 Cultural Resources

As a federal agency, FEMA must consider the potential effects of its actions upon cultural resources prior to engaging in any project. Cultural resources are defined as prehistoric and historic sites, structures, districts, buildings, objects, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. There are several laws a federal agency must consider when working with and identifying cultural resources. For the City of Boston Resilient Fort Point Channel project, FEMA will meet this obligation through its Section 106 of the National Historic Preservation Act of 1966 (NHPA) consultation. Section 106 of the NHPA, as amended and implemented by 36 CFR Part 800, outlines the required process for federal agencies to consider a project's effects to historic properties. The NHPA defines a historic property as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register." Eligibility criteria for listing a property on the National Register of Historic Places (NRHP) are found at 36 C.F.R. Part 60. While the definition of a cultural resource under NEPA can be broader, FEMA regularly uses Section 106 to meet its obligations to consider effects to cultural resources. For this project, FEMA determined that it was appropriate to use its NHPA review to fulfill its NEPA obligations.

Cultural resources determined to be potentially significant under the NHPA are subject to a higher level of review and federal agencies must consider the potential effects of their projects on those resources and consider steps to avoid, minimize, or mitigate those effects. To be considered significant, a cultural resource must meet one or more of the criteria established by the National Park Service that would make that resource eligible for inclusion in the NRHP. The term "eligible for inclusion in the NRHP" includes all properties that meet the NRHP listing criteria, which are specified in the Department of Interior regulations Title 36, Part 60.4 and NRHP Bulletin 15. Properties and sites that have not been evaluated at the time of the undertaking may be considered potentially eligible for inclusion in the NRHP and, as such, are afforded the same regulatory consideration as nominated properties.

5.5.1 Identification of APE, Cultural Resources, and Consultation Process

Area of Potential Effect

Pursuant to 36 CFR 800.4(a)(1), the Area of Potential Effects (APE) is defined as the geographic area(s) within which the undertaking may directly or indirectly affect cultural resources. Within the APE, effects to cultural resources are evaluated prior to the undertaking for both Standing Structures (above ground resources) and Archaeology (below ground resources). The APE for this undertaking consists of all areas of ground disturbance, including staging and access areas not on hardened surfaces, and any locations from which permanent alterations will be visible. This consists of the area of ground disturbance associated with construction of the berm and the elevated Harbor Walk. Visual effects are limited to the surrounding properties from which the berm and elevated Harbor Walk are visible.

The Massachusetts Historical Commission (MHC) maintains a database of the Commonwealth of Massachusetts' historic properties: the Massachusetts Cultural Resource Information System (MACRIS), which is regularly updated. FEMA uses this database as part of its efforts to identify significant cultural resources that may be affected by a project. A FEMA Secretary of the Interior-qualified Historic

Preservation Specialist has conducted a search of MACRIS, the National Register of Historic Places National Resources Information Service (NRHP NRIS) database, reviewed historical aerial images and historic maps, written histories of the project area and the Natural Resources Conservation Service's (NRCS) Web Soil Survey to assess the potential for eligible resources within the project APE.

Cultural Resources

From the start of its construction and continuing to present day, the Fort Point Channel area in South Boston has been a place of business and a location for activities oriented to water transportation, industry, and commerce. The Fort Point area was first developed in the 1830s by the Boston Wharf Company (BWCo) and was one of the nation's leading marketplaces for wool. Today, many of the Fort Point area's extant manufacturing and warehouse buildings have been preserved as a local landmarks district, with several buildings converted into artists' studios and lofts. Other original BWCo buildings now house office space, hotels, restaurants, and commercial businesses. The area derives its historic significance from being a large and remarkably intact example of the kind of warehousing and manufacturing areas that were once vital to the economies of cities across the nation. Buildings in Fort Point Channel area date predominately from 1870-1915.

The Fort Point Channel area was once home to several well-known manufacturing names in the region during the late nineteenth through the early twentieth centuries. Both the American Sugar Refinery Company, one of many sugar processors in the area at the time, and New England Confectionary Company (NECCO) occupied large parcels in the neighborhood. Gillette World Shaving Headquarters has been in Fort Point Channel for over 100 years and continues to play an important role in the development of the area.

Consultation

FEMA consulted with the Massachusetts State Historic Preservation Office (SHPO), the Massachusetts Board of Underwater Archaeology (BUAR), and the Native American Tribal governments through the responsible Tribal Historic Preservation Officer (THPO), whose areas of interest include Suffolk County (Mashpee Wampanoag Tribe and Mashpee Wampanoag Tribe of Hay Head [Aquinnah]), under Section 106 of the NHPA. FEMA submitted its initial finding that the proposed action would have "No Adverse Effect" on historic properties to the SHPO and THPOs on March 10, 2021 (FEMA 2021d, 2021f and 2021g). FEMA also submitted letters to several cultural and historic non-profits within the Fort Point Channel neighborhood, including Boston Landmarks Commission, Historic Boston Inc., Friends of Fort Point Channel, Boston Preservation Alliance, and the Boston Tea Party Ships & Museum. April 9, 2021, the SHPO's office concurred that the project would have no adverse effect on the historic resources within the project area (FEMA 2021e). The SHPO's office also concurred that there are no archaeological concerns within the project area as the ground has been previously disturbed by construction and demolition activities throughout the history of the neighborhood (FEMA 2021e).

5.5.2 Historic (Standing) Structures

5.5.2.1 Existing Conditions

The project area is located within the boundaries of the Fort Point Channel Historic District, a historic district listed in the NRHP. The Fort Point Channel Historic District comprises roughly 55-acres in South Boston located across Fort Point Channel from downtown Boston. It contains 103 buildings and 11 structures, specifically four (4) bridges, a prominent chimney, two (2) sections of seawall (channel walls) along both sides of Fort Point Channel, a circa 1920s Boston Wharf Company roof sign, and a monumental milk bottle built to advertise a milk company. 89 buildings and nine (9) structures are considered contributing to the historic district. Three (3) of the channel's historic bridges, Summer Street (1898-1899), Northern Avenue (1908), and Congress Street (1930) are rare examples of their types.

The Fort Point Channel granite channel walls are contributing elements within the historic district. The Fort Point Channel Landmark District, a local historic landmark district, is also located within the project area. The boundaries of both districts overlap almost entirely with each other. The project is also located directly adjacent to the historic Gillette World Shaving Headquarters Complex and its associated sign, which FEMA evaluated for eligibility for listing in the NRHP. To the west on the Downtown Boston side, the U.S. Post Office General Mail Facility is within the viewshed of the APE.

U.S. Post Office-General Mail Facility

The U.S. Post Office-General Mail Facility, located at 25 Dorchester Avenue, is a circa 1935 building which was subsequently renovated and added on to in the 1960s and further renovated in the 1980s. The building is situated along the west side of Fort Point Channel. While the building is currently encased in a steel frame with an aluminum panel skin, the original structure had a brick frame in a Neo-Classical style. Following extensive renovations over the years as described, the U.S. Post Office-General Mail Facility has lost its integrity of design, materials, workmanship, and feeling. The original structure from 1935 is no longer visible. Therefore, the U.S Post Officer-General Mail Facilities lacks the necessary integrity to be eligible for listing in the NRHP.

Gillette Manufacturing Complex

The South Boston campus of Gillette is the location where this internationally renowned company began operations. The Gillette Company and brand originated in 1895 when salesman and inventor King Camp Gillette invented a safety razor that used disposable blades. The American Safety Razor Company was founded on September 28, 1901 in Boston by Gillette and other members of the project, and the company was renamed the Gillette Safety Razor Company in 1904. As the BWCo began to sell off portions of its land in the Fort Point Channel area, Gillette and other industries expanded. Based on historic maps, Gillette gradually grew its plant footprint during the 1910s and 1920s in part by taking over portions of the former American Sugar Refinery Company, which held a large foothold on land along the southern portion of Fort Point Channel between West First and West Second streets. Some buildings were repurposed while others were torn down and new ones constructed in their place. In the 1920s, part of West First Street was reconstructed and named Gillette Park as Gillette began to occupy more of the buildings in the area.

During the time of urban renewal in the 1950s and 1960s, many companies were leaving cities. Gillette, however, showed a confidence in the future of Boston by investing extensively in its South Boston campus along Fort Point Channel. A *Boston Globe* article from August of 1960 announced plans for construction of a new $6 million Gillette plant. The Gillette Headquarters building (blade manufacturing building) facing Fort Point Channel was designed with a distinctive saw-tooth window configuration that represents the edge of a razor. The company sign bearing the words "Gillette World Shaving Headquarters" sits atop this edge of the building. The buildings included a new manufacturing plant, shipping and receiving building, and office facilities.

FEMA determined that the Gillette Manufacturing Complex is eligible for listing in the NRHP for its association with significant events and persons that have contributed to history, mainly the invention of the safety razor by King Camp Gillette which changed the world of shaving. The Gillette Manufacturing Complex is significant at both the local, state, and national levels for its associations with the history of manufacturing and industrial development in Boston (local significance), which affected the economy of both Massachusetts and New England as a whole (state significance). Gillette is an internationally recognized name that revolutionized the manufacturing of razors through the invention of the safety razor (national significance) and continues to maintain a presence and reputation around the world as a leader in the shaving industry.

The Gillette Manufacturing Complex has been a significant contributor to the economic growth and vitality of Boston throughout its more than 100 years of history in Fort Point Channel. As previously noted, during the time of urban renewal in the 1950s and 1960s when many companies were leaving cities, such as Boston, Gillette invested extensively in its South Boston campus and helped to bolster the local economy by staying in Fort Point Channel.

The Gillette Headquarters building is unique in its design with its razors edge facing Fort Point Channel that was designed to mimic the company's product. Although the buildings within the Gillette complex have been greatly altered over the lifespan of the complex (demolitions, new construction, reuse of buildings), these changes have been made to allow the company to adapt to new manufacturing needs. The complex retains sufficient integrity of location, feeling, and association.

Gillette Sign

The large sign with illuminated letters reading "Gillette World Shaving Headquarters" sits atop the Gillette Complex facing Fort Point Channel. It is visible not only to pedestrians in the city, but also those traveling along Interstate-93 through the city and to those who take trains to and from South Station. The sign has been a Boston landmark for decades and has been associated with the history of Gillette in the Boston area since it was constructed in the 1960s when the Gillette plant was expanded.

The sign was constructed by the Donnelly Electric Manufacturing Company of Boston. The company was founded in 1850 was one of the first manufactures of neon advertising signs in New England. The use of large-scale illuminated displays intended to be seen over long distances were an innovation of the automobile era and the company designed and produced an array of signs in the Boston area, many of which have since been dismantled. Surviving signs in the area include the Gillette World Shaving Headquarters sign, the NRHP-listed Shell Oil Company sign in Cambridge, and the Stop & Shop sign on the building adjacent to the Shell sign site.

The Gillette sign was restored in 2010 as part of Gillette's multimillion-dollar renovation project for the aging plant. At the time of the restoration, the sign stretched 400 feet long, stood 16 feet tall, and contained 5,000 feet of neon tubing. When the sign was restored, the neon tubing was replaced within over 14,000 light emitting diode (LED) modules, which are still utilized presently. Although the inner workings of the original neon have been removed, and is no longer linked to the neon sign era, the sign still has the illuminated appearance as originally constructed. FEMA has determined that the sign is eligible as a contributing element within the eligible Gillette Complex as it adds to the overall significance of the complex.

5.5.2.2 Potential Effects and Proposed Mitigation

No Action Alternative

If no federal action is taken, the implementation of ad hoc flood control measures would continue to be constructed. Adjacent commercial, institutional, and residential properties within Fort Point Channel would remain at risk of flood damage with potential damage to historic properties in the neighborhood. Effects to historic structures would be **minor**.

Proposed Action

Under the Proposed Action, there would be no direct physical construction effects to any buildings within the APE. Both historic and non-historic resources within the Fort Point Channel neighborhood would be protected from the 100-year flood event. The construction of these flood mitigation measures will not adversely affect the characteristics of the historic properties within the project area as determined through consultation with the SHPO's office. However, based on the condition of the existing channel walls as assessed during the construction phase, additional work could be necessary to stabilize or repair the walls. To mitigate the effects of such repairs FEMA would add a special condition to the project that the City of Boston must notify FEMA of the repair work and all repair or replacement work must be in-kind. In-kind shall mean that it is either the same or similar material, and the result shall match all physical and visual aspects, including form, color, and workmanship. Therefore, any new stones or mortar, or repair work on the channel walls will match the existing channel walls in materials, size, and color to minimize the effect to the historic channel walls.

As many parcels to the east of the APE are paved parking lots, minor visual effects would be anticipated. To the west on the Downtown Boston side, the only building with possible views of the project area is the U.S. Post Office General Mail Facility, with its loading docks facing Fort Point Channel. The Gillette World Shaving Headquarters complex, which is located adjacent to the Harbor Walk, is also visible from parts of Interstate 93 (expressway) and the railroad tracks to the west.

Construction related effects to historic (standing) structures would be **none** and there would be **minor** long-term beneficial effects to historic structures from flood-related damages.

5.5.3 Archaeological Resources

5.5.3.1 Existing Conditions

According to MACRIS, and other archaeological surveys (e.g., conducted for the construction of the Central Artery/Third Harbor Tunnel Project) there are no previously identified precontact or historic archaeological sites within the APE. Historic maps and atlases show that the Fort Point Channel area within the APE was previously disturbed by the following: demolition of a large manufacturing building along the channel during the Urban Renewal period of the 1950s and 1960s; construction of the central artery tunnel under a portion of the channel and the adjacent parcel where the Gillette pump house is located; construction of portions of the Gillette complex in the 1960s; and construction of the adjacent parking lots to service both Gillette and the surrounding properties.

5.5.3.2 Potential Effects and Proposed Mitigation

No Action Alternative

There are no known archaeological resources within the project area. If no federal action is taken, there would be **negligible** effects at the project site from ad hoc flood mitigation projects.

Proposed Action

No effect to any archaeological resources is expected resulting from the proposed project because there are no known archaeological resources identified within or adjacent to the project area, and the areas where ground disturbance will occur are previously disturbed as confirmed by the SHPO's office.

The extent of ground disturbance for the Proposed Action would be limited to the construction areas of the earthen berm and elevated Harbor Walk. The width of ground disturbance for the berm in Segments 1 and 3 would be limited to 45 feet along the length of the segments with a depth of two feet. This depth is minor and would be likely limited to previously disturbed soils. The ground disturbance for the elevated Harbor Walk in Segment 2 would be limited to areas that have been previously disturbed by construction on the existing Harbor Walk. Therefore, FEMA has determined that the Proposed Action would unlikely effect any unknown archaeological resources as the soils are previously disturbed and no further identification efforts are necessary. FEMA would condition the project in the event of unanticipated archeological discoveries. Effects to archaeological resources would be **negligible**.

5.6 Socioecomonic Resources

5.6.1 Land Use and Planning

As described in **Section 3.0**, South Boston was identified as a focus area for climate resilience initiatives in the Climate Ready Boston plan (Green Ribbon Commission 2016). This plan identifies and prioritizes flood entry pathways that should be addressed to meet climate resilience goals. In addition, the project area is governed by the 100 Acres Master Plan that provides a framework for steering future redevelopment including flood control measures and open space considerations. As development and redevelopment occur, as it has in this area for over 100 years, the 100 Acres Master Plan defines the land uses along the Fort Point Channel. One component of the 100 Acres Master Plan is the open space concept plan that designates approximately 60 feet inland of the existing Harborwalk, between Binford Street and Necco Court (adjacent to Segment 1 of the Proposed Action) to be vegetated open space in future private redevelopment proposals (City of Boston 2020b).

5.6.1.1 Existing Conditions

Existing land uses in the project area are recreation, consisting of the Harborwalk trail, which is an urban trail system that runs parallel to the shoreline, and surface parking. Adjacent to the project area, land use is predominantly surface parking, with commercial and industrial uses farther inland. The recently redeveloped 5 Necco Street parcel (previously the GE facility) is located to the north, which is a science and technology center that incorporated raised landscaping features and open space fronting the Fort Point Channel (City of Boston 2021c). The Gillette pump house and industrial manufacturing facility are to the south.

5.6.1.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, some ad hoc flood control efforts may be implemented that could temporarily reduce access to existing buildings and parking during construction or implementation. Redevelopment that is likely to occur could include flood protection measures in alignment with the 100 Acres Master Plan, such as the raised landscaped berm incorporated into the recently approved 15 Necco Street redevelopment project (City of Boston 2020b). The inclusion of flood-protection measures during redevelopment could temporarily reduce access to existing adjacent buildings and parking during construction and/or during implementation. Thus, there would be a negligible short-term effect on land use as ad hoc measures are constructed and implemented.

In the long term, measures implemented during redevelopment or on an ad hoc basis may reduce the risk of flood damage for the specific areas that they protect; however, these measures would not substantially reduce the risk of flooding for the entire 100 Acres Master Plan area. Some ad hoc measures may be consistent with the Climate Ready Boston plan and the 100 Acres Master Plan, while other measures may not be. However, neither plan envisions an ad hoc patchwork of flood protection measures, and flood protection measures may be constructed in places envisioned for other land uses in the plans. The No Action alternative would not be consistent with existing land-use plans and would have a minor long-term effect on land use in the 100 Acres Master Plan area.

Proposed Action

Under the Proposed Action, construction activity would reduce access to existing surface parking in the project vicinity and the Harborwalk, as work areas would be blocked off. Alternative routing for the Harborwalk would be provided, as needed, and access to the Gillette Pump House and manufacturing facility would be maintained. Some areas that are currently paved and used as parking lots would be converted to flood protection structures and open space. Deployment of the interim flood control measures would temporarily require street closures, which could reduce access to streets and buildings directly adjacent to closures. However, this would only occur during flooding events when access would already be reduced and would not alter current land use. Therefore, there would be minor short-term adverse effects from reduced access to existing buildings and streets directly adjacent to the project site during construction and from deployment of the interim flood control measures during floods.

Post-construction, some surface parking areas would be converted to the mixed berm and floodwall feature. The Proposed Action would reduce the risk of flood hazards in the 100 Acres Master Plan area. The mixed berm/floodwall is a component of the adopted 100 Acres Master Plan and is consistent with the Climate Ready Boston plan. The Proposed Action would enhance and maintain the Harborwalk, an existing public space, consistent with the 100 Acres Master Plan. Thus, the Proposed Action would result in a moderate long-term benefit by implementing a substantial component of adopted land use plans that enhance recreational resources, open space, and increase South Boston's resilience to climate change.

5.6.2 Noise

EPA developed federal noise emission standards in accordance with the Noise Control Act of 1972. The EPA identified major sources of noise and determined appropriate noise levels for activities that would infringe on public health and welfare in accordance with the law. The EPA identifies a 24-hour exposure level of 70 decibels as the level of environmental noise that would prevent any measurable hearing loss over a lifetime (EPA 1974). Noise levels of 55 decibels outdoors and 45 decibels indoors are identified as “preventing activity interference and annoyance” (EPA 1974). Areas of frequent human use that would benefit from lowered noise levels are identified as sensitive receptors: typical sensitive receptors include residences, schools, churches, hospitals, nursing homes, and libraries. The Federal Highway Administration established acceptable noise levels and ranges for construction equipment (FHWA 2006) and the Occupational Safety and Health Administration established thresholds for occupational noise exposure to protect the health and safety of workers (29 C.F.R. 1926.52).

The City regulates noise levels through the City of Boston Code, Ordinances, Title 7, Section 50: Regulations for the Control of Noise in the City of Boston, which prohibits construction noise levels above 85 decibels from 50 feet away in industrial districts such as the project area (City of Boston 2021a). Land uses that are considered sensitive to noise effects are referred to as “sensitive receptors.” Noise sensitive receptors consist of, but are not limited to, schools, residences, libraries, hospitals, and other care facilities.

5.6.2.1 Existing Conditions

The project area is located in urban South Boston and typical noise sources include cars, trucks, buses, sirens, water discharge from nearby industrial facilities, and construction noise. The closest noise sensitive receptors to the project area include the 35 Channel Center Street condos and the Sunrise Learning Academy, both located approximately 830 feet east of the project area.

5.6.2.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, some ad hoc flood control efforts may be implemented that could temporarily increase noise levels during construction. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, the 100 Acres Master Plan area would remain at risk of flooding, which could result in damage that must be repaired. Construction activities to repair flood damage would temporarily increase noise levels in the immediate vicinity of the work, but the effects would not extend very far because of the urban nature of South Boston. Any construction that may occur would not exceed EPA standards or regulatory thresholds for noise established by the Federal Highway Administration, the Occupational Safety and Health Administration, and the City. There would be a **negligible** long-term adverse effect because the continued risk of flooding would periodically generate associated construction noise from repairs.

Proposed Action

Under the Proposed Action, construction activities would temporarily increase noise levels in the project vicinity but would not exceed EPA standards or regulatory thresholds established by the Federal Highway Administration, the Occupational Safety and Health Administration, and the City. Adherence with these standards would minimize sound exposure and ensure noise levels would not cause hearing impairment or permanent damage for workers. Based on the type of construction equipment proposed for use (**Section 4.2**), construction noise would be expected to attenuate with distance to the background noise levels expected in an urban commercial/industrial area within 500 feet of the equipment. No noise sensitive receptors are present within the project vicinity (within 500 feet). Therefore, there would be a **negligible** short-term increase in noise levels during construction. Post-construction, noise levels would return to pre-construction levels and the risk of flooding would be reduced thus reducing occasional increases in noise from flood-related repairs. Deployment of interim flood control measures would not produce noise levels that exceed the existing ambient noise levels. Therefore, the Proposed Action would have a **negligible** long-term beneficial effect on noise levels.

5.6.3 Transportation

5.6.3.1 Existing Conditions

The project area is located in urban South Boston and encompasses the Harborwalk along the shoreline. The Harborwalk is a major trail that connects South Boston to other neighborhoods, such as the Seaport District, Downtown Waterfront, North End, and Charleston. East of the project area (inland) is A Street, a north-south minor arterial of South Boston (Massachusetts Department of Transportation 2021). A Street intersects with the local roadways—Necco Street, Binford Street, and Dorchester Avenue. Necco Street is located at the northern end of the project area but does not provide access to the project site or to proposed staging areas. Binford Street is located at the north-south halfway point in the project area and provides access to the project site as well as proposed staging areas, including the Channelside public parking lot. Dorchester Avenue is located at the southern end of the project area and provides access to the project site and proposed staging areas (**Appendix A, Figure 2)**. I-90 Massachusetts Turnpike is buried roughly 25 feet or more below ground and would not be affected by the alternatives as shown in **Section 5.6.2** and therefore will not be evaluated. Rail lines are present west of the Fort Point Channel along the shoreline, and a rail yard is located southwest of Dorchester Avenue, adjacent to the 100 Acres Master Plan area.

The Massachusetts Bay Transportation Authority (MBTA) provides transit service to the City of Boston. No transit stops are located within the project area. East of the project area, A Street is used for bus route 11, which operates daily from 12:35 a.m. to 11:45 p.m. and connects the neighborhood of South Boston to the Financial District downtown (MBTA 2021a, 2021b). The closest subway station is located one block south of the project area at the intersection of West Broadway and Dorchester Avenue. No docks for ferries or ferry routes are located in or near the project area (MBTA 2021c).

5.6.3.2 Potential Effects and Proposed Mitigation

<u>No Action Alternative</u>

Under the No Action alternative, some ad hoc flood control efforts may be implemented that could require street and sidewalk closures. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, these measures would not substantially reduce the risk of flooding for the entire 100 Acres Master Plan area in the long term. Flooding would continue to inundate the Harborwalk and streets, resulting in roadway and sidewalk closures, rerouting of transit services, and could inhibit use of the rail yard (Boston Harbor Now 2021). Construction for flood-related repairs may result in increases in traffic and congestion, road closures, or disrupted transit services that could worsen with sea level rise. Therefore, periodic construction activities for ad hoc flood control measures would have minor short-term effects on motorized and nonmotorized transportation. Continued flooding and flood damage that requires repair would result in a minor long-term adverse effect from road closures, transit service cancellation, and rerouting of both motorized and nonmotorized transportation modes.

Proposed Action

Under the Proposed Action, construction activities for the mixed berm and floodwall features would require the temporary closure and rerouting of Harborwalk users but would not require street closures. Construction for interim flood control measures would require temporary roadway and sidewalk closures in proximity to the work. Construction equipment and materials would be staged and stored on existing surface parking lots off Binford Street, which may reduce the availability of parking. Vehicles, equipment, and personnel would access staging sites and the project area via A Street and Binford Street. The project would likely require numerous trucks to transport materials such as concrete blocks and earth and thus could result in additional traffic on nearby streets. Although over 11,000 cubic yards of material would need to be imported, it would be brought to the site over the course of the construction (approximately 2 years), and the truck traffic to and from the site would not be noticeable in the average daily traffic on surrounding streets. Trucks would be staged off existing streets so that there would not be an increase in congestion from trucks waiting to access the construction zone. No rerouting of transit services or rail services would occur. Therefore, the Proposed Action would have a **minor** short-term effect on transportation from trail closures and rerouting, reduced available parking, and some additional traffic during construction.

Deployment of the interim flood control measures would temporarily require street and sidewalk closures, which would affect both motorized and non-motorized access. Street closures could also reduce emergency response times but would only occur during flooding events when streets would likely already be closed because of flood water inundation. Post-construction, the Proposed Action would reduce the risk of flooding in the 100 Acres Master Plan area that currently results in repeated street closures and reduced transit services. Rail services would not be affected by or benefit from the Proposed Action. Therefore, the Proposed Action would have a **minor** long-term beneficial effect from reduced risk of trail, road, and transit closures caused by flooding and flood damage.

5.6.4 Public Services and Utilities

5.6.4.1 Existing Conditions

The project area is characterized by large amounts of buried infrastructure including electrical lines, communication conduits, industrial raw water intakes and outfalls from the Gillette facility, stormwater infrastructure, and the I-90 Massachusetts Turnpike, which is buried approximately 25 feet underground (City of Boston 2020a). The construction of the turnpike included concrete slurry walls close to the ground surface that are still present. There are a series of walkway lights and associated buried electrical lines along the Harborwalk. No overhead power lines or drinking water pipes are present.

The stormwater infrastructure includes 14 outfalls in the project area that flow into Fort Point Channel. Stormwater infrastructure in South Boston is part of a combined sewer overflow system that collects rainwater runoff, domestic sewage, and industrial wastewater in the same pipes (Massachusetts Water Resources Authority 2021). Thus, when stormwater levels are too high, such as when flooding occurs, the combined sewer overflows and can carry human and industrial waste into waterways or get backed up and flood sewers and streets.

5.6.4.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, some ad hoc flood control efforts may be constructed; however, they would be unlikely to disrupt or increase demand on public services and utilities. Thus, there would be no short-term effect. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, these measures would not substantially reduce the risk of flooding for the entire 100 Acres Master Plan area in the long term. Flooding could continue to disrupt electric services; overflow combined sewer lines, causing water quality effects and potentially backing up pipes; and damage drainage outflows. Continued flooding could require repairs that may disrupt or increase demand on public services and utilities. Therefore, there would be a **minor** long-term effect on public services and utilities from flood-related damage and disruptions.

Proposed Action

Under the Proposed Action, construction activities would include the temporary support of utilities running along the Harborwalk to ensure that no utilities would be disrupted during project implementation. The construction equipment would be self-contained and thus not increase demand on utilities and services. Underground electrical lines that power Harborwalk lighting would be relocated as needed for project implementation but would not affect Harborwalk users, as they would be rerouted during construction. Interim flood control measure implementation would not disrupt or increase demand on public services or utilities and thus would have no effect. Fourteen drainage outfalls in the project area would be fitted with backflow preventers to inhibit seawater intake and might be replaced if the pipes are found to be aged and/or damaged. The backflow preventers would reduce the risk of the combined stormwater pipes from backing up in the event of high water and flooding in the channel. Ground disturbance would not reach depths that would affect the buried I-90 turnpike or supportive slurry walls. As described in Section 5.2.1, the project would likely be subject to state and local permits, including an NPDES Construction General permit, that would identify measures to avoid erosion and effects on water quality from construction activities. In addition, alterations to the outfalls may trigger requirements to revise existing NPDES discharge permits for the outfalls. The City would be responsible for obtaining any necessary permits and following all conditions of necessary permits. Therefore, there would be a **negligible** short-term effect on public services and utilities during construction activities.

Post construction, the Proposed Action would not require ongoing use of public services or utilities, and thus no long-term increase in demand for services and utilities would occur. Deployment of interim flood control measures would not disrupt or alter public services and utilities, as they would not be attached where utilities are located and would not require connection to utilities to operate. The Proposed Action would reduce the risk of flooding and flood related damage, reducing potential disruption to public services and utilities. Therefore, under the Proposed Action, there would be a **minor** long-term beneficial effect from the reduced risk of flooding and associated power outages and sewage backup.

5.6.5 Public Health and Safety

5.6.5.1 Existing Conditions

The project area is within District C-6 for police and the Emergency Medical Services, which includes one ambulance located within the police station at 101 W Broadway, just south of the 100 Acres Master Plan area (City of Boston 2021b). The project area is within District 6 of the Boston Fire Department, which is located at 272 D Street, approximately 0.50 miles southeast of the project area (City of Boston 2008). The closest hospital is the Tufts Medical Center located west of the Fort Point Channel at 860 Washington Street.

5.6.5.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, construction of ad hoc flood control efforts could affect emergency response times from construction-related detours or lane closures. However, potential closures would be temporary, and rerouting would be provided, resulting in a negligible short-term effect on response times. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, these measures would not substantially reduce the risk of flooding over the entire 100 Acres Master Plan area in the long term. Flooding would continue to occur in the 100 Acres Master Plan area, and it could be exacerbated by sea level rise, potentially effecting a larger portion of the South Boston area over time. Flooding would continue to require road closures, which could increase emergency response times, cause power outages, and back up sewage lines, thus exposing people to health hazards. Therefore, there would be a **minor** recurring long-term effect on public health and safety from periodic flooding.

Proposed Action

Under the Proposed Action, both the berm and floodwall construction area and the staging areas would be located away from streets on existing parking lots. Construction would not require street closures that could increase emergency response times. Construction of the interim flood control measures would require the temporary closure of streets and sidewalks in the vicinity of the work. Construction activities would not require police or emergency vehicle presence. Thus, the short-term effect on public health and safety would be **none**.

Post-construction, the Proposed Action would reduce the risk of flooding and associated public health and safety concerns such as the rerouting of emergency vehicles around flooded areas, backup of combined sewer systems, and other health hazards from flooding. Deployment of the interim flood control measures would temporarily require street closures but would only occur during flooding events when streets would likely already be closed for safety. Therefore, there would be a **minor** long-term beneficial effect from the reduced risk of flooding and associated public health and safety concerns.

5.6.6 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires agencies to identify and address the disproportionately high and adverse human health or environmental effects its activities may have on minority or low-income populations. The State of Massachusetts also considers those with limited English proficiency during an environmental justice analysis. The EPA's Environmental Justice Screening and Mapping Tool (EJ Screen), the Massachusetts Environmental Justice Viewer, and census data were used to evaluate the demographic characteristics of the project area and surrounding community. The EJ Screen analysis is based on the U.S. Census Bureau 2015 to 2019 American Community Survey 5-year summary data at the census block group level (EPA 2021b).

Environmental justice populations include minority, low-income, and limited English proficiency populations, and are defined by the state of Massachusetts as those that meet any of the following criteria:

- Block group whose annual median household income is equal to or less than 65 percent of the statewide median ($81,215 in 2018) (low income)
- 25 percent or more of the residents identify as a race other than white (minority)
- 25 percent or more of households have no one over the age of 14 who speaks English only or very well (limited English proficiency)

5.6.6.1 Existing Conditions

The project area is located within a single block group (block group 250250612001) that also encompasses the 100 Acres Master Plan area. The population in the block group does not meet any of the criteria for environmental justice populations, as shown in **Table 5.3** (EPA 2021b, U.S. Census Bureau 2019). Thus, environmental justice populations are not expected to be present adjacent to or near the project area.

Table 5.3. Environmental Justice Demographics

Geographic Area	Census Block Group	Percent Minority (%)	Percent Limited English Proficiency (%)	Median Household Income	Earning Below 65% of State Median Income (Y/N)	Environmental Justice Population Present (Y/N)
100 Acres Master Plan area[1]	250250612001	14	1	$193,068	N	N
Commonwealth of Massachusetts	-	28	6	$81,215	Not Applicable	Y

[1] Block group 250250612001 encompasses both the project area and the larger 100 Acre Master Plan area.

5.6.6.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, some ad hoc flood control efforts may be implemented that would produce noise and emissions. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, these measures would not substantially reduce the risk of flooding for the entire 100 Acres Master Plan area in the long term. Since there are no environmental justice communities in or near the project area, they would not be affected. Therefore, the No Action alternative would not result in a disproportionately high or adverse effect on environmental justice communities.

Proposed Action

Under the Proposed Action, construction noise and activity would not be expected to effect environmental justice populations, as they are not present within or near the project area. Similarly, there would be no effect on environmental justice populations after construction. Therefore, there would be no disproportionately high or adverse effects on environmental justice populations.

5.6.7 Hazardous Materials

Hazardous materials and wastes are regulated under a variety of federal and state laws, including 40 C.F.R. 260, the Resource Conservation and Recovery Act (RCRA) of 1976, the Solid Waste Act, the Toxic Substances Control Act, the Comprehensive Environmental Response, Compensation, and Liability Act as amended by the Superfund Amendments and Reauthorization Act, and the Clean Air Act of 1970. Occupational Safety and Health Administration standards under the Occupational Safety and Health Act seek to minimize adverse effects on worker health and safety (29 C.F.R. 1926). Evaluations of hazardous substances and wastes must consider whether any hazardous material would be generated by the proposed activity and/or already exists at or in the general vicinity of the site (40 C.F.R. 312.10). If hazardous materials are discovered, they must be handled by properly permitted entities per statutes listed in 310 CMR 30.000.

5.6.7.1 Existing Conditions

A review of the project area and 100 Acres Master Plan area was performed using EPA's NEPA Assist online tool. The NEPA Assist review identified one RCRA-regulated hazardous waste generator site that intersects the project area and 16 additional RCRA-regulated hazardous waste generator sites within the 100 Acres Master Plan area (EPA 2021d). The regulated site intersecting with the project area is the Gillette manufacturing facility. The Gillette manufacturing facility is a hazardous waste producer, and all hazardous materials are located within the Gillette manufacturing building. The project area is located on the portion of the Gillette property that is presently used for the existing Harborwalk. There are no Superfund sites (site regulated under the Comprehensive Environmental Response, Compensation, and Liability Act) in or near the project area. There are no known contaminated soils or hazardous materials within the project footprint where ground disturbance and excavation would occur.

5.6.7.2 Potential Effects and Proposed Mitigation

No Action Alternative

Under the No Action alternative, some ad hoc flood control efforts could occur, resulting in the potential for construction-related hazardous waste spills that would be avoided through compliance with federal, state, and local laws. Although ad hoc measures may reduce the risk of flood damage for the specific areas that they protect, these measures would not substantially reduce the risk of flooding over the entire 100 Acres Master Plan area in the long term. Flooding could affect RCRA-regulated sites within the project vicinity and pose a risk to human health and safety by causing accidental releases of hazardous materials. Floodwaters that inundate streets and buildings could contain hazardous substances such as commercial and industrial chemicals (Brennan et al. 2021). Receding floodwaters could carry hazardous wastes and materials into the Fort Point Channel. Thus, there would be a **minor** long-term adverse effect from the continued risk of flooding and damage that could lead to the dispersal of hazardous materials.

Proposed Action

The Proposed Action would include the use of mechanical equipment, such as graders and excavators, which could release fuels, oils, and lubricants through inadvertent leaks and spills. Construction activities would be temporary, and the use of equipment in good condition, while following BMPs and conditions specified in the NPDES permit, would reduce the threat of leaks and spills. Therefore, there would be a negligible short-term effect from the use of vehicles and equipment and the associated risk of hazardous leaks and spills. The Proposed Action would not include any work on or in the Gillette manufacturing facility building and all of the work on the Gillette property would occur within the existing footprint of the Harborwalk. Therefore, there would be no potential for the release of hazardous materials located within the building. Deployment of interim flood control measures would not affect RCRA-regulated sites, as the flood control measures would not direct floodwaters to those sites or be connected to them in any way. Post-construction, the Proposed Action would reduce the risk of flooding and associated potential damage to facilities regulated by the RCRA, reducing the potential for flood-related spills and release of hazardous materials. Thus, the Proposed Action would have a **minor** long-term beneficial effect from the reduced risk of flood-related release of hazardous waste and damage to RCRA-regulated facilities.

5.7 Cumulative Effects

This Environmental Assessment considers the overall cumulative effect of the Proposed Action and other actions that are related in terms of time or proximity. While consideration of cumulative effects are no longer required under regulations as of September 14, 2020, the cumulative effects text is retained in this document for the added perspective on potential effects provided. Cumulative effects represent the "effect on the environment which results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (40 C.F.R. 1508.7 pre-2020). In the context of evaluating the scope of a proposed action, direct, indirect, and cumulative effects must be considered.

In addition to NEPA, other statutes require federal agencies to consider cumulative effects. These include the Clean Water Act Section 404(b)(1) guidelines, the regulations implementing the conformity provisions of the Clean Air Act the regulations implementing Section 106 of the National Historic Preservation Act, and the regulations implementing Section 7 of the Endangered Species Act.

The Proposed Action is two of eight proposed flood mitigation measures at the Fort Point channel as part of an ongoing effort through the City of Boston's Climate Ready Boston plan (Green Ribbon Commission 2016). The mitigation measures comprise three near-term and five mid-term projects (see **Appendix A, Figure 7**). The three near-term projects, anticipated to be completed by 2025, include the Proposed Action, as well as two additional projects. The second project includes the partially completed flood mitigation features by the Alexandria Real Estate Equities Inc. property (see **Section 3**). This project includes additional planned improvements between the Alexandria Real Estate Equities Inc. improvements and the northern end of the Proposed Action. The Alexandria Real Estate Equities flood defense system would connect to the Proposed Action by having matching design flood elevations and would be completed during or shortly after the construction of the Proposed Action. The third project includes additional mitigation measures at the Arcade along Fort Point Channel between Summer Street and the completed portion of the Alexandria Real Estate Equities Inc. development mitigation measures. Designs have not been completed for this portion, but it has an anticipated completion date of 2025.

The remaining five mitigation measure projects are not anticipated to be completed until 2040. Three of the projects are located along the Fort Point Channel between Seaport Boulevard and Summer Street at Martin's Park, the Boston Children's Museum, and between Congress Street and Summer Street. The fourth project includes a proposed stormwater park space east and adjacent to the northern section of the Proposed Action. The park would likely extend up to Hull Road between the National Alexandria Real Estate Equities Inc. development and the Gillette property. The fifth project would be located on the south end of the Fort Point Channel on the south side of Dorchester Avenue. Because the projects are not anticipated to begin the design phase until 2025, there is insufficient information to provide more than a generalized evaluation that the projects would contribute to reductions in flooding in South Boston and would make the area more resilient against sea level rise. Any construction-related effects would be separated temporarily and spatially, and there would not be any cumulative effects related to short-term construction activities. Therefore, they are not considered in the cumulative effect analysis.

The three near-term projects are designed as stand-alone improvements to reduce flooding within a defined area and each project has independent utility. However, the projects as a whole are expected to be physically connected once complete and may have a cumulative effect on environmental resources throughout the 100 Acres Master Plan Area. Water quality and floodplain resources could be affected when considering all the projects as a whole.

- **Water Quality** – Implementation of the Proposed Action in combination with the other near-term projects would reduce the risk of flood damage to a larger area that includes the area south of Summer Street to the 100 Acres Master Plan area. The flood control measures would likely further reduce the potential to transport debris, sediments, and contaminants such as raw sewage directly into Fort Point Channel. The Alexandria Real Estate Equities Inc. flood control measures would be at the same elevation as the Proposed Action and connect to it. This would potentially eliminate a source of runoff when flooding occurs, as the connected projects would prevent runoff from a larger area. The project at the arcade may also connect at the northern end of the Alexander Real Estate Equities Inc. flood berm, potentially reducing further runoff from flood related wash. Therefore, there would be a **negligible**, cumulative, long-term beneficial effect on water quality.
- **Floodplain** – The other near-term projects in addition to the Proposed Action would be likely to provide protection to a larger area that includes the infrastructure between Summer Street and the Gillette property that could reduce further inland flooding, as they would likely be linked together. The extra flood protection would likely reduce the amount of runoff and debris entering the floodplain. Therefore, there would be a minor long-term beneficial effect on the protection of infrastructure in the floodplain and a **negligible** long-term beneficial effect on the health of the floodplain.

Within the 100 Acres Master Plan area, Related Beal submitted a Letter of Intent to construct an approximately 6.5-acre residential and commercial building at the 244–284 A Street lot (Boston Planning and Development Agency 2021). There could be concurrent construction occurring with this project and the Proposed Action, which could cause a short-term effect on traffic, noise, and temporary air emissions in the area. However, the effect would be negligible because of the built up urban area already contributing to those resources. The proposed development would be built regardless of whether the Proposed Action would take place and would likely have its own flood mitigation measures. The project site would likely not affect the harbor trail, as the construction would remain within the footprint of the 6.5-acre lot. As a result, there would be no long-term cumulative effect because of the 244–284 A Street development, as there would be no connecting infrastructure with the Proposed Action.

6.0 PERMITS AND PROJECT CONDITIONS

The City of Boston is responsible for obtaining all required federal, state, and local permits. While a good faith effort was made to identify all necessary permits for this Environmental Assessment, the following list may not include every approval or permit required for this project. Before, and no later than, submission of a project closeout package, the City must provide FEMA with a copy of the required permits from all pertinent regulatory agencies.

Additionally, FEMA would require the City to adhere to the following conditions during project implementation. Failure to comply with grant conditions may jeopardize federal funds.

1. Before construction begins, the City must obtain any required Clean Water Act Section 404 and 401 permits from USACE and MassDEP, respectively, and comply with all terms and conditions of the issued permits.
2. Before construction begins, the City must obtain any required NPDES permits from EPA and comply with all terms and conditions of the issued permit.
3. Before construction begins, the City must obtain with any required River and Harbors Act Section 10 Permit from USACE and comply with all terms and conditions of the issued permit.
4. Before construction begins, the City must obtain a MassDEP's Chapter 91 Waterway License and comply with all terms and conditions of the issued permit.
5. Before construction begins, the City must obtain a local certificate that demonstrates that the cumulative effect of the Proposed Action, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community (44 C.F.R. 60.3 and 44 C.F.R. 9.11(d)(4)) and comply with all terms and conditions of the issued certificate.
6. Before construction begins, the City must obtain approval from the local permitting official responsible for floodplain development to demonstrate that the Proposed Action is consistent with the criteria of the National Flood Insurance Program (44 CFR part 59 et seq.) or any more restrictive federal, state, or local floodplain management standards (44 C.F.R. 9.11(d)(6)) and comply with all terms and conditions of the issued permit. A copy of the approval/permit, or documentation from the permitting official that an approval/permit is not required, shall be forwarded to the state and FEMA for inclusion in the administrative record.
7. Before construction begins, the City must obtain a local certificate that demonstrates that the cumulative effect of the Proposed Action, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one foot at any point within the community (44 C.F.R. 60.3 and 44 C.F.R. 9.11(d)(4)) and comply with all terms and conditions of the issued certificate.
8. Before Construction begins, the City must submit a conditional letter of map revision ("CLOMR") request pursuant to 44 C.F.R. § 65.8 and part 72 (FEMA 2021a).
9. Following construction of the Proposed Action, the City must apply for a Letter of Map Revision in accordance with 44 C.F.R. 65.6.
10. Before construction begins, the City must submit a Notice of Intent with the Boston Conservation Commission seeking a determination that the Proposed Action would not adversely affect any area subject to protection under the Wetlands Protection Act.

11. Before construction begins, the City must consult with the Massachusetts Office of Coastal Zone Management and obtain a favorable Coastal Consistency Determination. The City must comply with all terms and conditions of the issued Coastal Consistency Determination.
12. In order to avoid adverse effects to winter flounder spawning and egg development habitat, cofferdam installation and removal should take place outside of the winter flounder time of year from January 15 – June 30 of any year. Work may take place behind dewatered cofferdams during this time.
13. If vegetation removal occurs during the migratory bird nesting season, the City must coordinate with the U.S. Fish and Wildlife Service to obtain any required authorization and must provide documentation of coordination with FEMA.

7.0 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

NEPA, its implementing regulations, and FEMA procedures stress the importance of engagement with partner agencies, applicants, and the public to the extent practicable while preparing an environmental assessment. To solicit input on the project and its potential effects, FEMA distributed an Environmental Assessment scoping document to the following agencies on June 16, 2021:

- EPA, Region 1
- HUD, Region 1
- NMFS, Habitat and Ecosystem Services Division
- NMFS, Protected Resources Division
- USACE, New England District
- USFWS, New England Field Office
- Mashpee Wampanoag Tribal Historic Preservation Office
- Wampanoag Tribe of Gay Head (Aquinnah) Tribal Historic Preservation Office
- MA Office of Coastal Zone Management
- MA Division of Fisheries and Wildlife
- MA Natural Heritage & Endangered Species Program
- MA Waterways Regulation Program MA Emergency Management Agency
- MA Department of Conservation and Recreation
- MA Department of Environmental Protection
- MA State Historic Preservation Office
- MA Environmental Policy Act Office
- The City of Boston
- Charles River Watershed Association
- Boston Landmarks Commission
- FEMA also submitted letters to several cultural and historic non-profits within the Fort Point Channel neighborhood, including Boston Landmarks Commission, Historic Boston Inc., Friends of Fort Point Channel, Boston Preservation Alliance, and the Boston Tea Party Ships & Museum

Following the distribution of the scoping checklist, FEMA received correspondence from the EPA on July 12, 2021, requesting a copy of the Environmental Assessment when it is available for review. NMFS provided comments on July 27, 2021, that included additional documents and information on sea level rise in the Boston area. NMFS comments included the following notes 1) Fort Point Channel is designated as EFH, 2) hardened shorelines may effect natural aquatic and floodplain functions including habitat, 3) requested consideration of the flood pathway just west of the project area to protect the railways, and 4) recommended that sea level rise assessments employ the intermediate-high (1.5 meter) or high (2.0 meter) scenarios from the "Global and Regional Sea Level Rise Scenarios for the United States" (NOAA 2017). FEMA responded to NMFS's comments on September 10, 2021 (FEMA 2021h).

