CITY OF BOSTON COASTAL STORM RISK MANAGEMENT

Todd Randall- Environmental Manager
Jeff Herzog- Project Manager
New England District
Date: 26 January 2023

US Army Corps of Engineers®

Photos of 2018 Nor'easter courtesy of businessinsider.com, noreaster-bomb-cyclone-floods-2018-1

AGENDA

- Introductions and Opening Remarks
- Study Authorizations
- Background and Federal Interest
- Study Purpose, Need and Scope
- Environmental & Cultural Coordination
- Problems, Opportunities, Objectives, and Constraints
- Existing Conditions
- Future Without Project Conditions
- Measures Screening
- Plan Formulation and Initial Array of Alternatives by Neighborhood (with discussions following)
- Path to Draft NEPA Document (Tentative Schedule)
- Open Discussion

AUTHORIZATION AND PURPOSE

The study is authorized by the resolution adopted by the Senate Public Works Committee dated September 12, 1969, authorizes the investigation of options for reducing flood risk along the coastline of Massachusetts and this authorization is applicable to this coastal storm risk management feasibility study.

Section 105(a) of the Water Resources Development Act (WRDA) of 1986, as amended (33 U.S.C. 2215(a)), specifies the cost-sharing requirements.

2018 Nor'easter, Boston, MA

BACKGROUND AND FEDERAL INTEREST

- Non-Federal Sponsor is the City of Boston
- The FCSA was executed on 02 May 2022; Funding received 29 August
- 47 Miles of Coastline; susceptible to extra-tropical events and more frequent events. Coastline is made up of dense urban environment and fill lands constructed in the 18th and 19th Century. Stakeholders include a mixture of public entities and private property, as well as historic property.
- Boston is the most populous city in Massachusetts with a population of ~635,000; 23rd largest City in US.

- The CDC Social Vulnerability Score for the City of Boston is .7861 (2020) indicating a high level of vulnerability considering a scale of 0 (lowest vulnerability) to 1 (highest vulnerability).
- The City of Boston completed Climate Ready Boston in 2022 developing multiple strategies and recommendations for near-term and long-term resilience. The USACE study builds on that effort identifying federal interest for implementation.

STUDY SCOPE

- The study will be a single purpose coastal storm risk management study

- Alternatives will be formulated and evaluated to meet the study objectives with the goal of managing the impacts of coastal storms on the population, economy and infrastructure in the City of Boston

- The study will include the evaluation of five neighborhoods

Photo from COB CSRM Charette Boston Harbor Tour 18 OCT 22

- The study will evaluate regional recommendations for implementation where municipal recommendations are not complete, or where regional recommendations maximize opportunities. Regional recommendations will be coordinated with the USACE Metro Coastal Resilience Study Team and its partners at the State of Massachusetts.

STUDY SCOPE

- Five Neighborhoods
  - East Boston
  - Charlestown
  - Downtown and North End
  - South Boston
  - Dorchester (Neponset River)

- Portions of Logan International Airport Property and other MASSPORT Properties

ENVIRONMENTAL COORDINATION: COOPERATING AGENCIES

- Cooperating and participating agency invitations were sent to the following agencies on Sept. 29, 2022:

Cooperating Agencies	Participating Agencies
USEPA – Region 1	USFWS
NOAA Fisheries	Massachusetts Executive Office of Energy & Environmental Affairs
FEMA	Massachusetts Department of Conservation and Recreation
USCG	Massachusetts Department of Transportation
National Park Service	Massachusetts Department of Environmental Protection
Massachusetts Office Of Coastal Zone Management	Massachusetts Port Authority
	Boston Water and Sewer Commission
	Massachusetts Water Resources Agency
	Massachusetts Bay Transportation Authority

- Planning Charette: October 18-20, 2022
- Neighborhood Plan Formulation Meetings: Nov 7, Nov 14, Nov 21, Dec 2, Dec 7, 2022
- First Interagency Meeting: January 25, 2023

ENVIRONMENTAL COORDINATION: NEPA

- Cooperating Agency letters were mailed October 5, 2022. Cooperating Agencies also participated in the Charette 18-20 October and in the 5 neighborhood specific discussion meetings.