FEMA sent notification regarding the availability of the draft Environmental Assessment for review and comment to the same agencies that were contacted with the NEPA Scoping Document.

Substantive comments received during the public review period will be addressed in the final Environmental Assessment. The public is invited to submit written comments by emailing david.robbins@fema.dhs.gov and eric.kuns@fema.dhs.gov or via mail to FEMA Region 1, 99 High Street Boston, MA 02110 Attn: Regional Environmental Officer. If no substantive comments are received from public or agency reviewers, the draft Environmental Assessment and Finding of No Significant Impact (FONSI) will be adopted as final.

8.0 LIST OF PREPARERS

CDM Smith:

- Emma Argiroff (Environmental Planner)
- Annamarie Weddle (Environmental Planner)
- Brandon Webb (Environmental Planner)
- Ajay Jadhav (Geographic Information System Specialist)
- Kate Stenberg, PhD (Senior NEPA Specialist, Quality Assurance/Quality Control Reviewer)

FEMA:

- David Robbins (Regional Environmental Officer)
- Mary Shanks (Deputy Regional Environmental Officer)
- Eric Kuns (Senior Environmental Specialist)
- Nulise Francois (PDM Project Manager)
- Kimberly De Muro (Lead Environmental Specialist)
- Kathleen Philp (Historic Preservation Specialist)
- Meredith Fagan (Environmental Specialist)
- Joshua Helms (Environmental Specialist)

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Appendix A Maps and Figures

Figure 1: Project Vicinity Map

Figure 2: Project Location Map

Figure 3: 100 Acre Master Planning Area

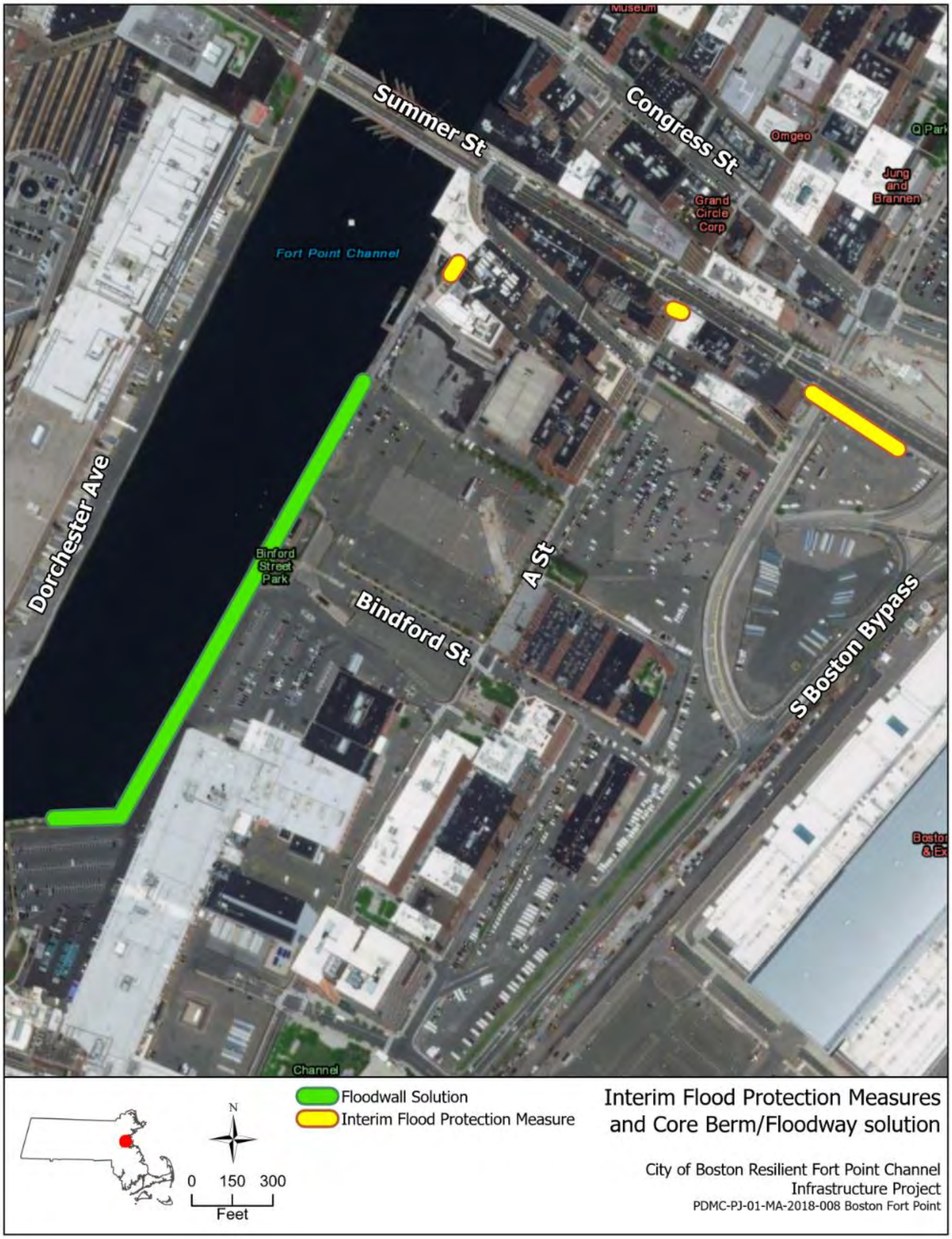

Figure 4: Interim Flood Control Measures

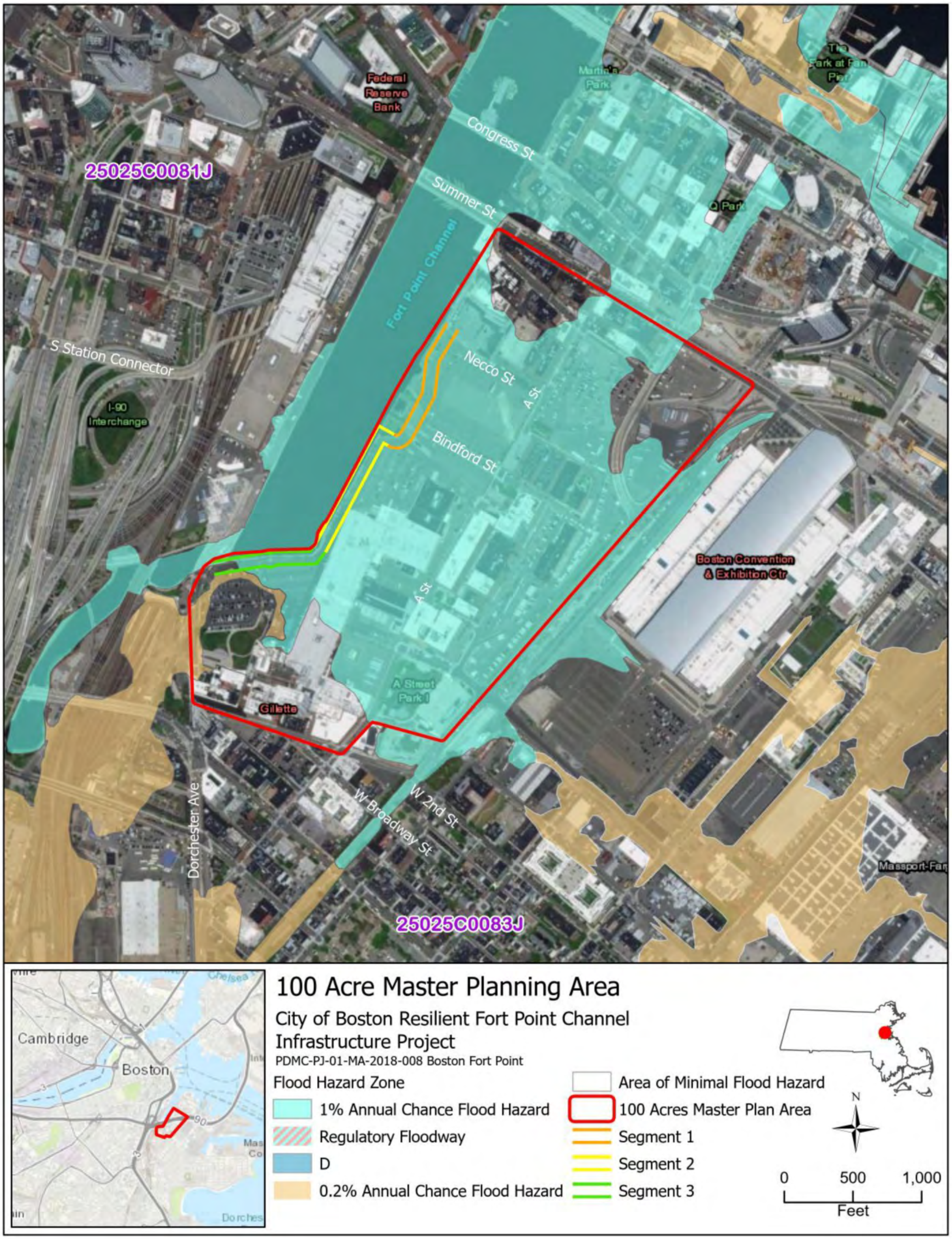

Figure 5. FIRM (Flood Insurance Rate) Map

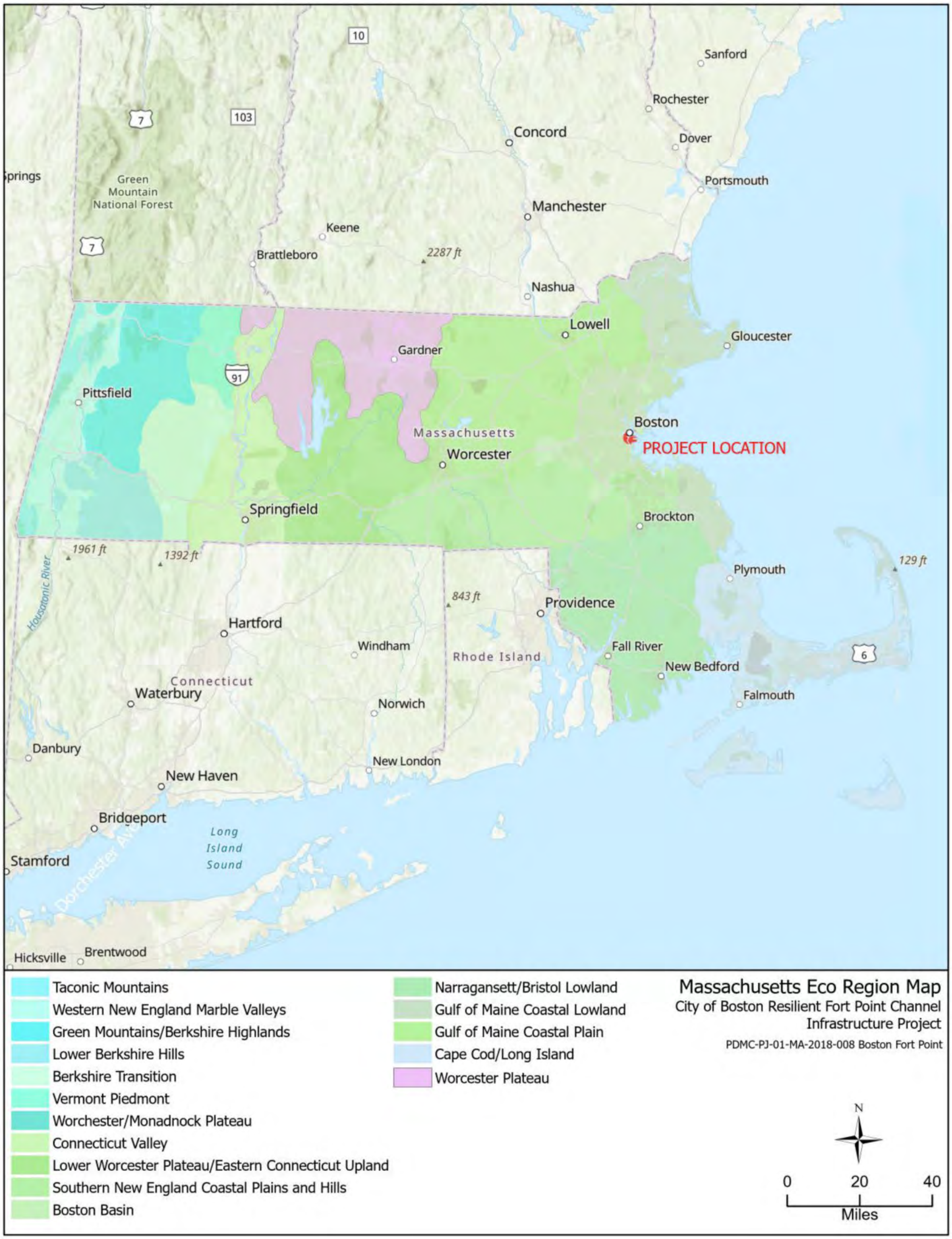

Figure 6. Massachusetts Ecoregions

Figure 7. Environmental Justice Populations

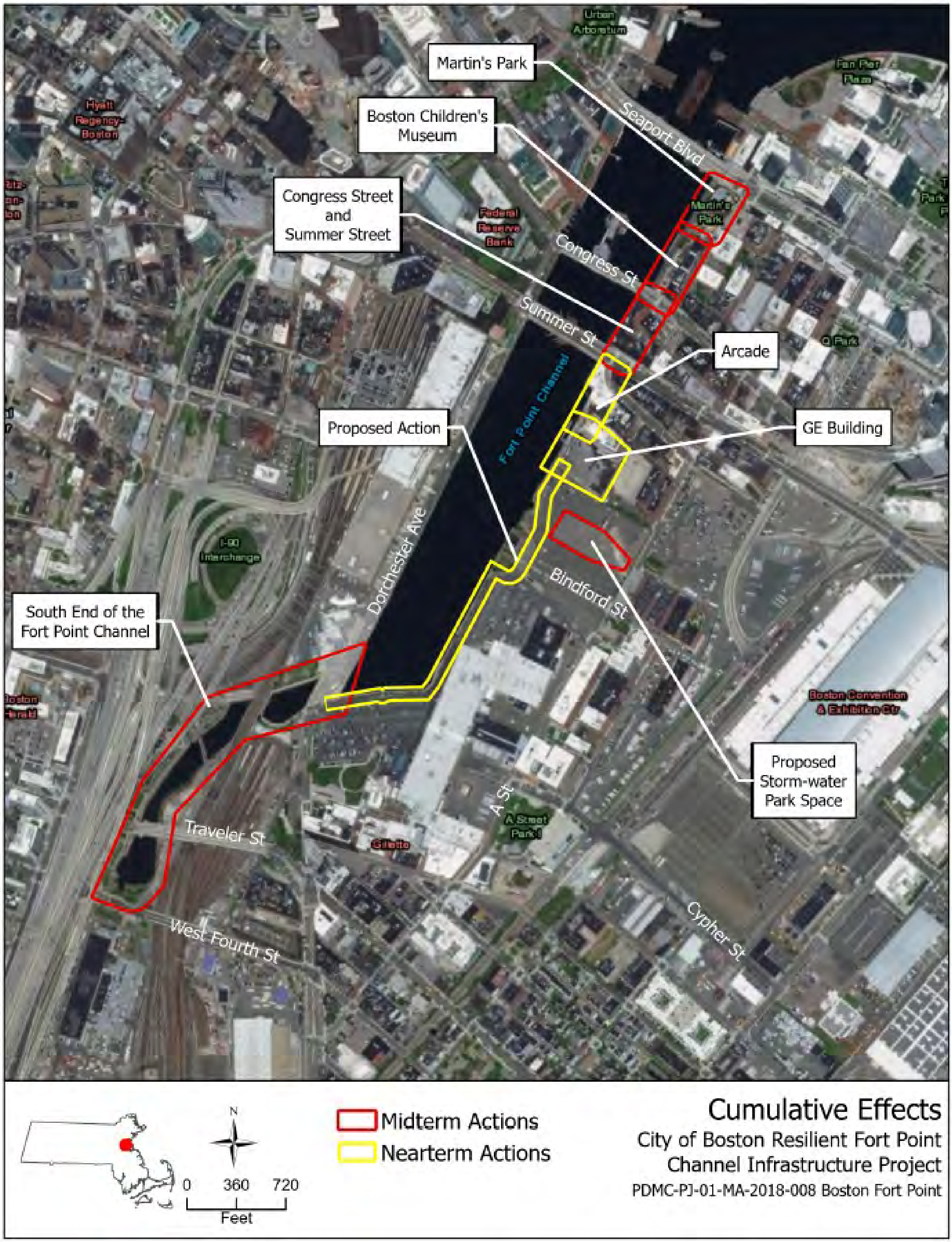

Figure 8. Climate Ready Boston Planned Projects

Appendix B Documents

Document 1

Scope of Work and Technical Memorandum

TECHNICAL MEMORANDUM

Arcadis U.S., Inc.
500 Edgewater Drive
Suite 511
Wakefield
Massachusetts 01880
Tel 781 224 4488
Fax

To:

Rich McGuinness, City of Boston

Copies:

Joe Christo, City of Boston

Christopher Busch, City of Boston

Carly Foster, CFM, AICP, Arcadis

Kathryn Edwards, PE, Arcadis

From:

Brett McMann, PE, Arcadis

Timothy Nelson, Arcadis

Kelli Thurson, CFM, Arcadis

Date:

January 2019

Arcadis Project No.:

LA003330.0006

Subject:

City of Boston FY2018 Pr- Disaster Mitigation Grant Program Application

Resilient Fort Point Channel Infrastructure Project

Flood Defense Conceptual Design and Cost Estimating Methodology

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INTRODUCTION

This memorandum presents an overview of the conceptual design and cost estimating approach for the City of Boston's application to FEMA's Pre-Disaster Mitigation (PDM) Grant Program to implement resilient flood protection infrastructure for Fort Point Channel. The proposed flood protection infrastructure will consist of a mix of earthen berms and mitigation of existing floodwalls for a 2,300 linear foot stretch of Fort Point Channel. This overview of the project design includes a description of the project site, the design flood elevation, and the proposed resilience features and site conditions that must be factored into the solution.

FEMA requires that all costs included in a funding application be necessary, reasonable, and allocable, consistent with provisions of 2 CFR Part 200. The City relied upon technical specialists and engineers to prepare the enclosed conceptual design and identify anticipated costs by line item, including those needed for further investigations, permitting, and construction of the project. The technical specialists and engineers used basic cost estimating guidelines presented in FEMA grant program guidance to develop cost estimates. The second portion of this memorandum provides descriptions of the methods and resources used and assumptions made to estimate costs for the City's application.

SITE DESCRIPTION

The proposed project focuses on improving flood protection in the 100 Acres Master Planning Area (project site), the most critical flood pathway on the eastern shoreline of the Fort Point Channel and one of the most critical in the entire City of Boston. The project site is the lowest site along the channel, and water currently and frequently overtops the existing shoreline during astronomical high tides and coastal storm events. The project site includes the Gillette World Shaving Headquarters, an important manufacturing facility and job site that has been operational for about over 117 years.

Over time, flood waters that enter through this site will extend further inland toward neighborhoods including South Boston and toward the Boston Convention and Exhibition Center. By the 2030s, with 9 inches of eustatic sea level rise, it will have a 20 percent (1 in 5) annual chance of flooding during a coastal storm event. By mid- to late- century, the 100 Acres Master Planning area is the first area along the channel expected to flood at least monthly and flood pathways will extend into inland Boston neighborhoods, connecting with pathways from Dorchester (south) and the Charles River (west).

The proposed project will directly benefit 31 properties and approximately 814 residents exposed to present and future flood risk, with many additional residents benefitting from the aesthetically enhanced waterfront. This includes one of New England's largest artists' communities with 300 artists who produce work in a wide array of media, Artists for Humanity (a youth and cultural community resource in creative industries), environmental sciences and renewable technologies companies, the Proctor & Gamble/Gillette plant, the Boston Convention and Exhibition Center, owners and occupants of several historic buildings located in the Fort Point Channel Landmark District, and all who will use and reside in the 100 Acres Master Plan area being planned. As the existing surface parking lots in the area are converted into a 24-hour resilient mixed-use neighborhood anchored by over 11 acres of new public open space and almost 5.9 million square feet of development in the 100 Acres Master Plan area, residents, workers, and visitors of all trades will benefit from flood protection along the Channel shoreline. Additionally, significant portions of A Street and Haul Road/South Boston Bypass are within the benefitting area and are expected to benefit from the project. A Street is an MTA bus route and Haul Road/South Boston Bypass serves as an evacuation route for the city of Boston. Both are also primary thoroughfares and truck and shipping access routes.

CONCEPTUAL DESIGN

Design Flood Elevation

According to the current FEMA Flood Insurance Rate Map (FIRM), the entire project site is located within the 100-year floodplain. The site's 100-year flood elevation (Base Flood Elevation) is El. 10 NAVD88 according to FIRM 25025C0081J – effective March 16, 2016. While the Suffolk County Flood Insurance Study provides stillwater elevations for the project site for the 1% annual chance flood event and the 0.2% annual chance flood event (the 100 and 500-year flood events, respectively), the City acknowledges the

Boston Harbor Flood Risk Model (BH FRM)[1] as the best available data to represent the dynamic nature of coastal storm events and sea level rise. The BH FRM was developed in 2015 through an initiative by MassDOT and the Federal Highway Administration to assess the vulnerability of Boston's Central Artery/Tunnel (CA/T) Project to sea level rise and extreme storm events. The study evaluated sea level rise scenarios for four distinct time periods (2013, 2030, 2070, and 2100). The results of the simulations were used to generate maps of potential flooding and associated water levels for the 10%, 2%, 1%, and 0.1% annual chance flood events, including peak wave crests.

The City of Boston used the BH FRM models in the Climate Ready Boston (CRB) 2016 citywide vulnerability assessment. CRB reviewed the nature of four flood probabilities (10%, 2%, 1%, and 0.1%) for three sea level rise scenarios: 9 inches, 21 inches, and 36 inches. The CRB flood data for 9 inches and 36 inches of sea level rise are largely identical the the MassDOT-FHWA data for 2030 and 2070, respectively, while the data for 21 inches of sea level rise were created specifically for Climate Ready Boston. The expected water levels for the 21-inch sea level rise scenario were interpolated from the MassDOT 2030 and 2070 data. Table 1 below depicts the water levels for each sea level rise scenario. Water levels include sea level rise and peak wave crests.

TABLE 1: CURRENT AND FUTURE WATER LEVELS

Sea Level Rise Scenario[2]	10% AEP Water Surface Elevation	2% AEP Water Surface Elevation	1% AEP Water Surface Elevation	0.1% AEP Water Surface Elevation
2013 (current conditions)	8.4	9.2	9.8	10.5
2030 (also known as the CRB 9 inch SLR scenario)	9.4	10.5	11	11.5
2050 (values interpolated from the 2030 and 2070 SLR scenarios)	10.7	11.6	12.1	13.1
2070 (also known as the CRB 36" SLR scenario)	11.9	12.8	13.3	14.6

[1] Bosma, Kirk, et al. "MassDOT-FHWA Pilot Project Report: Climate Change and Extreme Weather Vulnerability

Assessments and Adaptation Options for the Central Artery." MassDOT FHWA Report. June 2015. https://www.

massdot.state.ma.us/Portals/8/docs/environmental/SustainabilityEMS/Pilot_Project_Report_MassDOT_FHWA.pdf.

[2] Elevations specific to the Fort Point Channel

Technical specialists and engineers hired by the City have identified the project's appropriate and most effective design elevation as 14 feet NAVD88. This elevation is justified through the following assumptions and application of best practices when planning for sea level rise in capital projects:

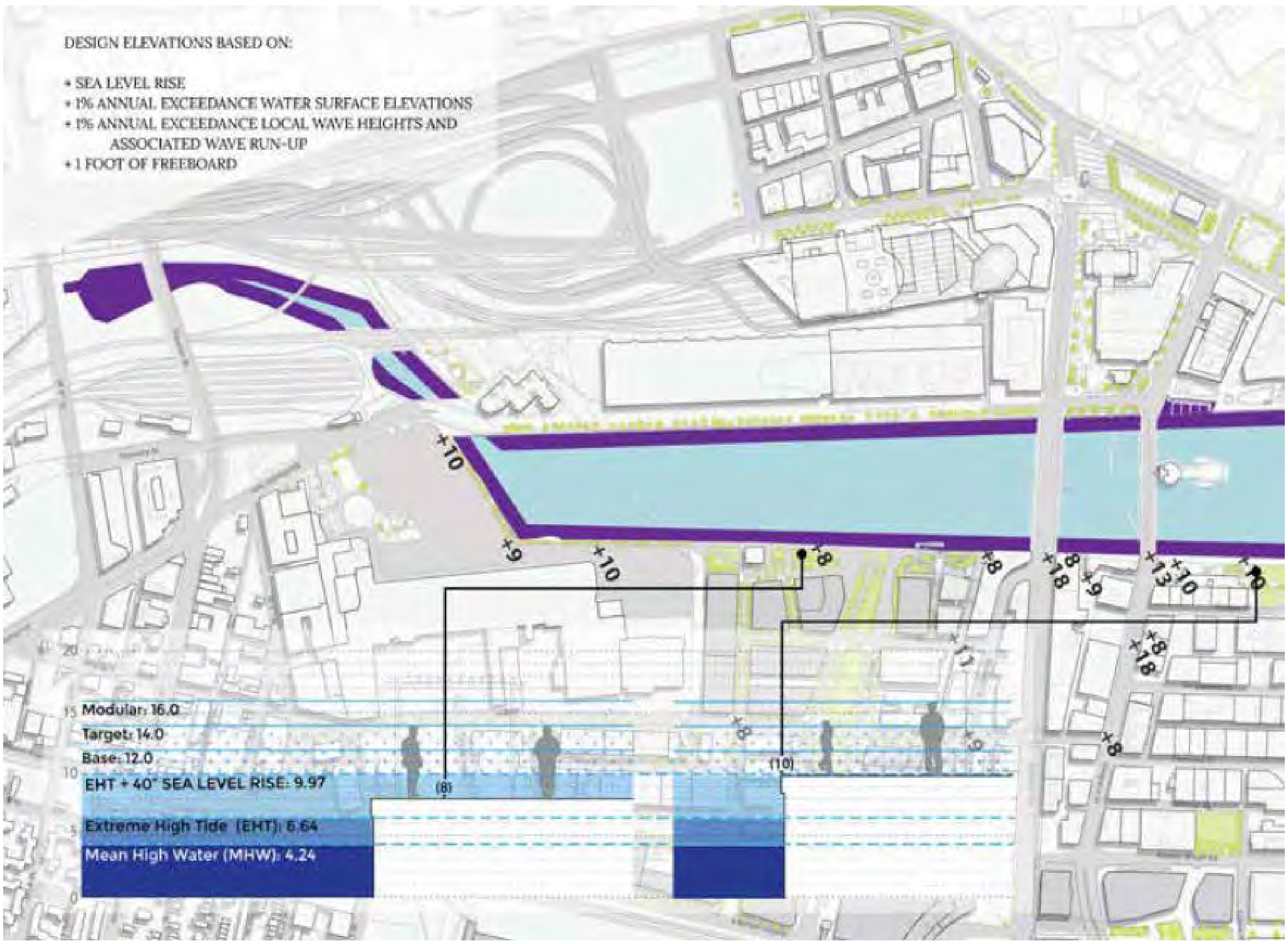
- A conservative useful life of the proposed project is 35 years[3]. If the proposed project is implemented by 2023, the project is expected to be effective until 2058. The expected flood elevation of the 1% AEP event in 2050 is roughly 12 feet NAVD. According to ASCE 24-14, *Flood Resistant Design and Construction*, a Class 4 structure in Zone A should consider a design elevation of the 1% flood elevation plus two feet of freeboard[4]. Incorporating two feet of freeboard into the 1% flood elevation expected over the life of the project provides a 14 foot NAVD design elevation.

The City's most recent study on the area, Coastal Resilience Solutions for South Boston, identified "base", "target", and "modular" levels of protection. These levels of protection were intended to represent the near-, mid-, and long-term adaptation elevations required to combat the 1-percent annual exceedance probability flood event in 2030, 2050, and 2070 with respective amounts of sea level rise in each timeframe. In the Fort Point Channel, the base level of protection recommended by the City is 14 feet NAVD. This elevation accounts for an anticipated sea level rise, wave runup, and freeboard to provide protection up to the 1-percent flood in 2050 and 2070 per the South Boston study (Figure 1).

[3] FEMA identifies major and concrete infrastructure, including floodwalls, as having acceptable project useful life limits of 35-100 years. The project's useful life is limited to 35 years due to the need for additional flood protection solutions in South Boston to mitigate flood pathways that may affect the project area. This is described in further detail in the Benefit Cost Analysis Technical Memo submitted with the project application.

[4] Flood Design Class 4 structures are those that pose a substantial risk to the community at large in the event of a failure, disruption of function, or damage by flooding. Considering the widespread impacts that will be mitigated by implementation of the proposed project, including protection of critical emergency evacuation routes, the City has identified the 100 Acres Master Planning area solution a Class 4 structure. https://www.fema.gov/media-library-data/1436288616344-93e90f72a5e4ba75bac2c5bb0c92d251/ASCE24-14_Highlights_Jan2015_revise2.pdf

FIGURE 1: DESIGN ELEVATIONS FROM COASTAL RESILIENCE SOLUTIONS FOR SOUTH BOSTON



It should be noted that although the proposed features address the lowest portions of Fort Point Channel, they have the ability to be tied into a larger proposed system in South Boston, where overall effectiveness will increase. Approximate elevations within the site and vicinity are as follows:

TABLE 2: APPROXIMATE SITE ELEVATIONS

Elevations of Interest	Elevation (ft. NAVD88)	Elevation (ft. MSL)	Elevation (ft. NGVD29)	Elevation (ft. BCB)	Elevation (ft. MTA-CA/T)
Current Seawall Crest/Harbor Walk (Avg.)	8.00	10.69	10.18	15.83	110.18
Gillette Facility First Floor	12.00	11.69	11.18	16.83	111.18
General Electric (GE) Facility First Floor	13.00	12.69	12.18	17.83	112.18
Crown Elevation of Proposed Berm	14.00	13.69	13.18	18.83	113.18
Crown Elevation of Proposed Seawall Elevation	14.00	13.69	13.18	18.83	113.18
Parking Lot Elevation	8.00	7.69	7.18	12.83	107.18

All elevations noted herein are relative to the NAVD88 datum. Table 3 below depicts datum conversions relevant to the project site. All tidal datums are referenced to the NOAA tide gauge station in Boston (Station ID 8443970).

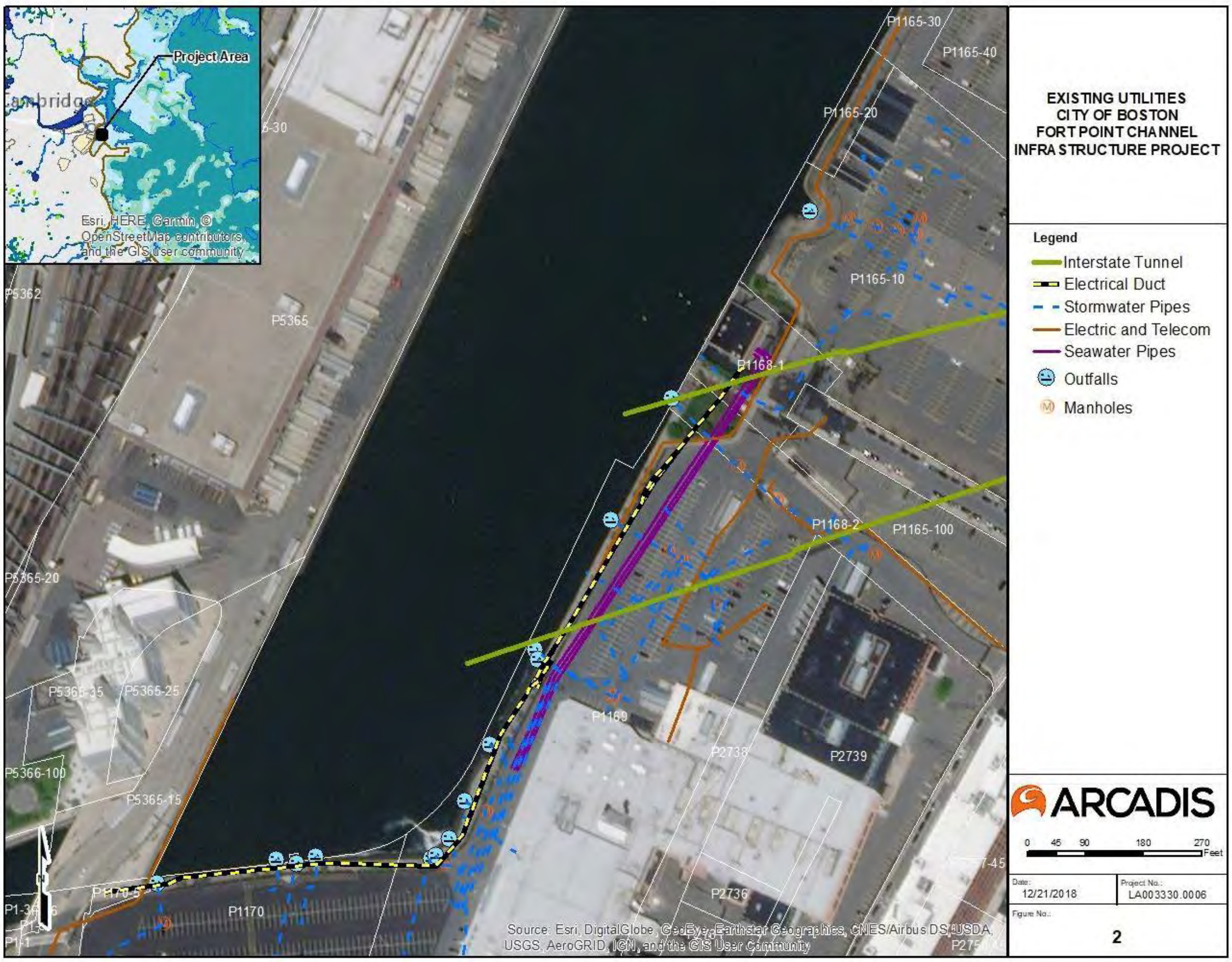
TABLE 3: DATUM CONVERSIONS

Elevations of Interest	Elevation (ft. NAVD88)
Boston MTA-CA/T Datum	99.18
Boston City Base Datum (BCB)	6.46
Mean Higher High Water (MHHW)	4.76
Mean High Water (MHW)	4.32
North American Vertical Datum (NAVD88)	0.00
Mean Sea Level (MSL)	-0.31
National Geodetic Vertical Datum (NGVD29)	-0.82
Mean Low Water (MLW)	-5.17
Mean Lower Low Water (MLLW)	-5.51

Proposed Resilience Features

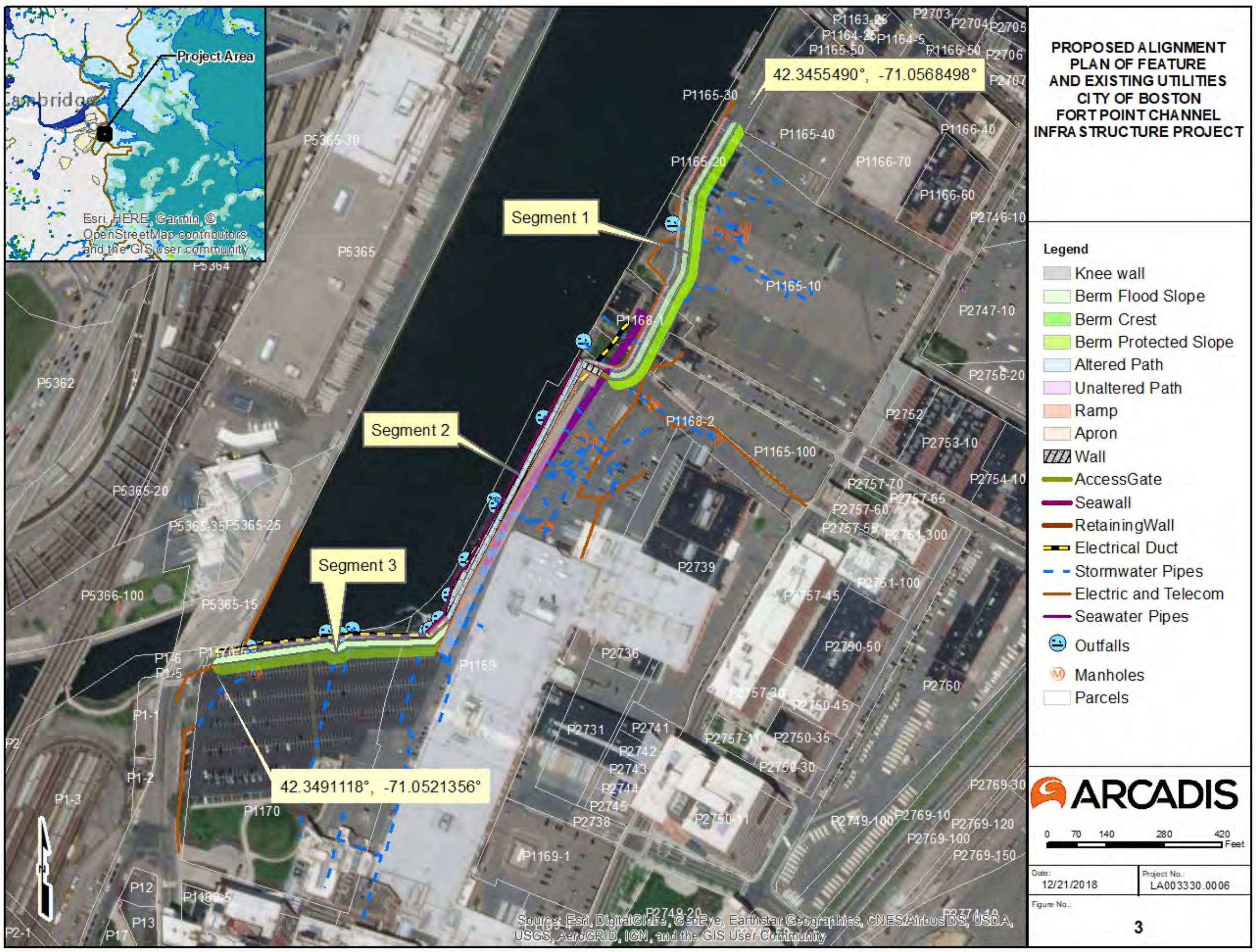
The site is characterized by a large amount of buried infrastructure (Figure 2), including electrical and communications conduits, industrial raw water intakes and outfalls from the Gillette facility, stormwater pipes, and multiple features associated with the I-90 Massachusetts Turnpike buried roughly 25 ft. or more below grade. During the burial of I-90 beneath the Fort Point Channel (the CA/T Project), large concrete slurry walls were built to facilitate tunnel construction and remain in place below the ground surface. The summation of the vast amount of existing buried infrastructure limits and in many cases precludes extensive use of driven piles, sheeting, or slurry walls as part of flood protection features on the surface.

FIGURE 2: EXISTING UTILITIES



The proposed resilience feature layout is shown in Figure 3. The features will consist of earthen berms and knee walls, a deployable flood gate, an elevated seawall/harbor walk section which functions as a floodwall, and protection of stormwater infrastructure. For planning purposes, the features are divided into three segments: Segment 1 running from the General Electric (GE) Facility at the proposal's northern boundary south to the Gillette pump house, Segment 2 from the Gillette pump house to the turn in the Fort Point Channel, and Segment 3 from the turn in the Fort Point Channel to Dorchester Avenue. The entire proposed resilience feature will have a ground disturbance footprint of 108,435 square feet, or 2.48 acres. All proposed features lie within the regulatory floodplain. Of the three proposed segments, Segment 1 will have the most independent utility as it protects the 100 Acres Master Planning area, which sits on the lowest elevation along the channel and is a flood pathway entrance.

FIGURE 3: FEATURE LAYOUT



Segment 1 is 728.5 ft. long with an average existing ground elevation of 8.3 ft. (NAVD88). It starts at 42.3455490°, -71.0568498°, and ends at 42.3457195°, -71.0547908°. The segment starts at the GE property line on the northern edge of the proposed site. GE has incorporated resilient engineering strategies into the property and has elevated features at approximately El. +13.0' NAVD88. The proposed berm will tie in to these features and run south parallel to the existing Harbor Walk. It will partially encircle the Gillette pump house used for raw seawater intake for industrial use. The berm segment will terminate at a 15-foot wide access driveway for the pump house, which will employ a FloodBreak or similar passive deployable flood gate. It was assumed vehicular access would be required to be maintained at all times to the Gillette facility, thus requiring a flood gate. A knee wall on the flood side of the berm feature will be incorporated to minimize the lateral width required for the proposed berm. The berm will have a 5-foot crown width and 4H:1V flood-side and protected-side slopes. The proposed width of the feature is 45 feet, resulting in a total expected ground disturbance footprint of 0.75 acres (32,782 square feet). General ground disturbance required for the proposed work is expected to a depth of 2', but could be greater at utility crossings pending the need for additional utility protection. Where municipal or industrial outfalls are located, backflow prevention fittings, in the form of flap gates, will be installed. Since the outfalls cross under the proposed feature, they will be at risk of misalignment or cracking due to differential settlement induced by the berm. The project proposes to strengthen the sections of line with modern pipe directly under the proposed features where necessary. A typical section for proposed Segments 1 and 3 can be found below in Figure 4. The proposed feature layout for Segment 1 is shown in Figure 5.

FIGURE 4: SEGMENT 1 AND SEGMENT 3 BERM CROSS-SECTION

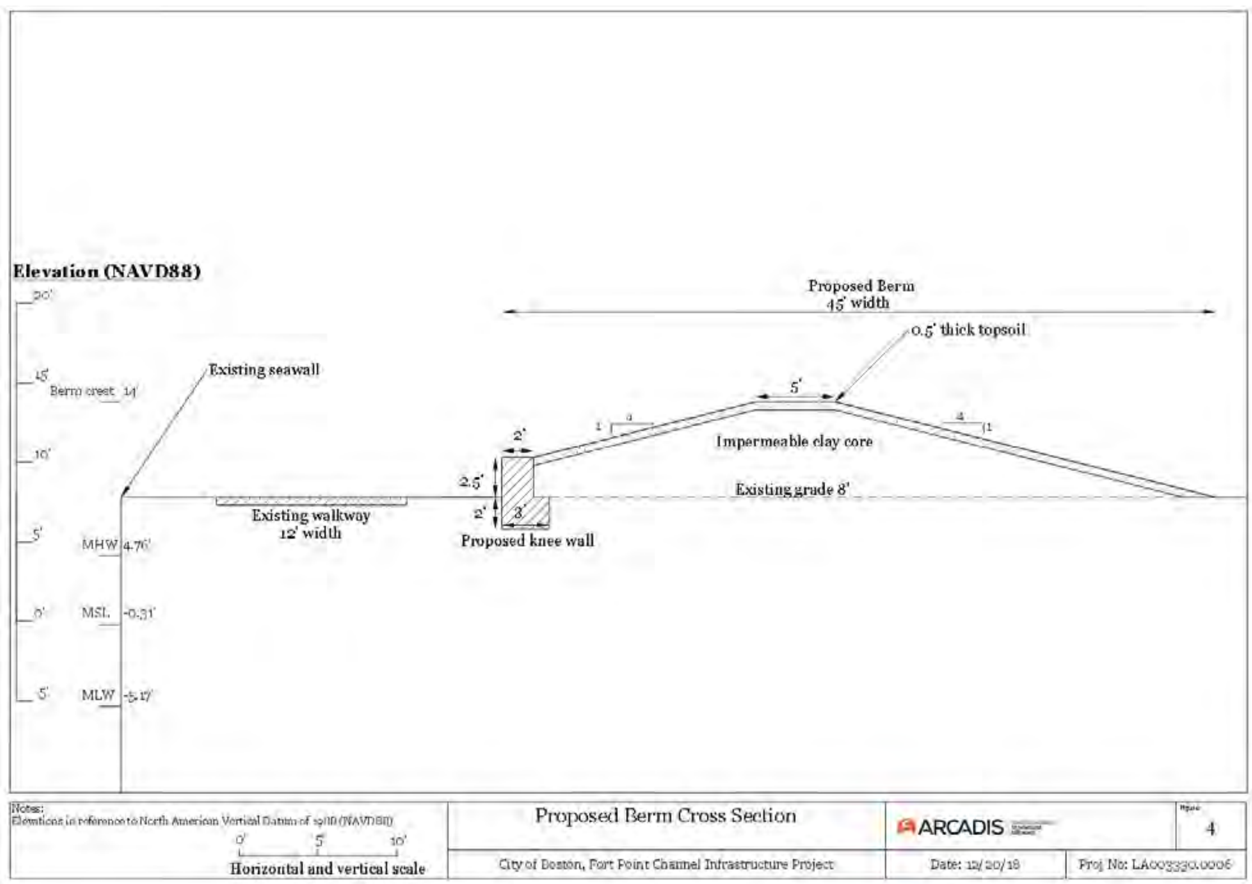
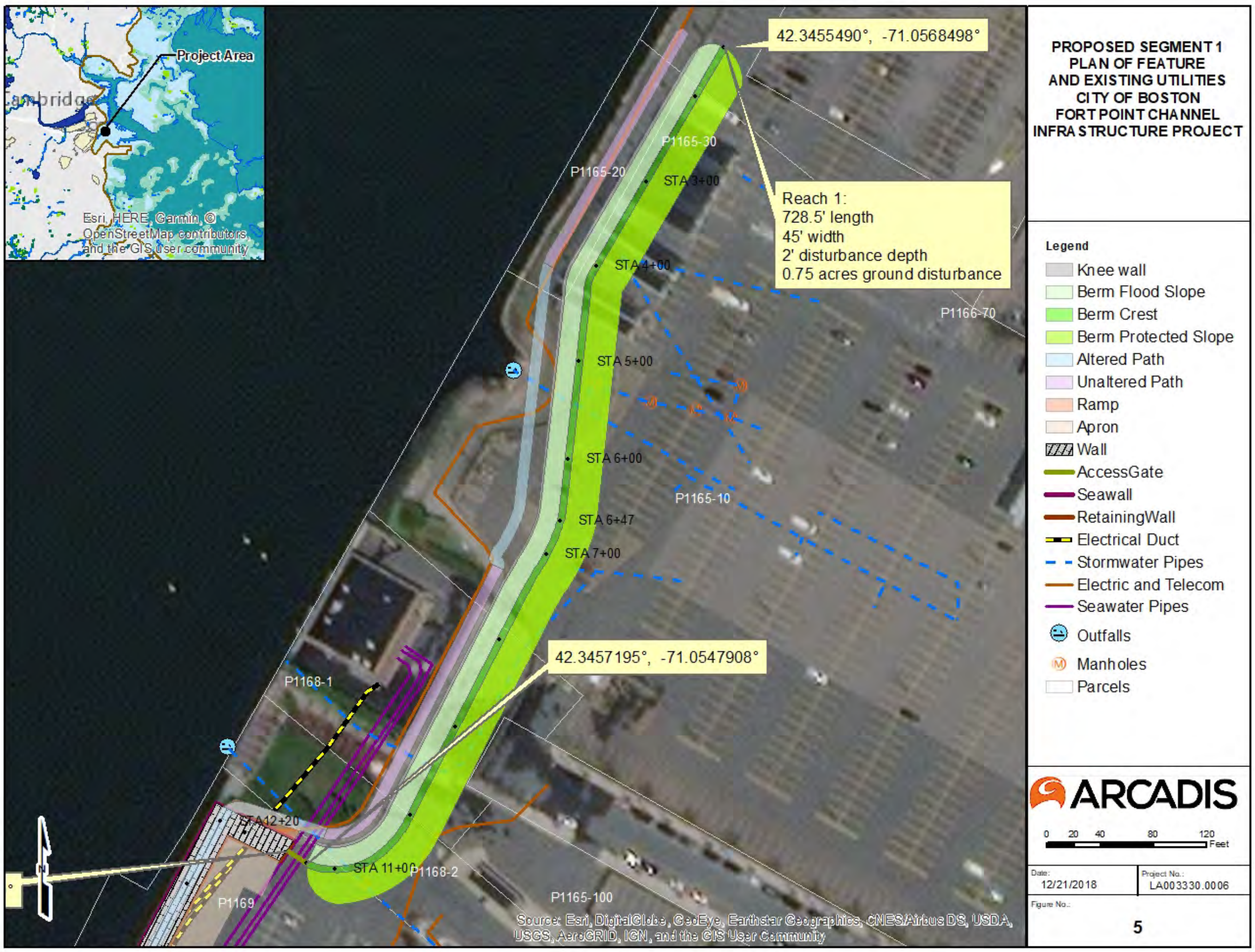


FIGURE 5: SEGMENT 1 ALIGNMENT



Segment 2 is 816 ft. long with an average existing ground elevation of 9.4 ft. (NAVD88). It starts at 42.3457638°, -71.0549170° and ends at 42.3474564°, -71.0533691°. The segment starts at the Gillette pump house access driveway and runs along the existing Harbor Walk southward until the western turn in the Fort Point Channel. Since there are large buried industrial pipes and electrical conduit running underground from the Gillette pump house parallel to the Harbor walk, limited space is available for an earthen berm. Furthermore, Gillette has noted they require vehicular access between their facilities and the Harbor walk, generating a pinch point near the turn in the Fort Point Channel. The flood protection feature is envisioned to consist of a double retaining wall of granite blocks matching those of the seawall. The granite blocks would extend the seawall's crest elevation to the required design elevation (approximately 6 vertical feet to reach 14 feet NAVD88). The protected side would also make use of granite blocks as a retaining wall feature, with impermeable fill in between the elevated seawall and rear retaining wall. The blocks would rest on concrete footing. All blocks would be doweled together as the upper layers of existing seawall are now with rebar rods. The total top width of the feature would be 18' wide, with a 12' wide shared use path for the Harbor Walk located on its crest. Ground disturbance expected for the width of the alignment is approximately 50 feet, for a total ground disturbance footprint of 40,800 square feet (0.93 acres). General ground disturbance required for the proposed work is expected to a depth of 2' but could be greater at utility crossings. Where municipal or industrial outfalls are located, backflow prevention fittings, in the form of flap gates, will be installed. Since the outfalls cross under the proposed feature, they will be at risk of misalignment or cracking due to differential settlement induced by the berm. The project proposes to strengthen the sections of line with modern pipe directly under the proposed features where necessary. A typical section for the proposed Segment 2 can be found below in Figure 6. The proposed feature layout for Segment 2 is shown below in Figure 7.

FIGURE 6: SEGMENT 2 CROSS-SECTION

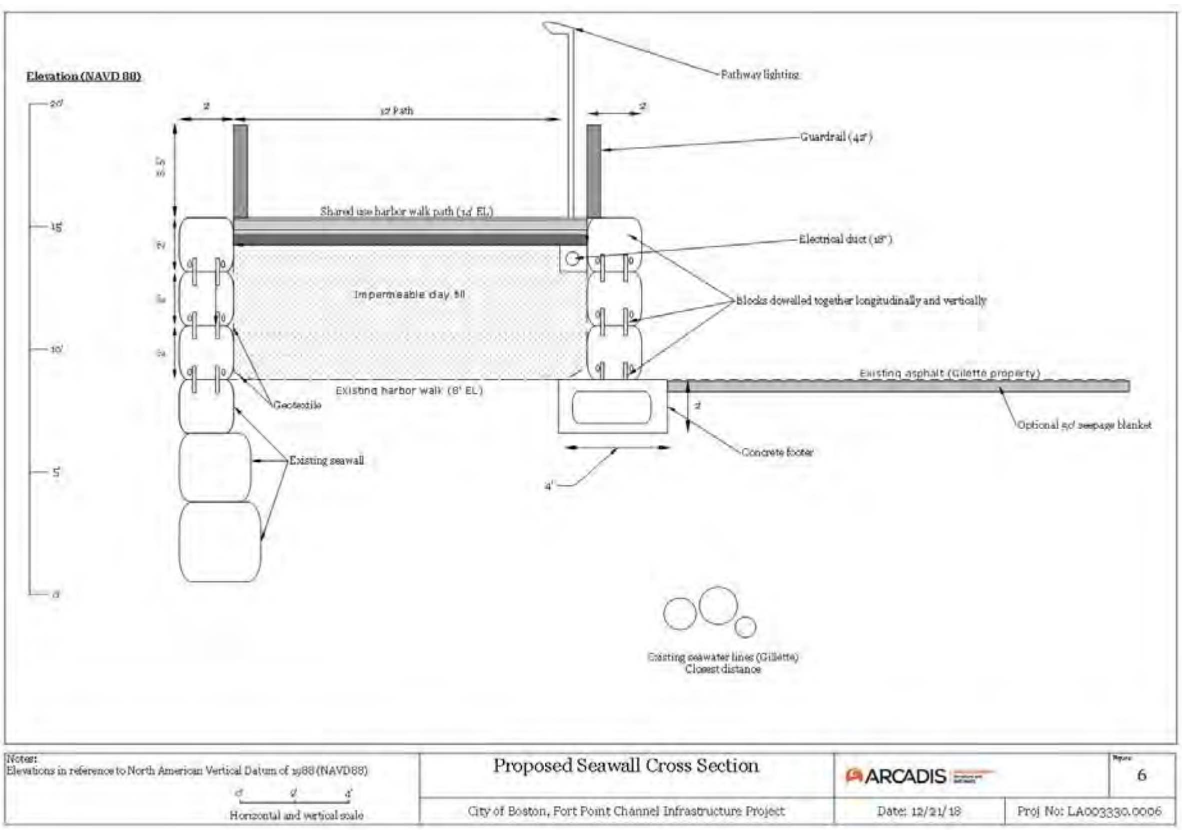
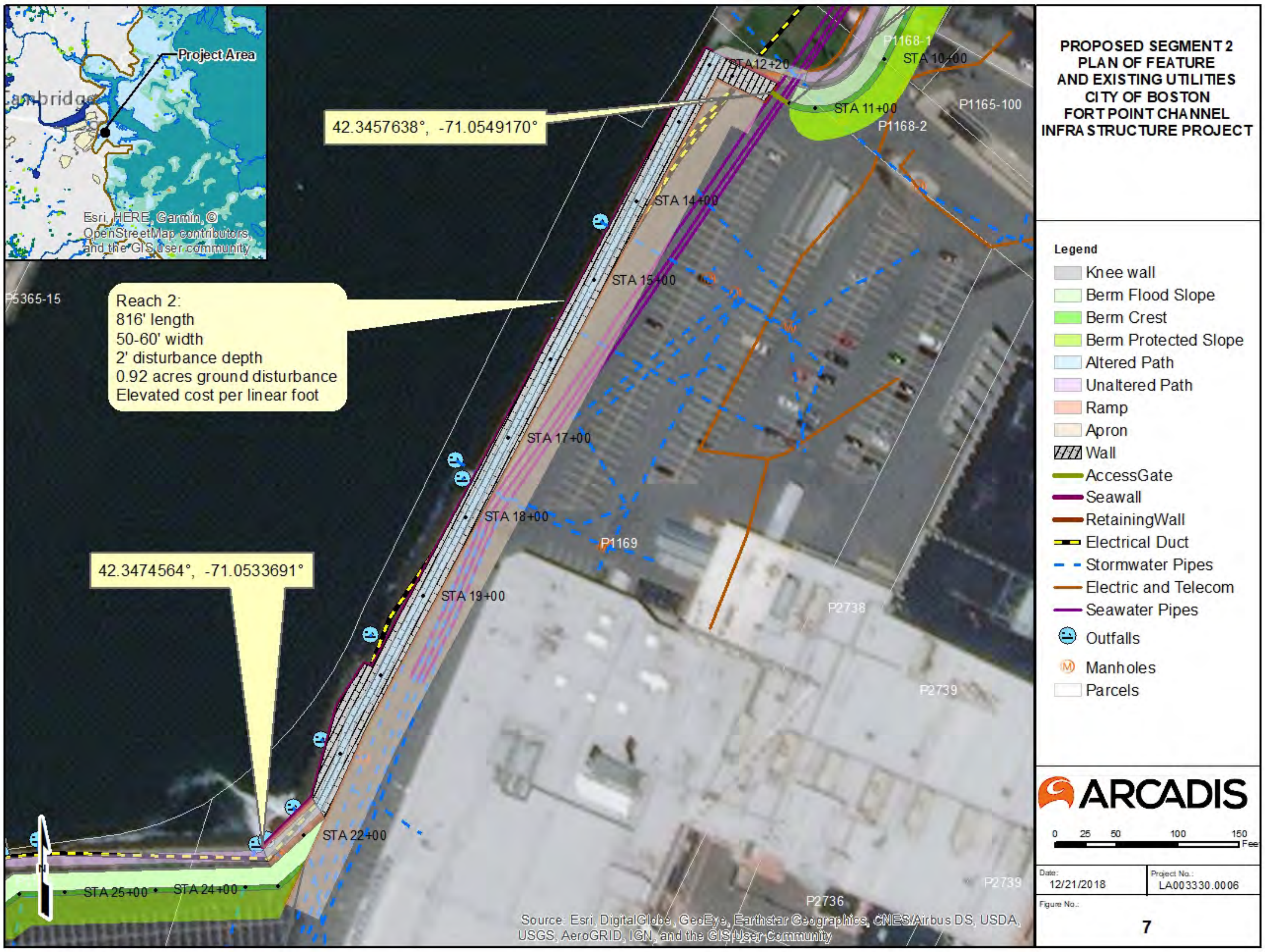


FIGURE 7: SEGMENT 2 ALIGNMENT



Segment 3 is 774.5 ft. long with an average existing ground elevation of 9.4 ft. (NAVD88). It starts at 42.3474343°, -71.0533083° and ends at 42.3491118°, -71.0521356°. Similar to Segment 1, the width of ground disturbance will be limited to 45' along the length of Segment 2, resulting in a 34,852.5 square-foot ground disturbance footprint (0.80 acres). Disturbance is expected to a depth of 2', but will be greater at utility crossings. The segment runs parallel to the existing Harbor walk from the westward turn in the Fort Point Channel to Dorchester Avenue. It will be situated on existing Gillette facility parking lots. Where municipal or industrial outfalls are located, backflow prevention fittings, in the form of flap gates, will be installed. Since the outfalls cross under the proposed feature, they will be at risk of misalignment or cracking due to differential settlement induced by the berm. The project proposes to strengthen the sections of line with modern pipe directly under the proposed features where necessary. It will mirror Segment 1 in design as an earthen berm, with a knee wall to limit lateral width.The proposed feature layout is shown below in Figure 8.

It should be noted that the proposed features in all three segments have no permanent intrusions into the channel. Intermittent barge access in the channel may be required for backflow preventer installation on outfalls and for some seawall modifications, but there will be no fill or new construction in the channel.

FIGURE 8: SEGMENT 3 ALIGNMENT

Existing Infrastructure

Utilities running along the proposed alignment will need to be temporarily supported during construction, or in the case of certain buried lines of age, possibly relocated and replaced. In general, crossing utilities will pass under the proposed features in sleeves and will be fitted with TideFlex or similar backflow preventers at their outfalls.

Known underground and overhead utilities include the following:

Segment 1:
- Buried stormwater utilities servicing the Gillette paved parking lots and a large stormwater outfall north of the Gillette pump house.
- A small buried electrical conduit servicing the Harbor Walk lighting.
- 42-inch, 36-inch, and 24-inch diameter raw water intake pipes which intake seawater from the Fort Point Channel at the pump house and transport it south to the Gillette facilities. These run roughly parallel to the Harbor Walk.

Segment 2:
- Buried stormwater utilities servicing the Gillette paved parking lots and several large stormwater and industrial water outfalls from the Gillette facility.
- A small buried electrical conduit servicing the Harbor Walk lighting.
- A large buried communications and electrical bank running parallel to the Gillette seawater conduits
- 42-inch, 36-inch, and 24-inch diameter raw water intake pipes which intake seawater from the Fort Point Channel at the pump house and transport it south to the Gillette facilities. These run roughly parallel to the Harbor Walk.

Segment 3:
- Buried stormwater utilities servicing the Gillette paved parking lots and several large stormwater and industrial water outfalls from the Gillette facility.
- A small buried electrical conduit servicing the Harbor Walk lighting.
- A secondary smaller pump house (buried) for the Gillette facilities intake/discharge of raw seawater for industrial use.

Based on available geotechnical boring data, the underlying strata is comprised of soft clay and mud fill to approximately 25-30’ below the surface of the project site, as much of Boston’s coastal shores are comprised of artificially filled areas. Below this layer, alternating layers of hard and soft compressible clays, mixed with sporadic sand and shell lenses extend down to refusal of most boring records at approximately 70 ft. below existing grade. The existence of compressible layers at depth will likely lead to proposed flood protection features being subjected to consolidation settlement; however, appropriate design, construction measures, and construction sequencing may be enacted to prevent the proposed features from settling below their intended elevations. Furthermore, as is common with many earthen flood protection features, periodic maintenance may be required to maintain the design elevation. The permeable upper layers may also necessitate anti-seepage measures such as slurry wall installation down to the impermeable clay layers.   Detailed additional investigation will be required to determine the in-situ soil properties with regard to water seepage through the upper soil layers and settlement due to placed overburden.

Supports for the deployable flood gate at the Gillette pump house will comprise channeled beams embedded into the gate’s base/concrete footing. In the event a major storm is forecast, aluminum stop logs would be inserted between the soldier piles to form the flood gate defense.

Long-term Maintenance Requirements

Expected maintenance action requirements and frequency are detailed in Table 4 below. An annual expected Operations and Maintenance (O&M) cost allowance of $155,000 has been estimated to cover maintenance tasks.

TABLE 4: ANTICIPATED MAINTENANCE REQUIREMENTS

Description of Task	Frequency	Comments
Inspection of earthen berms for damage	Annually	Includes man-made damage (tire ruts from mowing), rodent holes, or natural wear (erosion from precipitation runoff)
Inspection of concrete walls for damage	Annually	Includes checking for cracks, differential settlement, corrosion at joints, etc.
Mowing of sodded portions during the growing season	Biweekly (during growing season only)	
Inspection and testing of deployable flood gate and outfall flap gates. Checking for corrosion.	Annually	
Re-sealing and/or re-grouting of any joints in walls	As-needed	
Addition of earthen fill to berm sections to combat settlement	As-needed	This activity would occur only if the berm settled to an elevation below the design elevation. It could be combated with initial overbuild as well.

Project Risks

The largest risks to the project's viability, cost, and schedule are threefold: the presence of extensive (and often old) buried infrastructure near the Gillette facilities and the poor upper soil layers' ability to withstand increased overburden and prevent seepage. Although this memorandum was based upon efforts to map and plan around what known buried infrastructure exists, construction projects in older urban areas often unearth unanticipated conditions in the field which were not reflected in utility record drawings. All subterranean infrastructure data collected for this project is included in **Attachment 2** for reference. Upon further field investigation, the understanding of buried infrastructure and its importance will evolve. Furthermore, the Interstate 90 tunnel system is buried (at varying depths) under the project site. The City has reached out to Massachusetts Department of Transportation to coordinate further design phases and determine allowable ground disturbance methods and extents, and allowable overburden pressure.

Geotechnical investigation and design will refine the project requirements in several ways:

- It will inform the amount of overbuild or periodic maintenance required to maintain the design elevation to combat ground settlement due to the weight of the placed fill.
- It will inform the design over buried utilities in order to ensure their continued function.
- And finally, it will inform the means (possibly) required to combat seepage, although this is of low concern due to the transient nature of storm surge and tidal events. Seepage control measures could also increase the depth of disturbance of all three segments of the project.

Pending further investigations, all three of the factors listed above could affect the project's proposed features in the future.

SCHEDULE OF WORK

The proposed project schedule identifies major milestones with target dates for meeting each milestone. Proposed schedules must not exceed the grant period of performance. FEMA expects to announce awards on October 1, 2019 and the deadline for Resilient Infrastructure projects is April 1, 2023.

TABLE 5: SCHEDULE OF WORK

Description of Task	Starting Point	Unit of Time	Duration (days)	Unit of Time	Work Completed by
State and Local contracting process	1	days	90	days	City of Boston and MEMA
Design procurement	91	days	90	days	City of Boston
Site investigations, design, public engagement, permitting	181	days	350	days	City of Boston and design/professional services consultant
Construction procurement	546	days	90	days	City of Boston
Construction	636	days	630	days	City of Boston and construction contractor
Inspections and closeout	1,366	days	30	days	City of Boston and MEMA

COST ESTIMATING METHODOLOGY

Calculations were prepared to confirm the design concepts and to obtain quantities for major items. Unit prices were estimated using a combination of local contractor or supplier cost information and nationally published cost information.

Local Contractor or Supplier Cost Information

When available, the project or unit cost estimates provided are based on recent local contractor bid or cost information provided by local contractors or suppliers for a specific type of construction, project element, or item.

Nationally Published Cost Information

Where recent contractor bids or construction cost information was not available, cost estimates were developed using recent similar projects along the eastern seaboard of the U.S., from locations such as New York, NY and Norfolk, VA for which the preparing party had direct knowledge or involvement. Additionally, nationally published 2018 RSMeans Heavy Construction Cost Data was used for national average cost estimates. The RSMeans cost data are based on national average costs and then adjusted with the RSMeans heavy construction location factor for the closest nearby city with similar economic characteristics, and standard location specific adjustment factors provided by the local building officials or references such as the U.S. Army Corps of Engineers Construction Cost Index. Cost estimates are developed to estimate reasonable and necessary costs for construction materials, labor, and equipment and related site work.

ASSUMPTIONS

Cost Estimate Item as a Percentage of Construction Costs

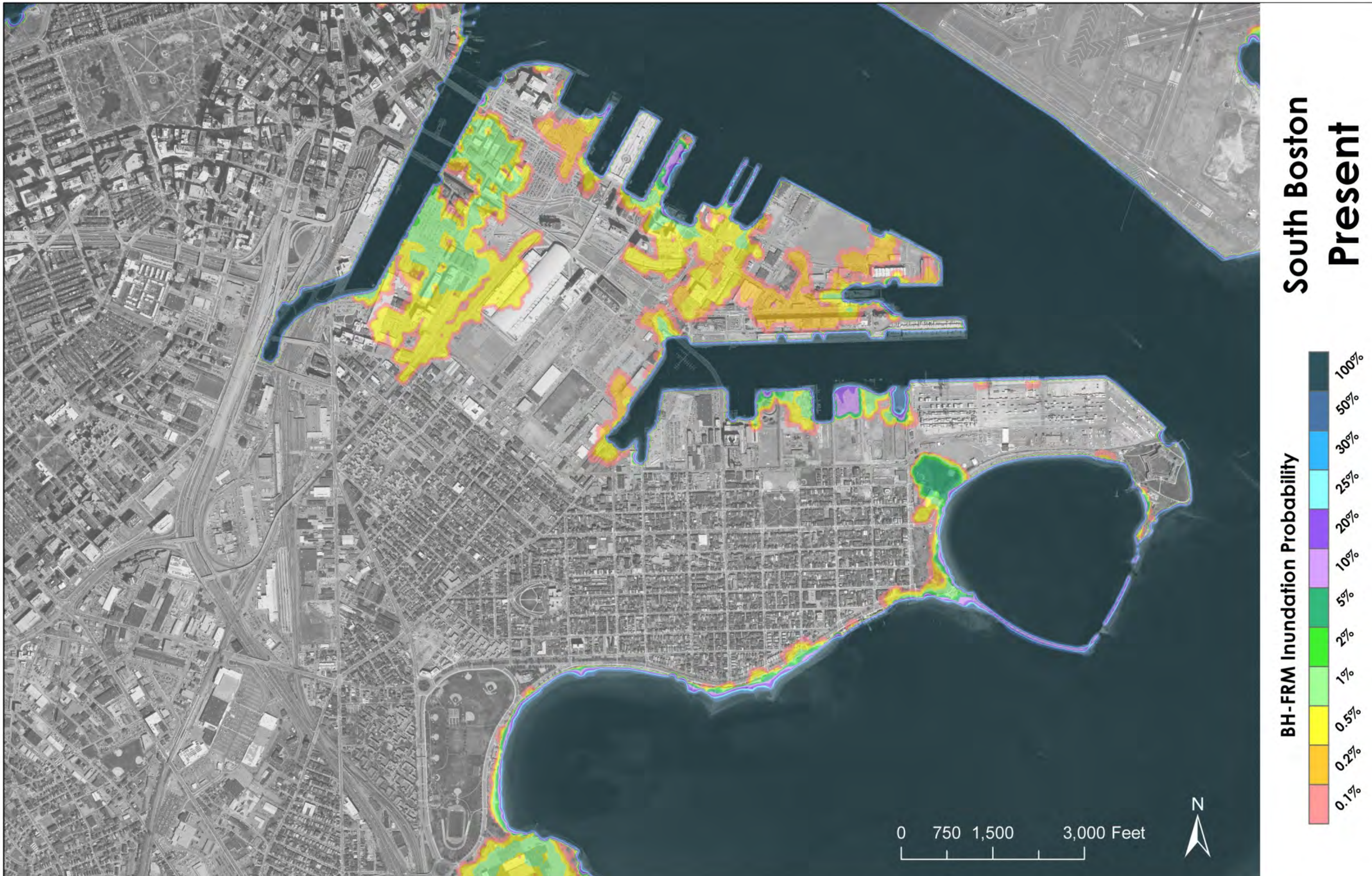
Several cost items are estimated as a percentage of the construction cost due to the preliminary nature of the estimate. These include geotechnical investigations, surveys and assessments, design, and permitting, and costs associated with inspections, testing, and engineering support during construction. The percentages assigned for each of these items is based on percentages commonly used in the industry for the specific items or on standard industry practice and knowledge. Pre-award costs represent the cost incurred for development of the grant application. Grant management costs are also included in the cost estimate as the allowable five percent of the cost of engineering and construction.

ATTACHMENTS

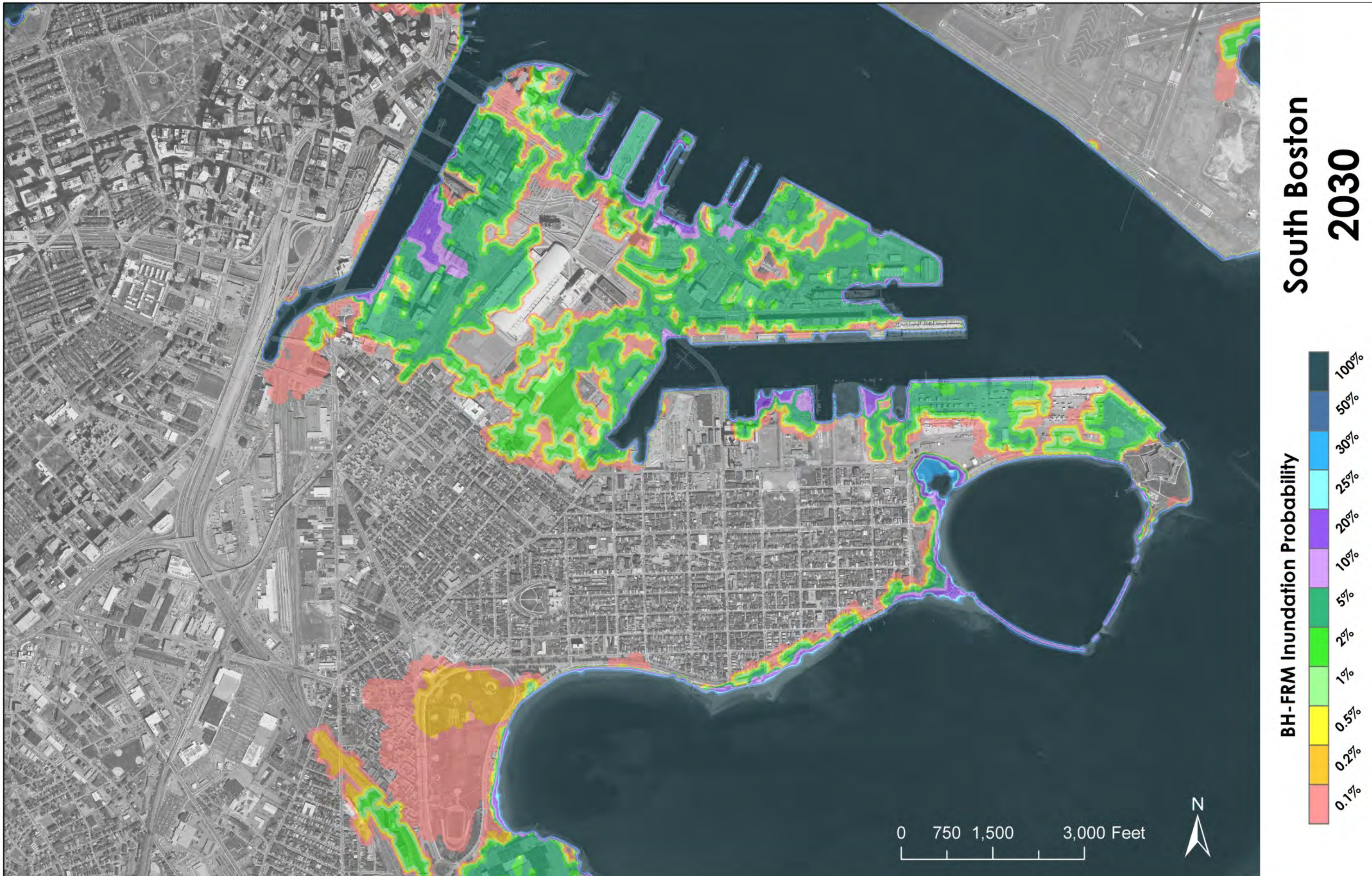
Memo Attachment 1. Cost Estimate

Memo Attachment 2. Existing Surveys and Subterranean Infrastructure

Document 2
BH FRM Coastal Storm and Sea Level Rise Models


South Boston
Present
BH-FRM Inundation Probability
100%
50%
30%
25%
20%
10%
5%
2%
1%
0.5%
0.2%
0.1%
0 750 1,500 3,000 Feet
N

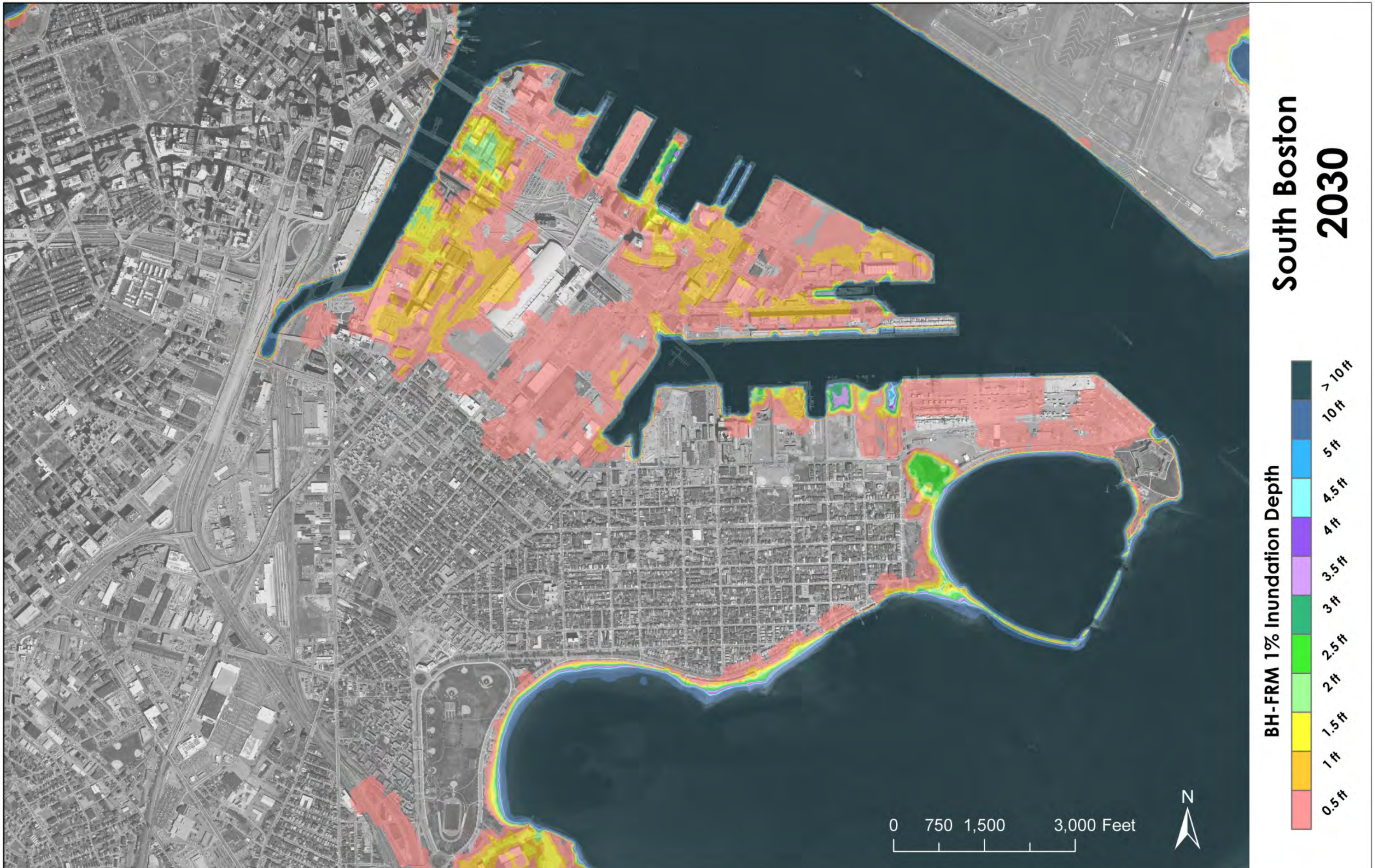
0 ft SLR

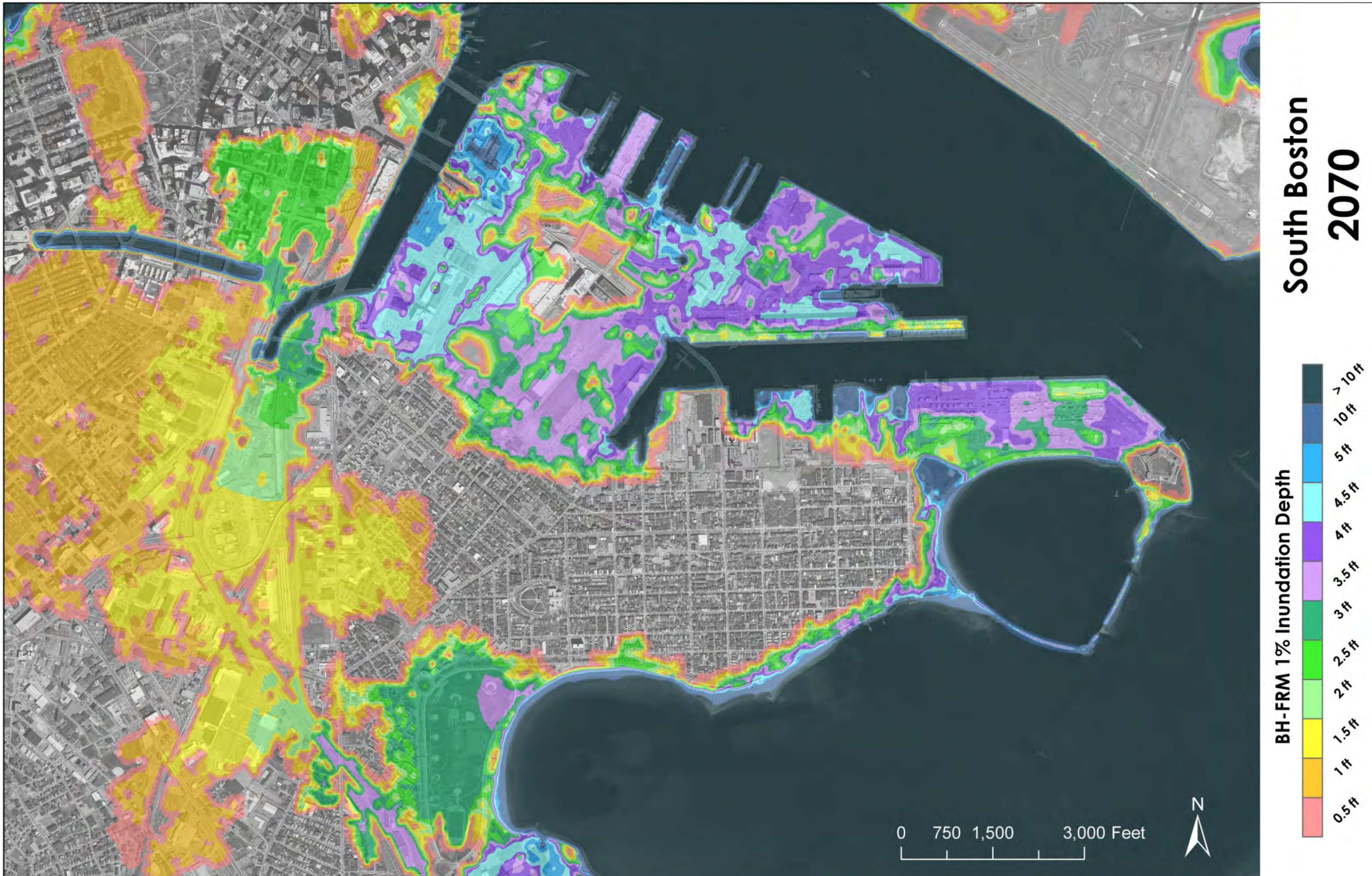

South Boston
2030
BH-FRM Inundation Probability
100%
50%
30%
25%
20%
10%
5%
2%
1%
0.5%
0.2%
0.1%
0 750 1,500 3,000 Feet
N

~8 inches SLR

~40 inches SLR

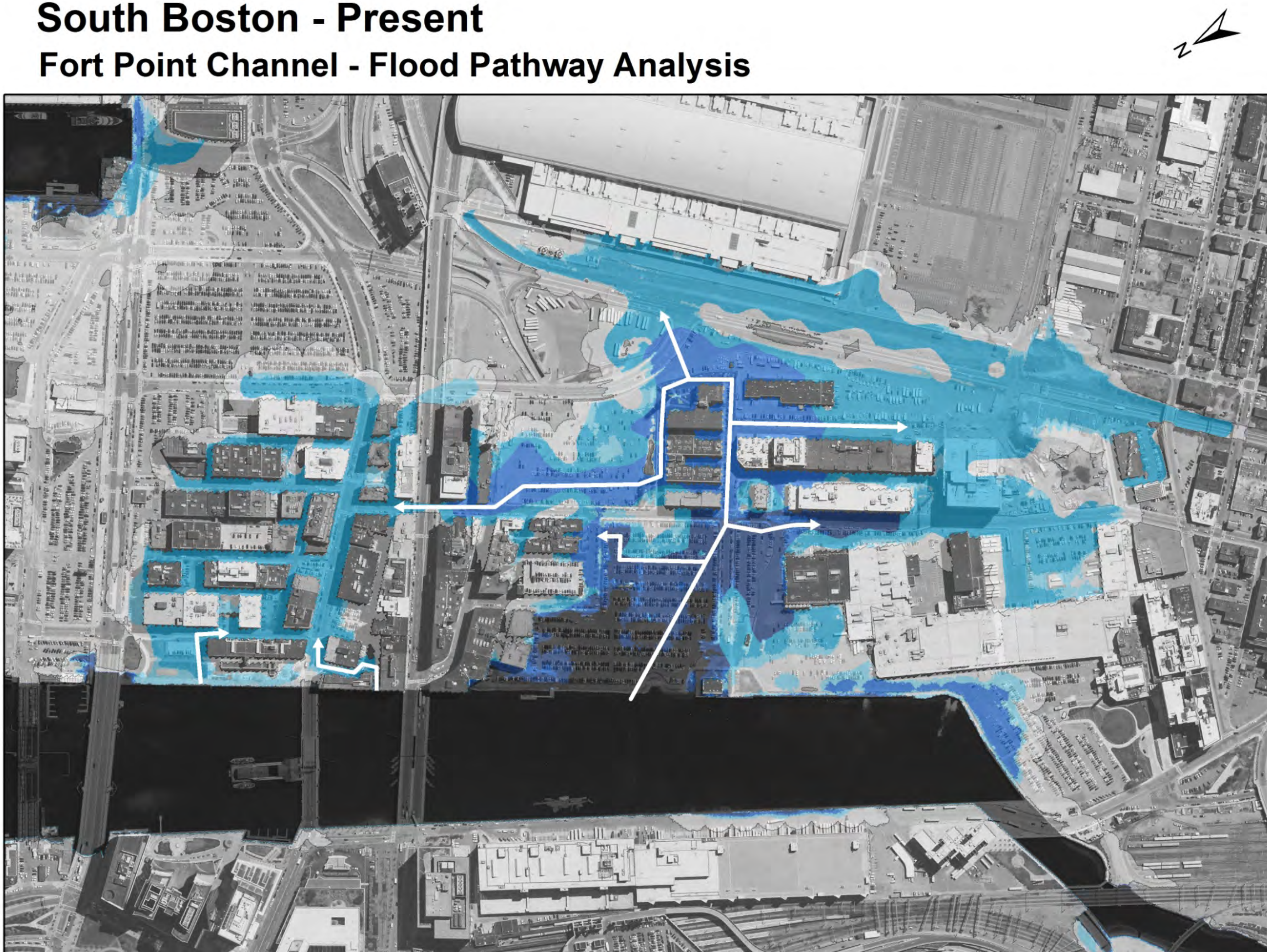

South Boston
Present
BH-FRM 1% Inundation Depth
> 10 ft
10 ft
5 ft
4.5 ft
4 ft
3.5 ft
3 ft
2.5 ft
2 ft
1.5 ft
1 ft
0.5 ft
0 750 1,500 3,000 Feet
N


South Boston
2030
BH-FRM 1% Inundation Depth
> 10 ft
10 ft
5 ft
4.5 ft
4 ft
3.5 ft
3 ft
2.5 ft
2 ft
1.5 ft
1 ft
0.5 ft
0 750 1,500 3,000 Feet
N


South Boston
2070
BH-FRM 1% Inundation Depth
> 10 ft
10 ft
5 ft
4.5 ft
4 ft
3.5 ft
3 ft
2.5 ft
2 ft
1.5 ft
1 ft
0.5 ft
0 750 1,500 3,000 Feet
N

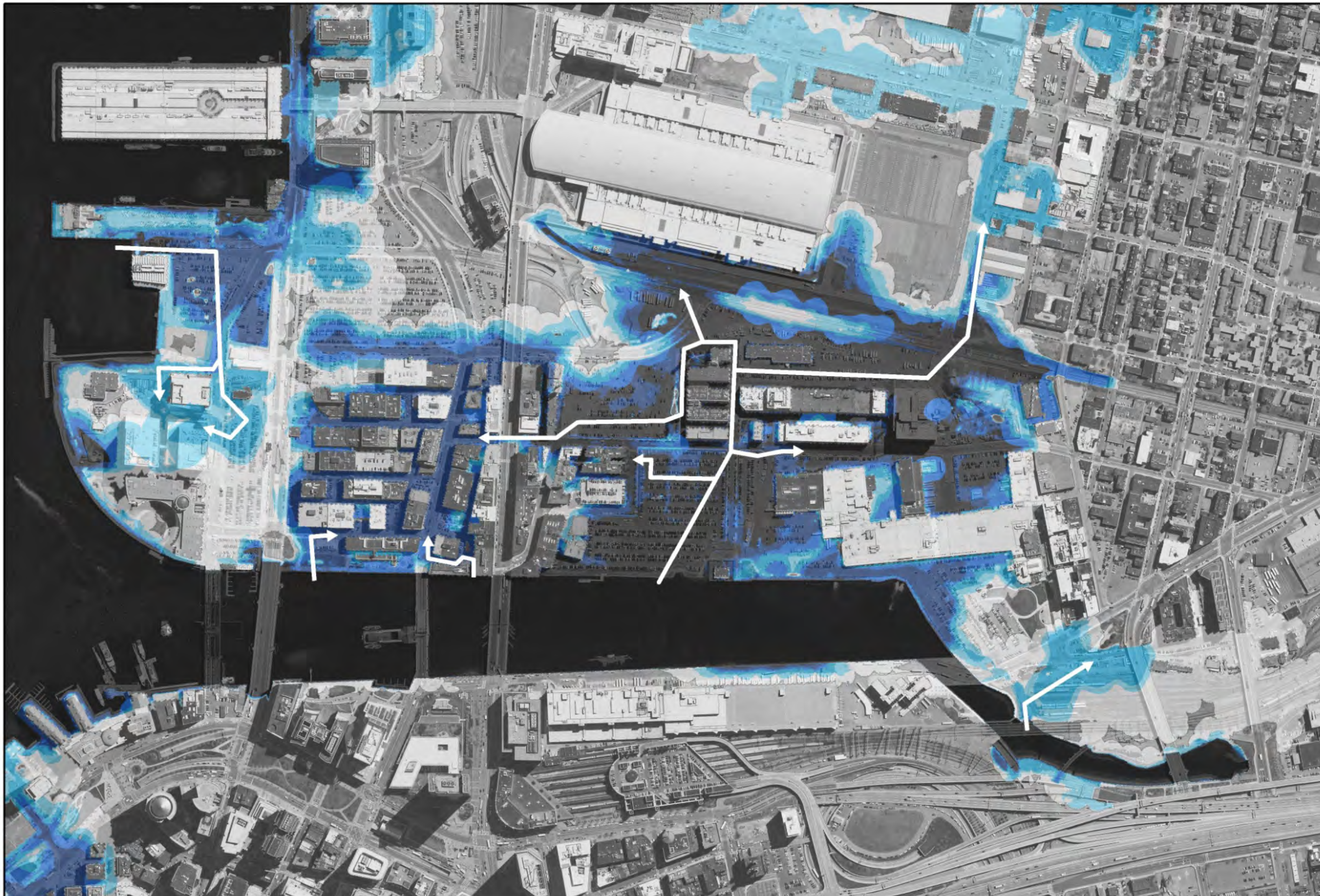
South Boston - Present

Fort Point Channel - Flood Pathway Analysis



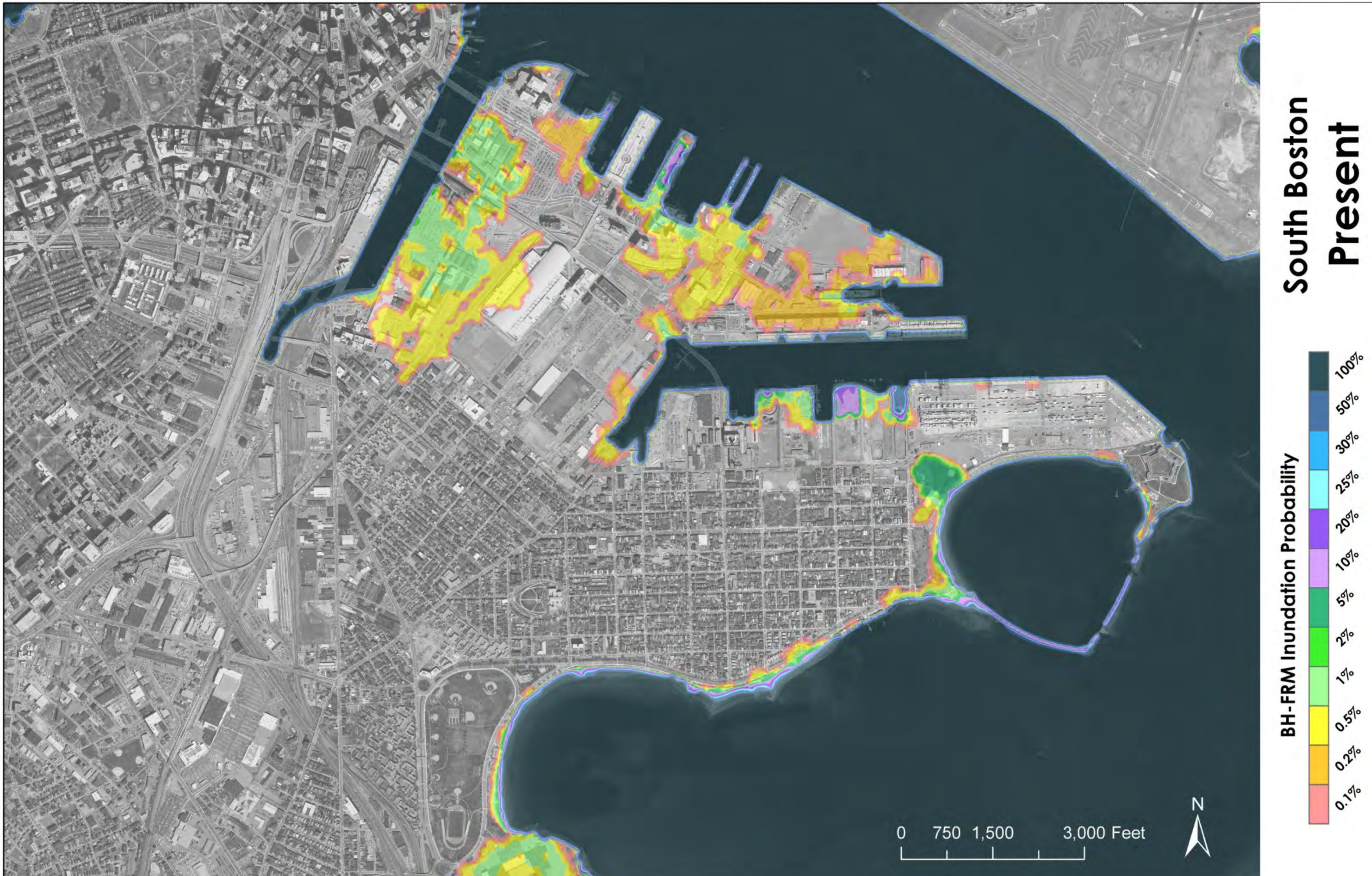
South Boston - 2030

Fort Point Channel - Flood Pathway Analysis



South Boston - Present

Seaport - Flood Pathway Analysis



South Boston
Present
BH-FRM Inundation Probability
100%
50%
30%
25%
20%
10%
5%
2%
1%
0.5%
0.2%
0.1%
0 750 1,500 3,000 Feet
N

0 ft SLR

Document 3

8-Step Floodplain Review

EXECUTIVE ORDER 11988 FLOODPLAIN MANAGEMENT 8-STEP ANALYSIS (44 CFR PART 9)

TITLE: City of Boston Resilient Fort Point Channel Infrastructure Project

LOCATION: City of Boston, Fort Point Channel (approximately 42.349072, -71.052323 to 42.345684, -71.056507)

PROPOSED ACTION: The City of Boston (City) proposes to construct 2,300 linear feet of mixed berm and floodwall mitigation features along a portion of the southeast edge of Fort Point Channel.