- NAE will conduct an Agency Scoping meeting on 25 January 2023 for compliance with Sec. 1001, WRRDA 2014.

- City of Boston is developing a public facing website (USACE will link Project site to COB Site) to serve as the primary website for the Study.

- Public Scoping Meeting and Study introduction meetings will occur virtually between 26 January 2023 and 03 February 2023; a public notice will go out via multiple platforms in advance of the meeting.

- Additional outreach to Neighborhoods through Newsletters, Environmental Reporters, and City Council Neighborhood Representatives will occur between 26 January and 03 February 2023.

- If it is determined that an EIS is moving forward, a Notice of Intent for the EIS will be published and additional public scoping meetings will be noticed and held.

CULTURAL & HISTORIC COORDINATION: TRIBAL AND SHPO CONSULTATION

- Pursuant to Section 1001 of WRRDA 2014, Cooperating Agency Letters were sent to federal and non-federal Agencies on October 5, 2022.

- Initial correspondence was sent on October 5, 2022, to the Narragansett Indian Tribe, Wampanoag Tribe of Gay Head (Aquinnah), and the Mashpee Wampanoag Tribe inviting them to participate in the Charette 18-20 October 2022; additionally, they will be invited to a scoping meeting 23-27 January 2023 and to request scoping comments pursuant to NEPA.

- Correspondence was also sent to the Massachusetts State Historic Preservation Officer, the Massachusetts Board of Underwater Archaeological Resources, and the Boston Landmarks Commission on Oct. 5, 2022 requesting cooperating agency status and participation in the October 2022 Charette.

- Following the Alternatives Milestone Meeting (AMM) and screening of alternatives, the consultation process pursuant to Section 106 of the NHPA will be formally initiated with all stakeholders.

PROBLEMS, OPPORTUNITIES, OBJECTIVES, AND CONSTRAINTS

PROBLEMS

- Critical infrastructure is damaged by the effects of coastal storms.
- The effects of coastal storms limit or inhibit vehicle traffic on critical transportation and evacuation routes.
- Structures (commercial and residential), are damaged by coastal storms
- Coastal storms pose a risk to life, health, and safety of the population in the City of Boston.

OPPORTUNITIES

- Improve the resilience of the city to the impacts of coastal storms and flooding (Note: the USACE principles of resilience are Prepare, Absorb, Recover, and Adapt)
- Utilize NNBFs and/or restoration of the natural coastal system of defenses to manage coastal storm risk
- Improve floodplain management
- Manage the risk to utilities including water, wastewater, electricity, phone, etc. that are at risk to the effects of coastal storms and are essential for human health and safety.

OBJECTIVES

- Manage the risk of economic impacts from coastal storms and coastal flooding within the City of Boston for the 50-year period of analysis.
- Manage the coastal storm risk to human life, health, and safety to the population in the City of Boston over the 50-year period of analysis.
- Manage the risk of critical infrastructure impacts from coastal storms and coastal flooding within the City of Boston over the 50-year period of analysis.

CONSTRAINTS

- Avoid formulation that transfers or exacerbates risk in communities outside the City of Boston for the sake of benefits within the City.
- Formulate alternatives within the jurisdiction of the City of Boston. The City will have to commit to LERRDS and O&M for the recommended plan.
- Avoid adverse impacts and significant delays to maritime navigation and USCG operations within the study area.