DESCRIPTION OF PROJECT: Under the Proposed Action Alternative, the City would construct approximately 2,300 linear feet of mixed berm and floodwall mitigation features along a portion of the southeast edge of the Fort Point Channel shoreline, between the GE Facility and Dorchester Avenue. These features would be certified as flood protection measures in accordance with 44 CFR 65.10.

The project would be within an area referred to as the 100 Acres Master Planning area, which is bounded by Fort Point Channel and A Street to the west, Summer Street to the north, the South Boston Bypass Road/Haul Road to the east, and West First Street and Mt. Washington Avenue to the south. The purpose of the project is to reduce flood damage in the 100 Acres Master Planning Area and South Boston. The Fort Point Channel is a flood entry point into Boston and the project site is located at the lowest elevation along the channel. Flood protection would consist of three design segments.

Segment 1 would extend from the GE Facility at the northern boundary south to the Gillette pump house and would be approximately 728.5 feet long. Flood protection in Segment 1 would be located landward of the existing Harborwalk and would include an earthen berm with a 5-foot crown width and 4H:1V flood-side and protected side slopes. The earthen berm would be elevated to approximately 14.6 feet NAVD88 to account for anticipated sea level rise and wave run-up. A knee wall on the seaward side of the berm feature would be incorporated to minimize the lateral width required for the berm to 45 feet. The knee wall would be raised to approximately 10.5 feet NAVD 88. The berm would terminate at a 15-foot wide access driveway for the pump house and would employ a Flood Break or similar passive deployable flood gate at the driveway.

Segment 2 would extend from the Gillette pump house to the western turn in the Fort Point Channel and would be approximately 816 feet long. Segment 2 would consist of a double retaining wall of granite blocks matching those of the existing seawall. The seaward side of the retaining wall would raise the existing seawall's crest elevation approximately 6 vertical feet to reach 14 feet NAVD88. The landward side would also make use of granite blocks as a retaining wall feature, with impermeable clay fill in between the seaward and landward walls. The total width of the feature would be 18 feet wide, with a 12 foot wide shared use path for the Harborwalk located on its crest. The blocks would rest on a concrete footing. All blocks would be doweled together with rebar rods.

Segment 3 would extend from the western turn in the Fort Point Channel to Dorchester Avenue and would be 774.5 feet long. Segment 3 would have a similar earthen berm as described for the Segment 1 flood protection. Along all three segments, where municipal and industrial outfalls are located, backflow prevention fittings, in the form of flap gates, would be installed on each outfall. Sections of outfall pipe located below the proposed features would be strengthened where necessary to reduce the risk of misalignment during settlement.

STEP 1 Determine whether the proposed action is located in the 100-year floodplain (500-year floodplain for critical actions)

The project area is located within a special flood hazard area (Zone AE) subject to inundation by the one percent annual chance flood, as shown on the FEMA Flood Insurance Rate Map panel 25025C0081J dated March 16, 2016. The project area is also in a coastal area that is subject to wave action and future sea level rise. No wetlands occur in or adjacent to the project area.

STEP 2 Notify the public at the earliest possible time of the intent to carry out an action in a floodplain and involve the affected and interested public in the decision-making process.

An Initial Public Notice was posted in the following location(s): *The Herald* on April 13, 2021 and the City newsletter.

STEP 3 Identify and evaluate practicable alternatives to locating the proposed action in a floodplain (including alternatives sites, actions and the "no action" option). If a practicable alternative exists outside the floodplain FEMA must locate the action at the alternative site.

Alternatives:

1. No Action Alternative – Under the No Action Alternative, no FEMA funded flood protection would be constructed along the Fort Point Channel. Some flood protection measures may occur; however, these would likely be smaller ad hoc and uncoordinated actions providing localized protection and would occur over a longer range of time. For the reasonably foreseeable future, high water events and future sea level rise would continue to flood the 100 Acre Master Planning Area and South Boston, damaging infrastructure and property. During high water events, water would continue to inundate streets necessitating road closures and disrupting public transportation systems. Flooded sewage systems could back up causing raw sewage to come up into the streets and buildings. Water would continue to inundate buildings and basements, posing risks to electrical facilities and potentially requiring evacuations. Debris collected in floodwaters would continue to flow out into the channel when floodwaters recede.
2. Proposed Alternative – The proposed alternative includes the use of earthen berms, knee walls, and retaining walls to reduce flood damage along the lowest point in the seawall on Fort Point Channel. Segment 1 and Segment 3 would consist of earthen berms raised to approximately 14 feet NAVD88 with a knee wall on the seaward side. Segment 2 would consist of retaining walls raised to approximately 14 feet NAVD88. These features would protect adjacent infrastructure and property from wave run-up during storms and future sea level rise based on the Boston Harbor Flood Risk Model.

3. Alternative 2: Flood Gates–One alternative to the proposed action was analyzed within the floodplain. Alternative 2 would construct flood protection at the mouth of Fort Point Channel by installing a flood gate or series of gates able to be closed in advance of high-water events. Flood control gates would be constructed within the channel's banks and would remain open for the large majority of time for proper stormwater evacuation and daily tidal exchange. This alternative would require more specialized engineering and would require larger upfront costs than the Proposed Alternative. Alternative 2 would have a shorter design life and require more frequent closures of the gate over time as sea levels rise, limiting effectiveness and increasing potential environmental impacts as compared to the Proposed Alternative. The environmental impacts of construction in the water and the alterations to the aquatic habitat and long-term aquatic processes would be substantially greater than the Proposed Alternative. Alternative 2 would provide less opportunity for social benefit and was not the preferred alternative during consultation with environmental agencies. This alternative was determined to be technically and financially impracticable.
4. Alternatives Outside the Floodplain – There are no practicable alternatives outside the floodplain. The purpose of the proposed project is to reduce damage from flooding in the 100 Acre Master Planning area. This area is already heavily developed (urbanized) and it is not practicable to move existing streets, utilities, and private development outside of the floodplain. The Fort Point Channel is a critical flood pathway for the South Boston Waterfront according to the Boston Harbor Flood Risk Model. The project site is at the lowest elevation along the channel, and currently water frequently overtops the existing shoreline during astronomical high tides and coastal storm events.

STEP 4 Identify the potential direct and indirect impacts associated with the occupancy or modification of floodplains and the potential direct and indirect support of floodplain development that could result from the proposed action. 44 CFR Part 9.10

The Proposed Action would result in a minor short-term adverse effect on the 100-year floodplain due to construction in the floodplain. Construction activities could cause an accidental release of hazardous waste during the construction period from unknown underground sources or minor leaks from construction equipment and ground disturbing activities could cause sediment to runoff into nearby water systems.

The Proposed Action would result in a minor long-term adverse effect on the 100-year floodplain due to fill placement in the floodplain that would alter the natural path of water during high water events. Ground disturbance and the potential biological impacts of building the flood control structures in the floodplain would be minimal because the area has been developed and redeveloped for more than 100 years. Areas that are currently paved and used as parking lots would be converted to flood protection structures and open space. The Proposed Action would not discharge fill or riprap within Waters of the U.S. and the project would not alter the course of flow of the Fort Point Channel.

In the long-term, the project would decrease the risk of flood damage from high water events and sea level rise in the 100 Acre Master Planning Area and protect existing structures, utilities, and public health and safety. The construction of earthen berms would include a 6-inch layer of topsoil and sod, having a positive impact on the floodplain as it would add some level of permeability. The Proposed Action would enhance and protect the Harborwalk, an existing public space and social resource. The berms and floodwall would reduce the potential for debris to be carried into the channel when floodwaters recede. In addition to the independent utility of the Proposed Action in reducing the risk of flooding in the 100 Acre Master Planning area, the Proposed Action would work in conjunction with existing flood mitigation measures north of the project area to protect the larger Fort Point area.

The Proposed Action would not directly support any specific development proposal within the floodplain; however, it could indirectly support future development. Although, private development decisions are not directly contingent upon floodplain protection, the addition of flood protection measures may indirectly support redevelopment of the urban spaces in the project area. The Proposed Action does not include the addition of, or improvements to, roadways or utilities that would support expanded urban uses of the project area. Any redevelopment that might occur would be subject to local and state floodplain development regulations, as well as the stipulations of the 100 Acre Master Plan, which requires additional greenspace and the creation of permeability along the channel's edge (approximately 2.18 acres).

STEP 5 Minimize the potential adverse impacts and support to or within floodplains to be identified under Step 4, restore and preserve the natural and beneficial values served by floodplains.

Because the project area already is developed, many of the traditional approaches for minimizing and avoiding floodplains are not practicable to this project. The Proposed Action is functionally dependent on its location in the floodplain (44 CFR 9.11(d)(1)(i)) and potential impacts would be minimized (44 CFR 9.11(d)(5)). FEMA would require the following conditions to avoid and minimize potential adverse impacts identified in Step 4:

- The Subapplicant must obtain a local certificate that demonstrates no rise in the base flood elevation anywhere within the community (44 CFR 60.3 and 44 CFR 9.11(d)(4)).
- Following the construction of the Proposed Action, the Subapplicant must apply for a Letter of Map Revision in accordance with 44 CFR 65.6.
- The Subapplicant would implement the project in accordance with all local and state regulations and in accordance with 44 CFR 9.11(d)(6).
- The Subapplicant must obtain and comply with any required Section 404 and 401 permits from the U.S. Army Corps of Engineers and the Massachusetts Department of Environmental Protection, respectively, to comply with the Clean Water Act. These permits would include conditions to avoid, minimize, and mitigate for impacts on water quality, including but are not limited to:
    - Siltation and erosion control measures (e.g., silt fences)
    - Turbidity control
    - Site restoration measures (e.g., replanting exposed soils with native vegetation)
    - Minimizing work within the water

  - Prevention of accidental release of hazardous waste

- The Subapplicant would implement floodplain regulations in accordance with federal minimum requirements for participation in the National Flood Insurance Program.

The Proposed Action would mitigate flood damage to structures and property in the 100 Acre Master Planning area, protecting facilities, residences, and businesses from future flood events and sea level rise. Existing paved surfaces would be converted to earthen berms which would include 6 inches of topsoil and be planted with sod, adding minor benefit to water resources through filtration of precipitation. The Proposed Action would protect Waters of the U.S. by reducing the potential for debris to be carried into the channel during flooding and high-water events. The Proposed Action would reduce the need for flood-related repairs and the associated use of construction equipment that could generate spills of lubricants and fuels. There could also be a reduction in flooding of facilities regulated by state and federal hazardous materials laws that currently occur in the project area and vicinity.

STEP 6 Reevaluate the proposed action to determine first, if it is still practicable in light of its exposure to flood hazards or impacts on wetlands, the extent to which it will aggravate the hazards to others, and its potential to disrupt floodplain and wetland resources and second, if alternatives preliminarily rejected at Step 3 are practicable in light of the information gained in Steps 4 and 5. FEMA shall not act in a floodplain unless it is the only practicable location.

The Proposed Action remains practicable because it meets the purpose and need of the project to protect the 100 Acre Master Planning Area from flooding and flood damage and the minimization measures described in Step 5 would minimize adverse impacts to the floodplain. The proposed action is functionally dependent on its location in the floodplain. The alternatives eliminated in Step 3 remain impracticable because (a) the No Action Alternative does not meet the purpose and need of the project (does not reduce flood hazards in the 100 Acre Master Planning area), and (b) Alternative 2, Flood Gates (gates at the mouth of the channel) would be more technically and financially demanding, have a shorter design life, require more frequent closures over time as sea levels rise, and would have greater short- and long-term environmental impacts, and (c) Alternatives Outside the Floodplain (i.e. relocation infrastructure) would be prohibitively expensive and impracticable.

STEP 7 Prepare and provide the public with a finding and public explanation of any final decision that the floodplain is the only practicable alternative.

The final public notice will be included as part of the environmental assessment public notice.

STEP 8 Review the implementation and post - implementation phases of the proposed action to ensure that the requirements stated in Section 9.11 are fully implemented.

The FEMA grant would be conditioned for the Subapplicant to secure federal, state, and local permits for work in the floodplain. Compliance with all federal, state, and local permits will be determined as part of the grant closeout process. Full detail of the conditions placed on the grant can be found in the Record of Environmental Consideration.

Section L

Stormwater Report by Boston Water & Sewer Commission

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Boston Water and Sewer Commission

City of Boston
Mayor Martin J. Walsh

Resilient Fort Point Channel Infrastructure Project – Technical Support for Response to FEMA RFI

Technical Memorandum
BWSC No. 18-206-001
Hazen No. 90028-002
July 15, 2020

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List of Acronyms

Abbreviation	Definition
BWSC	Boston Water and Sewer Commission
RFI	Request for Information
SLR	Sea Level Rise
FEMA	Federal Emergency Management Administration
MEMA	Massachusetts Emergency Management Administration
BH-FRM	Boston Harbor Flood Risk Model
MH-FRM	Massachusetts Harbor Flood Risk Model
PDM	Pre-Disaster Mitigation
BCB	Boston City Base
SCS	Soil Conservation Service
PDM	Pre-Disaster Mitigation
DEM	Digital Elevation Model

1. Introduction

The purpose of this Technical Memorandum (TM) is to document analyses Hazen performed using the Boston Water and Sewer Commission (BWSC) 2D Inundation Model to analyze the proposed coastal flood protection measures around the Fort Point Channel in Boston (the City). The City is applying for funding to advance the *Resilient Fort Point Channel Infrastructure Project* through FEMA's Pre-Disaster Mitigation (PDM) grant program. After an initial application was submitted, FEMA responded with follow-up Requests for Information (RFIs) about the proposed project.

The analyses and model predictions documented in this TM provide information that will help to address the RFIs received by FEMA. All data about the proposed *Resilient Fort Point Channel Infrastructure Project* was obtained from a TM authored by Arcadis and revised in February 2020 (preceding this TM).

1.1 Resilient Fort Point Channel Infrastructure Project

As documented in the February 2020 TM, the City is developing plans to implement coastal defense structures along the eastern edge of the Fort Point Channel. These defense measures consist of earthen berms and floodwalls along the edge of the Channel (Figure 5 of the February 2020 TM), and additional interim (deployable) flood protection measures within the Fort Point Channel drainage area (Figure 12 of the February 2020 TM).

Based on analyses completed by the City, the permanent structures will be designed to provide coastal protection up to a design elevation of 14.6 feet NAVD88 (21.05 feet BCB). The deployable structures were conceptualized to block "flood pathways" that allowed coastal flooding to propagate further into the City away from the coast. Further information on these structures can be found in the February 2020 TM.

1.2 FEMA RFI

After submission of the initial PDM grant application, FEMA replied with an RFI containing several follow-up questions. In particular, the RFI stated that additional analysis was required to "verify the adequacy of interior drainage once (the) proposed wall/levee is built". In addition, the RFI stated that the initial application indicated a preference towards storage/infiltration to address interior drainage problems compared to pumping, and that the application did not include any technical analysis to demonstrate that storage is a feasible alternative to address new interior drainage concerns.

The primary concern identified in the RFI pertains to the proposed flood protection measures worsening interior drainage by not allowing stormwater runoff to discharge directly into the Fort Point Channel. There is concern that during high tide conditions when stormwater and combined sewer outfalls are "blocked" by a high water level, the proposed berm might worsen interior drainage by preventing direct discharge of stormwater runoff into the channel (in effect creating a basin).

To assess the potential of the proposed flood protection measures to worsen/create new interior drainage problems, a 2D model was developed using the BWSC *Inundation Model*. This model was used to simulate a 10-year, 24 hour (SCS) storm event with SLR and 100-year storm surge (as described in Section 2.1) for the purpose of assessing interior drainage system performance for various scenarios.

2. 2D Model Configuration & Assumptions

2.1 Existing BWSC Model

BWSC maintains a hydrologic/hydraulic model, using PCSWMM version 7.2 software, designed to predict the response of the collection system to wet weather, and the extent and duration of flood inundation within the City. The City's collection system infrastructure is composed of a sewer system (partially combined) and a storm drain system, each of which has outfalls that are subject to tidal fluctuations and vulnerable to storm surge. A 1-dimensional model was developed by BWSC for both the storm drain and sewer systems. These models dynamically predict flow and level throughout the sewer and drain system and can simulate conditions which surcharge the systems and cause flooding. A 2-dimensional model was developed using these models as a basis, with advancement to include detailed topographic data and the ability to predict the movement of water on the ground surface and around buildings. This model (the "Inundation Model") was used to complete the analyses described herein.

2.2 Rainfall and Boundary Conditions

In response to the RFI from FEMA and MEMA, the City determined that the effectiveness of the coastal defense measures (and proclivity for them to worsen interior drainage) should be assessed using a "10-year, 24 hour storm" for stormwater, and a "1% chance annual storm with 9 inches of sea level rise" based on the Boston Harbor Flood Risk Model (BH-FRM) for coastal flooding.

BWSC has previously developed a 2D Model (the "Inundation Model") that utilized boundary conditions produced by a hydrodynamic coastal model. The Inundation Model used boundary conditions from the Massachusetts Coast Flood Risk Model (MC-FRM), which is a newer and more advanced version of the BH-FRM. The BH-FRM and MC-FRM were developed and operated by Woods Hole Group.

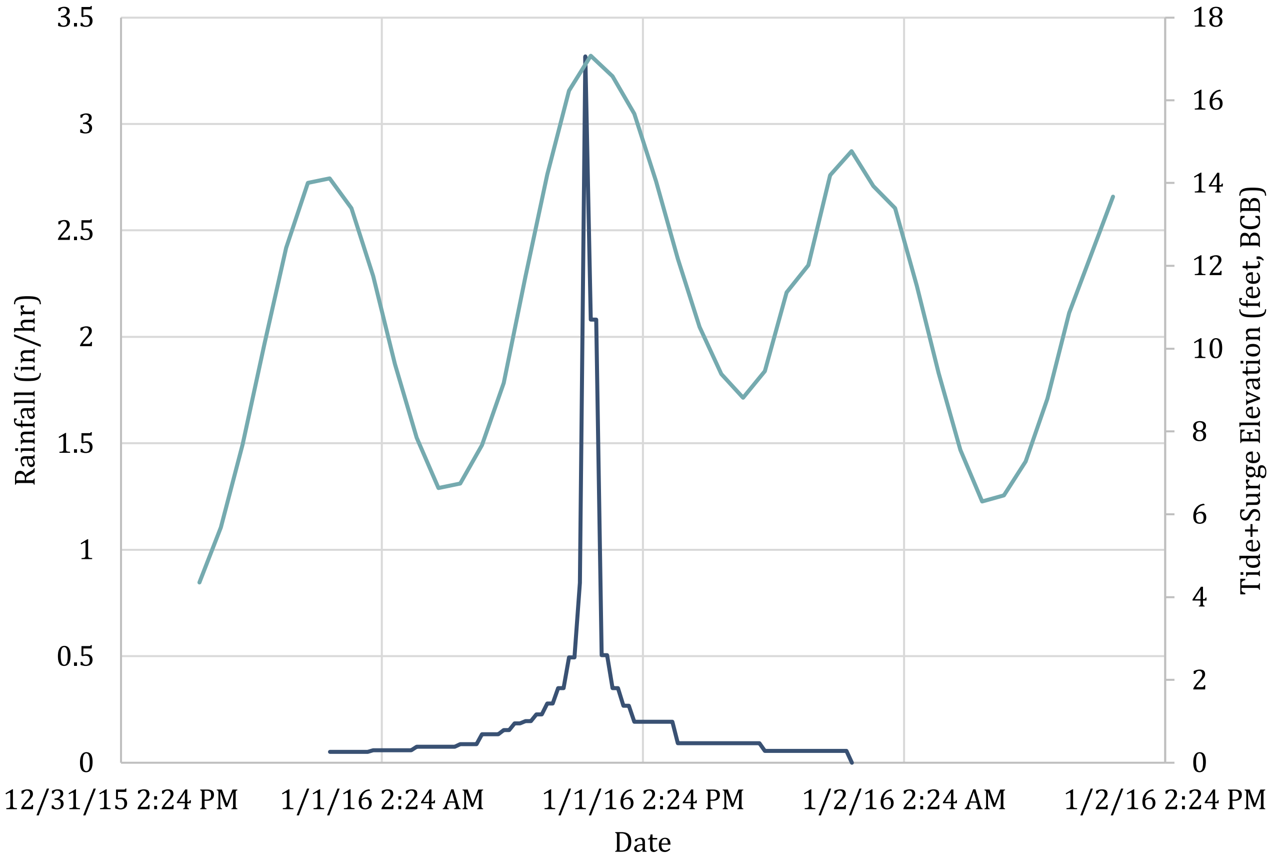
Both sea level rise and storm surge are accounted for in the MC-FRM. According to Woods Hole Group, "*The sea level rise produced under this scenario (RCP8.5) was developed specifically for the Commonwealth of Massachusetts, is being used in the MC-FRM, and is consistent with the projections being used in the Massachusetts State Hazard Mitigation Climate Adaptation Plan. These projections are being used by coastal communities developing resiliency plans and for mitigation planning through the Massachusetts Office of Coastal Zone Management, and the Massachusetts Emergency Management Agency programs. Projections were developed for the Commonwealth of Massachusetts and take into account regional considerations for the Northeast.*"

For the purpose of the simulations described herein the following rainfall and boundary conditions were applied:

- Rainfall: 5.15 inches (10-year, 24-hour, SCS storm)
- Sea Level Rise: 1.29 feet (MC-FRM)
- Storm Surge: 2.61 feet (100-year level from MC-FRM Nor'easter event)

With SLR and storm surge, the peak water level during the simulation was 10.62 feet (NAVD88), compared to 6.72 feet (NAVD88, approximate present-day high tide, based on the 2008 centered epoch). Figure 2-1 depicts the model application of rainfall and the tide cycle.

Figure 2-1: Boundary Conditions and Rainfall



2.3 Existing Conditions Model Configuration (SLR & Storm Surge)

For the existing conditions simulation, a 2D mesh was generated using a 25-foot resolution for the project area (which was defined as the area tributary to Fort Point Channel outfalls in the Commission's existing sewer and drain model). The mesh was generated using a digital elevation model (DEM) developed for the Inundation Model project from LiDAR collected in 2013-2014 by USGS (the "Post-Sandy" dataset). The DEM was augmented to reflect recently completed regrading in the project area as shown in Figure 2 of the February 2020 TM.

2D outfalls were generated along all waterfront boundaries, including within the Fort Point Channel. The tidal timeseries shown in Figure 2-1 was applied to all 1D and 2D outfalls uniformly. Rainfall (as shown in Figure 2-1) was applied uniformly across the entire model.

2.4 Flood Protection Measures Model Configuration (SLR & Storm Surge)

A simulation was configured that included representations of the proposed flood protection measures. As documented in the February 2020 TM, the permanent shoreline protection measures along the Fort Point Channel were designed to provide protection up to an elevation of 14.60 feet (NAVD88). As shown in Figure 2-1, the peak tide level achieved during a 100-year surge event with SLR (based on MC-FRM model predictions) is 10.62 feet (NAVD88). As such, the shoreline and interim (deployable) flood protection measures were represented as "obstructions" in the 2D model. This representation of the flood protection measures accurately characterizes the performance of the proposed flood protection measures during the specified coastal conditions and the impact of these structures on interior drainage.

2.5 Rainfall Only

Before the SLR and storm surge conditions were evaluated in the model, an initial set of simulations was configured to isolate the effect of rainfall on the existing drainage system and on the proposed coastal protection measures. These simulations did not include any sea level rise or storm surge and utilized the existing "July" tide cycle in BWSC's model, which reaches a peak elevation of 7.22 feet (NAVD88).

3. Model Predictions

3.1 Rainfall Only Simulations

The model was used simulate the 10-year 24-hour design storm without sea level rise or storm surge. The purpose of the simulation was to assess the performance of the interior drainage system during a rain only event (present day), with and without the proposed flood protection elements. As shown in Figures 3-1 and 3-2, these simulations demonstrate that performance of the interior drainage system is unaffected by the proposed flood protection elements during a present-day rainfall only event. These predictions show that the proposed flood protection features do not interfere with stormwater discharge, and do not create additional risk in terms of accumulation of stormwater.

Simulation Parameters	
Rainfall:	5.15 inches (10-yr, SCS)
Sea Level Rise:	0 feet
Storm Surge:	0 feet

BOSTON WATER AND SEWER COMMISSION

Notes:
Locations and nature of proposed Fort Point Channel flood protection measures are based on the Technical Memorandum dated February 2020, by Arcadis, titled "City of Boston Grant Application, Resilient Fort Point Channel Infrastructure Project, Flood Defense Conceptual Design and Cost Estimating Methodology".

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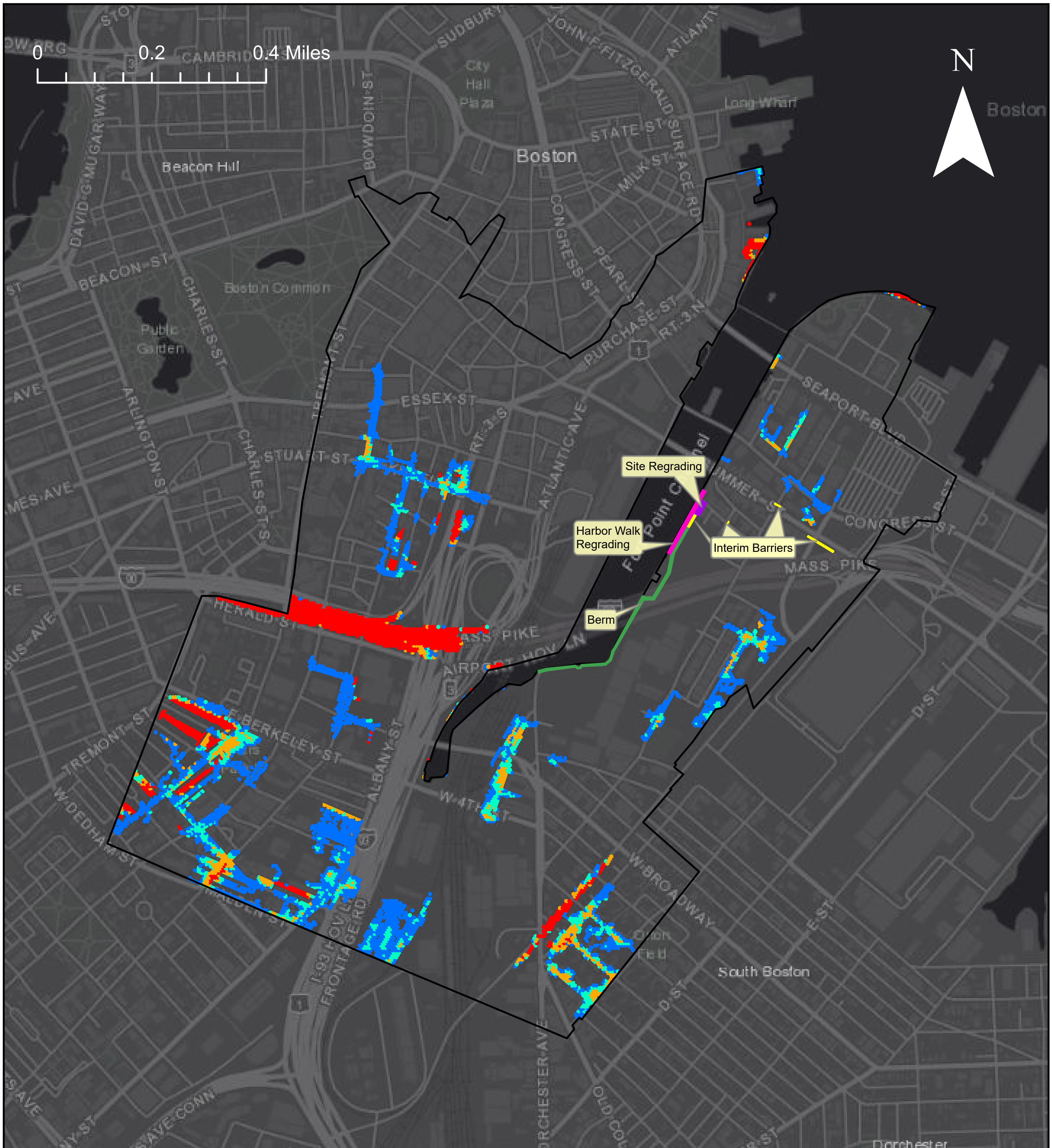
HAZEN CONTRACT 90028-002
BWSC CONTRACT 18-206-001

FEMA PDM Grant Application
Analysis of Resilient Fort Point Channel Infrastructure Project
Existing Conditions Model Predictions No Rainfall
July 2020

Figure 3-1

Model Prediction
- Predicted Depth > 0 in and < 6 in
- Predicted Depth > 6 in and < 1 ft
- Predicted Depth > 1 ft and < 2 ft
- Predicted Depth > 2 ft
- 2D Model Boundary



Simulation Parameters	
Rainfall:	5.15 inches (10-yr, SCS)
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FEMA PDM Grant Application
Analysis of Resilient Fort Point Channel Infrastructure Project
Coastal Berms and Inland Barriers Model Predictions No Rainfall
July 2020

Figure 3-2

Model Predicted Max Depth
≤6 in
≤1 ft
≤2 ft
>2 ft
2D Model Boundary
Interim Barriers
Site Regrading
Harbor Walk Regrading
Berm

3.3 Existing Conditions (SLR & Storm Surge)

The existing conditions simulation showed widespread flooding throughout the project area. Storm surge is the main source of flooding throughout the project area. Storm surge propagates inland towards low lying areas via gravity ("flood pathways") from the unprotected shoreline. Floodwaters enter the interior drainage system and exceed the capacity of the combined sewer and drain systems, causing surcharging, backwater conditions, and flow reversal in some locations. These conditions create additional upstream flooding in non-coastal areas. Floodwaters also enter the sewer and drain systems through unprotected outfalls in the Fort Point Channel (and elsewhere) without tide gates. As a result of these factors, the interior drainage system is overwhelmed by coastal flooding and not capable of conveying stormwater runoff to outfalls to be discharged. Figure 3-3 is a map depicting model predictions from this existing conditions simulation.

3.4 Flood Protection Measures (SLR & Storm Surge)

Compared to existing conditions model predictions, the addition of flood protection measures (permanent and interim/deployable, as described in the February 2020 TM) reduces the magnitude of coastal flooding in the project area. The peak depth of flooding within the project area is reduced from greater than 2 feet in most areas to less than 1 foot in most areas. As such, model predictions indicate that the flood protection measures may have a net positive impact on the performance of the interior drainage system by reducing the amount of coastal floodwater entering the combined sewer and drain systems.

Compared to existing conditions, model predictions do not demonstrate any negative effect on discharge of coastal stormwater. This indicates that the project does not create any additional residual risk in the form of drainage accumulation. Since combined sewer and drain outfalls are unchanged by the proposed flood protection measures, the performance of these structures is largely determined by downstream boundary conditions (tide level). In both the "Existing Conditions" and "Flood Protection Measures" simulations, the tide level rises above the invert of most outfalls within the Fort Point Channel (as they are configured in BWSC's model), preventing discharge of stormwater during high tide conditions. As such, the proposed project does not create any additional risk in terms of interior drainage accumulation and reduces the burden on the interior drainage system by reducing intrusion of coastal floodwaters. Figure 3-4 is a map depicting model predictions from the Flood Protection Measures simulation.

To further assess the effectiveness of the proposed flood protection measures, the amount of flooded area exceeding (or equal to) various depths within the approximate limits of the master planning zone (between Gillette and Summer Street) was calculated, as shown in Table 3-1.

Table 3-1: Flooded Area Comparison

Predicted Flood Depth (feet)	Existing Conditions (acres)	Flood Protection (acres)	Percent Reduction
> 6 inches	55.3	33.0	40.3%
> 1 foot	50.0	19.8	60.4%
> 2 feet	28.0	0.02	99.9%

As shown in Table 3-1, the proposed flood protection measures significantly reduce peak flood depths in the master planning area. Flooding exceeding 2 feet is essentially eliminated, and flooding exceeding 1 foot is reduced by ~60% in the master planning area. This demonstrates significant benefit from the proposed flood protection measures since higher peak flood depths cause more property damage and interfere with transportation. Several conclusions can be drawn from the Flood Protection Measures simulation:

1. The permanent and interim/deployable flood protection structures reduce the magnitude of coastal flooding, and result in significantly smaller peak flood depths in the project area. Since flooding exceeding 2 feet in depth is essentially eliminated, and much of the remaining flooded area has less than 6 inches of flooding predicted, it is probable that property/building damage will be significantly reduced. Flooding with a depth of 6 inches or less will typically remain in the street/public ROW.

2. The interior drainage system is inadequate to convey flows during the "Existing Conditions" simulation because of the large intrusion of coastal (ocean) floodwaters. Model predictions indicate that the flood protection measures may improve the performance of the interior drainage system by reducing the amount of coastal floodwater entering the conveyance systems.

3. The project does not create any additional risk in terms of interior drainage accumulation.

4. Other improvements may further reduce intrusion of coastal floodwaters into the project area by reducing backflow during high tide conditions when the hydraulic gradient prevents coastal discharges. The City has assessed potential locations for future improvements (e.g., storage)

It should also be noted that the model used for this analysis does not include any representation of recently completed projects that reduce imperviousness with green stormwater features. It is possible that these features may further reduce predicted flooding depths.

Simulation Parameters

Rainfall:	5.15 inches (10-yr, SCS)
Sea Level Rise:	1.29 feet (MC-FRM)
Storm Surge:	2.61 feet (100-yr Nor'easter, MC-FRM)

BOSTON WATER AND SEWER COMMISSION

Notes:
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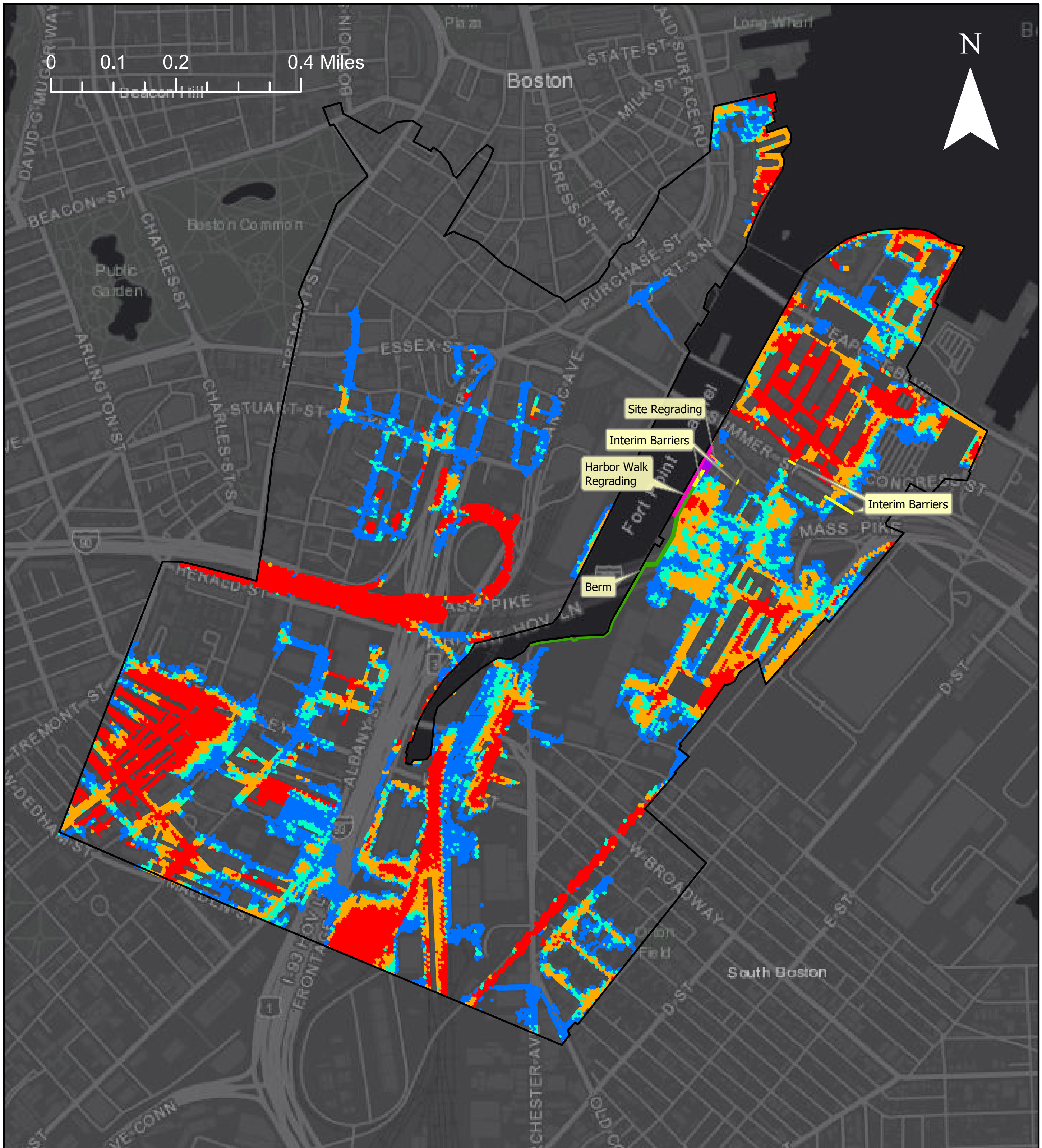
HAZEN CONTRACT 90028-002
BWSC CONTRACT 18-206-001

FEMA PDM Grant Application
Analysis of Resilient Fort Point Channel Infrastructure Project
Existing Conditions Model Predictions
June 2020
Figure 3-3

Model Prediction
- Predicted Depth > 0 in and < 6 in
- Predicted Depth > 6 in and < 1 ft
- Predicted Depth > 1 ft and < 2 ft
- Predicted Depth > 2 ft
- 2D Model Boundary



Simulation Parameters	
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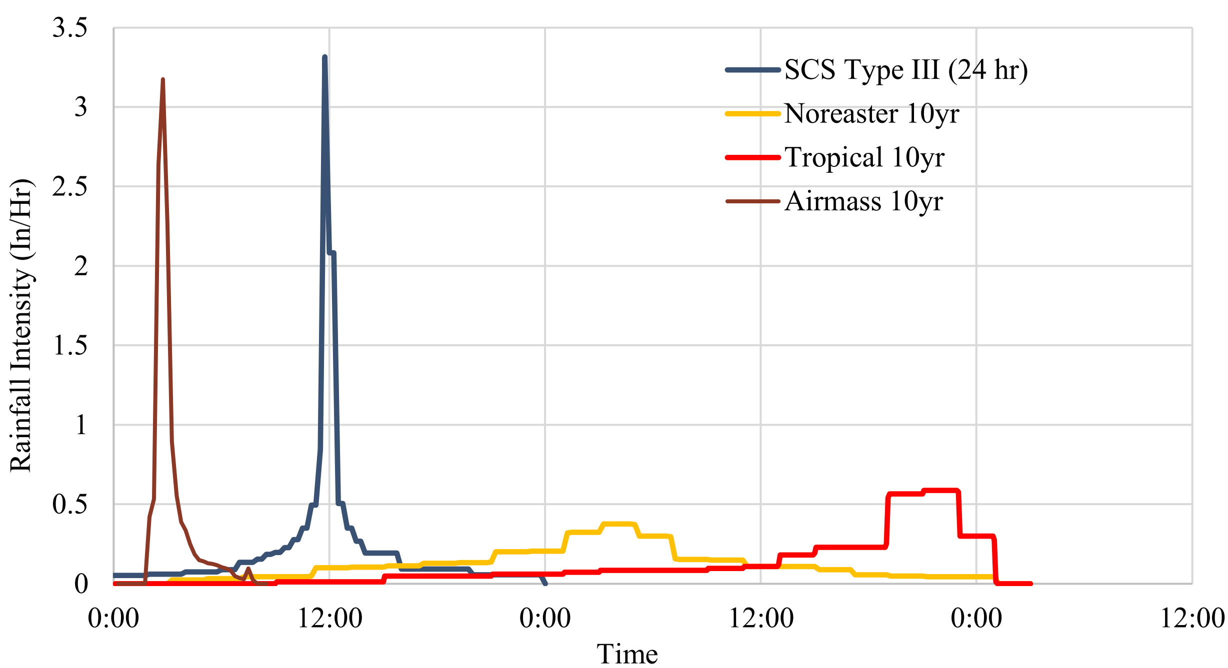
FEMA PDM Grant
Analysis of Resilient Fort Point Channel Infrastructure Project
Coastal Berms and Inland Barriers Model Predictions
June 2020
Figure 3-4

Model Predicted Max Depth
≤6 in
≤1 ft
≤2 ft
>2 ft
2D Model Boundary
Interim Barriers
Site Regrading
Harbor Walk Regrading
Berm

4. Conclusion

The purpose of this TM was to document the results of 2D model analyses conducted to assess the impact of coastal flood protection measures on the performance of the interior drainage system along the east side of the Fort Point Channel in Boston. Model predictions indicate that the flood protection measures proposed and described in the City's PDM grant application do not negatively impact the performance of the interior drainage system. A simulation of existing conditions indicated the interior drainage system becomes overwhelmed with coastal floodwaters during a 100-year storm surge event with 1.29 feet of sea level rise. The flood protection measures proposed in the PDM grant application effectively reduce the amount of coastal floodwater intrusion in the project area, which may benefit the performance of the interior drainage system by facilitating more storage/conveyance of stormwater runoff. In addition, it should be noted that the coincident impact of intense rainfall (10-year SCS storm) and significant coastal storm surge may not be typical and represents a conservative assumption for the purpose of analyzing a "worst-case" scenario. In general, rain events with high peak intensity (such as the SCS distribution used for the design storm) are "airmass" events that occur in absence of organized lifting mechanisms. These airmass events (single cell thunderstorms) are not associated with storm surge. In Boston, rain events that are associated with storm surge (nor'easters and tropical events), have much lower peak rainfall intensities, as shown in Figure 4-1.

Figure 4-1: 10-year Rain Event Comparisons



Note: The nor'easter, tropical, and airmass hyetographs shown in Figure 4-1 were developed during the BWSC Inundation Model project. These hyetographs were developed based on analysis of data from Logan Airport (NOAA Gauge ID 19-0770) from 1948 to May 2018. 3,100 individual events were classified into each category based on synoptic maps and National Weather Service radar.

In conclusion, this analysis finds that the proposed coastal flood protection measures do not result in a greater burden on the interior drainage system during a coastal flooding event, and that the adequacy of the interior drainage system is not impacted by the proposed flood protection measures. Additional simulations that only included rainfall demonstrate that interior drainage is not impacted by the proposed coastal protection measures, and that the project is not associated with additional risk of interior stormwater accumulation. In addition, this analysis finds that the proposed flood protection measures reduce peak flood depths throughout the project area and have the potential to significantly reduce property damage and disruptions that can result from large flooding events.

Section L

Memo for Fort Point Channel Flood Pathways by Woods Hole Group

MEMORANDUM

DATE March 2, 2020 **JOB NO.** 2018-0000

TO Joe Christo, Senior Resilience and Waterfront Planner
Climate Change and Environmental Planning
Boston Planning and Development Agency

FROM Woods Hole Group, Inc.
107 Waterhouse Road,
Bourne, MA 02532

Fort Point Channel Flood Pathways

Figure 1 present the existing (current sea level) flood risk for the South Boston area in terms of an annual coastal flood exceedance probability. These data were developed using the Boston Harbor Flood Risk Model (BH-FRM), a high-resolution, hydrodynamic, probabilistic model of flood risk within Boston Harbor (Bosma et al., 2015). Storm events striking an area result in significantly different impacts depending on factors such as: the timing of the storm with the tide cycle; the storm track; radius to maximum wind of the tropical storm; the amount of precipitation; etc. Probabilistic modeling evaluates a statistically robust set of viable storm conditions that produces a spatial probability of flooding. Hundreds to thousands of storms are dynamically simulated to produce flood exceedance probabilities at high resolution. Using a statistically robust approach, probability flood exceedance can be defined as the probability of flood water inundating the land surface at a specific location.

The most frequent probability causing flooding along the eastern side of the Fort Point Channel is between 1-2% (between a 50- to 100-year return period), as indicated by the lighter green colors shown on along the entry point of flooding at Fort Point Channel. This flood point of entry results in isolated flooding as shown in the red ellipse area. The detailed flow patterns associated with this flood pathway are shown in Figure 2. This figure shows the progression of flooding as the water enters the area and advances inland as water flows down streets and around the infrastructure of the area. The flood pathway sub-model provides the volumetric flood progression results from the initial entry probability (between 1-2%) up to the 0.1% (1000-year) flood probability. As such, the extent of flooding and the propagation pathways of the flood water can be identified. During progressively larger and larger storm events, the water advances inland as shown by the color scale and associated arrows indicating flow direction. The results show 3 specific points of entry along the eastern end of Fort Point Channel, including:

- The 100-acre master plan area and Necco Street garage area – This area represents the earliest flood entry point and also the largest volumetric contributor to the inland flooding. As such, this flood pathway is the primary contributor to the flooding in this area.

- A small alley between the Summer St. Bridge and the Congress St. Bridge - This flood pathway is a minor contributor to the flooding in the area, and primarily floods Congress St. and surrounding minor streets.

- The area near the Boston's Children's Museum – The flood pathway is also a relatively minor contributor to flooding in the streets between Seaport Blvd and Congress St.

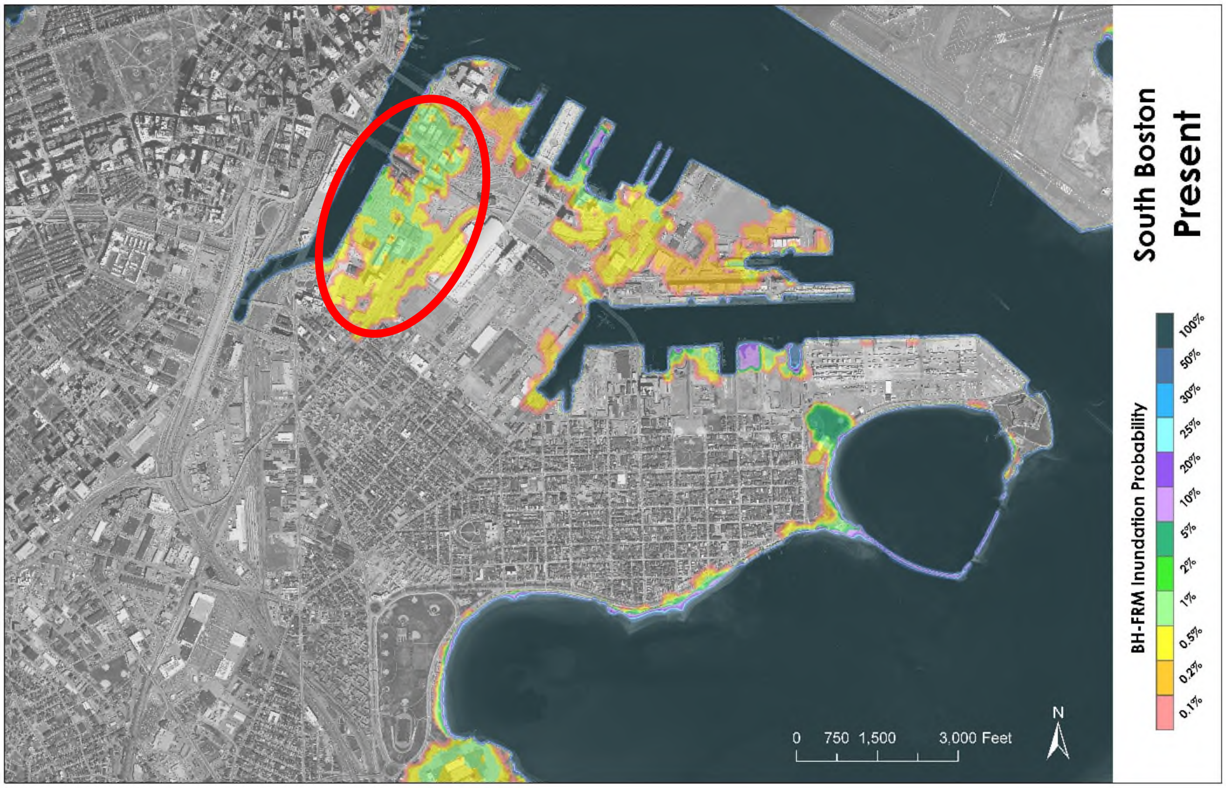


Figure 1. Probabilistic flood model results from the BH-FRM under present day conditions.

Under current day flood risk, the proposed project would be effective at minimizing surface water flooding from Fort Point Channel by mitigation of these three flood pathways. All other flooding in the area is fringe flooding that does not penetrate inland with any significant extent or volume.

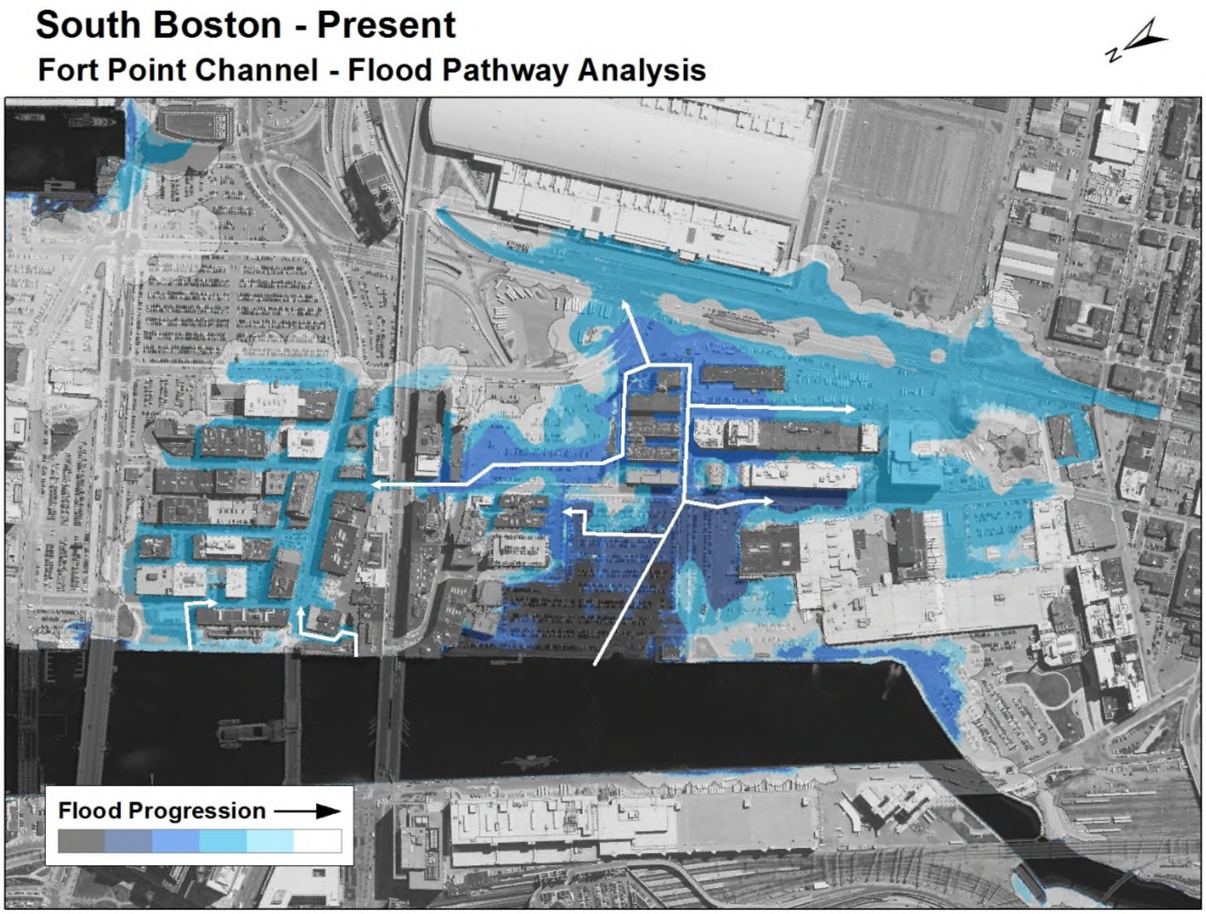


Figure 2. Flood pathway model for the eastern side of Fort Point Channel for present day storm conditions.

Looking forward with 9 inches of sea level rise, Figure 3 presents the probabilistic BH-FRM model results for the South Boston area. While the Climate Ready Boston assessment assumes that this level of flooding occurs in approximately 2030, this condition may occur decades later depending on the emission scenario that occurs. Figure 3 shows that flooding in the area has expanded, and there are additional flood entry points that occur around the area. However, at this stage in the changing climate, the Fort Point Channel flood area is still volumetrically isolated from the other flood areas around South Boston. While there are some minor connections at the 0.1% (1000-year) return period, this does not result in any significant volume of water propagating into the Fort Point Channel flood compartment.

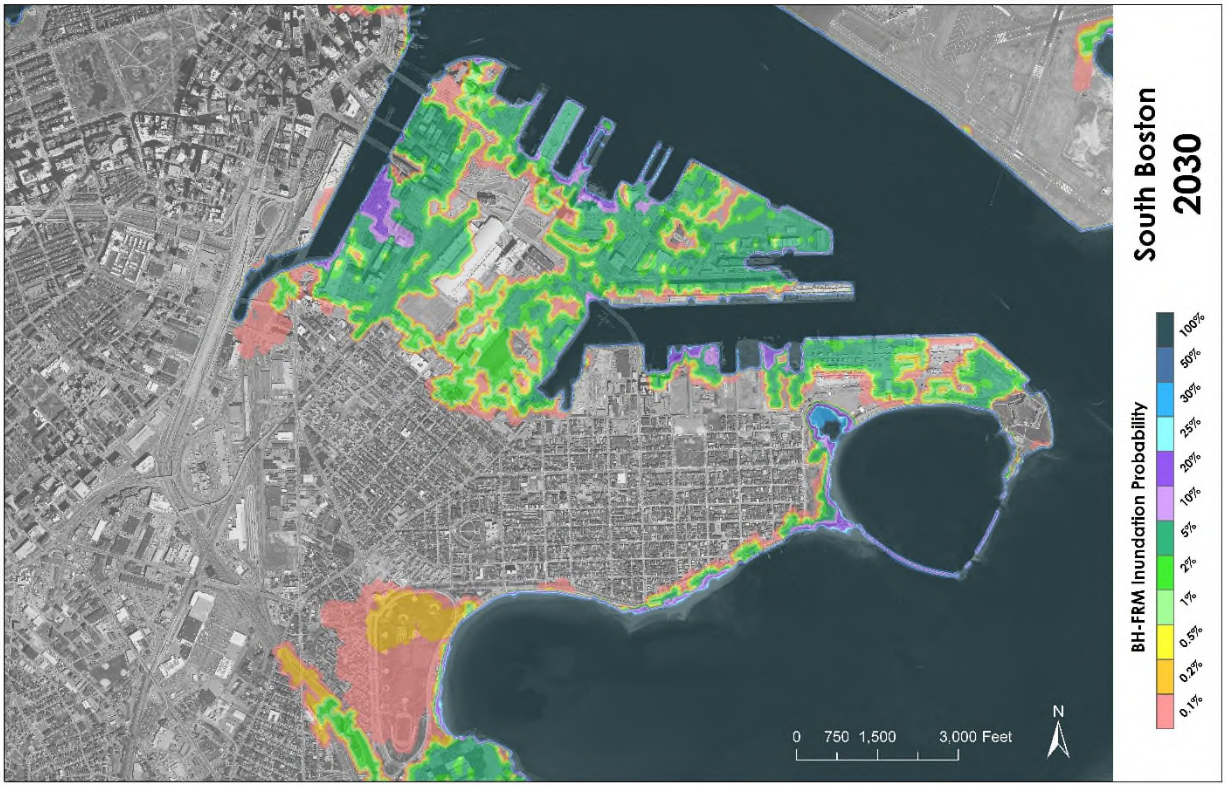


Figure 3. Probabilistic flood model results from the BH-FRM with 9 inches of sea level rise.

Figure 4 presents the results of the more detailed flood pathway modeling for the 9-inch sea level rise scenario. The same three flood entry points that appear for present day storm conditions, also occur with these future storm conditions. The volume of water entering from these flood entry points dominate the flooding in this area and penetrate further inland (to the Boston Convention and Exhibition Center) and adjacent areas. However, there are no significant volume connections that arrive to the Fort Point Channel flood area from other flood entry points around South Boston under this climate change level. While there are some minor connections and fringe flooding areas that occur during the most extreme storm return period (1000-year), these connections are driven by water arriving from the Fort Point Channel flood entry points and not from other locations (e.g., Reserve Channel).

More details on the development and results of the Boston Harbor Flood Risk Model can be found in Bosma et al. (2015), which was the recipient of the 2017 Federal Highway Administration Environmental Excellence Award.

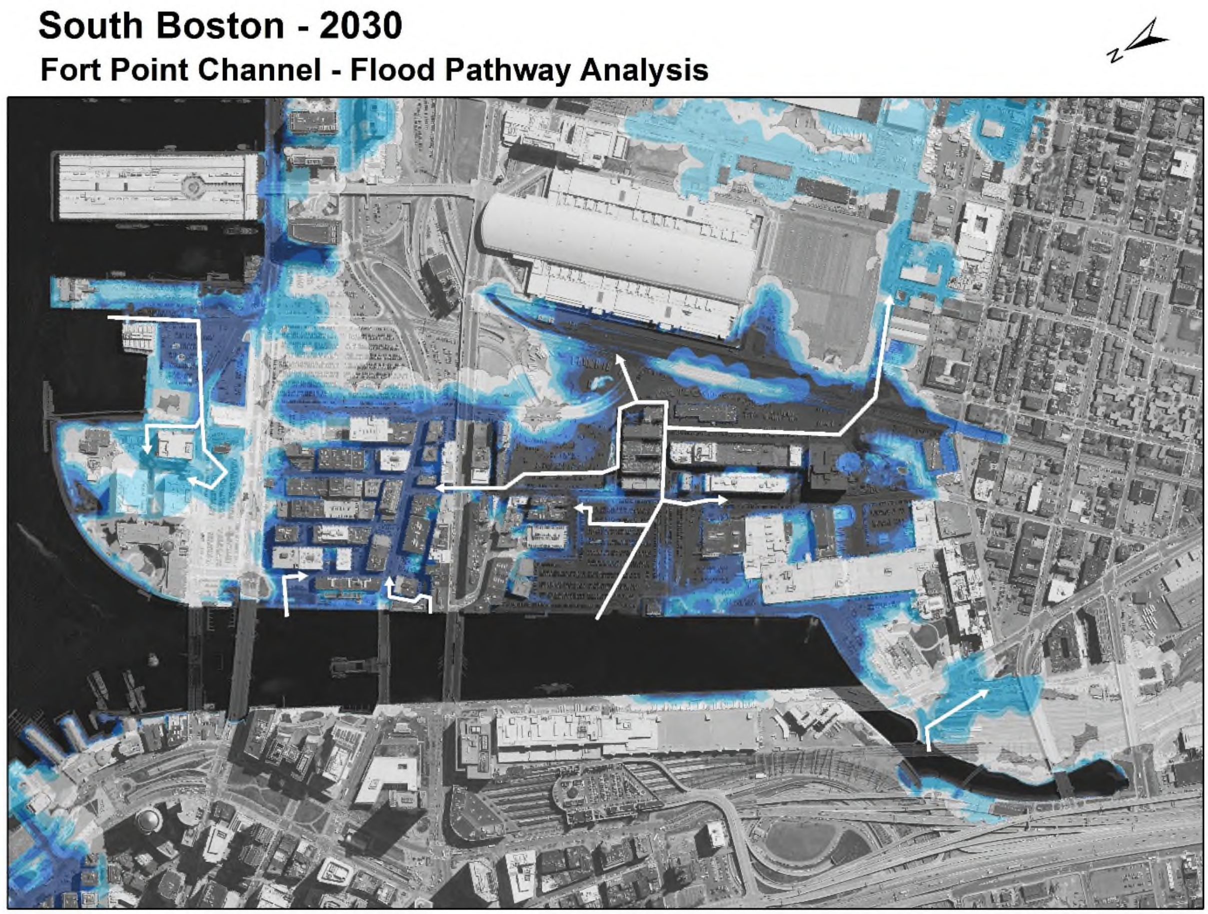


Figure 4. Flood pathway model for the eastern side of Fort Point Channel for storm conditions including 9 inches of sea level rise.

Section L

Technical Memo for Benefit-Cost Analysis Methodology by Arcadis

TECHNICAL MEMORANDUM

FEMA Pre Disaster Assistance Grant Program

Boston, Massachusetts

Resilient Fort Point Channel Infrastructure Project

Benefit-Cost Analysis Methodology

Rev July 2020

CONTENTS

TABLES AND FIGURES

ATTACHMENTS

1 OVERVIEW

The enclosed technical memorandum identifies the approach and data used to complete a benefit-cost analysis (BCA) for Resilient Fort Point Channel Infrastructure Project (Project) in Boston, Massachusetts. The Project focuses on improving flood protection in the 100 Acres Master Planning Area in the South Boston neighborhood, the most critical flood pathway on the eastern shoreline of the Fort Point Channel and one of the most critical in the entire City of Boston. The Project site is the lowest elevation along the channel, and water currently and frequently overtops the existing shoreline during astronomical high tides and coastal storm events. The project site includes the Gillette World Shaving Headquarters, an important manufacturing facility and job site that has been operational for over 100 years.

The Project site is located within the Special Flood Hazard Area delineated in FEMA's Flood Insurance Rate Maps (FIRMs) for the City and is vulnerable to the 1-percent annual chance flood elevation under present sea level conditions. With 9 inches of eustatic sea level rise, the site will have a 20-percent (1 in 5) annual chance of flooding and water that enters through the 100 Acres Master Planning area will extend inland toward the Boston Convention and Exhibition Center.

This benefit-cost analysis (BCA) memorandum has been updated from its original submission in January 2019 to address FEMA Requests for Information.

1.1 Software

Analysts used FEMA's BCA Toolkit Version 6.0 to revise the BCA and determine the Benefit-Cost Ratio (BCR) for the proposed mitigation project. Following the FEMA BCA Reference Guide and Supplement, the analysis is based on detailed flood hazard information from the Boston Harbor Flood Risk Model (BH FRM). The BH FRM was developed in 2015 through an initiative by MassDOT and the Federal Highway Administration to assess the vulnerability of Boston's Central Artery/Tunnel Project to sea level rise and extreme storm events.[1] The Climate Ready Boston initiative used the data to generate maps of potential flooding and associated water levels for the 10-percent, 2-percent, 1-percent, and 0.1-percent annual chance flood elevations for four sea level rise scenarios. Analysts used the study's 9-inch sea level rise scenarios and calculated structure damage, contents loss, and relocation costs in accordance with *FEMA's Sea Level Rise and Hazard Mitigation Assistance Programs* (**Attachment A**). Pre-mitigation and post-mitigation damage costs were calculated using the USACE's North Atlantic Coast Comprehensive Study depth damage functions appropriate for the area following FEMA benefit-cost analysis methodologies, and entered into the BCA Toolkit as Professional Expected Damages.

1.2 Proposed Mitigation Action: Other

The Project will provide flood protection along approximately 2,300 linear feet of the Fort Point Channel shoreline. The flood protection features will consist of earthen berms and knee walls, a deployable flood gate, and an elevated seawall/Harbor walk which functions as a floodwall. Approximately 600 linear feet total of interim flood protection measures are also proposed to mitigate unprotected flood pathways from sites proximate to the proposed alignment and those located further north on the Fort Point Channel. The Project's design elevation is 14.6 feet NAVD88, which is the American Society of Civil Engineer's

[1] Bosma, Kirk, et. al. "MassDOT-FHWA Pilot Project Report: Climate Change and Extreme Water Vulnerability Assessments and Adaptation Options for the Central Artery." MassDOT FHWA Report. June 2015. https://www.mass.gov/files/documents/2018/08/09/MassDOT_FHWA_Climate_Change_Vulnerability_1.pdf

recommended minimum design elevation for a Class 4 structure in Zone A plus factors of safety for future adaptability. The Project is independently effective to 11.5 feet NAVD88, the 0.1 percent annual chance flood elevation with 9 inches of sea level rise; this serves as the Project's level of protection. The Project is proposed under FEMA's new Resilient Infrastructure initiative under the Pre-Disaster Mitigation Program and is thus an infrastructure protective measure per guidance in the Fiscal Year 2018 Notice of Funding Opportunity. The most applicable mitigation project type available in the BCA Toolkit is the "other" option, as the project is not a drainage improvement, nor will it restore the floodplain, divert, or store floodwater.

2 PROJECT AND MAINTENANCE COSTS

Table 1 summarizes the Project's total capital and annual maintenance costs in 2018 dollars. Annual maintenance costs are expected to cost $200,000 to cover yearly damage inspections, testing of interim flood protection measures, and necessary repairs in addition to mowing and addition of fill to sodded berms, if necessary. Please refer to the Project's *Flood Defense Conceptual Design and Cost Estimating Methodology* for a detailed capital budget.

Table 1. Project Capital and Maintenance Costs, 2018 dollars

Mitigation Activity	Capital Cost	Annual Maintenance Cost
Resilient Fort Point Channel Infrastructure Project	$20,401,204.82	$200,000.00

3 ANALYSIS APPROACH

The Project benefit-cost analysis is based on professional expected damages using coastal flood hazard models that project flood elevations expected with 9 inches of sea level rise. Pre-mitigation damages and post-mitigation damages are input in the Toolkit to identify losses avoided attributable to the project. Impacts were estimated using FEMA guidance and best practices, including use of USACE depth-damage and depth-displacement curves to estimate impacts. Categories of losses include direct physical damage to structures and their contents, displacement costs, mental stress and anxiety and lost productivity avoided by protecting residents within the benefitting area, and environmental benefits expected from converting impervious surface to open space. The proposed project will directly benefit 31 buildings and 814 residents exposed to present and future flood risk. This section describes the methods and assumptions used to estimate expected pre- and post-mitigation damages associated with the project.

3.1 Flood Hazard Data and Sea Level Rise

The City of Boston acknowledges the BH FRM as the best available flood modeling data and uses the model's flood projections to study and plan for coastal resilience and regulate development in areas vulnerable to flooding. The BH FRM is a state-of-the-art numerical model capable of simulating thousands of potential nor'easters and tropical storms coincident with a range of tide levels, riverine flow rates in the Charles and Mystic Rivers, and sea level rise conditions. As described in the project's *Flood Defense Conceptual Design and Cost Estimating Methodology,* the BH FRM produces flood pathway assessments to identify the direction and flow of water to facilitate site-specific resilient design. Figure 1 and **Attachment B** summarize the results of the flood pathway assessment for South Boston. The flood pathway assessment summary and accompanying maps demonstrate that the Fort Point Channel is volumetrically isolated for the 0.1-percent flood elevation with 9 inches of sea level rise and have limited to no residual risk present from other pathways in South Boston for this event. The flood pathway assessment results drive the project's level of protection and useful life used in this BCA.

Figure 1. Fort Point Channel Flood Pathway Assessment and Flood Protection Alignments (core shoreline protection in green with interim flood protection in yellow). Flood inundation shown is based on time series.

As described in the *Flood Defense Conceptual Design and Cost Estimating Methodology,* the Project's design elevation includes a factor for sea level rise. Per FEMA's memorandum for Regional Administrators on *Sea Level Rise and Hazard Mitigation Assistance Programs* (2013), FEMA will fund cost effective hazard mitigation projects that include sea level rise estimates. Projects that include a factor for sea level rise can identify additional benefits in the BCA; these benefits can be applied to projects in any U.S. coastal area where relative sea level rise data is available (FEMA, 2013; **Attachment A**). Per FEMA's memorandum, users can incorporate future flood risk reduction benefits by "add[ing] the estimated sea level rise to the current … flood elevations for the area."

Following the above guidance from FEMA, the BCA is based on BH FRM maps and flood elevations for the 10-percent, 2-percent, 1-percent, and 0.1-percent flood elevations with 9 inches of sea level rise. **Attachment C** displays the flood extents for the four recurrence intervals and Table 2 provides estimates of water surface elevations. The below elevations indicate conditions with waves, including peak water surface elevation during the crest of the wave, though wave action in Fort Point Channel is minimal. Analysts extracted site-specific flood elevations through a GIS exercise, overlaying building footprints with flood elevation raster files for each flood event to identify the expected flood elevation at each benefitting structure.

Table 2. Water levels expected with 9 inches of sea level rise

Annual Exceedance Probability	10%	2%	1%	0.1%
Recurrence Interval	10-year	50-year	100-year	1,000-year
Water Surface Elevation (NAVD88)	9.4	10.5	11	11.5

3.2 Level of Protection

The flood pathway assessment for the Fort Point Channel determined that the Project will provide protection up to the 0.1-percent annual chance flood event (11.5 feet NAVD88) with little to no residual risk, and no residual damage currently captured in the benefit cost analysis. After this point, it is expected that flood pathways from other locations in the South Boston neighborhood will impact the Project area. As such, the level of protection used for the BCA is the 0.1-percent annual chance flood elevation with 9 inches of sea level rise. This level of protection indicates the point in which residual risk will affect the project area. Refer to Section 3.5 for more detail on how the level of protection contributes to estimation of post-mitigation damages.

3.3 Project Useful Life

FEMA defines project useful life as the "estimated amount of time (in years) that the mitigation action will be effective.[2]" In an effort to coordinate residual risk and level of protection with the Project useful life, analysts assume that Project effectiveness is aligned with 9 inches of sea level rise. The Project useful life is therefore based on the year that Boston may experience 9 inches of sea level rise. This condition may occur over a varying number of years based on the sea level rise curve used. Analysts evaluated U.S. Army Corps of Engineers (USACE) 2013 sea level rise curves to estimate the year in which 9 inches of sea level rise will occur. See Table 3. The USACE intermediate curve expects 9 inches of sea level rise to occur in 2066.

Table 3. USACE Intermediate Sea Level Rise Curves for Boston

Year	SLR increment in ft: USACE Intermediate Curve, 2013
2020	0.0
2025	0.08
2030	0.16
2035	0.24
2040	0.32
2045	0.41
2050	0.50
2055	0.58
2060	0.65
2070	0.81

[2] FEMA June 2009 BCA Reference Guide: https://www.fema.gov/media-library-data/20130726-1736-25045-7076/bca_reference_guide.pdf

Considering the project will be completed by 2023, this yields a project useful life of 43 years.

3.4 Pre-Mitigation Professionally Expected Damages

Thirty-one buildings located within the 0.1-percent AEP floodplain in the 100 Acres Master Planning Area are expected to benefit from the proposed mitigation project. Most of these structures are in BH FRM's 1-percent annual chance floodplain for current climate conditions and are thus also vulnerable to current flood hazards. Pre-mitigation damages are estimated using FEMA benefit-cost analysis methodologies and are comprised of structure damage, contents losses, and displacement costs.

Structure Damage and Contents Loss

Structure damage and contents losses are estimated using depth-damage curves from USACE's *North Atlantic Coast Comprehensive Study*[3] and replacement costs estimated using RSMeans and USACE Content to Structure Value Ratios (CSVRs) from the *Lake Pontchartrain Hurricane Risk Reduction Study.*[4]

The structure information used to identify direct physical damages is based on the inventory developed for *Climate Ready Boston* in 2016 and updated using the City of Boston's online property tax Assessing and 2018 parcel data.[5] The *Climate Ready Boston* structure inventory is a GIS-based dataset that georeferences building footprints with attributes required to estimate direct physical damages, including but not limited to structure use, size, and height. For more details on how the *Climate Ready Boston* Building Footprint dataset was developed, see the *Climate Ready Boston: Approach and Methodology for Asset Data Collection and Exposure and Consequence Analysis.*[6] Benefitting structures captured in this analysis are presented in Figure 2.

BCA analysts reviewed and updated the benefitting structure use types, numbers of stories, and living areas by spatially joining the *Climate Ready Boston* building inventory with the City's 2018 parcels data in GIS. To confirm the accuracy of the resulting information, analysts compared parcel IDs from the spatial dataset with the City's online Assessing search tool. **Table 4** reviews the source and additional notes for the structure attributes used in the calculation of direct physical damages. **Attachment D** provides each building used in the benefit-cost analysis and its unique attributes.

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[3] USACE. North Atlantic Coast Comprehensive Study: Resilient Adaptation to Increasing Risk. Physical Depth Damage Function Summary Report. June 2015. https://www.nad.usace.army.mil/Portals/40/docs/NACCS/10A_PhysicalDepthDmgFxSummary_26Jan2015.pdf.

[4] USACE. West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study Integrated Draft Feasibility Report and Environmental Impact Statement. Economic Appendix D. 2012. https://www.mvn.usace.army.mil/Portals/56/docs/PD/Projects/WSLP/WSLPAppDEconomics.pdf

[5] Tax Assessing Data and Parcel Information found here: https://data.boston.gov/dataset/property-assessment, through the Property Assessment FY 2018 database.

[6] City of Boston. Climate Ready Boston Approach and Methodology for Asset Data Collection and Exposure and Consequence Analysis. 2016. https://www.boston.gov/sites/default/files/imce-uploads/2017-02/boston_appendix_asset_inventory_exposure_and_consequence_analysis_101820.pdf

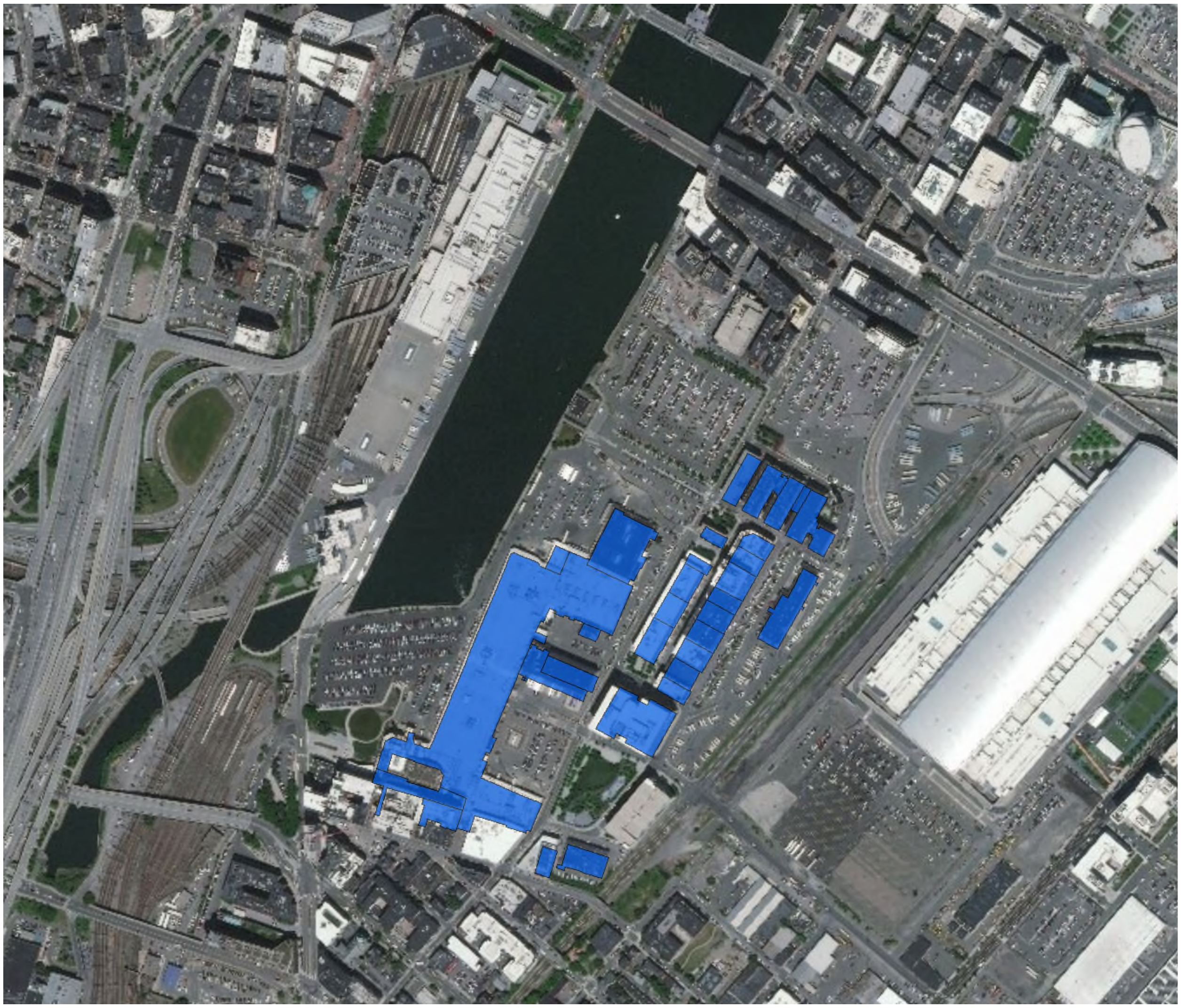


Figure 2. Benefitting Structures

Table 4. Resilient Fort Point Channel Infrastructure Project, Benefitting Structure Attribute Sources

Structure Attribute	Source and Notes
Structure Use	Structure uses reflect 2018 property types from the City Assessing database. In mixed use, multi-story buildings, it is assumed that the first floor is commercial use.
Building Type	The Building Type assigns a Hazus Occupancy classification to each building based on a similar structure use. The Building Type is assigned for both the first-floor use and the dominant structure use. Hazus occupancies are used to assign FEMA standard values to structures when appropriate.
Living Area	Total living area is sourced from the City's Assessing Department using 2018 parcel data. There are a few cases where a parcel contains several

Structure Attribute	Source and Notes
	buildings but does not identify separate living space. In this occurrence, analysts split the living area between all buildings on the parcel, based on the size of each building footprint. This reduces the potential of double-counting living space. In the case that no living area is available, the size of the building footprint is used as a proxy for living space.
Number of Stories	The City's 2018 parcel data provides the number of stories for the analysis. In the case where the number of stories is omitted from the parcel database, it is assumed a building is 1 story tall.
First Floor Living Area	The first floor living area is calculated by dividing the total living area of a building by the number of stories.
First Floor Elevation	In the absence of Elevation Certificates, first floor elevation data is estimated by overlaying the georeferenced structure inventory with 2009 LiDAR topography data and gathering the average ground elevation within a building footprint. This approach was confirmed using Google Street View.
Building Replacement Value	Climate Ready Boston used RSMeans 2016 Building Construction Cost Data specific to each building type to estimate replacement costs. Analysts updated the 2016 unit replacement costs using the Bureau of Labor Statistic's CPI Inflation calculator. The inflation calculator specifies dates; replacement costs were inflated from January 2016 dollars to November 2018 dollars. Unit building replacement costs are applied to the first floor living area square footage only estimate the replacement value of the first floor. This results in a conservatively low estimate of building replacement costs for the damage calculations. For mixed-use buildings, the replacement value estimates reflect the dominant building type.
Contents Value	Contents values are based on contents-to-structure value ratios (CSVRs) for buildings obtained through surveys in the West Shore Lake Pontchartrain Hurricane and Storm Damage Risk Reduction Study. CSVRs are assigned based on the structure's first floor use.
Flood Elevation	Flood elevations for the 10-percent, 2-percent, 1-percent, and 0.1-percent events were gathered from water elevation raster files developed from the BH FRM for Climate Ready Boston, as this is the most accurate flood elevation data available. Analysts overlaid the raster data with the building footprints and identified the maximum total flood elevation within a building using ArcGIS extraction tools.

Depth-Damage Functions and Flood Depths

Direct physical damages to buildings are evaluated based on depth damage functions (DDFs) per FEMA guidance. A DDF correlates the depth, duration, and type of flooding to a percentage of expected damage to a structure and its contents, including inventory.[7] Flood depths at each structure are cross-referenced with DDFs to provide expected percent loss for each structure and its contents. This percent loss is then translated to damage based on building and content replacement costs for the first floor. As FEMA's default DDFs provided in the BCA Toolkit's Flood Module do not offer appropriate damage functions for high-rise or mixed-use structures such as those prevalent throughout the project area, analysts identified alternative DDFs to use in the analysis.

Following Hurricane Sandy, the USACE developed DDFs specific to the Northeast for coastal flooding in a report titled the North Atlantic Comprehensive Study (NACCS, see Footnote 3). The NACCS DDFs are the most current and location-specific information available to estimate direct physical damages expected from buildings in Boston. Analysts identified appropriate NACCS DDF prototypes based on the characteristics and occupancy of individual structures. For each selected benefitting structure, analysts matched the structure use type with its correlated DDF and replacement cost value. In the case of mixed-use structures, the building replacement cost values are based on the dominant use of the building, while the contents values are based on the first-floor use. NACCS DDF prototypes used in this analysis and their assignments to individual structures are provided in **Attachment E and Attachment D**, respectively. The logic for these assignments is provided in Table 5.

Flood depths within structures are identified by subtracting a building's expected first floor elevation from the relative flood elevation expected at that facility. Analysts then rounded flood depths to the nearest foot to correlate a percent damage from the depth-damage function. These calculations are reflected in Attachment D.

Table 5. Depth-Damage Function Assignment Logic

DDF Prototype	Logic for Building Assignment
2 Commercial, Engineered, Inundation Damage	• Applies to Low Rise (1 story) and Mid-Rise (2-9 story) non-residential structures. • Office buildings and light industrial structures made of concrete or masonry.
3 Commercial, Non/Pre-Engineered, Inundation Damage	• Applies to Low Rise (1 story) and Mid-Rise (2-9 story) non-residential structures. • Warehouse-type buildings.
4A Urban High Rise, Inundation Damage	• Applies to Mid-Rise (2-9 story) and High-Rise (10 stories +) mixed-use commercial and residential buildings.

[7] Duration is not a modeled output in the hazard data for this assessment. Duration is assumed to be captured within the DDFs based on the flood hazard type: inundation, wave, or erosion-based.

Displacement

Displacement costs are those borne by occupants during the time when a building becomes uninhabitable due to expected flood damage and are applicable to both residential and non-residential property owners. Allowable displacement costs include a rental cost per month based on structure occupancy and square footage, and a one-time disruption cost. Analysts used local rental rates identified in 2016 for the *Climate Ready Boston* analysis, established from an online survey of different sizes and types of residential and non-residential spaces available for rent within Boston at the time of the study. The survey used three online real estate services: Loopnet, Trulia, and Zillow. One-time disruption costs reported in the Hazus 2.1 Flood Technical Manual are assigned based the first floor Hazus occupancy assigned (Building Type). These costs have been normalized to 2018 dollars based on inflation.

Displacement time is derived from DDFs that relate a depth of flooding to an amount of time that a structure is not usable. It is based on occupancy type and flood depth, similar to the structure and contents DDFs. The North Atlantic Comprehensive Study does not provide depth displacement functions, and as such, analysts extracted default depth-displacement from the BCA Toolkit to estimate displacement time for structures based on flood depth within a building.

It is reasonable to assume that extensive damage to the first floor of mixed-use buildings affects access to upper floors, and that all the occupants of a building would be displaced in such a situation. Nevertheless, many mixed-use buildings in the analysis are nearly 10 stories tall and displacement costs for the upper floors is quite high. As a conservative measure of displacement costs, this analysis only evaluates the displacement costs associated with a structure's first floor. **Attachment D** provides the displacement-depth functions used in the analysis in addition to building-specific rental and disruption costs.

Pre-Mitigation Damage Estimates

Using the approach and data sources noted above, Table 6 presents the pre-mitigation expected damage costs for each return period.

Table 6. Pre-Mitigation Damage Estimates

Event	Building Damage	Contents Loss	Relocation Cost	Total Losses
10-year	$4,542,652	$2,694,083	$70,890	$7,307,626
50-year	$14,652,543	$14,397,316	$856,803	$29,906,662
100-year	$14,758,060	$14,508,092	$894,665	$30,160,817
1000-year	$20,673,768	$28,875,655	$1,755,301	$51,304,724

3.5 Post-Mitigation Damages

As described in the Analysis Approach, the proposed project is independently effective with 9 inches of sea level rise and will provide protection against the 1,000-year flood elevation with 9 inches of sea level rise, an expected water level of 11.5 feet NAVD88. Elevations significantly higher than this elevation may impact the project area through other flood pathways. As such, analysts assume that the post-mitigation 1,001-year return period will inflict similar damages as the pre-mitigation 1,000-year return period.

Table 7 displays how post-mitigation damages are entered into FEMA's BCA Toolkit. This is a very conservative approach as the BCA is assuming complete solution failure at this elevation, where such a flood elevation is expected to yield very little overtopping.

Table 7. Post-Mitigation Damage Estimates

Event	Building Damage	Contents Loss	Relocation Cost	Total Losses
10-year	$0	$0	$0	$0
50-year	$0	$0	$0	$0
100-year	$0	$0	$0	$0
1000-year	$0	$0	$0	$0
1,001-year	$20,673,768	$28,875,655	$1,755,301	$51,304,724

*Note: emergency response costs and roadway or utility disruption may still occur in a post-mitigation scenario. Nevertheless, the costs of these items were not included in the assessment and are not captured in the pre-mitigation benefits. By not including these benefits, analysts assume a net zero impact on emergency response costs.

4.2 Additional Project Benefits

FEMA's BCA Toolkit allows for the use of additional project benefits if the benefit-cost ratio of the project using structure damages and loss of function is greater than 0.75. These additional benefits include costs for mental stress and lost productivity, as well as environmental benefits if the project is expected to add such value.

Mental Stress and Lost Productivity

Natural disasters threaten or cause loss of health, social, and economic resources, which leads to psychological distress. Analysts assume that some residential displacement will occur if mixed-use structures are flooded, although displacement benefits are not accounted for as a conservative estimate of expected damages. Displacement signifies a clear connection between disasters and mental stress and lost productivity impacts. Analysts estimated the residential population in the project area by multiplying the number of residential units within benefitting structures by 2.36, the City's average household size in 2018 according to Census Quickfacts data. The number of residential units within the benefitting structures was provided directly by the City. Employees eligible for lost productivity benefits was estimated by assuming that at least one person per residential unit is employed.

The expected annual social benefits calculated by the BCA Toolkit is $5,002,522.

Table 8. Mental Stress and Lost Productivity Inputs

Structure	Number of Residential Units	Population	Employed Residents
Midway Artist Studios, 15 Channel Center St	89	210	89
25 and 35 Channel Center St	130	307	130
Fort Point Place, 21 Wormwood St	126	297	126
Total	345	814	345

Environmental Benefits

As detailed in the conceptual design and cost estimating methodology technical memorandum attached to the main project application, the proposed resilience features include the conversion of impervious space to an earthen berm. Therefore, environmental benefits can be included in the BCA Toolkit as green open space with the Toolkit-supported value of $8,308 per acre converted per year. Segment 1 of the proposed project design includes a total footprint and area of ground disturbance of 0.75 acres to be converted to an earthen berm. Combined with the total footprint and area of ground disturbance of Segment 3, which also entails a proposed berm covering 0.8 acres, the proposed project will convert a total of 1.55 acres of impervious surface to green open space. Analysts inputted a conversion of 1.55 acres of green open space into the Toolkit, yielding environmental benefits of $12,877 per year.

5 ANALYSIS ASSUMPTIONS

The following assumptions must be considered when reviewing this benefit-cost analysis:

- The proposed scope for the Project includes interim flood protection solutions to provide protection against other flood pathways from Fort Point Channel that volumetrically connect to the 100 Acres Master Planning Area. The interim flood solutions are redundant flood protection alternatives if projects currently being designed and implemented to protect these areas are delayed and not complete by the time the proposed berm and seawall elevation are complete. The interim flood solutions and other flood projects will benefit a larger area and more structures than included in this assessment.

- Structures expected to benefit from the project include the Gillette World Shaving Headquarters, a financial institution, and many new projects that are currently being designed and constructed. See the written responses to the main Project application for more detail. It is expected that damage to these structures will result in a loss of economic activity in the area; however, interruptions to businesses and reduced economic activity are not traditional benefits and thus not included in the benefit-cost analysis. Without economic activity metrics, the analysis identifies extremely conservative estimates of project benefits.