STUDY CONSIDERATIONS

- Sea Level Change
- Public and Private Real Estate
- Future Infil Development
- Actions by Other Agencies/Organizations
- Navigation and Port-related Operations
- Existing/Future Environmental Conditions
- Evacuation Corridors
- Community Connectedness to the Water
- Existing and Future Projects
- Flood Pathways
- Environmental Justice Communities
- Protected Resources

KEY UNCERTAINTIES

-Sea level change

-Future development in the city (MASSPORT, Port Norfolk, East Boston)

-Actions by Others (ongoing CRB projects at various stages of design and construction)

-Degradation of marsh and other natural features that affect coastal storm risk

-Actions by other surrounding municipalities that may impact coastal storm risk within the city of Boston

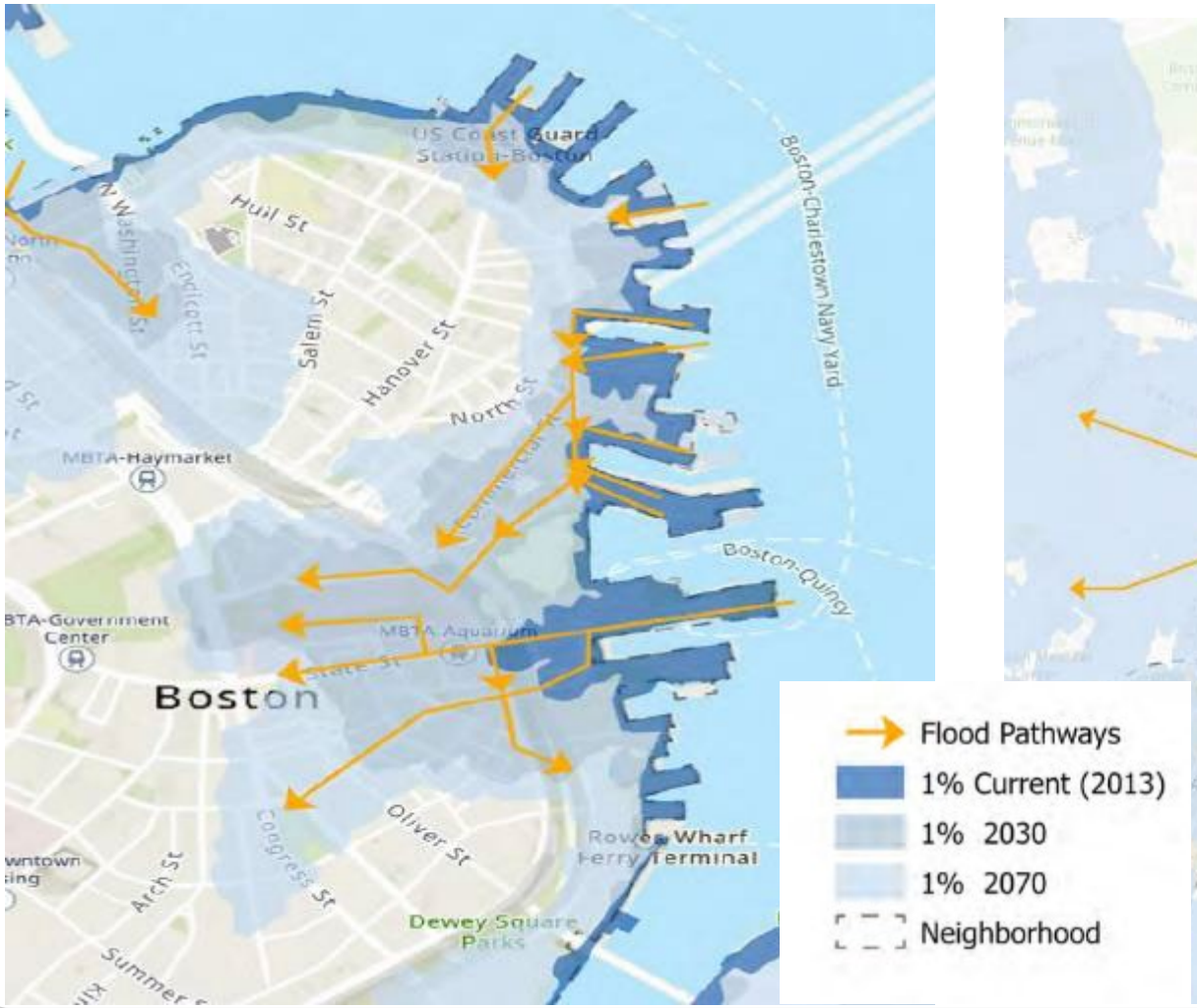
-HTRW within the study area (Chelsea Creek, Neponset River, etc.)

-EV (cultural resources) from pre NEPA construction requirements in fill lands

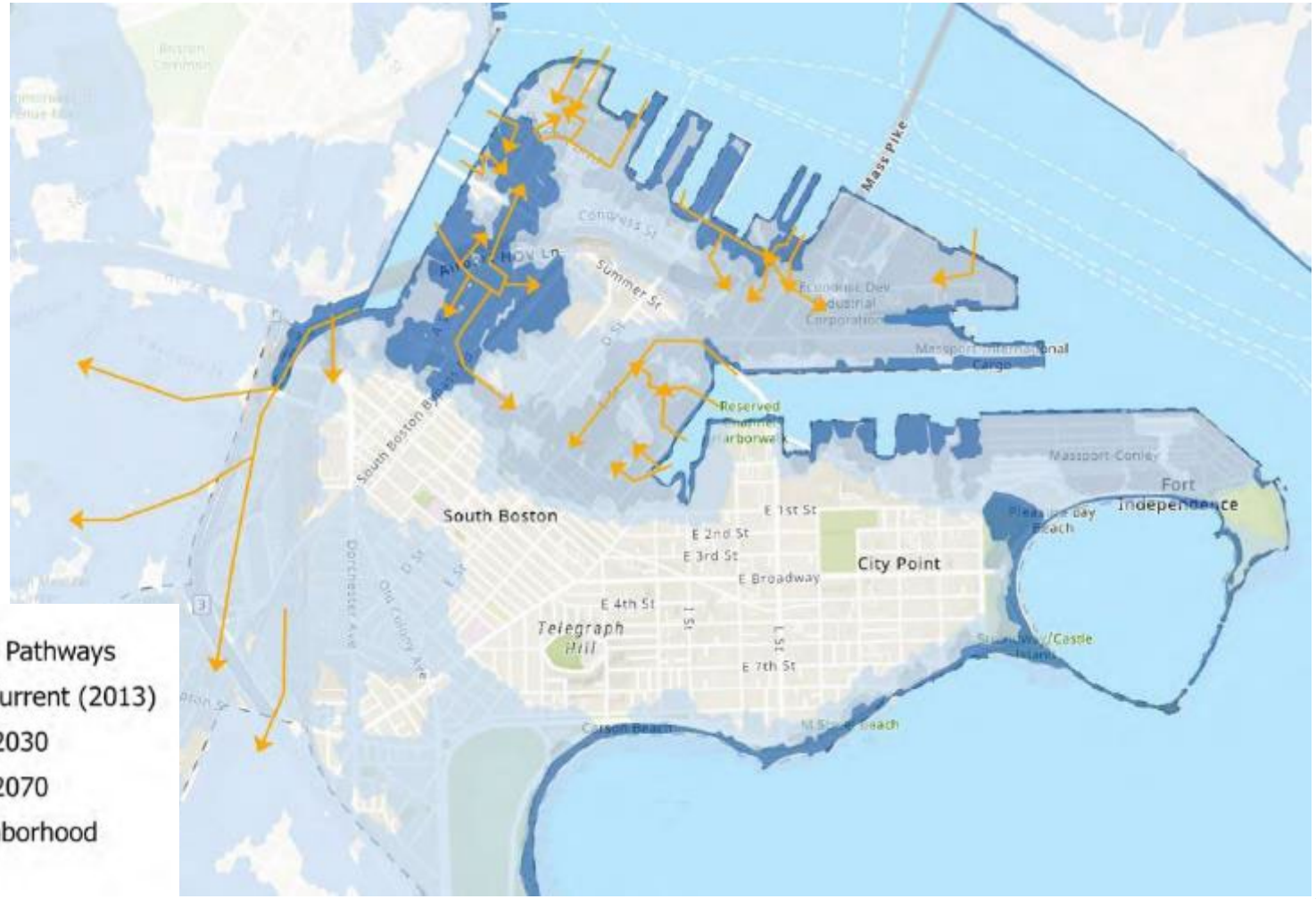
-Key uncertainties within the substrate and pile construction of much of the coastline