6 RESULTS

The benefit-cost ratio (BCR) for the Resilient Fort Point Channel Infrastructure Project and the total project cost is listed in **Table 9** below. The total project BCR is 1.30, which demonstrates that the mitigation project is a cost-effective solution using conservative estimates of benefits.

Table 9. The North Yacht Basin Seawall Mitigation Project BCA Results

Present Value Benefits	Present Value Costs	BCR
$29,989,894	$23,102,597	1.30

ATTACHMENT A

FEMA SLR Memorandum and Frequently Asked Questions

U.S. Department of Homeland Security
500 C Street, SW
Washington, DC 20472

FEMA

December 23, 2013

MEMORANDUM FOR: Regional Administrators
Regions I-X

ATTENTION: Regional Mitigation Division Directors
Hazard Mitigation Assistance Branch Chiefs

FROM: Roy E. Wright
Deputy Associate Administrator for Mitigation

SUBJECT: Sea Level Rise and Hazard Mitigation Assistance Programs

Pursuant to the FEMA directive to integrate climate change adaptation into its programs, policies and operations, FEMA will fund cost effective hazard mitigation projects that include sea level rise estimates. The National Oceanic and Atmospheric Administration and the U.S. Army Corps of Engineers have recently released sea level rise estimates for various coastal areas. These tools will allow applicants to determine the projected sea level rise at a specific site for various time horizons.

In order to use the FEMA Benefit Cost Tool to calculate the benefit cost ratio for a mitigation project that includes sea level rise, the user should add the estimated sea level rise to the current 10-, 25-, 50-, and 100-year flood elevations for the area. In jurisdictions that have adopted a freeboard requirement, the amount of freeboard should be added to the flood elevations as well. The FEMA Benefit Cost Tool contains depth-damage curves for certain facilities and will calculate the benefits associated with mitigating to higher elevations. Attached is a list of Frequently Asked Questions on incorporating sea level rise into Hazard Mitigation Assistance projects.

If you have any questions, please contact me directly at (202) 646-3461, or Kayed Lakhia, Deputy Director, Risk Reduction Division at (202) 646-3458.

Attachment

FEMA

Incorporating Sea Level Rise (SLR) into Hazard Mitigation Assistance (HMA) Benefit Cost-Analysis Frequently Asked Questions (FAQs)

1. **Why is FEMA making the SLR information available, and providing tools for Benefit Cost Analyses?**
As part of the President's Executive Order on Climate Change, the President's Council for Environmental Quality (CEQ) developed "Implementing Instructions for Federal Agency Climate Change Adaptation Planning" to address climate change resiliency. In support of the Instructions, FEMA issued a policy statement, 2011-OPPA-01, "FEMA Climate Change Adaptation Policy", which outlines seven initial actions to help integrate climate change adaptation considerations into our programs, policies and operations. To implement this policy, FEMA is developing a Climate Change Adaptation Implementation Plan. One of the seven initial actions as part of the Plan is to "evaluate how climate change considerations can be incorporated into grant investment strategies with specific focus on infrastructure and evaluation methodologies or tools". Including SLR data into the benefit-cost analysis tool integrates adaptation into our programs.

2. **Where can I find a copy of FEMA's Climate Change Adaptation Policy 2011-OPPA-01 and how does it impact the Hazard Mitigation Assistance programs?**
A copy of FEMA's Climate Change Adaptation Policy can be found at http://www.fema.gov/media-library/assets/documents/33082.

   The Hazard Mitigation Assistance programs provide grants to States, Indian Tribal governments, and U.S. Territories to implement long-term hazard mitigation measures after a major disaster declaration. HMA is intended to reduce the loss of life and property resulting from natural hazards and to help States implement mitigation measures during recovery from a disaster. Projects must contribute to a long-term solution to an existing or anticipated hazard. A project's anticipated benefits must be equal to or more than the cost of implementing the project, which is demonstrated through a benefit cost analysis that compares the cost of the project to the benefits anticipated to occur over the lifetime of the project.

   Mitigation activities funded by the HMA programs are required by FEMA regulations to be cost-effective. The determination of cost-effectiveness is typically demonstrated by the calculation of a benefit cost ratio, dividing the total annualized project benefits by total annualized project cost. Projects where benefits exceed costs are generally considered cost-effective. Benefits may include avoided damages, loss of function and displacement. Currently, benefits are calculated on existing conditions and past hazard events. This memo will allow communities to use modeling data for future risk such as sea level rise conditions. Written materials and training to help applicants are available at http://www.fema.gov/benefit-cost-analysis.

3. **Can the FEMA benefit-cost analysis (BCA) module reflect potential future sea level rise (SLR) when evaluating HMA projects?**
   Yes. Relative SLR can be included in flood elevations when conducting BCAs in coastal areas using the full data flood module. SLR can be applied to projects in any U.S. coastal area where relative SLR data is available. This includes areas subject to coastal flooding as identified in the current NFIP flood study, or coastal rivers and streams located as far inland as the extent of estimated tidal influence or storm surge.

   Currently, the full data module can incorporate relative SLR for all residential structures. It can also incorporate relative SLR for nonresidential structures where a depth-damage function curve is available. If a depth-damage function curve is not available, the applicant can perform an individual structure- or facility- based risk assessment to determine the depth-damage function for that particular structure or facility.

   When performing structure elevation projects or projects that have freeboard requirements, SLR estimates should be added to the freeboard requirements that may have been adopted in local or state building codes. Freeboard is a factor of safety usually expressed in feet above a flood level for the purpose of floodplain management. For more information about freeboard, please visit http://www.fema.gov/floodplain-management/freeboard.

4. **Does FEMA mandate including SLR in all HMA applications?**
   No. FEMA does not mandate the inclusion of estimated SLR for HMA project applications. The state or local community may use SLR to consider future conditions in mitigating future flood risk.

5. **Who decides whether to include SLR in HMA project applications?**
   A State, Territorial or Tribal Emergency Management Agency, in coordination with the State National Flood Insurance Program (NFIP) Coordinator and the local applicant, may decide to include SLR in an HMA project application.

6. **What SLR value(s) or sources of SLR data will FEMA accept for its HMA project applications?**
   A Grantee or applicant may use any valid source that is based on recognized SLR estimation methods for SLR. There are several federal government sources for relative SLR data along coastal areas. Some of these sources include:

   - NOAA Center for Operational Oceanographic Products and Services' Mean Annual SLR Trend Data http://tidesandcurrents.noaa.gov/sltrends/sltrends.shtml;
   - USACE Climate Change Adaptation Sea Level Change Curves http://corpsclimate.us/ccaceslcurves.cfm; and
   - Globalchange.gov provides more information specific to New Jersey and New York http://www.globalchange.gov/what-we-do/assessment/coastal-resilience-resources

   Other published studies conducted or recognized by a State, Territory or Tribe can be utilized but must be provided as part of the project application for verification. Acceptance of other studies produced by non-Federal entities will be reviewed by FEMA for acceptance. While there are several different rates of global (i.e., eustatic) SLR that have been published and recognized by various government entities, these global rates must be adjusted further to reflect "relative" changes in sea level caused by localized subsidence or emergence along the coast. Accordingly, these "relative" rates of SLR vary along the coast.

7. **How does the user include SLR in the BCA module?**
To include SLR in the BCA module, the user adds the estimated SLR to the 10-, 50-, 100- and 500-year flood elevations. Some sources for SLR predictions include a yearly rise (linear) based on historical trends, while some provide for accelerated rise (exponential) based on predictive science models.

    - *Linear Projections of SLR Based on Historical Trends:* For SLR data that is linear, the analyst should look at the yearly anticipated SLR and multiply that value by the project useful life. This value can then be added each of the current flood elevations provided in the FEMA Flood Insurance Study (FIS). An analysis conducted using the adjusted FIS data to include SLR should provide a reasonable estimate of anticipated damages from the increased flooding depths in future events and provide consideration for SLR. Note that linear projections of relative SLR based on historical trends are usually considered baseline, low-rise projections. These projections might be used where communities have a higher tolerance for risk (e.g., projects with a short lifespan or planning areas with flexibility to make alternative choices within the near-term).

    - *Accelerated SLR Based on Predictive Science Models:* Most current scientifically recognized data sources include accelerated projections of SLR for various years in the future. When utilizing a study that provides these projection timelines and elevations, the analyst should use the projected SLR for the last year of the project useful life. For example, if an elevation project is being awarded in 2013, the project useful life is 30 years. The projected total SLR in 2043 should be utilized when adjusting the flood elevation data.

8. **What are the associated project design requirements when including SLR in the BCA module?**
For elevation projects, the structure must be elevated in accordance with local or state requirements, including freeboard and SRL.

9. **Does the local jurisdiction have to include SLR in zoning and ordinance development before FEMA will include SLR in HMA applications?**
No. However, if the community has adopted an SLR ordinance, the elevation specified in the ordinance should be the minimum elevation used in the HMA project and BCA calculation.

10. **Can an individual homeowner include SLR rise in its home elevation?**
Yes. A homeowner can choose to mitigate to a future hazard that includes anticipated SLR. However, a homeowner cannot apply directly to FEMA for mitigation assistance. Homeowners must work with their local jurisdiction if they are interested in HMA assistance. Detailed information on how to apply for HMA is available at http://www.fema.gov/hazard-mitigation-grant-program or by contacting your local or state emergency management office.

ATTACHMENT B

Attachment B: Fort Point Channel Flood Pathway Assessment

WOODS HOLE GROUP
FOR EARTH, FROM SPACE
A CLS COMPANY

MEMORANDUM

DATE March 2, 2020 **JOB NO.** 2018-0000

TO Joe Christo, Senior Resilience and Waterfront Planner
Climate Change and Environmental Planning
Boston Planning and Development Agency

FROM Woods Hole Group, Inc.
107 Waterhouse Road,
Bourne, MA 02532

Fort Point Channel Flood Pathways

Figure 1 present the existing (current sea level) flood risk for the South Boston area in terms of an annual coastal flood exceedance probability. These data were developed using the Boston Harbor Flood Risk Model (BH-FRM), a high-resolution, hydrodynamic, probabilistic model of flood risk within Boston Harbor (Bosma et al., 2015). Storm events striking an area result in significantly different impacts depending on factors such as: the timing of the storm with the tide cycle; the storm track; radius to maximum wind of the tropical storm; the amount of precipitation; etc. Probabilistic modeling evaluates a statistically robust set of viable storm conditions that produces a spatial probability of flooding. Hundreds to thousands of storms are dynamically simulated to produce flood exceedance probabilities at high resolution. Using a statistically robust approach, probability flood exceedance can be defined as the probability of flood water inundating the land surface at a specific location.

The most frequent probability causing flooding along the eastern side of the Fort Point Channel is between 1-2% (between a 50- to 100-year return period), as indicated by the lighter green colors shown on along the entry point of flooding at Fort Point Channel. This flood point of entry results in isolated flooding as shown in the red ellipse area. The detailed flow patterns associated with this flood pathway are shown in Figure 2. This figure shows the progression of flooding as the water enters the area and advances inland as water flows down streets and around the infrastructure of the area. The flood pathway sub-model provides the volumetric flood progression results from the initial entry probability (between 1-2%) up to the 0.1% (1000-year) flood probability. As such, the extent of flooding and the propagation pathways of the flood water can be identified. During progressively larger and larger storm events, the water advances inland as shown by the color scale and associated arrows indicating flow direction. The results show 3 specific points of entry along the eastern end of Fort Point Channel, including:

- The 100-acre master plan area and Necco Street garage area – This area represents the earliest flood entry point and also the largest volumetric contributor to the inland flooding. As such, this flood pathway is the primary contributor to the flooding in this area.

- A small alley between the Summer St. Bridge and the Congress St. Bridge - This flood pathway is a minor contributor to the flooding in the area, and primarily floods Congress St. and surrounding minor streets.

- The area near the Boston's Children's Museum – The flood pathway is also a relatively minor contributor to flooding in the streets between Seaport Blvd and Congress St.

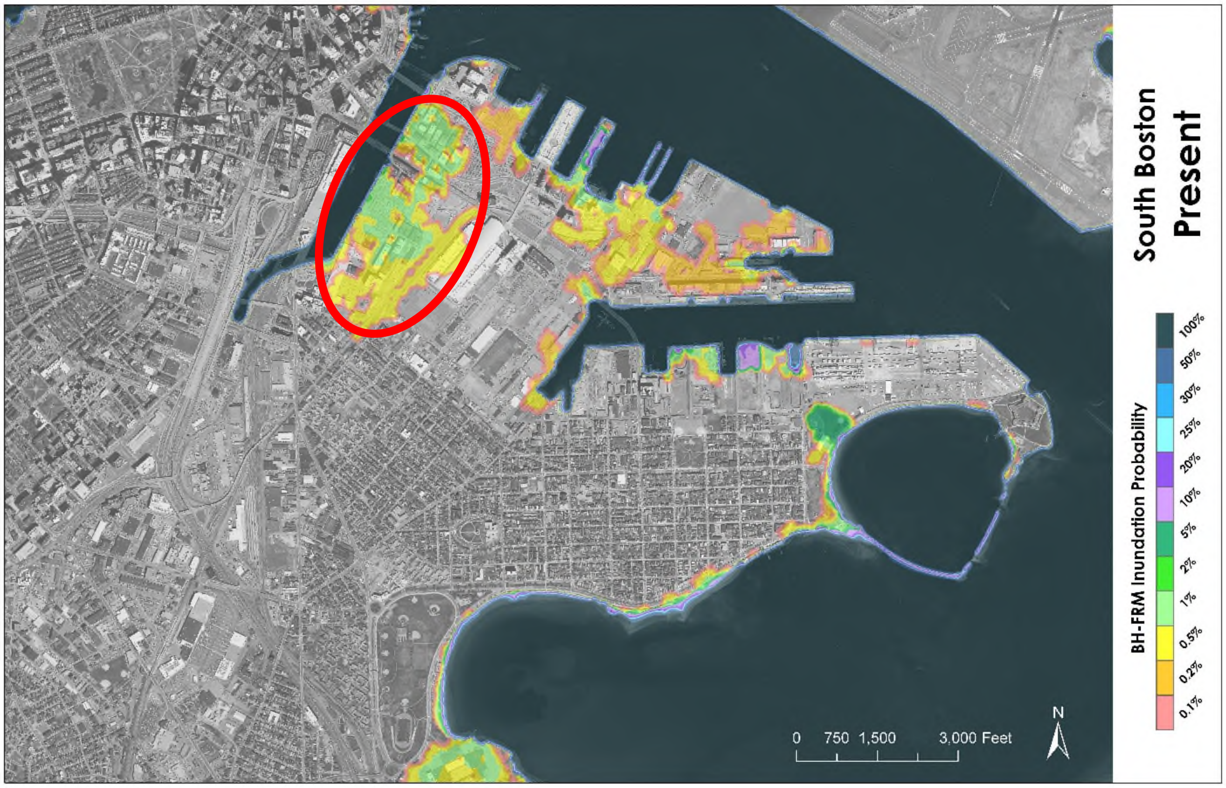


Figure 1. Probabilistic flood model results from the BH-FRM under present day conditions.

Under current day flood risk, the proposed project would be effective at minimizing surface water flooding from Fort Point Channel by mitigation of these three flood pathways. All other flooding in the area is fringe flooding that does not penetrate inland with any significant extent or volume.

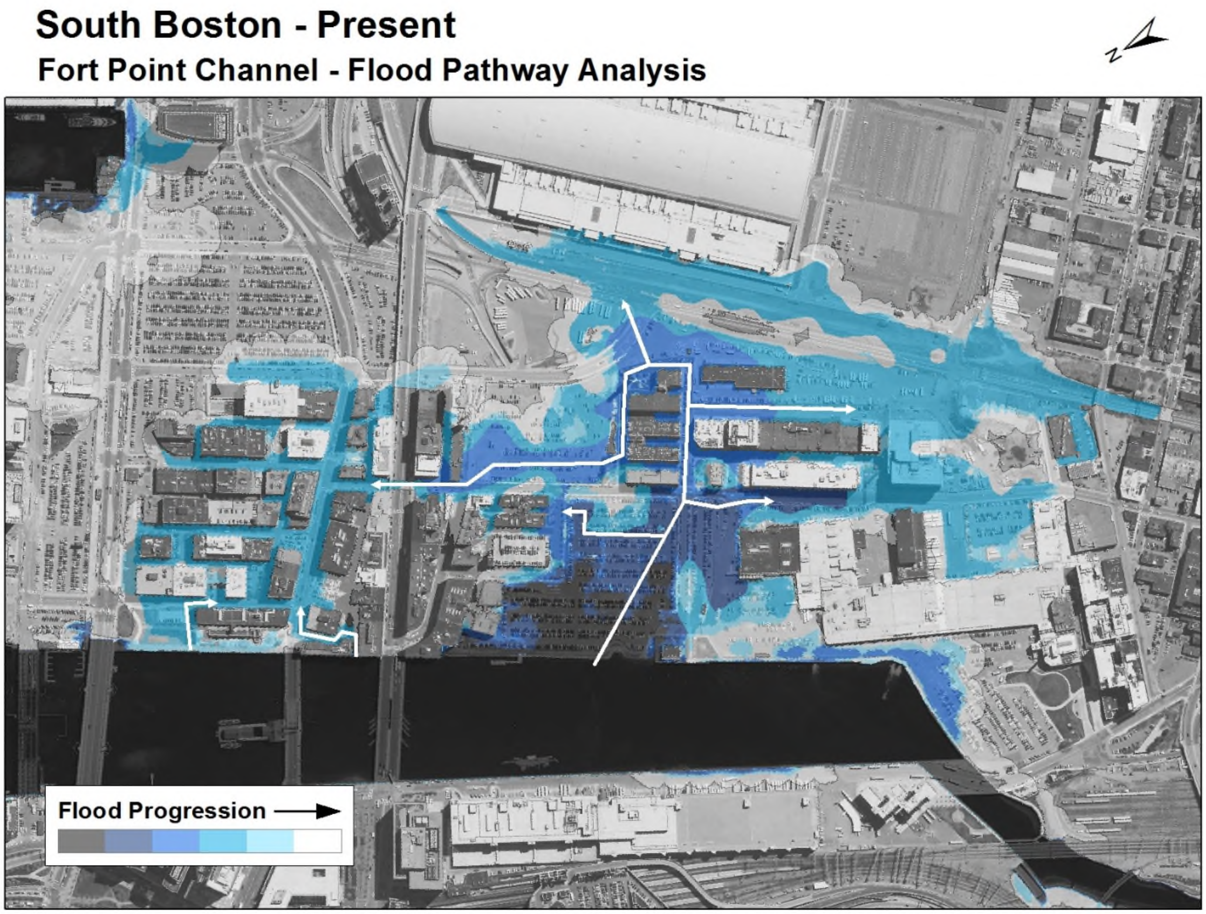


Figure 2. Flood pathway model for the eastern side of Fort Point Channel for present day storm conditions.

Looking forward with 9 inches of sea level rise, Figure 3 presents the probabilistic BH-FRM model results for the South Boston area. While the Climate Ready Boston assessment assumes that this level of flooding occurs in approximately 2030, this condition may occur decades later depending on the emission scenario that occurs. Figure 3 shows that flooding in the area has expanded, and there are additional flood entry points that occur around the area. However, at this stage in the changing climate, the Fort Point Channel flood area is still volumetrically isolated from the other flood areas around South Boston. While there are some minor connections at the 0.1% (1000-year) return period, this does not result in any significant volume of water propagating into the Fort Point Channel flood compartment.

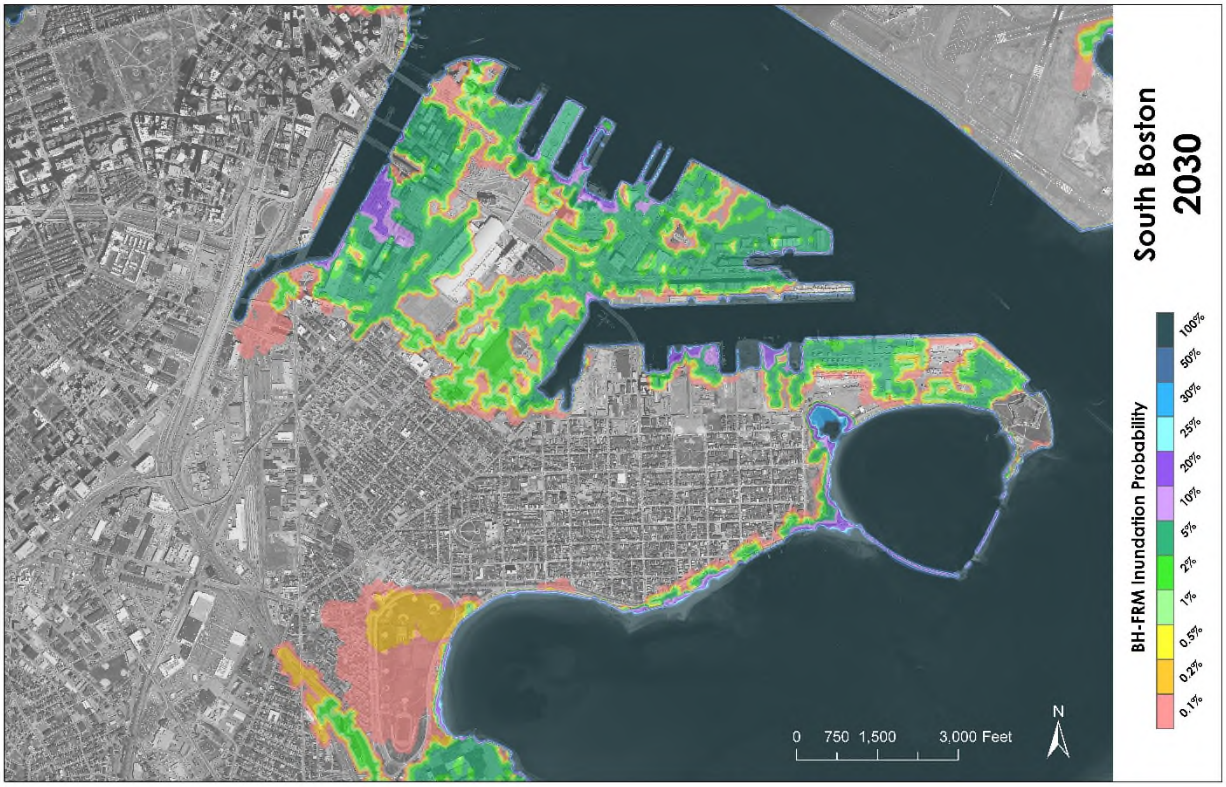


Figure 3. Probabilistic flood model results from the BH-FRM with 9 inches of sea level rise.

Figure 4 presents the results of the more detailed flood pathway modeling for the 9-inch sea level rise scenario. The same three flood entry points that appear for present day storm conditions, also occur with these future storm conditions. The volume of water entering from these flood entry points dominate the flooding in this area and penetrate further inland (to the Boston Convention and Exhibition Center) and adjacent areas. However, there are no significant volume connections that arrive to the Fort Point Channel flood area from other flood entry points around South Boston under this climate change level. While there are some minor connections and fringe flooding areas that occur during the most extreme storm return period (1000-year), these connections are driven by water arriving from the Fort Point Channel flood entry points and not from other locations (e.g., Reserve Channel).

More details on the development and results of the Boston Harbor Flood Risk Model can be found in Bosma et al. (2015), which was the recipient of the 2017 Federal Highway Administration Environmental Excellence Award.

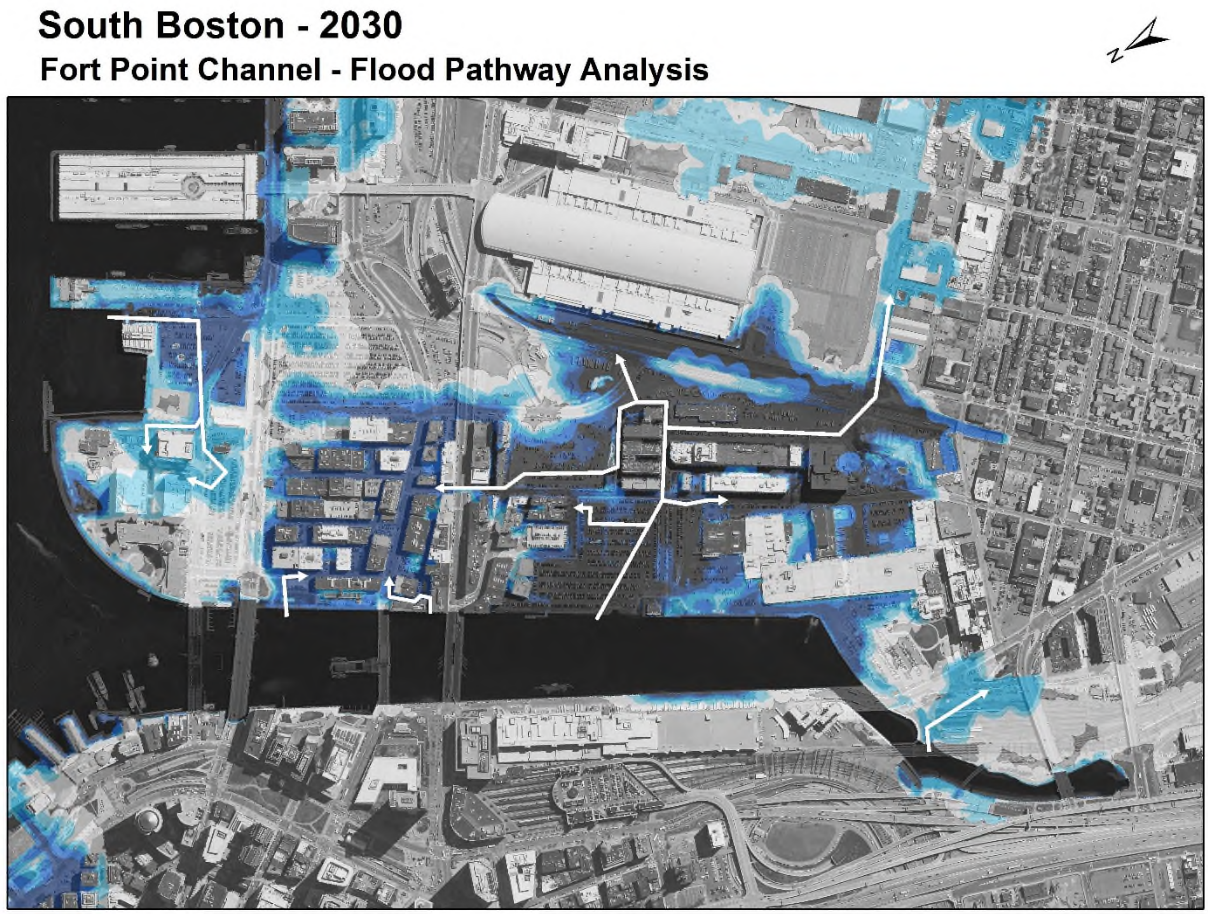
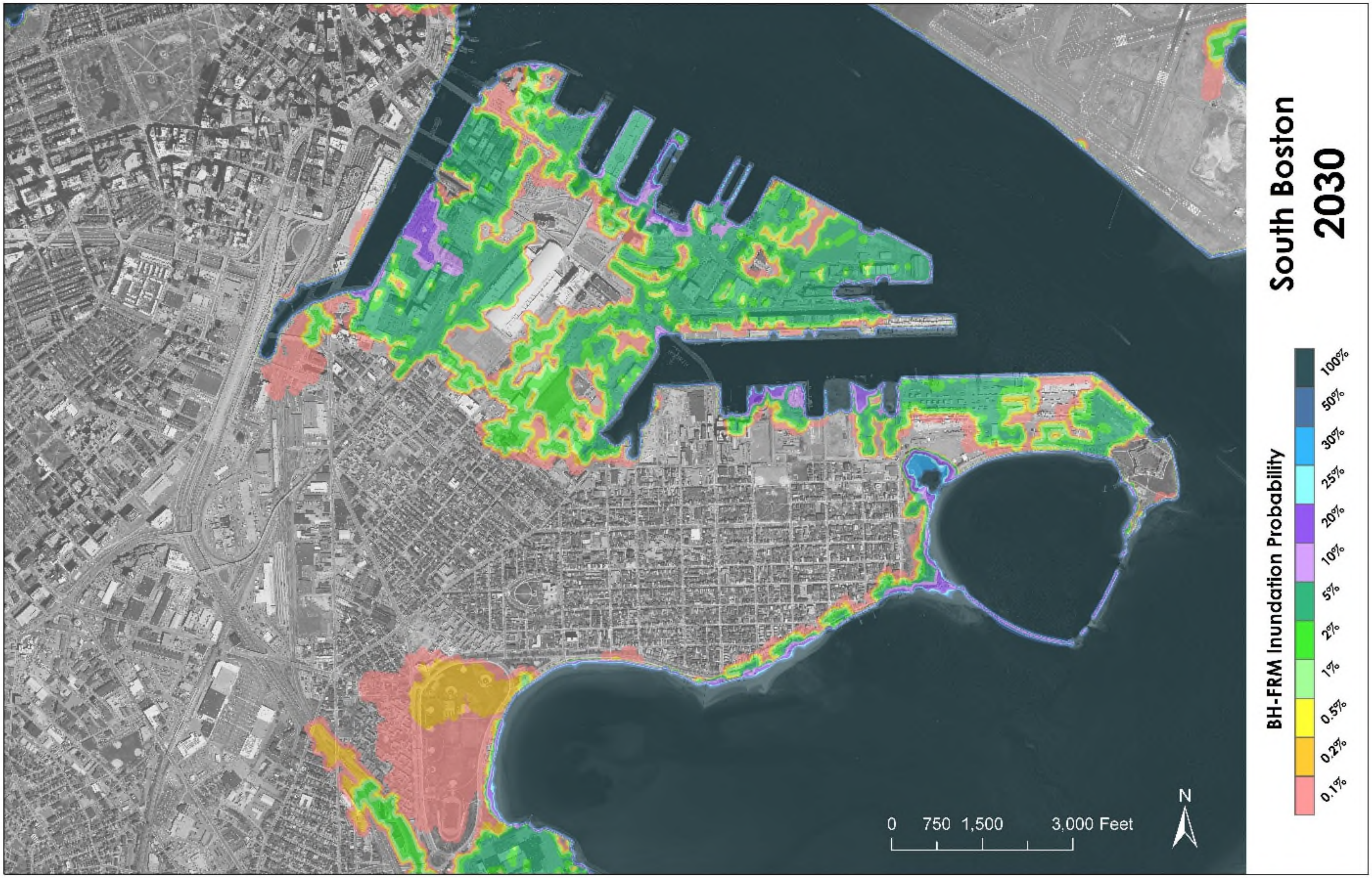


Figure 4. Flood pathway model for the eastern side of Fort Point Channel for storm conditions including 9 inches of sea level rise.

ATTACHMENT C

9-inch Sea Level Rise Maps



Probabilistic flood model results from the BH-FRM with 9 inches of sea level rise.

ATTACHMENT E

NACCs DDF Prototypes

6.5 Prototype 1A-1: Apartments – 1 Story – No Basement

Most Likely Building Characteristics: The prototype building is of unreinforced masonry construction on a slab foundation. It is one story. Utilities are located on the first floor. Ceiling height is 8'-0". Age range is between 15 and 30 years old. The FFE is 1'-0" above grade.
Minimum-Damage Building Characteristics: The prototype building is a newer building of steel or reinforced concrete construction on a slab foundation. It is one story. Utilities may be protected. The first floor elevation is 2'-0" above grade.
Higher-Damage Building Characteristics: The prototype building is an older building of wood frame or unreinforced masonry construction that is elevated above grade on a crawl space. See Table 11 below:

Table 11. Prototype 1A-1: Apartments – 1 Story – No Basement

	Most Likely	Minimum Damage	Maximum Damage
Stories	1	1	1
Foundation	Slab	Slab	Crawl Space
Utilities	1st floor	May be protected	
Age (years)	15 - 30	Newer	Older
Ceiling Height	8'-0"	8'-0"	8'-0"
Structure	Unreinforced masonry	Steel/ Reinforced concrete	Wood frame/ unreinforced masonry
Height of Finished Floor Above Grade	1'-0"	2'-0"	3'-0"

Damage function users are advised that the degree to which mold spreads throughout a building is a function of flood duration, humidity, and the amount of time it takes for people to reenter and remediate the building. The interrelationship of these last two factors is complex, and mold damages can vary widely as a result. If extensive mold is considered likely, the high damage function is considered more appropriate for use.
Table 12 through Table 20 provide the Prototype 1A-1: One-Story Apartments- No Basement; Inundation Damages, Erosion Damages, Wave-Slab Damages, and Wave-Wall Damages for structures and contents. Figure 38 through Figure 46 provide the corresponding damage functions.
Note regarding buildings with more than three stories and less than ten stories:

- For shallow foundations, use the Prototype 1 Damage Function
- For deep foundations, use the Prototype 4 Damage Function

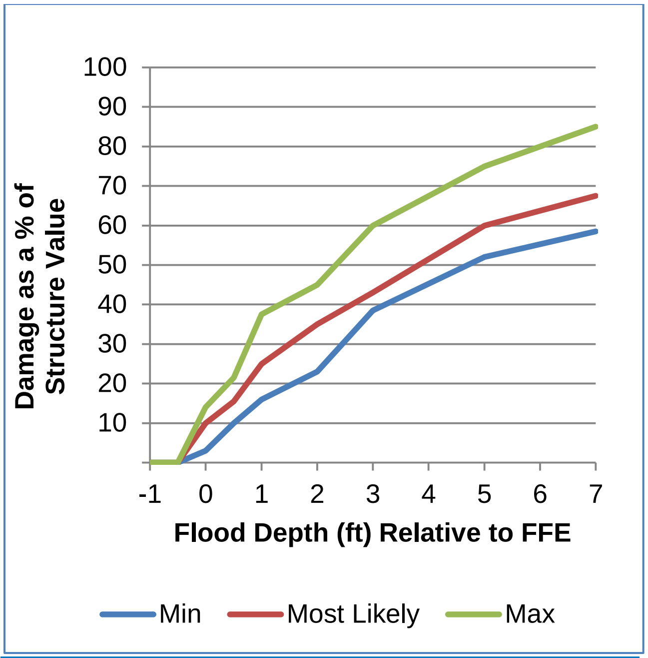


Figure 38. Prototype 1A1- Apartments – 1 Story – No Basement, Inundation Damage - Structure

Table 12. Prototype 1A-1: Apartments – 1 Story – No Basement, Inundation Damage – Structure

Flood Depth	Min	Most Likely	Max
-1.0	0	0	0
-0.5	0	0	0
0.0	3	10	14
0.5	10	16	22
1.0	16	25	38
2.0	23	35	45
3.0	39	43	60
5.0	52	60	75
7.0	59	68	85

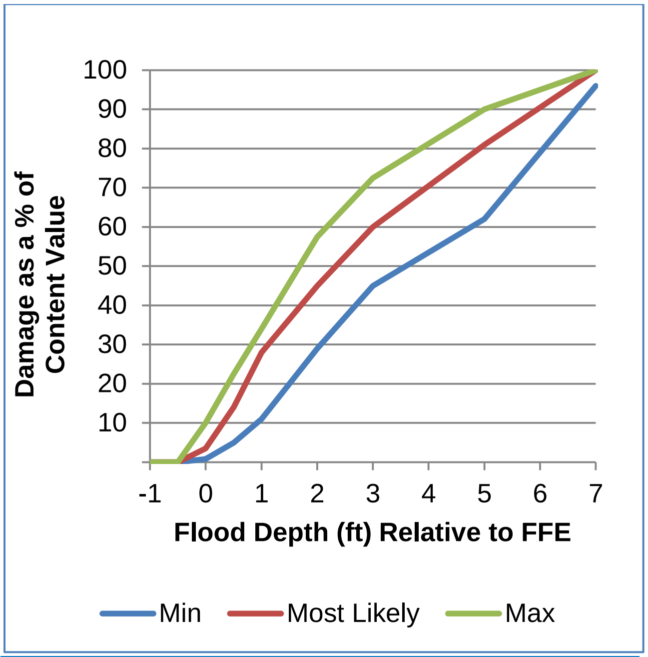


Figure 39. Prototype 1A-1: Apartments – 1 Story – No Basement, Inundation Damage – Content

Table 13. Prototype 1A-1: Apartments – 1 Story – No Basement, Inundation Damage – Content

Flood Depth	Min	Most Likely	Max
-1.0	0	0	0
-0.5	0	0	0
0.0	1	4	10
0.5	5	14	23
1.0	11	28	34
2.0	29	45	58
3.0	45	60	73
5.0	62	81	90
7.0	96	100	100

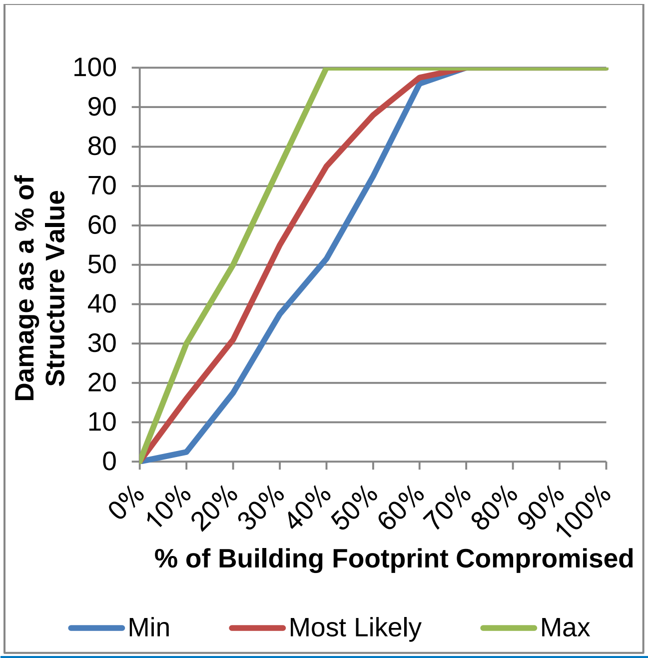


Figure 40. Prototype 1A-1: Apartments – 1 Story – No Basement, Erosion Damage – Structure

Table 14. Prototype 1A-1: Apartments – 1 Story – No Basement, Erosion Damage – Structure

Percent Comp-romised	Min	Most Likely	Max
0%	0	0	0
10%	3	16	30
20%	18	31	50
30%	38	55	75
40%	52	75	100
50%	73	88	100
60%	96	98	100
70%	100	100	100
80%	100	100	100
90%	100	100	100
100%	100	100	100

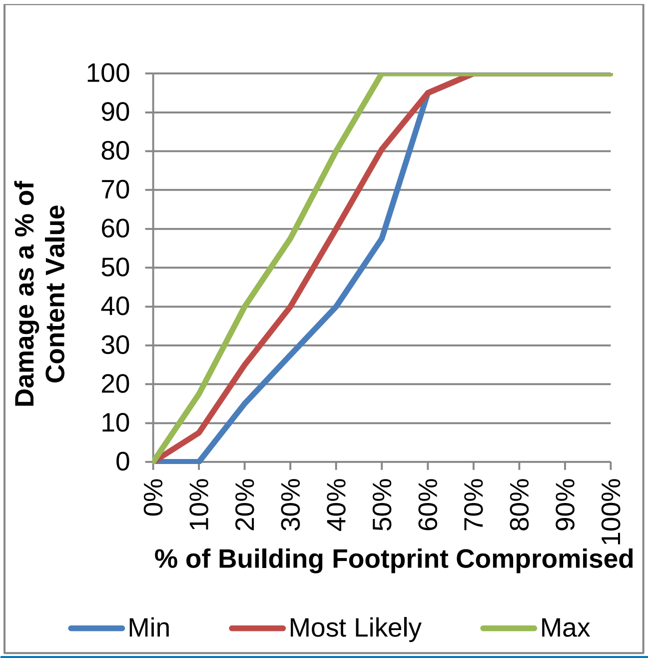


Figure 41. Prototype 1A-1: Apartments – 1 Story – No Basement, Erosion Damage - Content

Table 15. Prototype 1A-1: Apartments – 1 Story – No Basement, Erosion Damage - Content

Percent Comp-romised	Min	Most Likely	Max
0%	0	0	0
10%	0	8	18
20%	15	25	40
30%	28	40	58
40%	40	60	80
50%	58	81	100
60%	95	95	100
70%	100	100	100
80%	100	100	100
90%	100	100	100
100%	100	100	100

Note: Wave and erosion damage functions are only to be used for structures that are close to the shoreline.

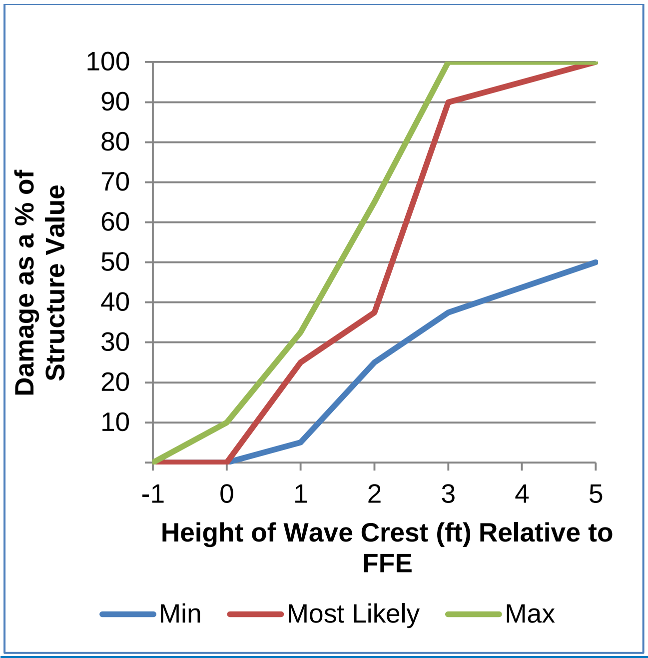


Figure 42. Prototype 1A-1: Apartments – 1 Story – No Basement, Wave Damage, Slab Foundation – Structure

Table 16. Prototype 1A-1: Apartments – 1 Story – No Basement, Wave Damage, Slab Foundation – Structure

Wave Crest	Min	Most Likely	Max
-1	0	0	0
0	0	0	10
1	5	25	32.5
2	25	37.5	65
3	37.5	90	100
5	50	100	100

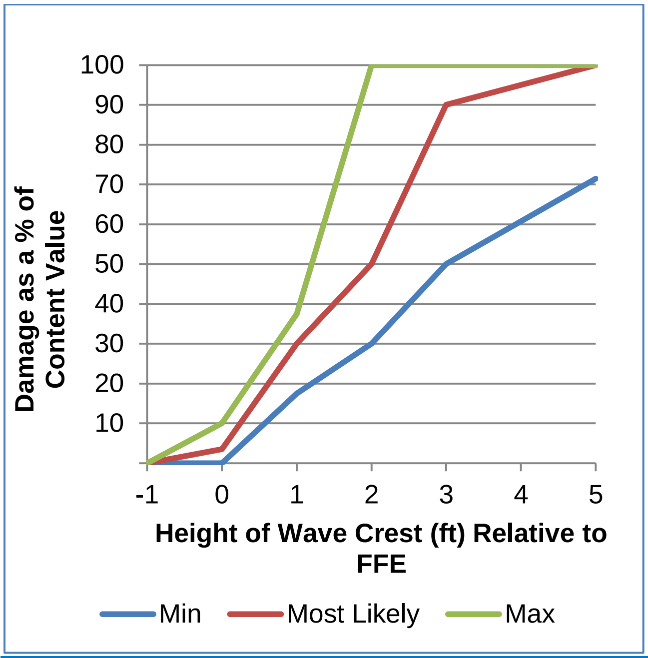


Figure 43. Prototype 1A-1: Apartments – 1 Story – No Basement, Wave Damage, Slab Foundation - Content

Table 17. Prototype 1A-1: Apartments – 1 Story – No Basement, Wave Damage, Slab Foundation - Content

Wave Crest	Min	Most Likely	Max
-1	0	0	0
0	0	3.5	10
1	17.5	30	37.5
2	30	50	100
3	50	90	100
5	71.5	100	100

Note: Wave and erosion damage functions are only to be used for structures that are close to the shoreline.

Table 18 and Figure 44 show wave, surge, and still water[14] characteristics associated with 100% wave damage for the most likely building characteristics of a single-story apartment building without a basement (Prototype 1A-1). This prototype has a slab foundation and a FFE of 1.0 feet above grade. With depth-limited breaking waves (typically the most damaging wave condition), 100% wave damage for this prototype is expected to occur with a still water depth (d) of 3.9 feet. This still water depth will typically allow a maximum wave height of 3.0 feet (H_b = .78d). The wave crest under this condition would be approximately 6.0 feet above grade ($0.7H_b$ + d).