EXISTING CONDITIONS AND FUTURE WITHOUT A FEDERAL PROJECT

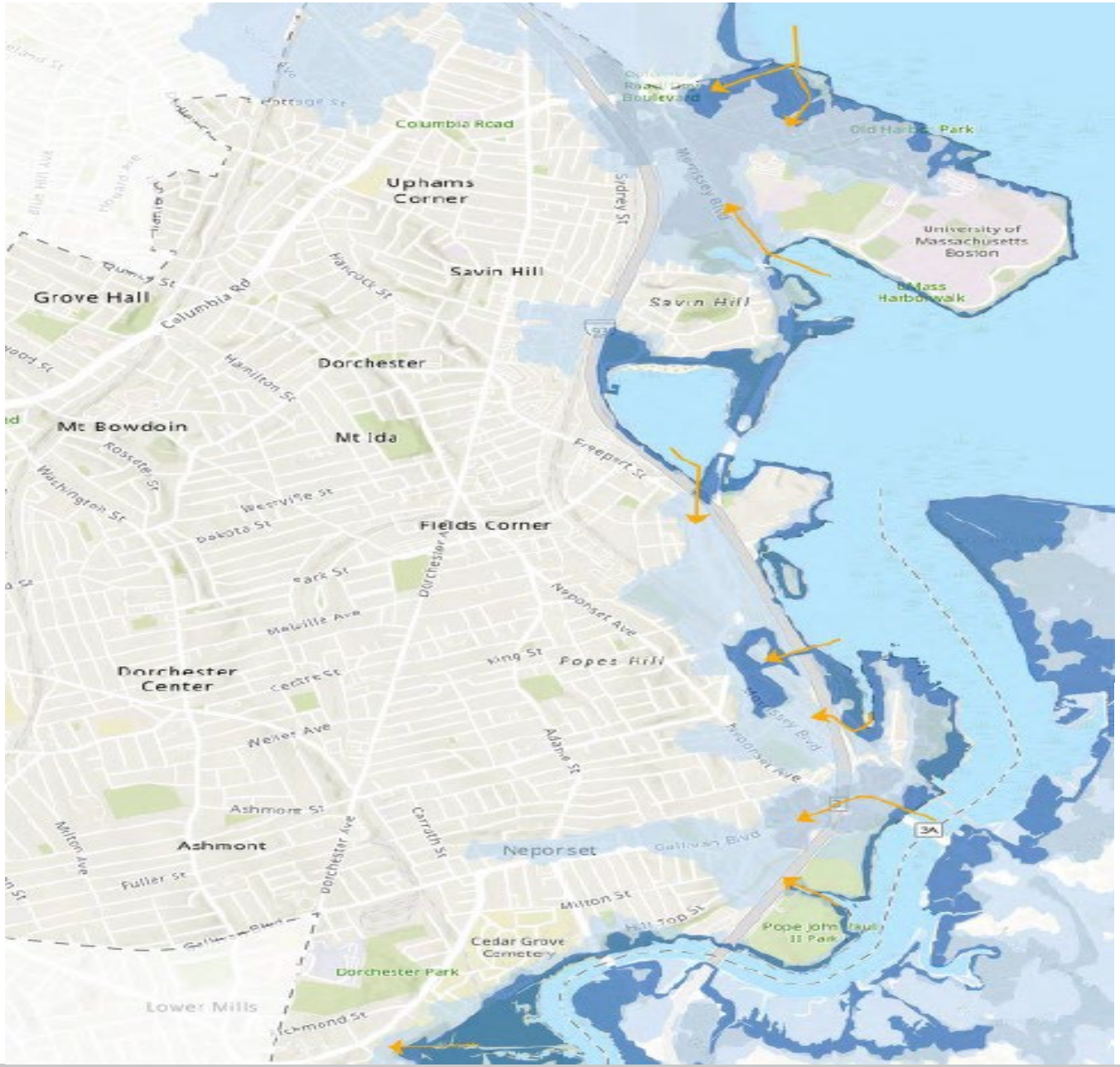
EXISTING AND FWOP FLOODPLAIN CONDITION DOWNTOWN AND NORTH END