[14] See Definitions section at the end of this report

Table 18. Building, Flood, and Wave Characteristics, Maximum Wave Damage Scenario, Prototype 1A-1 Apartments – 1 Story – No Basement, Most Likely Building Characteristics, Slab Foundation

Designation	Characteristic	Feet
A	FFE Above Grade	1.0
B	Wave Crest Height Above FFE	5.0
C	Breaking Wave Height (H_b = 0.78d)	3.0
D	$0.7H_b$	2.1
E	Still Water Elevation (d)	3.9
F	Wave Crest Elevation ($0.7H_b$ + d)	6.0

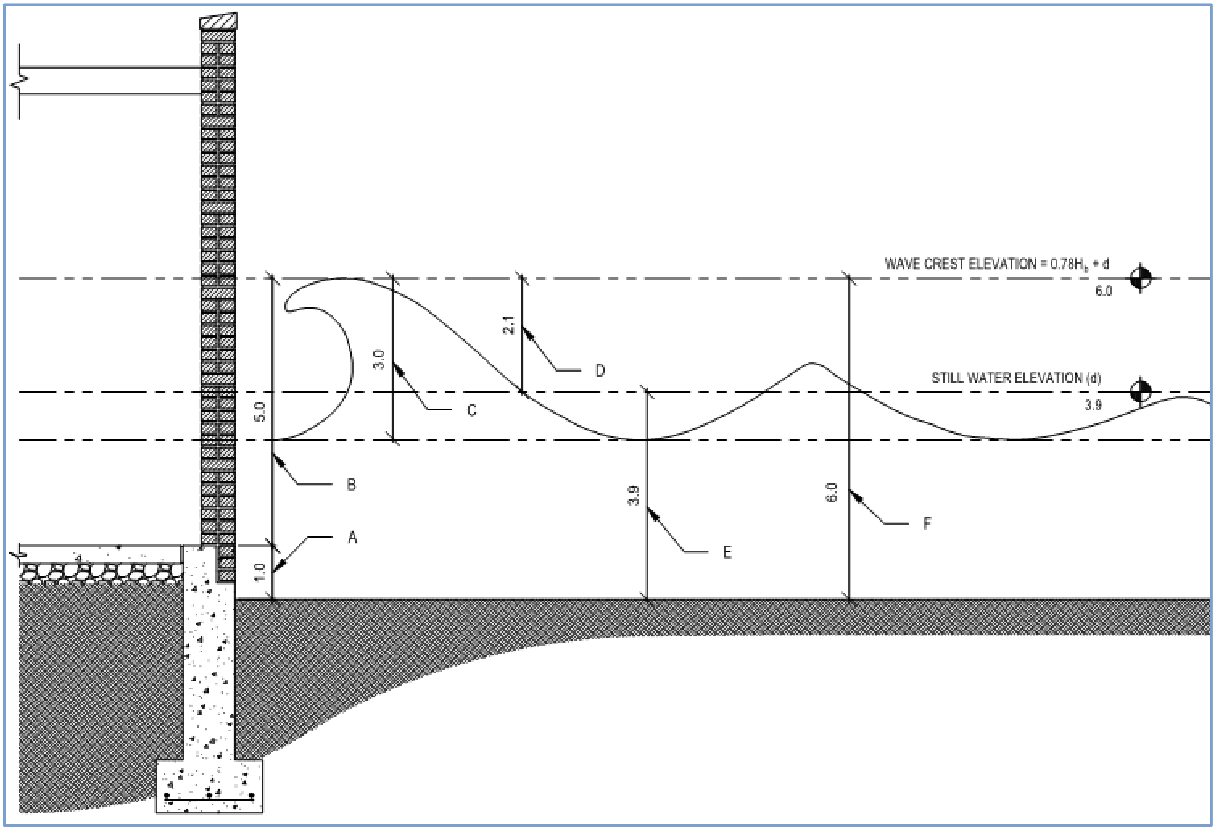


Figure 44. Illustration of Maximum Wave Damage Scenario, Prototype 1A-1 Most Likely Building Characteristics, Slab Foundation

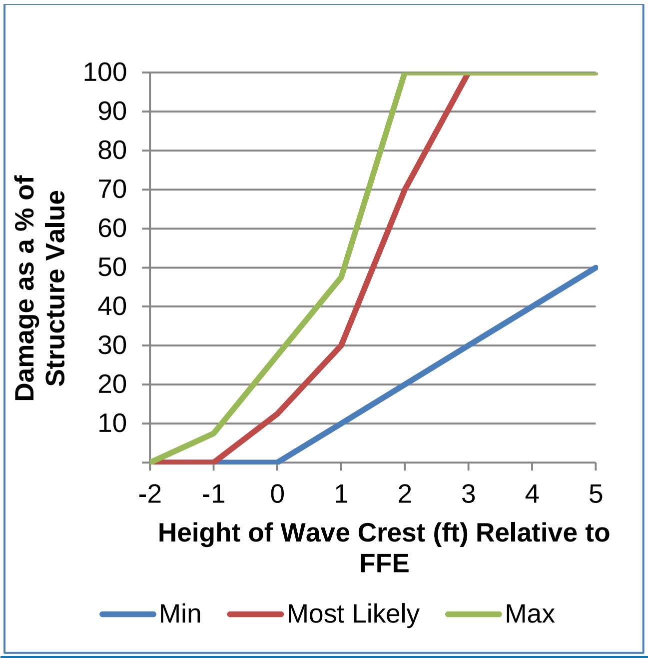


Figure 45. Prototype 1A-1: Apartments – 1 Story – No Basement, Wave Damage, Extended Foundation Wall - Structure

Table 19. Prototype 1A-1: Apartments – 1 Story – No Basement, Wave Damage, Extended Foundation Wall - Structure

Wave Crest	Min	Most Likely	Max
-2	0	0	0
-1	0	0	7.5
0	0	12.5	27.5
1	10	30	47.5
2	20	70	100
3	30	100	100
5	50	100	100

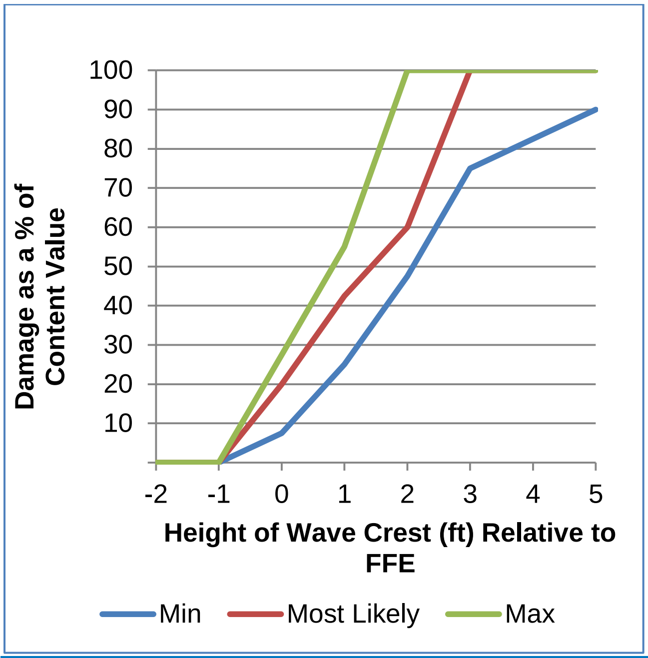


Figure 46. Prototype 1A-1: Apartments – 1 Story – No Basement, Wave Damage, Extended Foundation Wall- Content

Table 20. Prototype 1A-1: Apartments – 1 Story – No Basement, Wave Damage, Extended Foundation Wall- Content

Wave Crest	Min	Most Likely	Max
-2	0	0	0
-1	0	0	0
0	7.5	20	27.5
1	25	42.5	55
2	47.5	60	100
3	75	100	100
5	90	100	100

Note: Wave and erosion damage functions are only to be used for structures that are close to the shoreline.

6.6 Prototype 1A-3: Apartments – 3 Stories – No Basement

Most Likely Building Characteristics: The prototype building is of unreinforced masonry construction on a slab foundation. It has three stories. Utilities are located on the first floor. Ceiling height is 8'-0". Age range is between 15 and 30 years old. The finished floor is 1'-0" above grade.

Minimum-Damage Building Characteristics: The prototype building is a newer building of steel or reinforced concrete construction on a slab foundation. It has three stories. Utilities may be protected. The finished floor is 2'-0" above grade.

Higher-Damage Building Characteristics: The prototype building is an older building of wood frame or unreinforced masonry construction that is elevated above grade on a crawl space. It has three stories.

See Table 21 below:

Table 21. Prototype 1A-3: Apartments – 3 Stories – No Basement: Building Characteristics

	Most Likely	Minimum Damage	Maximum Damage
Stories	3	3	3
Foundation	Slab	Slab	Crawl Space
Utilities	1st floor	May be protected	
Age (years)	15 - 30	Newer	Older
Ceiling Height	8'-0"	8'-0"	8'-0"
Structure	Unreinforced masonry	Steel/ Reinforced concrete	Wood frame/ unreinforced masonry
Height of Finished Floor Above Grade	1'-0"	2'-0"	

Table 22 and Table 23 are presented below. Figure 47 and Figure 48, present the corresponding damage functions.

Damage function users are advised that the degree to which mold spreads throughout a building is a function of flood duration, humidity, and the amount of time it takes for people to reenter and remediate the building. The interrelationship of these last two factors is complex, and mold damages can vary widely as a result. If extensive mold is considered likely, the high damage function is considered more appropriate for use.

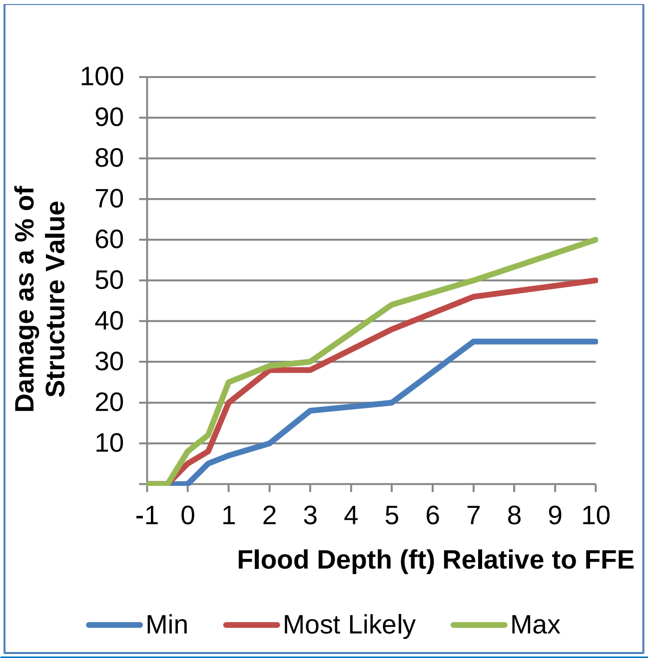


Figure 47. Prototype 1A-3: Apartments – 3 Stories – No Basement, Inundation Damage – Structure

Table 22. Prototype 1A-3: Apartments – 3 Stories – No Basement, Inundation Damage – Structure

Flood Depth	Min	Most Likely	Max
-1.0	0	0	0
-0.5	0	0	0
0.0	0	5	8
0.5	5	8	12
1.0	7	20	25
2.0	10	28	29
3.0	18	28	30
5.0	20	38	44
7.0	35	46	50
10.0	35	50	60

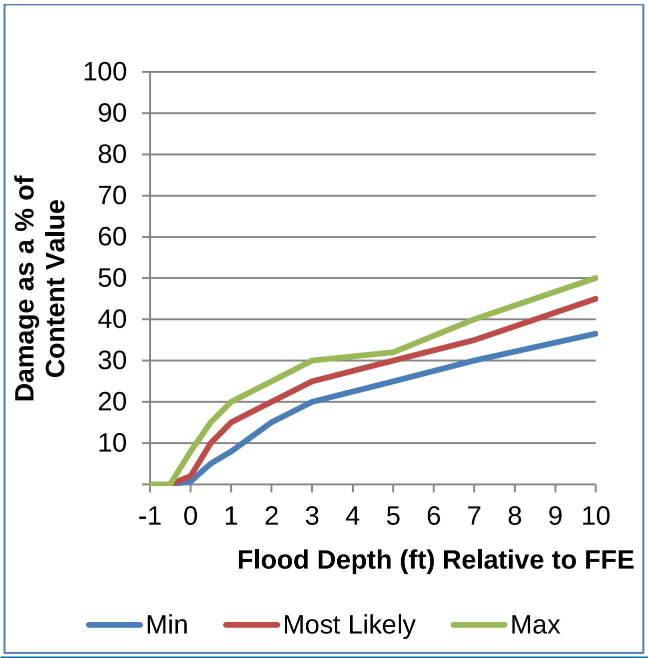


Figure 48. Prototype 1A-3: Apartments – 3 Stories – No Basement, Inundation Damage – Content

Table 23. Prototype 1A-3: Apartments – 3 Stories – No Basement, Inundation Damage – Content

Flood Depth	Min	Most Likely	Max
-1.0	0	0	0
-0.5	0	0	0
0.0	1	2	8
0.5	5	10	15
1.0	8	15	20
2.0	15	20	25
3.0	20	25	30
5.0	25	30	32
7.0	30	35	40
10.0	37	45	50

6.7 Prototype 2: Commercial – Engineered

Most Likely Building Characteristics: The building has a steel frame with precast infill.

Minimum-Damage Building Characteristics: The building has a reinforced concrete frame.

Higher-Damage Building Characteristics: The building has a steel frame with light cladding.

See Table 24 below:

Table 24. Prototype 2: Commercial Engineered: Building Characteristics

	Most Likely	Minimum Damage	Maximum Damage
Stories	2	2	2
Foundation	Slab	Slab	Slab
Structure	Steel frame; precast infill	Reinforced concrete	Steel frame with light cladding
Cladding		Concrete Panels	Light cladding
Height of Finished Floor Above Grade	0'-0"	0'-0"	0'-0"

Damage function users are advised that the degree to which mold spreads throughout a building is a function of flood duration, humidity, and the amount of time it takes for people to reenter and remediate the building. The interrelationship of these last two factors is complex, and mold damages can vary widely as a result. If extensive mold is considered likely, the high damage function is considered more appropriate for use.

Table 25 through Table 33 present Prototype 2 Inundation Damages to Structure, Perishable and Nonperishable Contents; Erosion Damages to Structure, Perishable Contents and Nonperishable Contents; and Wave Damages to Structure, Perishable Contents and Nonperishable Contents. Figure 49 through Figure 57 present the corresponding damage functions.

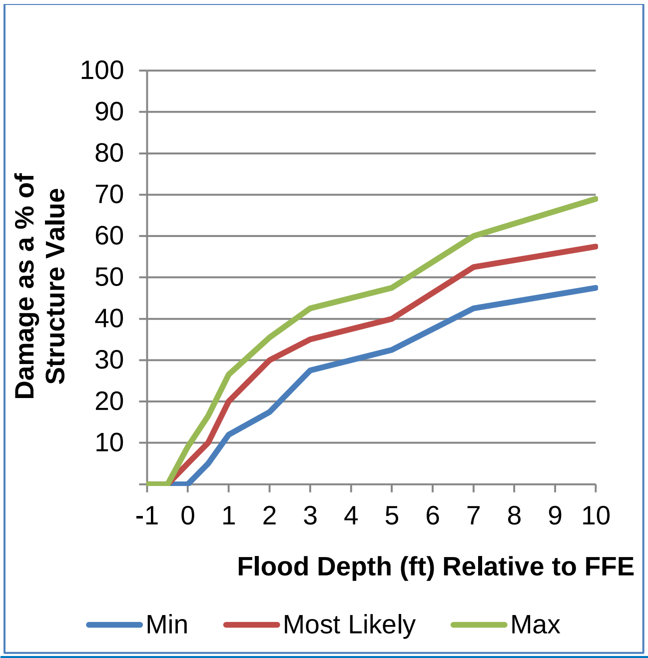


Figure 49. Prototype 2: Commercial Engineered, Inundation Damage – Structure

Table 25. Prototype 2: Commercial Engineered, Inundation Damage – Structure

Flood Depth	Min	Most Likely	Max
-1.0	0	0	0
-0.5	0	0	0
0.0	0	5	9
0.5	5	10	17
1.0	12	20	27
2.0	18	30	36
3.0	28	35	43
5.0	33	40	48
7.0	43	53	60
10.0	48	58	69

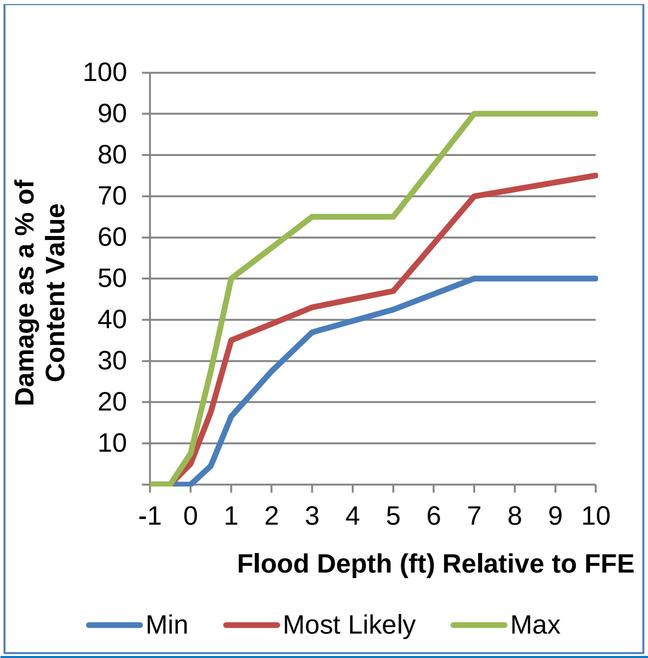


Figure 50. Prototype 2: Commercial Engineered, Inundation Damage – Perishable Content

Table 26. Prototype 2: Commercial Engineered, Inundation Damage – Perishable Content

Flood Depth	Min	Most Likely	Max
-1.0	0	0	0
-0.5	0	0	0
0.0	0	5	8
0.5	5	18	28
1.0	17	35	50
2.0	28	39	58
3.0	37	43	65
5.0	43	47	65
7.0	50	70	90
10.0	50	75	90

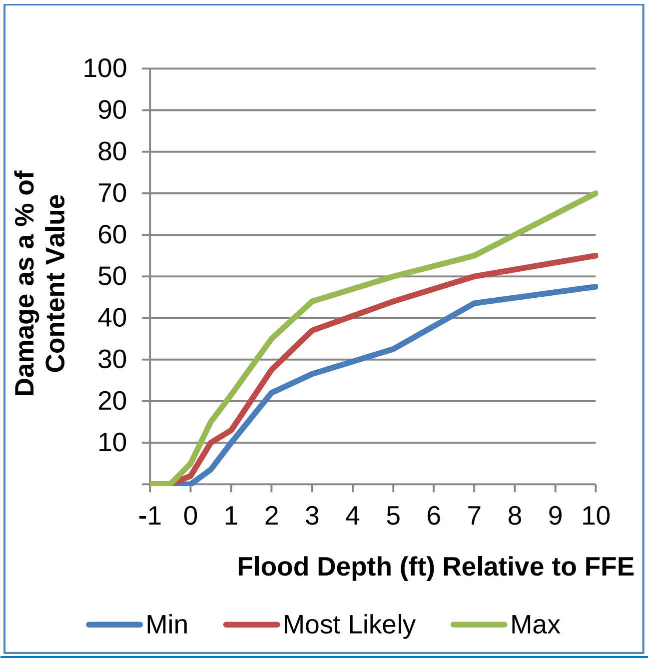


Figure 51. Prototype 2: Commercial Engineered, Inundation Damage – Nonperishable Content

Table 27. Prototype 2: Commercial Engineered, Inundation Damage – Nonperishable Content

Flood Depth	Min	Most Likely	Max
-1.0	0	0	0
-0.5	0	0	0
0.0	0	2	5
0.5	4	10	15
1.0	10	13	22
2.0	22	28	35
3.0	27	37	44
5.0	33	44	50
7.0	44	50	55
10.0	48	55	70

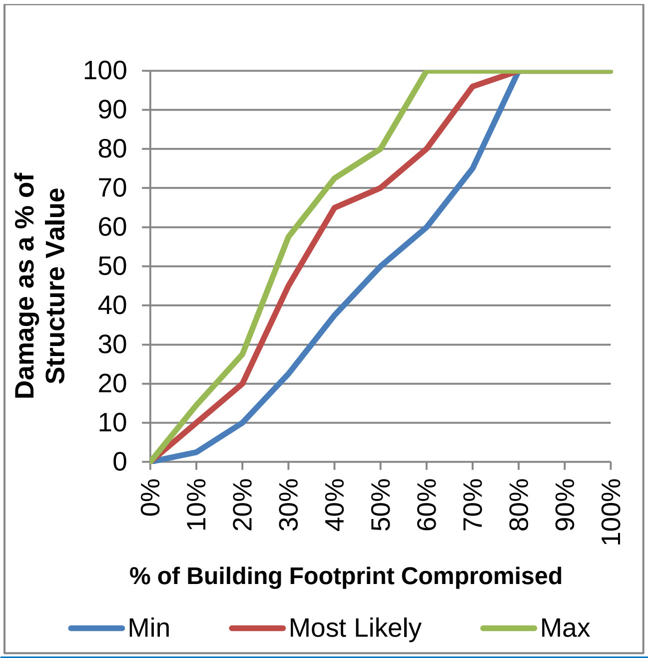


Figure 52. Prototype 2: Commercial Engineered, Erosion Damage - Structure

Table 28. Prototype 2: Commercial Engineered, Erosion Damage - Structure

Percent Comp-romised	Min	Most Likely	Max
0%	0	0	0
10%	3	10	15
20%	10	20	28
30%	23	45	58
40%	38	65	73
50%	50	70	80
60%	60	80	100
70%	75	96	100
80%	100	100	100
90%	100	100	100
100%	100	100	100

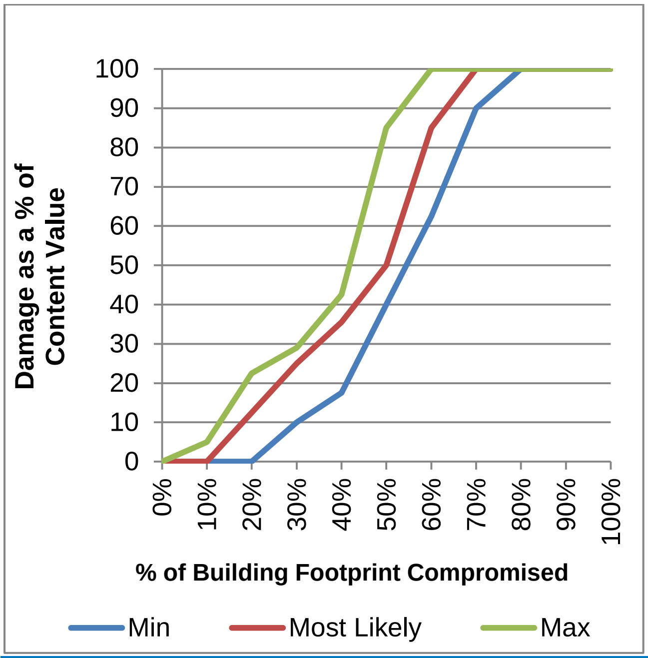


Figure 53. Prototype 2: Commercial Engineered, Erosion Damage - Perishable Content

Table 29. Prototype 2: Commercial Engineered, Erosion Damage - Perishable Content

Percent Comp -romised	Min	Most Likely	Max
0%	0	0	0
10%	0	0	5
20%	0	13	23
30%	10	25	29
40%	18	36	43
50%	40	50	85
60%	63	85	100
70%	90	100	100
80%	100	100	100
90%	100	100	100
100%	100	100	100

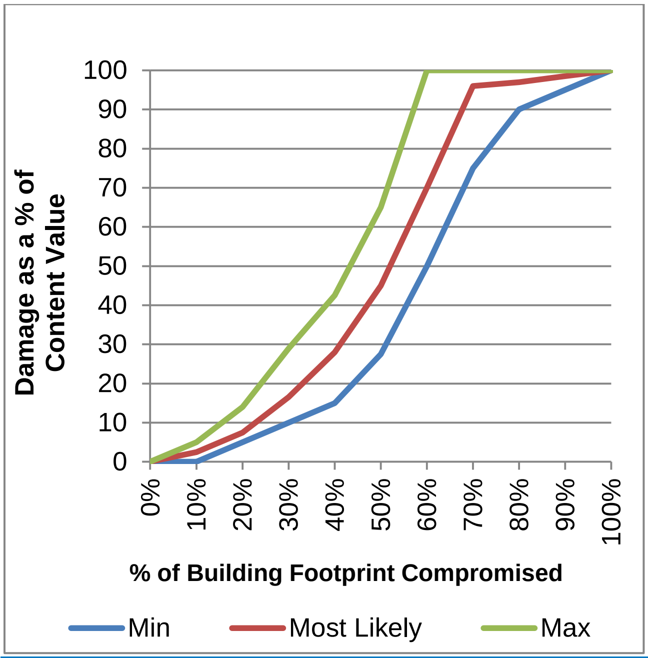


Figure 54. Prototype 2: Commercial Engineered, Erosion Damage - Nonperishable Content

Table 30. Prototype 2: Commercial Engineered, Erosion Damage - Nonperishable Content

Percent Comp-romised	Min	Most Likely	Max
0%	0	0	0
10%	0	3	5
20%	5	8	14
30%	10	17	29
40%	15	28	43
50%	28	45	65
60%	50	70	100
70%	75	96	100
80%	90	97	100
90%	95	99	100
100%	100	100	100

Note: Wave and erosion damage functions are only to be used for structures that are close to the shoreline.

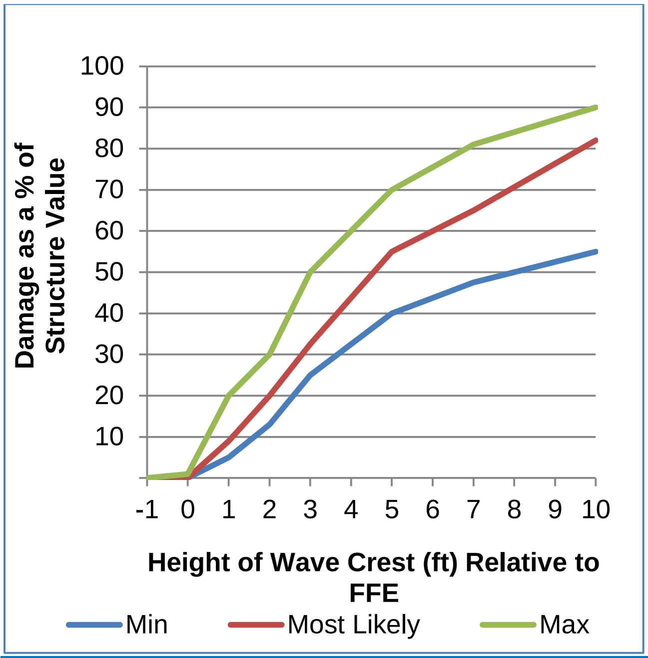


Figure 55. Prototype 2: Commercial Engineered, Wave Damage - Structure

Table 31. Prototype 2: Commercial Engineered, Wave Damage - Structure

Wave Crest	Min	Most Likely	Max
-1	0	0	0
0	0	0	1
1	5	9	20
2	13	20	30
3	25	33	50
5	40	55	70
7	48	65	81
10	55	82	90

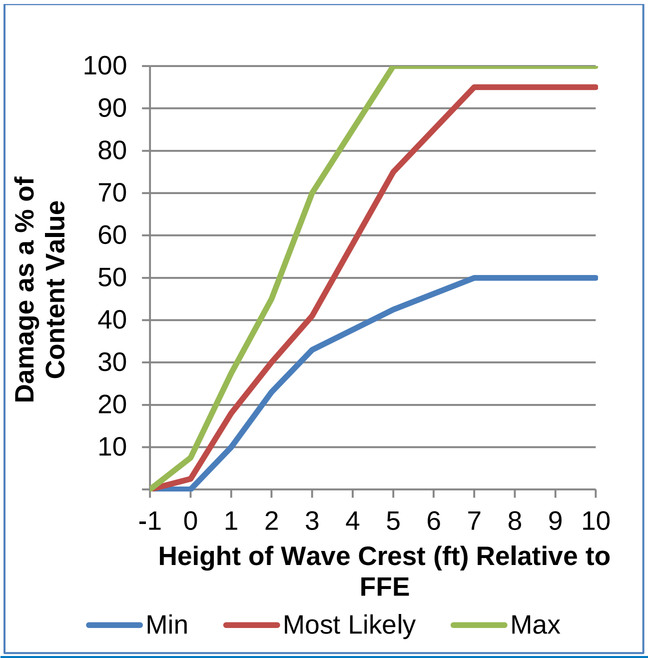


Figure 56. Prototype 2: Commercial Engineered, Wave Damage – Perishable Content

Table 32. Prototype 2: Commercial Engineered, Wave Damage – Perishable Content

Wave Crest	Min	Most Likely	Max
-1	0	0	0
0	0	3	8
1	10	18	28
2	23	30	45
3	33	41	70
5	43	75	100
7	50	95	100
10	50	95	100

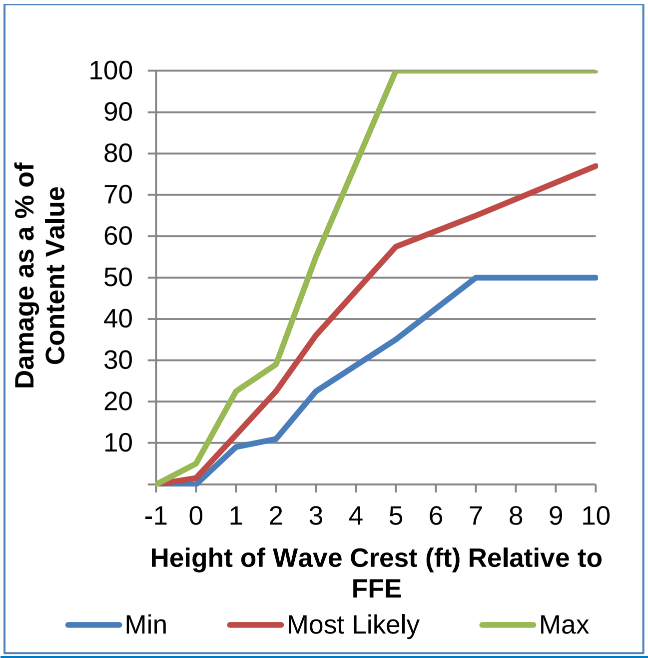


Figure 57. Prototype 2: Commercial Engineered, Wave Damage – Nonperishable Content

Table 33. Prototype 2: Commercial Engineered, Wave Damage – Nonperishable Content

Wave Crest	Min	Most Likely	Max
-1	0	0	0
0	0	2	5
1	9	12	23
2	11	23	29
3	23	36	55
5	35	58	100
7	50	65	100
10	50	77	100

Note: Wave and erosion damage functions are only to be used for structures that are close to the shoreline.

A point of failure illustration for wave damage is not provided for this prototype because a building of this type was not expected to experience 100% damage as a result of wave impact.

6.8 Prototype 3: Commercial – Non/Pre Engineered

Most Likely Building Characteristics: The building has a steel or light metal frame and a slab foundation. The finished floor is 1'-0" above grade.

Minimum-Damage Building Characteristics: The building has a steel frame with masonry infill, and a slab foundation. The finished floor is 1'-0" above grade.

Higher-Damage Building Characteristics: The building has a wood or light metal frame and is elevated above grade on a crawl space. The finished floor is 3'-0" above grade.

See Table 34 below:

Table 34. Prototype 3: Commercial Non/Pre-Engineered: Building Characteristics

	Most Likely	Minimum Damage	Maximum Damage
Stories	1	1	1
Foundation	Slab	Slab	Crawl space
Structure	Steel or light metal	Steel with masonry infill	Wood frame or light metal
Height of Finished Floor Above Grade	1'-0"	1'-0"	3'-0"

Damage function users are advised that the degree to which mold spreads throughout a building is a function of flood duration, humidity, and the amount of time it takes for people to reenter and remediate the building. The interrelationship of these last two factors is complex, and mold damages can vary widely as a result. If extensive mold is considered likely, the high damage function is considered more appropriate for use.

Table 34 through Table 43 presents Prototype 3 Commercial Non-Engineered Inundation, erosion and wave damages for structural, and perishable and nonperishable contents. Figure 58 through Figure 66 present the corresponding damage functions.

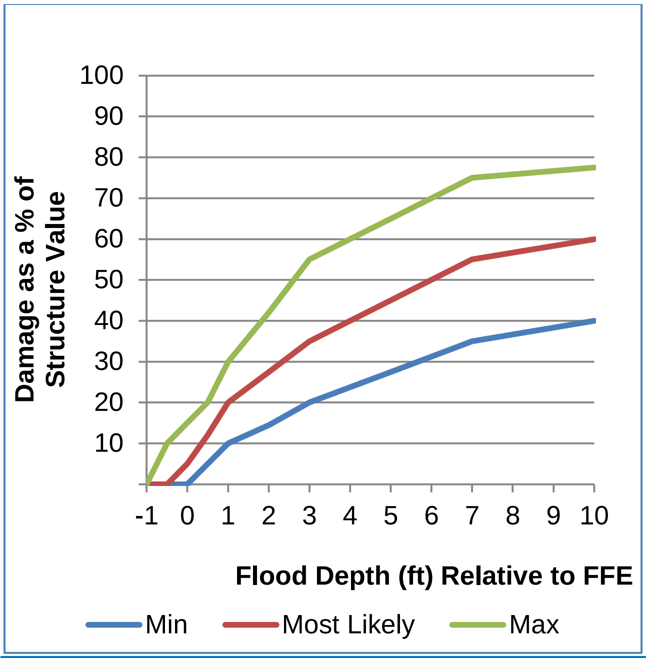


Figure 58. Prototype 3: Commercial Non/Pre-Engineered, Inundation Damage – Structure

Table 35. Prototype 3: Commercial Non/Pre-Engineered, Inundation Damage – Structure

Flood Depth	Min	Most Likely	Max
-1.0	0	0	0
-0.5	0	0	10
0.0	0	5	15
0.5	5	12	20
1.0	10	20	30
2.0	15	28	42
3.0	20	35	55
5.0	28	45	65
7.0	35	55	75
10.0	40	60	78

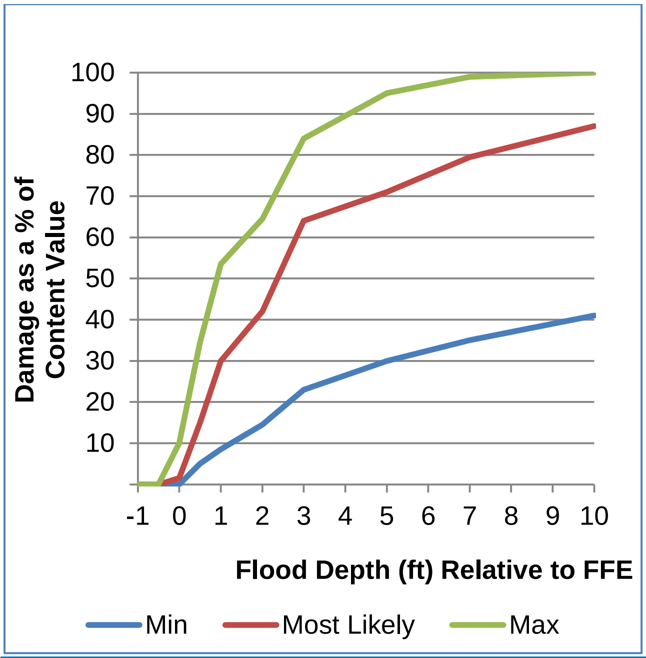


Figure 59. Prototype 3: Commercial Non/Pre-Engineered, Inundation Damage – Perishable Content

Table 36. Prototype 3: Commercial Non/Pre-Engineered, Inundation Damage – Perishable Content

Flood Depth	Min	Most Likely	Max
-1.0	0	0	0
-0.5	0	0	0
0.0	0	2	10
0.5	5	15	35
1.0	9	30	54
2.0	15	42	65
3.0	23	64	84
5.0	30	71	95
7.0	35	80	99
10.0	41	87	100

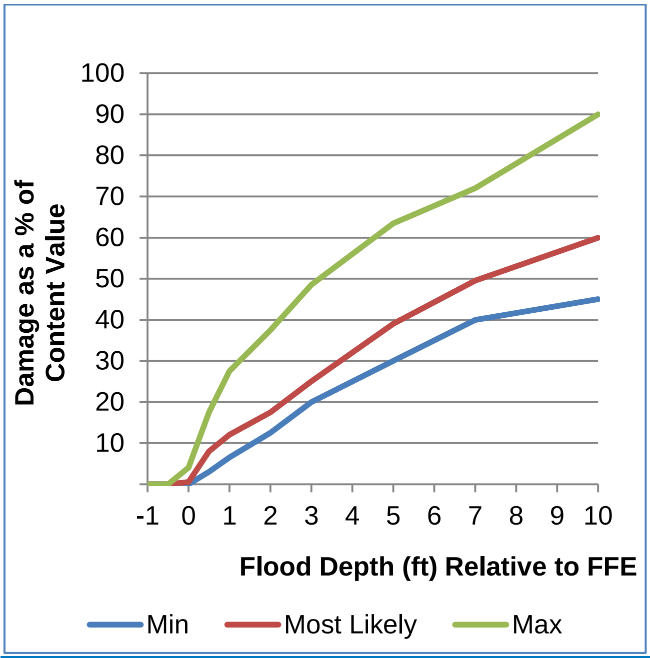


Figure 60. Prototype 3: Commercial Non/Pre-Engineered, Inundation Damage – Nonperishable Content

Table 37. Prototype 3: Commercial Non/Pre-Engineered, Inundation Damage – Nonperishable Content

Flood Depth	Min	Most Likely	Max
-1.0	0	0	0
-0.5	0	0	0
0.0	0	1	4
0.5	3	8	18
1.0	7	12	28
2.0	13	18	38
3.0	20	25	49
5.0	30	39	64
7.0	40	50	72
10.0	45	60	90

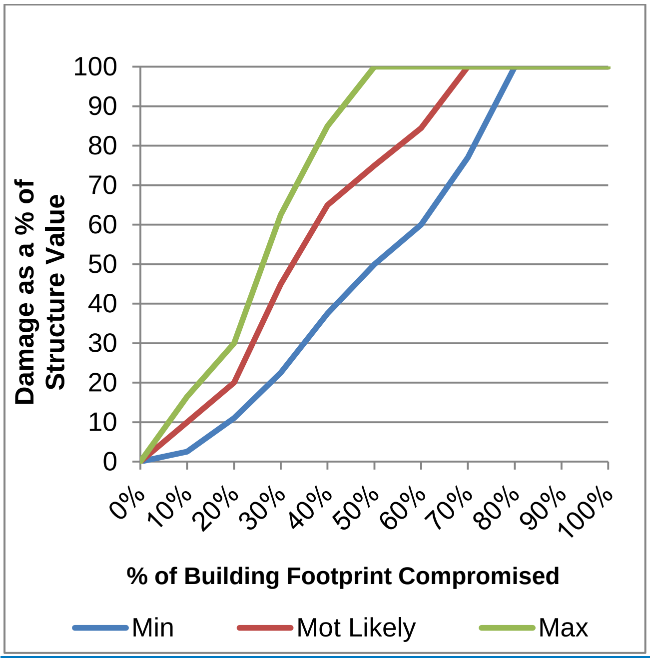


Figure 61. Prototype 3: Commercial Non/Pre-Engineered, Erosion Damage - Structure

Table 38. Prototype 3: Commercial Non/Pre-Engineered, Erosion Damage - Structure

Percent Comp-romised	Min	Most Likely	Max
0%	0	0	0
10%	3	10	17
20%	11	20	30
30%	23	45	63
40%	38	65	85
50%	50	75	100
60%	60	85	100
70%	77	100	100
80%	100	100	100
90%	100	100	100
100%	100	100	100

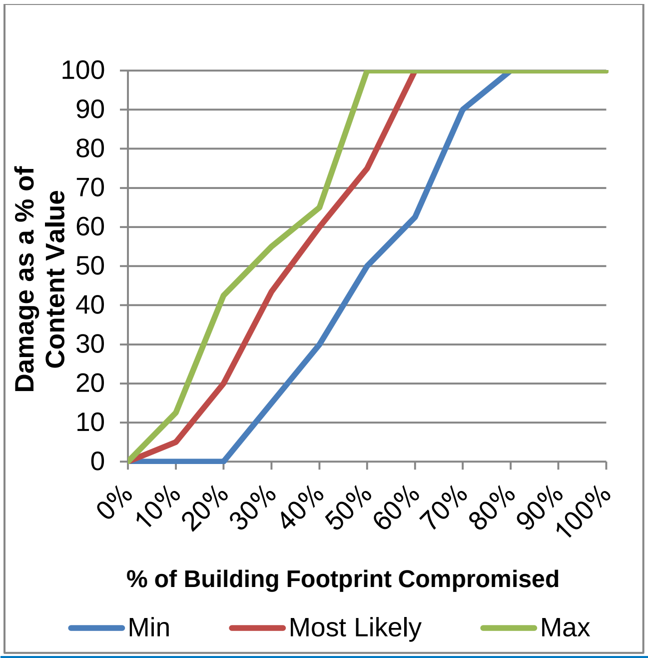


Figure 62. Prototype 3: Commercial Non/Pre-Engineered, Erosion Damage – Perishable Content

Table 39. Prototype 3: Commercial Non/Pre-Engineered, Erosion Damage – Perishable Content

Percent Comp-romised	Min	Most Likely	Max
0%	0	0	0
10%	0	5	13
20%	0	20	43
30%	15	44	55
40%	30	60	65
50%	50	75	100
60%	63	100	100
70%	90	100	100
80%	100	100	100
90%	100	100	100
100%	100	100	100

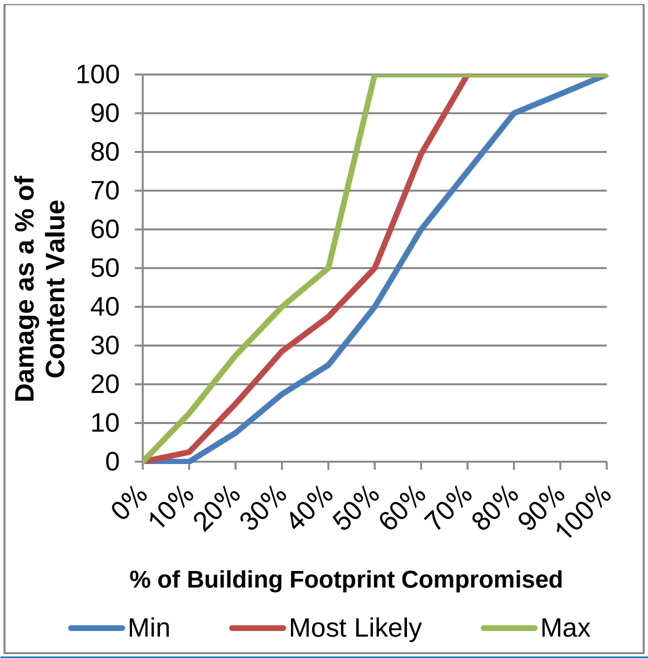


Figure 63. Prototype 3: Commercial Non/Pre-Engineered, Erosion Damage – Nonperishable Content

Table 40. Prototype 3: Commercial Non/Pre-Engineered, Erosion Damage – Nonperishable Content

Percent Comp-romised	Min	Most Likely	Max
0%	0	0	0
10%	0	3	13
20%	8	15	28
30%	18	29	40
40%	25	38	50
50%	40	50	100
60%	60	80	100
70%	75	100	100
80%	90	100	100
90%	95	100	100
100%	100	100	100

Note: Wave and erosion damage functions are only to be used for structures that are close to the shoreline.

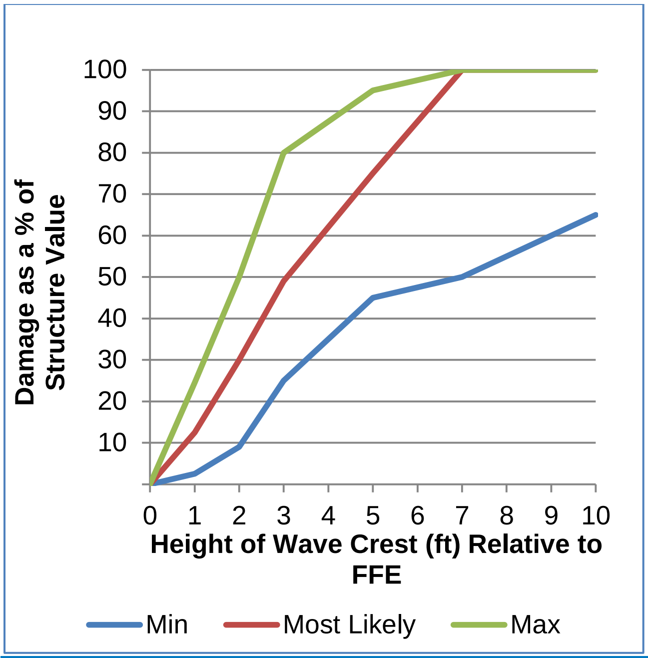


Figure 64. Prototype 3: Commercial Non/Pre-Engineered, Wave Damage - Structure

Table 41. Prototype 3: Commercial Non/Pre-Engineered, Wave Damage - Structure

Wave Crest	Min	Most Likely	Max
0	0	0	0
1	2.5	12.5	24.5
2	9	30	50
3	25	49	80
5	45	75	95
7	50	100	100
10	65	100	100

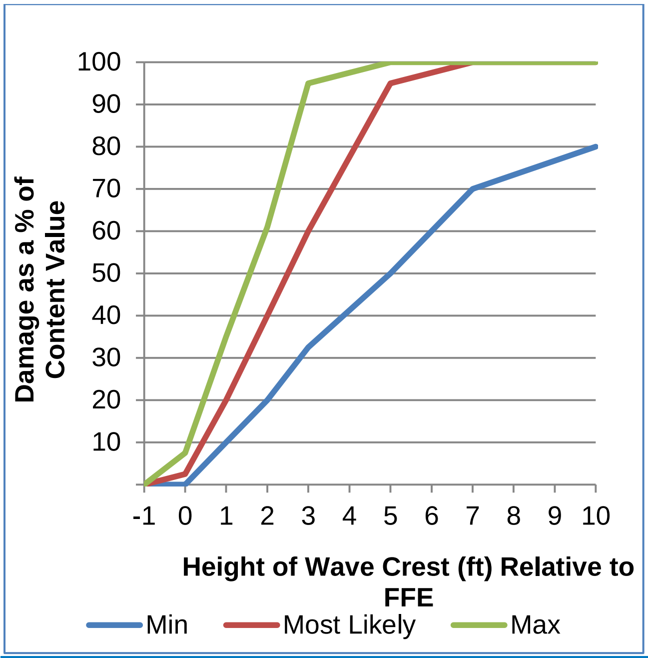


Figure 65. Prototype 3: Commercial Non/Pre-Engineered, Wave Damage – Perishable Content

Table 42. Prototype 3: Commercial Non/Pre-Engineered, Wave Damage – Perishable Content

Wave Crest	Min	Most Likely	Max
-1	0	0	0
0	0	2.5	7.5
1	10	20	35
2	20	40	61
3	32.5	60	95
5	50	95	100
7	70	100	100
10	80	100	100

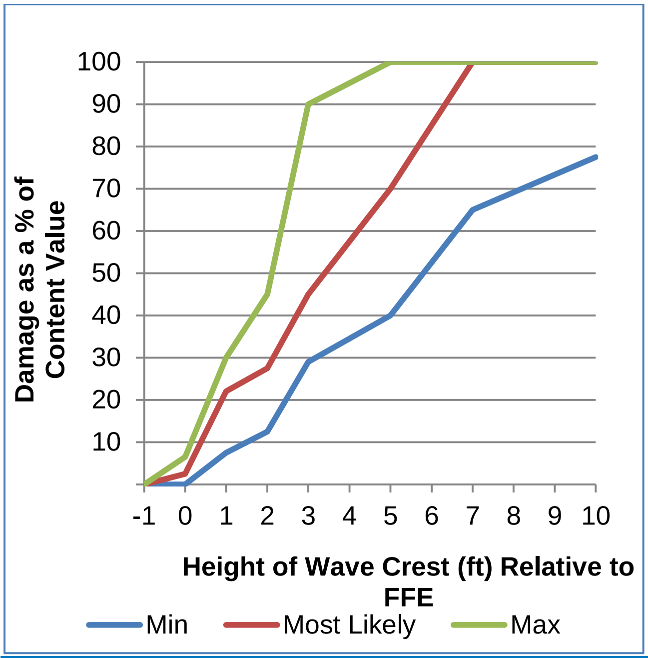


Figure 66. Prototype 3: Commercial Non/Pre-Engineered, Wave Damage – Nonperishable Content

Table 43. Prototype 3: Commercial Non/Pre-Engineered, Wave Damage – Nonperishable Content

Wave Crest	Min	Most Likely	Max
-1	0	0	0
0	0	2.5	6.5
1	7.5	22	30
2	12.5	27.5	45
3	29	45	90
5	40	70	100
7	65	100	100
10	77.5	100	100

Note: Wave and erosion damage functions are only to be used for structures that are close to the shoreline.

Table 44 and Figure 67 show wave, surge, and still water characteristics associated with 100% wave damage for the most likely building characteristics of a commercial non- or pre-engineered building (Prototype 3). This prototype has a slab foundation and a FFE of 1.0 feet above grade. With depth-limited breaking waves (typically the most damaging wave condition), 100% wave damage for this prototype is expected to occur with a still water depth (d) of 5.2 feet. This still water depth will typically allow a maximum wave height of 4.0 feet (H_b = .78d). The wave crest under this condition would be approximately 8.0 feet above grade ($0.7H_b$ + d).

Table 44. Building, Flood, and Wave Characteristics, Maximum Wave Damage Scenario, Prototype 3 Commercial Non/Pre-Engineered, Most Likely Building Characteristics

Designation	Characteristic	Feet
A	FFE Above Grade	1.0
B	Wave Crest Height Above FFE	7.0
C	Breaking Wave Height (H_b = 0.78d)	4.0
D	0.7H_b	2.9
E	Still Water Elevation (d)	5.2
F	Wave Crest Elevation (0.7H_b + d)	8.0

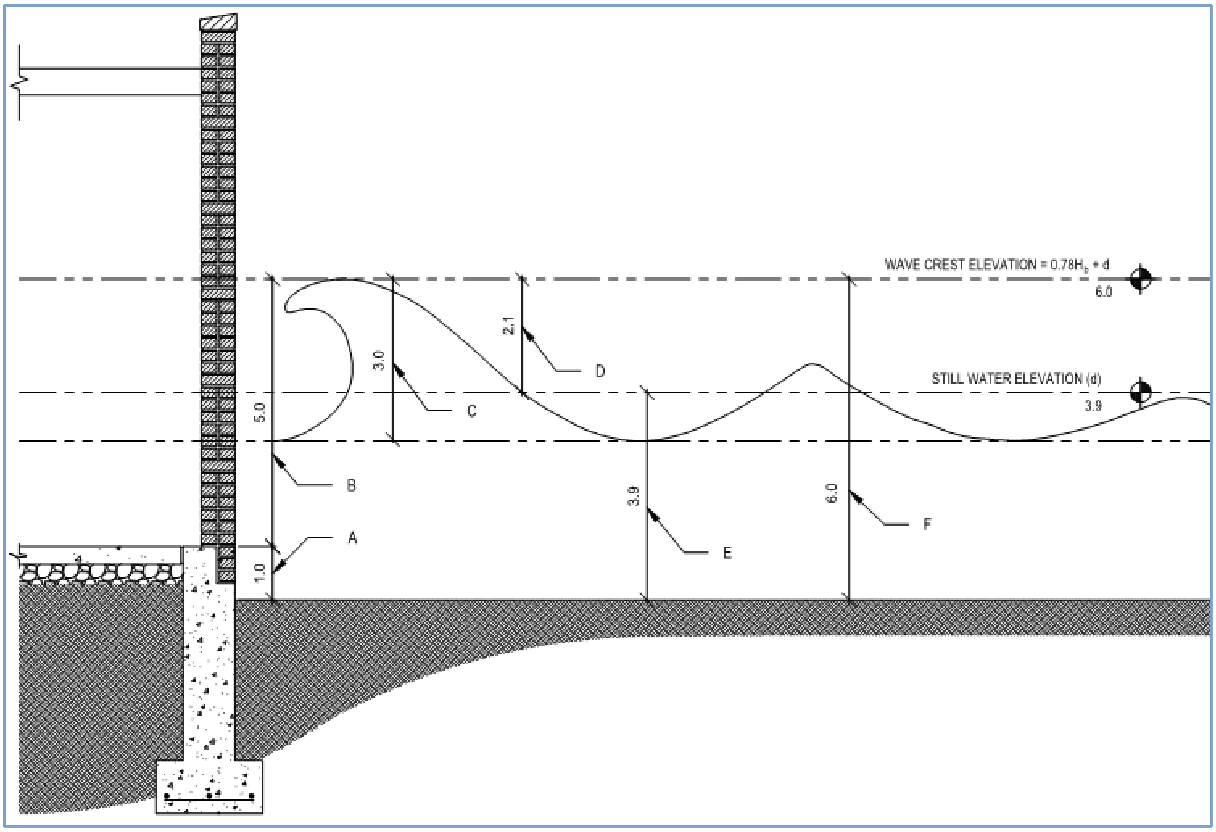


Figure 67. Illustration of Maximum Wave Damage Scenario, Prototype 3 Commercial Non/Pre-Engineered, Most Likely Building Characteristics

6.9 Prototype 4A: Urban High Rise

Most Likely Building Characteristics: The building is between 15 and 30 years old, and has a full basement with parking and Mechanical/Electrical/Plumbing (MEP) equipment. The first (ground) level has an open lobby layout with limited finishing. Upper levels are apartments. MEP equipment constitutes 40% of the building's total value.

Minimum-Damage Building Characteristics: The building is between 0 and 10 years old, with minimal MEP equipment in the basement. The first (ground) level has an open lobby layout with limited finishing. Upper levels are apartments. MEP equipment constitutes 35% of the building's total value.

Higher-Damage Building Characteristics: The building is older. It has multiple basements with extensive Mechanical/Electrical/Plumbing (MEP) equipment. The first (ground) level houses retail establishments. Upper levels are apartments. MEP equipment constitutes 50% of the building's total value.

See Table 45 below:

Table 45. Prototype 4A: Urban High Rise: Building Characteristics

	Most Likely	Minimum Damage	Maximum Damage
Stories	10	10	10
Foundation	Deep	Deep	Deep
Age	15 - 30	0 – 10	Old—unknown codes
Structure	Structural steel or reinforced concrete	Structural steel or reinforced concrete	Structural steel or reinforced concrete
Basement	Full basement with MEP and parking	Minimal MEP	Multiple basements, MEP+
1st Floor Use	Lobby	Open lobby	Retail
Upper Floor Use	Apartments	Apartments	Apartments
Elevators/MEP	40% of total value	35% of total value	50% of total value

Table 46 and Table 47 present the inundation damage for structure and contents for Prototype 4A, Urban High Rise. Figure 68 and Figure 69 present the corresponding damage functions.
Damage function users are advised that the degree to which mold spreads throughout a building is a function of flood duration, humidity, and the amount of time it takes for people to reenter and remediate the building. The interrelationship of these last two factors is complex, and mold damages can vary widely as a result. If extensive mold is considered likely, the high damage function is considered more appropriate for use.
The damage to high rise buildings should be calculated as a percent of the first 10 stories.
Note regarding buildings with more than three stories and less than ten stories:

- For shallow foundations, use the Prototype 1 damage function
- For deep foundations, use the Prototype 4 damage function

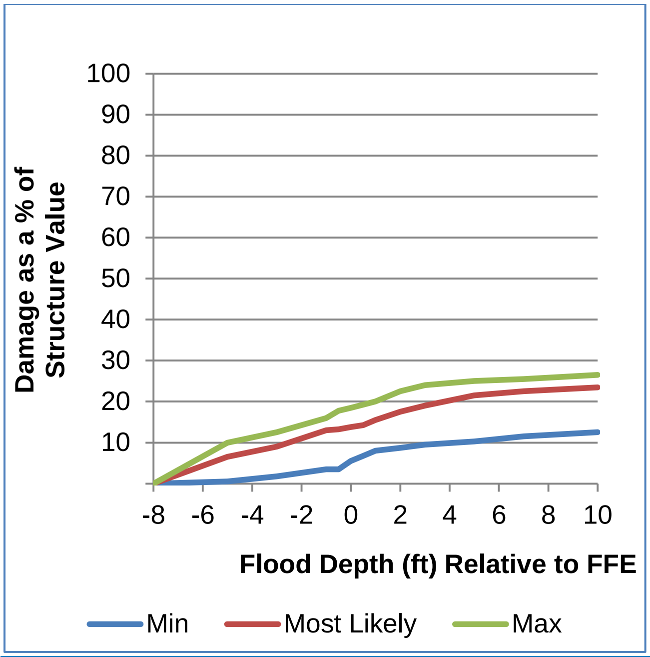


Figure 68. Prototype 4A: Urban High Rise, Inundation Damage – Structure

Table 46. Prototype 4A: Urban High Rise, Inundation Damage – Structure

Flood Depth	Min	Most Likely	Max
-8	0	0	0
-5	0.5	6.5	10
-3	1.75	9	12.5
-1	3.5	13	16
-0.5	3.5	13.25	17.75
0	5.5	13.75	18.5
0.5	6.75	14.25	19.25
1	8	15.5	20
2	8.75	17.5	22.5
3	9.5	19	24
5	10.25	21.5	25
7	11.5	22.5	25.5
10	12.5	23.5	26.5

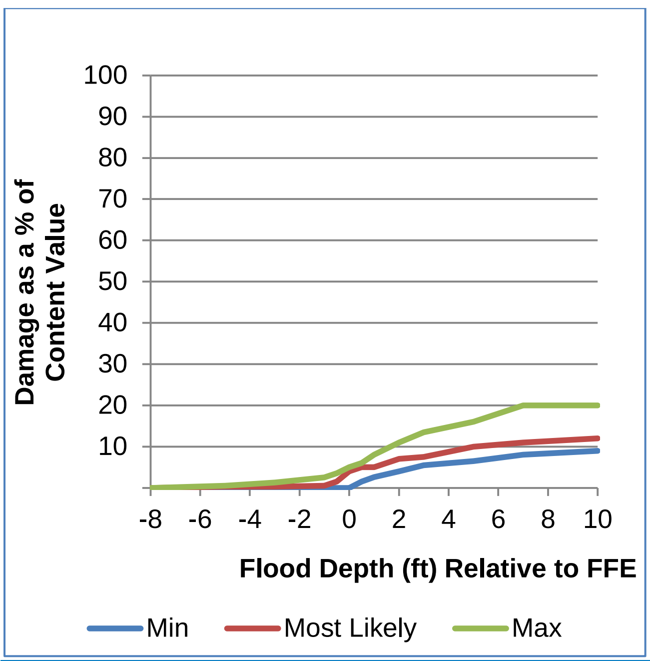


Figure 69. Prototype 4A: Urban High Rise, Inundation Damage – Content

Table 47. Prototype 4A: Urban High Rise, Inundation Damage – Content

Flood Depth	Min	Most Likely	Max
-8	0	0	0
-5	0	0.25	0.5
-3	0	0.25	1.25
-1	0	0.5	2.5
-0.5	0	1.5	3.5
0	0	4	5
0.5	1.5	5	6
1	2.6	5	8
2	4	7	11
3	5.5	7.5	13.5
5	6.5	10	16
7	8	11	20
10	9	12	20

ATTACHMENT F

Data Documentation Template

Benefit-Cost Analysis (BCA) Data Documentation Template – Damage-Frequency Assessment

FEMA reviews Benefit-Cost Analyses (BCAs) for all proposed mitigation projects submitted under the FEMA grant programs to determine whether the information provided in the application is:

1. Credible and well-documented
2. Prepared in accordance with accepted FEMA BCA practices
3. Able to demonstrate that the project is cost-effective

The Damage Frequency Assessment can be used for any hazard for which frequency-damage relationships can be established from historical damage data and/or engineering judgment. The following template can be used to assist in the collection and entering of information to meet these requirements within the BCA Tool. One way to use this tool is to highlight or circle the source and use the last column to record the software input and justification for values that vary from the FEMA Standard Value (Default).

Obtained	Input	Documentation Summary	Source(s)	Software Input/ Justification
☒	Name, address, county, and latitude/longitude for each project structure	Include contact information and whether building is historic.	City of Boston	Structure Name: Fort Point Channel Resilient Infrastructure Project Property Location: 42.3455490, -71.0568498 City: Boston State: Massachusetts ZIP Code: 02210 County: Suffolk Historic Site: Located in a historic district, but does not disrupt historic structures.
☒	Scope of Work (SOW)	Should include: • Problem Description and Proposed Solution • Description of Existing Conditions • Work Schedule	The scope of work is detailed in the Arcadis Technical Memorandum titled *Flood Defense Conceptual Design and Cost Estimating Methodology* updated	Project Description: The proposed project is a 2,300-feet shoreline mitigation project that includes a mixture of elevated berm and seawall features, as well as approximately 600 additional linear feet in interim flood protection measures. The project design elevation is 14.6 feet NAVD88. The proposed

Obtained	Input	Documentation Summary	Source(s)	Software Input/ Justification
		• Cost Estimate • Engineering schematics, detailed engineering drawings, or engineering designs • The proposed level of protection for the project (i.e., it will mitigate up to the 50-yr event)	February 2020. Information is also included in the accompanying BCA Methodology	level of protection is 11.5 feet NAVD88, equivalent to the 0.1% annual chance (1,000-year) flood event with 9 inches of sea level rise and is based on the current limit of independent effectiveness. The expected project cost is ~$20,401,205 million total, with annual maintenance costs of $200,000. The scope of work is described in two memorandums submitted with this proposal: the BCA Methodology Memo and in further detail in the Conceptual Design and Cost Estimating Methodology memo, which contains example cross-sections of the proposed features.
☒	Basis for Damages	Refer to your project SOW to determine the basis for damages [historical damages or expected].	Sources for the basis for damages are City of Boston data on the built environment, USACE North Atlantic Coast Comprehensive Study depth damage functions appropriate for the area, as well as flood data provided through the Boston Harbor Flood Risk Model.	Historic damages in the project area are difficult to document. Professionally modeled damages are used as the best available data.
☒	Hazard Type	Refer to your project SOW to determine the hazard type. Choose from: Flood, Hurricane Wind, Earthquake, Tornado, Wildfire, or	Boston Harbor Flood Risk Model	Coastal flooding in a short manmade channel with limited wave action

Obtained	Input	Documentation Summary	Source(s)	Software Input/ Justification
		Other. Hazard type is found in the SOW.		
☒	Mitigation Project Type and Description	Refer to your project SOW to determine the mitigation project type and to obtain the project description. Project types vary by hazard and can include: • **<u>Flood</u>**: Acquisition, Elevation, Relocation, Dry Flood Proofing, Drainage Improvement, Other Flood Proofing measures • **<u>Hurricane Wind</u>**: Acquisition, Shutters, Roof, Load Path • **<u>Earthquake</u>**: Strengthen Structure or Anchor/Brace Non-Structural • **<u>Tornado</u>**: New Safe Room or Retrofitting Existing Structure • **<u>Wildfire</u>**: Defensible Space Activities, Hazardous Fuels Reduction, Ignition Resistant Construction Activities, or Other	The scope of work is detailed in the Arcadis Technical Memorandum titled *Flood Defense Conceptual Design and Cost Estimating Methodology* updated February 2020. Information is also included in the accompanying BCA Methodology	Mitigation Action Type is "Other Floodproofing Measures."
☒	Cost Estimate	All anticipated project costs, including maintenance costs, should be detailed over the useful life of the project. Avoid the use of lump-sum costs. The Cost Estimate should include:	Line item cost estimate provided as attachment to the Arcadis Technical Memorandum titled *Flood Defense Conceptual Design and Cost Estimating*	Mitigation Project Cost: ~$20,401,205 Annual Project Maintenance Costs: $200,000 Total Present Value Mitigation Project Cost: $23,102,597

Obtained	Input	Documentation Summary	Source(s)	Software Input/ Justification
		• The estimate source and an itemized list of costs • The base year of all cost estimates and any changes to the anticipated construction date • Anticipated environmental resource remediation or historic property treatment measures • Other related construction/demolition/ relocation costs, such as survey permitting, site preparation, site maintenance, site assessment, legal costs and material disposal • Other acquisition costs, such as appraisals, legal recordation, displacement costs, and maintenance	*Methodology* updated February 2020.	Line item estimates of the mitigation project cost are included in the Conceptual Design and Cost Estimate Methodology technical memorandum submitted with the project application. Estimates were developed by design professionals using CostWorks cost-estimating software and local bids for similar work, where possible.
☒	Base Year of Costs	The year in which the mitigation project's cost was estimated. If cost estimates are several years old, the user can use the inflation calculator in the cost estimator to account for inflation in costs between the base year and the present. If cost figures are adjusted provide a description of methodology used in the justification tab of the cost estimator.	2018	The BCA is estimating using project costs and professionally modeled damages from 2018. This is entered in the Damage Analysis Parameters section of the Damage Frequency Assessment in Toolkit Version 6.0. The entry does not appear to inflate the costs.

Obtained	Input	Documentation Summary	Source(s)	Software Input/ Justification
☒	Project Useful Life (PUL)	The estimated amount of time (in years) that the mitigation action will be effective. The PUL is based on the type of mitigation.	Flood hazard model used to determine independent effectiveness developed by Woods Hole Group and sourced from the Boston Harbor Flood Risk Model. Year for 9 inches of sea level rise derived from USACE sea level rise intermediate curve from 2013	43 years, estimated based on level of protection provided by the project and the expected timeframe in which 9 inches of sea level rise may occur. Refer to the BCA Methodology memorandum for further detail.
☒	Facility Type	Choose one or more facility types for loss of function: utilities, roads/bridges, non-residential buildings, or not applicable. Provide photocopies of tax records, hard copy or electronic photos, appraisals, or maps.	Data is available from assessor, owner, local tax appraiser or surveyor office, or title documents.	Analysts entered the facility type as a Residential Structure, since the project provides protection against 31 buildings with a variety of residential and non-residential occupancies.
☐	Value of Services: Utilities	Enter the facility description, type of service, number of customers served and value per unit of service ($/person/day). Select electrical, water, wastewater, or other from the drop-down. If user chooses other, enter the description of the service. If a utility, enter the number of customers served by the utility. If	N/A	The project BCA did not integrate public service loss of function values

Obtained	Input	Documentation Summary	Source(s)	Software Input/ Justification
		other, enter the portion of the population that will be affected by the mitigation. Provide letters or technical studies from utilities that include engineering estimates or historic evidence of impact on service due to an event. FEMA Standard Values for Loss of Service for utilities: • Loss of electric power: $131/person/day • Loss of potable water: $103/person/day • Loss of wastewater: $45/person/day Any number outside of the FEMA Standard Values must be documented with a letter from the utility that would be affected.		
☐	Value of Services: Roads/Bridges	Enter the facility description, estimated number of one-way traffic trips per day, additional time per one-way trip due to the detour, number of additional miles, and the Federal mileage reimbursement rate for a private vehicle ($/mile). FEMA Standard Values for Loss of Service for roads:	N/A	The project BCA did not integrate public service loss of function values

Obtained	Input	Documentation Summary	Source(s)	Software Input/ Justification
		• Loss of road/bridge service: $38.15/vehicle/hour Mileage: Use current Federal Mileage Rate (http://www.gsa.gov/Portal/gsa/ep/contentView.do?contentId=17943&contentType=GSA_BASIC&queryYear=2008) Any number outside of the FEMA Standard Values must be documented with Department of Transportation (DOT) traffic studies or letter from utility or traffic departments. Maps indicating the location of road closure and the proposed detour route should be included.		
☐	Non-Residential Buildings	Choose a facility type: fire station, hospital, police station, or other. For "other" buildings, enter the annual budget of public agencies, limited to the budget associated with building(s), and select the appropriate service name to provide the budget for that service.	N/A	The project BCA did not integrate public service loss of function values
☒	Analysis Duration	Input the current analysis year and the year the utility, building, road, or bridge was built. This will provide a period of history for the historical	N/A	Analysis duration is not entered in this assessment as recurrence intervals are known for all estimated damages.

Obtained	Input	Documentation Summary	Source(s)	Software Input/ Justification
		losses. Provide documentation such as an appraisal or title. For structures less than 10 years old, input the minimum analysis duration of 10 years. For older structures for which flood damage/loss data or construction activities indicate a significant change in local flow conditions, the analysis can be assumed to begin on the date when the change first occurred. Therefore, the user would manually input the analysis duration in years. In this instance, required documentation includes a Flood Insurance Study or Hydrology and Hydraulics Study that accounts for the change in local flow conditions.		
☒	Damages Before Mitigation	Enter the year of occurrence and number of days of a loss of function **before** the mitigation project is completed (i.e., a bridge was unusable for 5 days after a flood). If based on historical occurrence, provide written documentation from a credible source. If number of days of loss of function is derived or estimated, provide written	Sources used to determine damages before mitigation include City of Boston data on the built environment, USACE North Atlantic Coast Comprehensive Study depth damage functions appropriate for the area, as well as flood data	Damages before mitigation are estimated using professionally modeled damages that represent building damage, contents losses, and relocation costs for building occupants. Damages are estimated for four recurrence intervals: the 10-percent, 2-percent, 1-percent, and 0.1-percent annual chance elevations (also referred to as the 10-year, 50-year, 100-year, and 1,000-year flood elevations) with 9 inches of sea level rise. Flood data is sourced from the

Obtained	Input	Documentation Summary	Source(s)	Software Input/ Justification
		explanation of the method used, including all assumptions. Click on the Icon to the left of "Damage Year" to see the field chooser. Update the fields to reflect information needed for documentation. Enter the year of occurrence and a minimum of two hazard events of known frequency or three hazard damage events of unknown frequency that occur within the analysis period. The historical loss must have been a loss that the mitigation project would have mitigated. When there are multiple events occurring in the same year, add the total dollars and enter it as one single event. Columns can be added to reflect any damage category: avoided physical damages to structures and contents, infrastructure (bridges, roads, culverts, etc.), loss of function (displacement, loss of rental or business income), casualties, and avoided emergency management costs.	provided through the Boston Harbor Flood Risk Model.	Boston Harbor Flood Risk Model, developed through a MassDOT and Federal Highway Administration initiative to assess vulnerability of Boston's Central Artery/Tunnel project to sea level rise and extreme storm events. The report may be found here: https://www.mass.gov/files/documents/2018/08/09/MassDOT_FHWA_Climate_Change_Vulnerability_1.pdf A letter from the model's lead developer is also attached to the benefit-cost analysis, which justifies the project will provide sufficient protection against all events expected with 9 inches of sea level rise.

Obtained	Input	Documentation Summary	Source(s)	Software Input/ Justification
		Recommended documentation varies depending on how the data was obtained. Documentation should cite the date of the data, the source, and the author. Recommended documentation: • Frequencies or Reoccurrence Intervals (RIs) linked to documented Flood Insurance Study (FIS) data • U.S. Geological Survey (USGS) stream gauge data or National Oceanic and Atmospheric Administration (NOAA) tide gauge data • Insurance records (if used to assess how often events occurred) • Newspaper accounts citing credible sources, such as a public agency • Copies of engineering/technical expert reports • For peak ground acceleration and other seismic issues use refer to the recurrence intervals for Earthquake mitigation projects where “expected damages” are determined.		

Obtained	Input	Documentation Summary	Source(s)	Software Input/ Justification
		• Use Hurricane Wind module to determine Hurricane Wind reoccurrence intervals and plug that number in to the chart. Letter from subject matter expert who has independently calculated frequencies		
☐	Unknown Frequency Calculator	To use the unknown frequency calculator, provide documentation of: 1. A minimum of three hazard events that occur in different years where either: • Frequencies/RIs of all events are unknown, or • Frequencies/RIs of up to two events are known and have total inflated damage values that exceed the total inflated values of all the other unknown frequency/RI events. 2. Date of construction (needed for period of record).	N/A	Frequencies are known.
☐	After Mitigation: Loss of Function	Enter the calculated number of days of a loss of function **after** the mitigation project is completed (i.e., a bridge was unusable for 5 days after a flood).	N/A	The project BCA did not integrate public service loss of function values

Obtained	Input	Documentation Summary	Source(s)	Software Input/ Justification
		Except where a function (utility, road/bridge, and building) is completely eliminated, a post-project loss of function time should be entered in this part of the analysis. Documentation includes a letter from an official or a copy of a written technical study. If the number of days is derived or estimated provide a written explanation of the method used, including all assumptions.		
☒	Damages After Mitigation	Nearly all mitigation projects have some residual damages. Most projects will not completely eliminate damages after mitigation, but will reduce damages by a certain percentage or up to a certain design level event/RI (the level of protection).	Sources used to determine damages before mitigation include City of Boston data on the built environment, USACE North Atlantic Coast Comprehensive Study depth damage functions appropriate for the area, as well as flood data provided through the Boston Harbor Flood Risk Model.	Based on technical analysis, the project is expected to eliminate the pre-mitigation damages included in the benefit cost analysis up to 11.5 feet NAVD88. Flood events that exceed 11.5 feet NAVD88 may impact the project's benefitting area. 11.5 feet NAVD88 is equivalent to the 1,000-year flood event with 9 inches of sea level rise. The BCA conservatively assumes that a 1,001-year flood event that occurs post-mitigation will have damages equivalent to the modeled 1,000-year pre-mitigation damages, though any overtopping at this elevation will be minimal and is unlikely to result in loss.

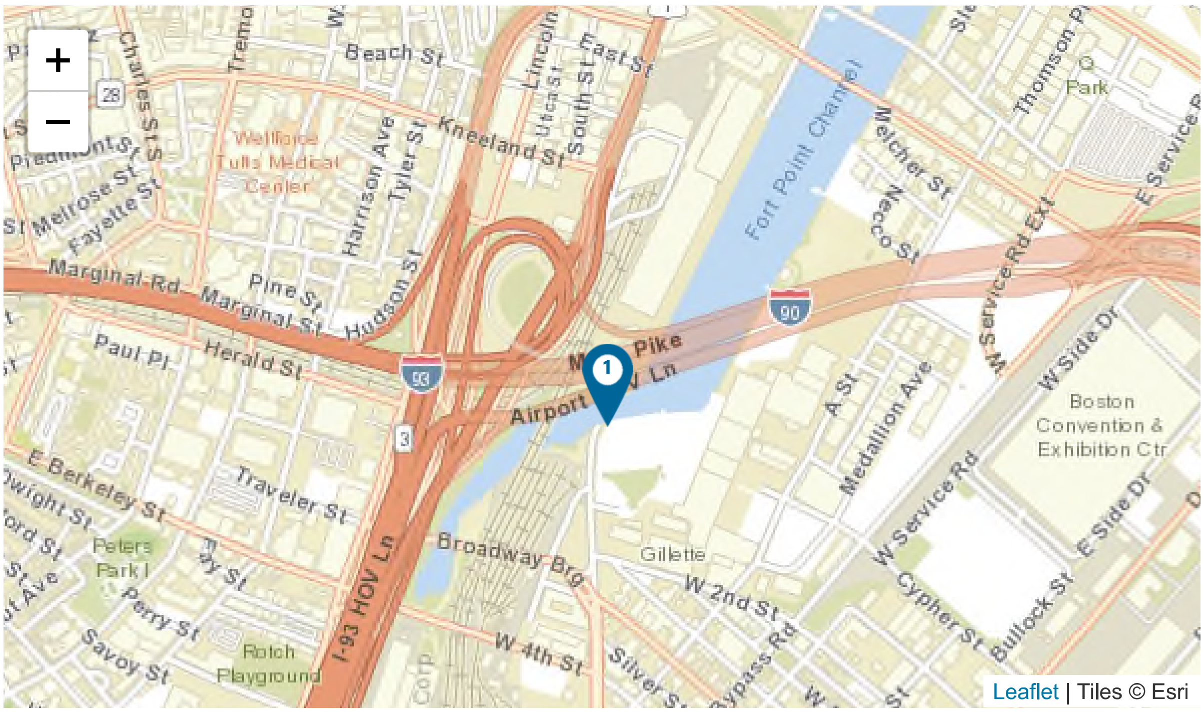
ATTACHMENT G

BCA Toolkit Report

FEMA

Benefit-Cost Calculator
v6.0.0 (Build 20200218.1850)

Benefit-Cost Analysis
Project Name: Fort Point Channel Resilient Infrastructure Project



MAP MARKER	MITIGATION TITLE	PROPERTY TYPE	HAZARD	BENEFITS (B)	COSTS (C)	BCR (B/C)
1	Other @ 42.3455490; -71.0568498		DFA : Coastal A Flood	$ 29,989,894	$ 23,102,597	1.30
Totals				**$ 29,989,894**	**$ 23,102,597**	**1.30**

Property Configuration

Property Title:	Other @ 42.3455490; -71.0568498
Property Location:	02210, Suffolk, Massachusetts
Property Coordinates:	42.3455490, -71.0568498
Hazard Type:	Coastal A Flood
Mitigation Action Type:	Other
Property Type:	Residential Building
Analysis Method Type:	Professional Expected Damages

Cost Estimation

Other @ 42.3455490; -71.0568498

Project Useful Life:	43
Project Cost:	$20,401,204.82
Number of Maintenance Years:	43 Use Default:Yes
Annual Maintenance Cost:	$200,000

Damage Analysis Parameters - Damage Frequency Assessment

Other @ 42.3455490; -71.0568498

Year of Analysis Conducted:	2018
Year Property was Built:	0
Analysis Duration:	0 Use Default:Yes

Professional Expected Damages Before Mitigation

Other @ 42.3455490; -71.0568498

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL		
RECURRENCE INTERVAL (YEARS)	DAMAGES ($)	Cat…	Cat…	Cat…	NUMBER OF VOLUNTEERS	NUMBER OF DAYS	ANNUALIZED RECURRENCE INTERVAL (YEARS)	DAMAGES ($)	ANNUALIZED DAMAGES AND LOSSES ($)
10	7,307,626	0	0	0	0	0	10	7,307,626	1,182,666
50	29,906,662	0	0	0	0	0	50	29,906,662	300,335
100	30,160,817	0	0	0	0	0	100	30,160,817	354,032
1,000	51,304,724	0	0	0	0	0	1,000	51,304,724	51,300

Professional Expected Damages After Mitigation

Other @ 42.3455490; -71.0568498

	OTHER	OPTIONAL DAMAGES			VOLUNTEER COSTS		TOTAL		
RECURRENCE INTERVAL (YEARS)	DAMAGES ($)	Cat…	Cat…	Cat…	NUMBER OF VOLUNTEERS	NUMBER OF DAYS	ANNUALIZED RECURRENCE INTERVAL (YEARS)	DAMAGES ($)	ANNUALIZED DAMAGES AND LOSSES ($)
1,001	51,304,724	0	0	0	0	0	1,001	51,304,724	51,248

Additional Benefits - Social

Other @ 42.3455490; -71.0568498

Number of Workers: 345

Expected Annual Social Benefits: $5,002,522

Additional Benefits - Environmental

Other @ 42.3455490; -71.0568498

Total Project Area (acres):	1.55
Percentage of Green Open Space:	100.00%
Percentage of Riparian:	0.00%
Percentage of Wetlands:	0.00%
Percentage of Forests:	0.00%
Percentage of Marine Estuary:	0.00%
Expected Annual Environmental Benefits:	$12,877.4

Benefits-Costs Summary

Other @ 42.3455490; -71.0568498

Total Standard Mitigation Benefits:	$24,813,437
Total Additional Benefits - Social:	$5,002,522
Total Additional Benefits - Environmental:	$173,935
Total Mitigation Project Benefits:	$29,989,894
Total Mitigation Project Cost:	$23,102,597
Benefit Cost Ratio - Standard:	1.07
Benefit Cost Ratio - Standard + Additional:	1.30

Section M

Project Map and Plans

WOODS HOLE GROUP
A CLS COMPANY

107 Waterhouse Road
Bourne, MA 02532

City of Boston
Fort Point Channel
Between 15 Necco St. and Dorchester Ave.
Boston, MA
USGS Boston South Quadrangle, Map Scale 1:24,000

Existing Conditions
City of Boston Resilient Fort Point Channel Infrastructure Project
December 17, 2021

Manholes

Outfalls

Seawater Pipe

Top of Coastal Bank

Electrical Duct

Electric And Telecom Line

Open Space

FEMA Flood Zones/ Land Subject to Coastal Storm Flowage

AE

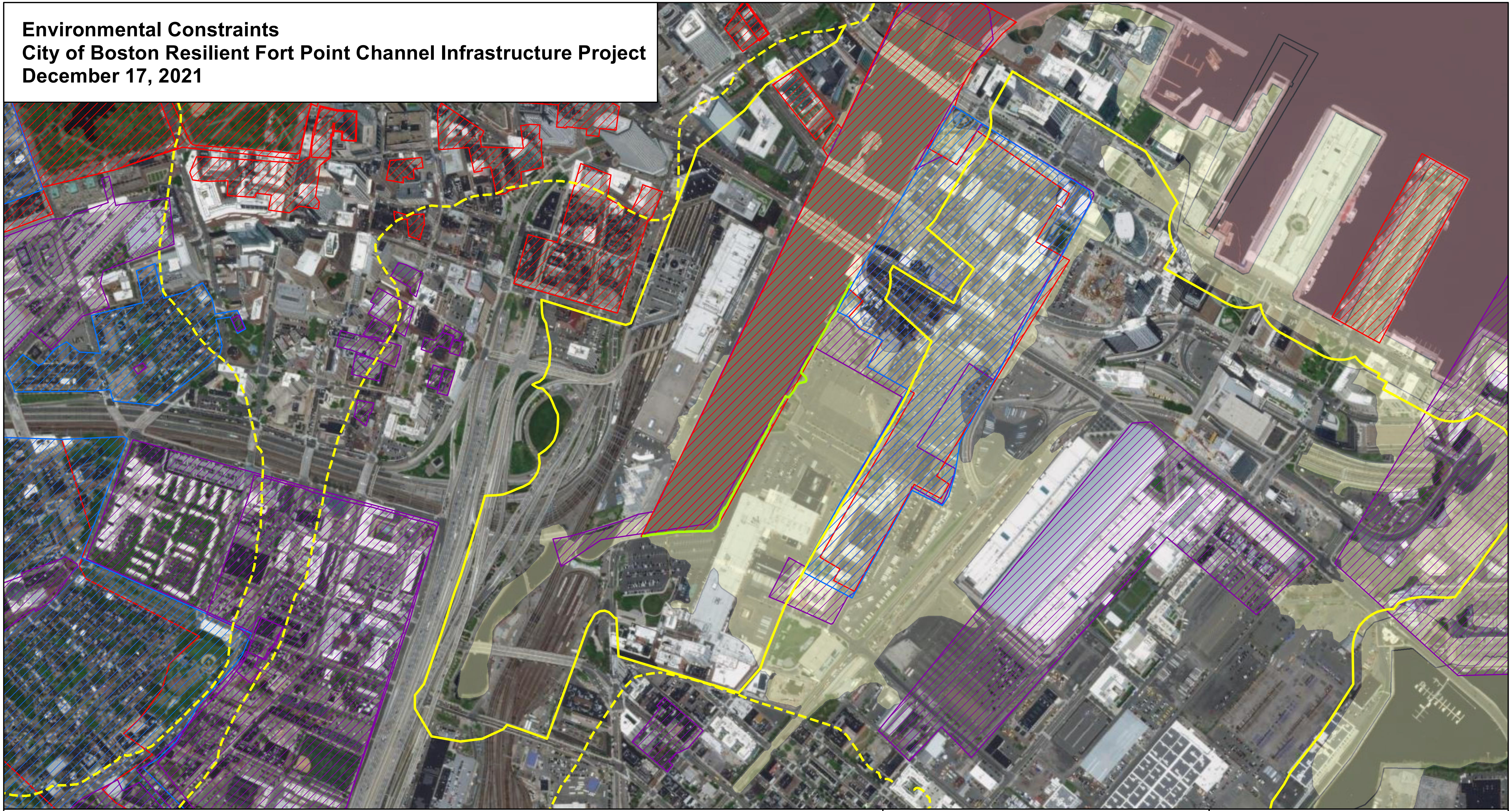
VE

N

0 400 800 1,600 Feet

WOODS HOLE GROUP
A CLS COMPANY

Environmental Constraints
City of Boston Resilient Fort Point Channel Infrastructure Project
December 17, 2021



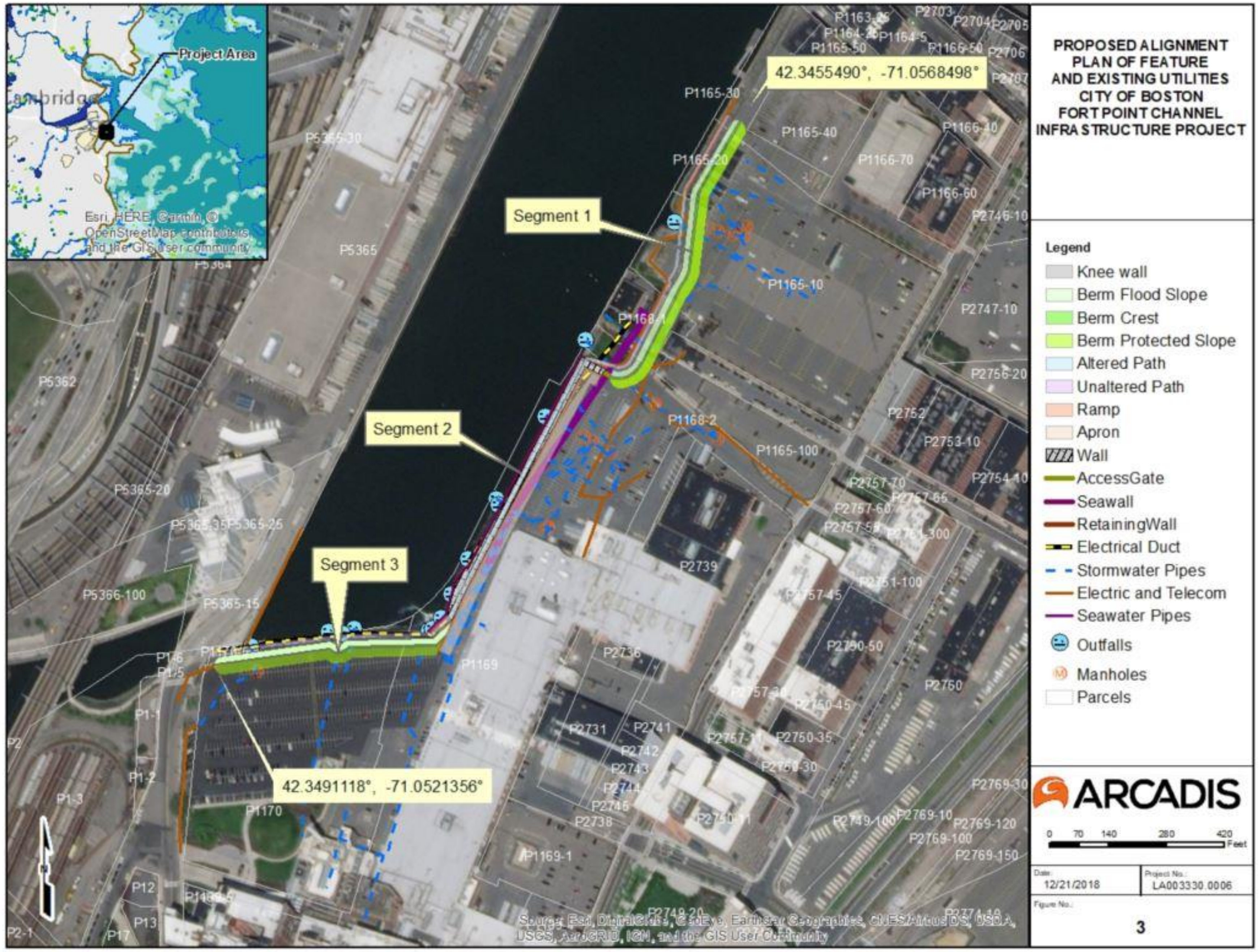
Top of Coastal Bank
Landlocked Tidelands
Historic High Waterline

Massachusetts Historic Commission Inventory
National Register of Historic Places
Local Historic District
Inventoried Property

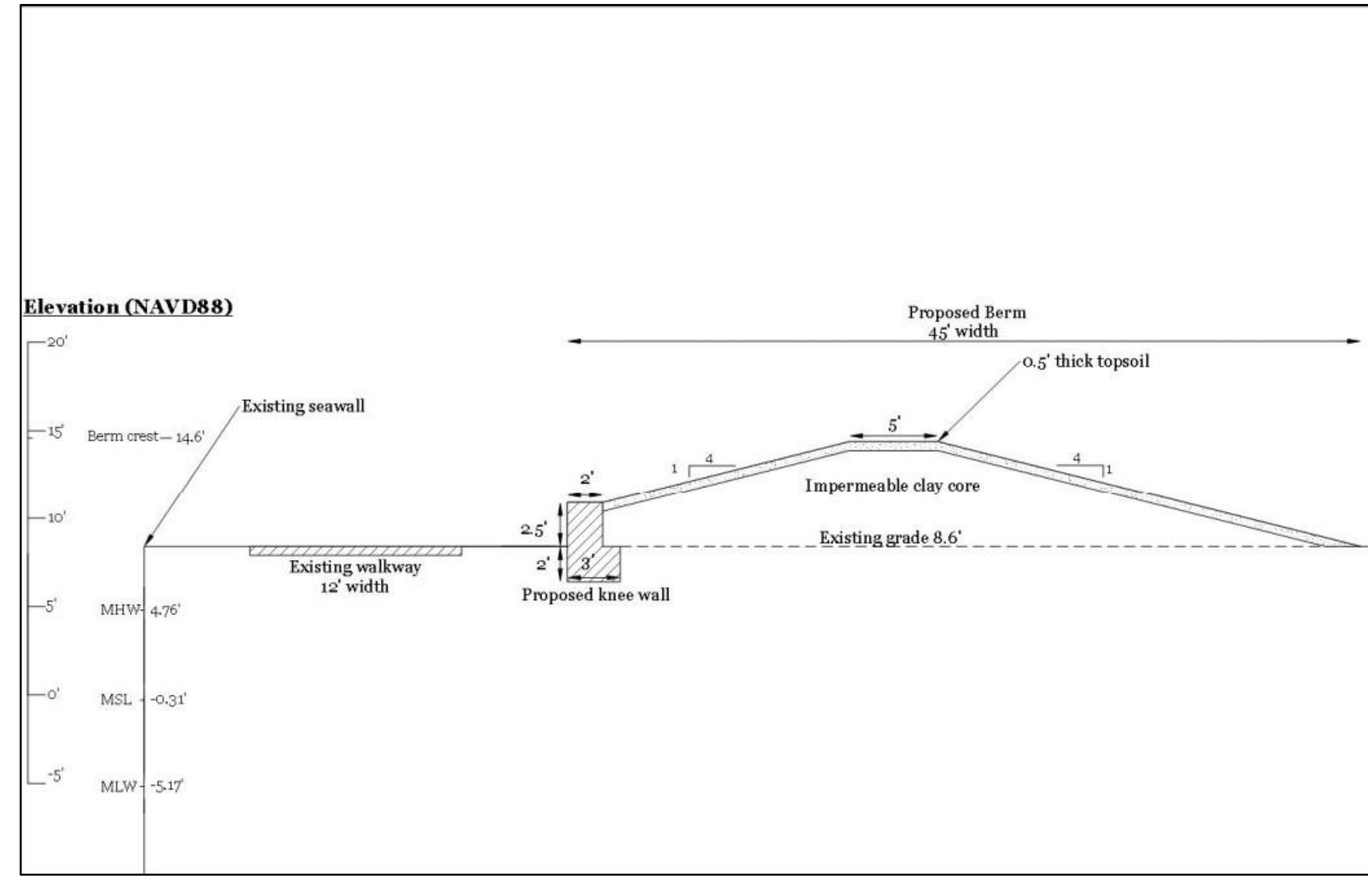
FEMA Flood Zones/ Land Subject to Coastal Storm Flowage
AE
VE

N
0 400 800 1,600 Feet

WOODS HOLE GROUP
A CLS COMPANY



Typical cross-section for Segments 1 and 3.



Typical cross-section for Segment 2.