EXISTING AND FWOP FLOODPLAIN SOUTH BOSTON



EXISTING AND FWOP FLOODPLAIN DORCHESTER



Flood Pathways

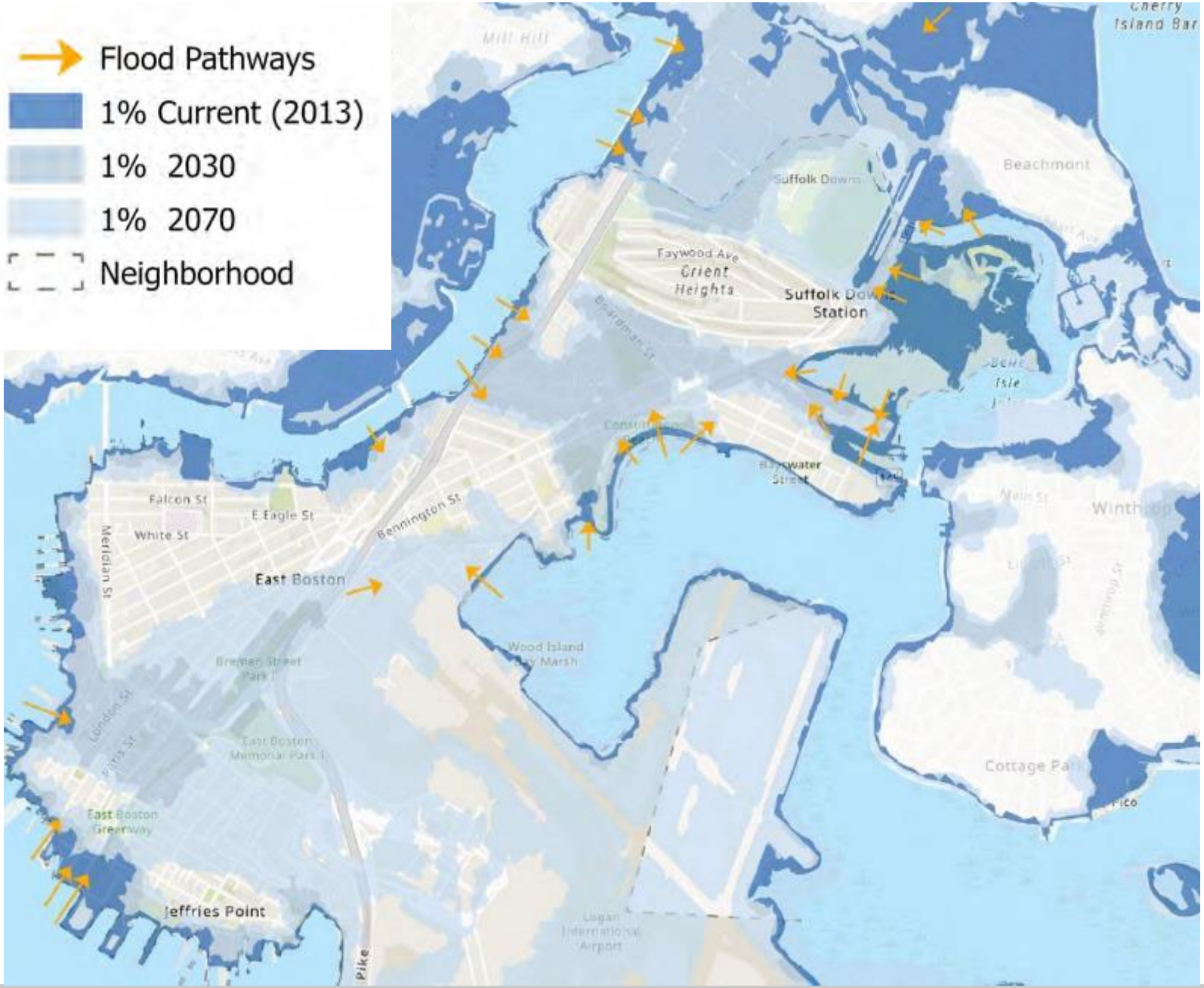
1% Current (2013)

1% 2030

1% 2070

Neighborhood

EXISTING AND FWOP FLOODPLAIN EAST BOSTON



EXISTING AND FWOP FLOODPLAIN CHARLESTOWN

Flood Pathways

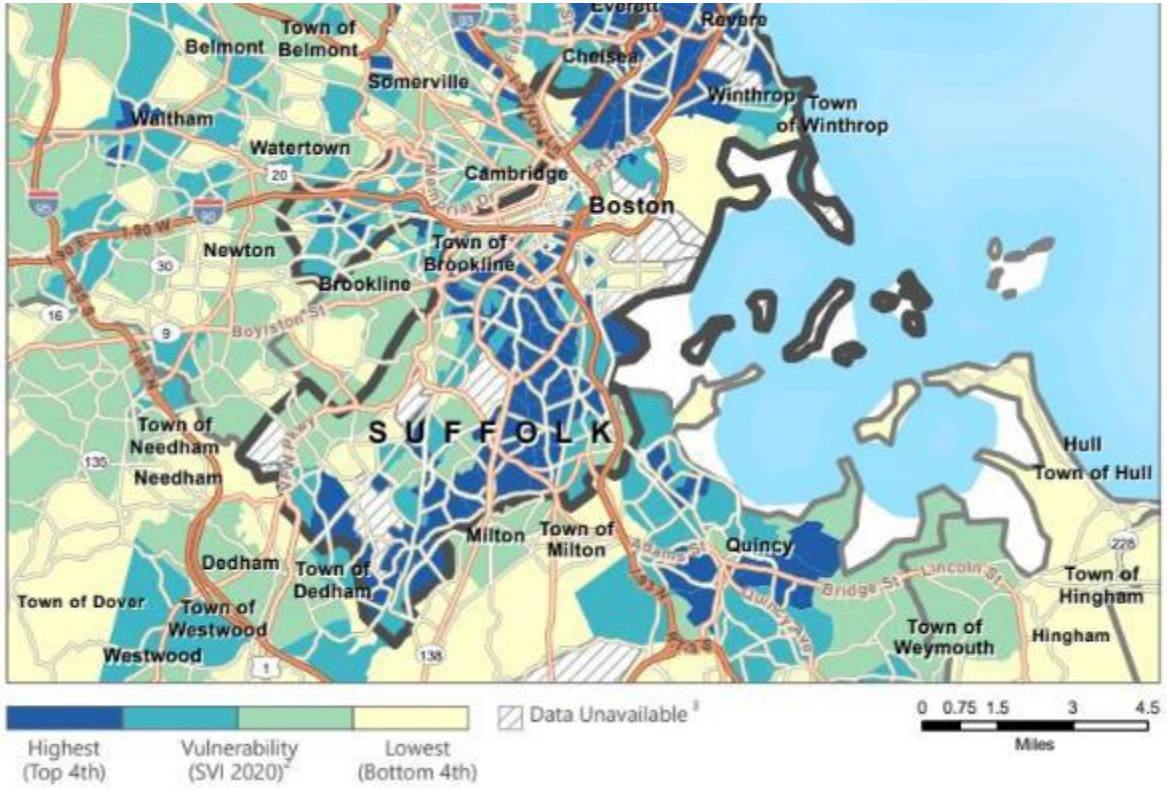
1% Current (2013)

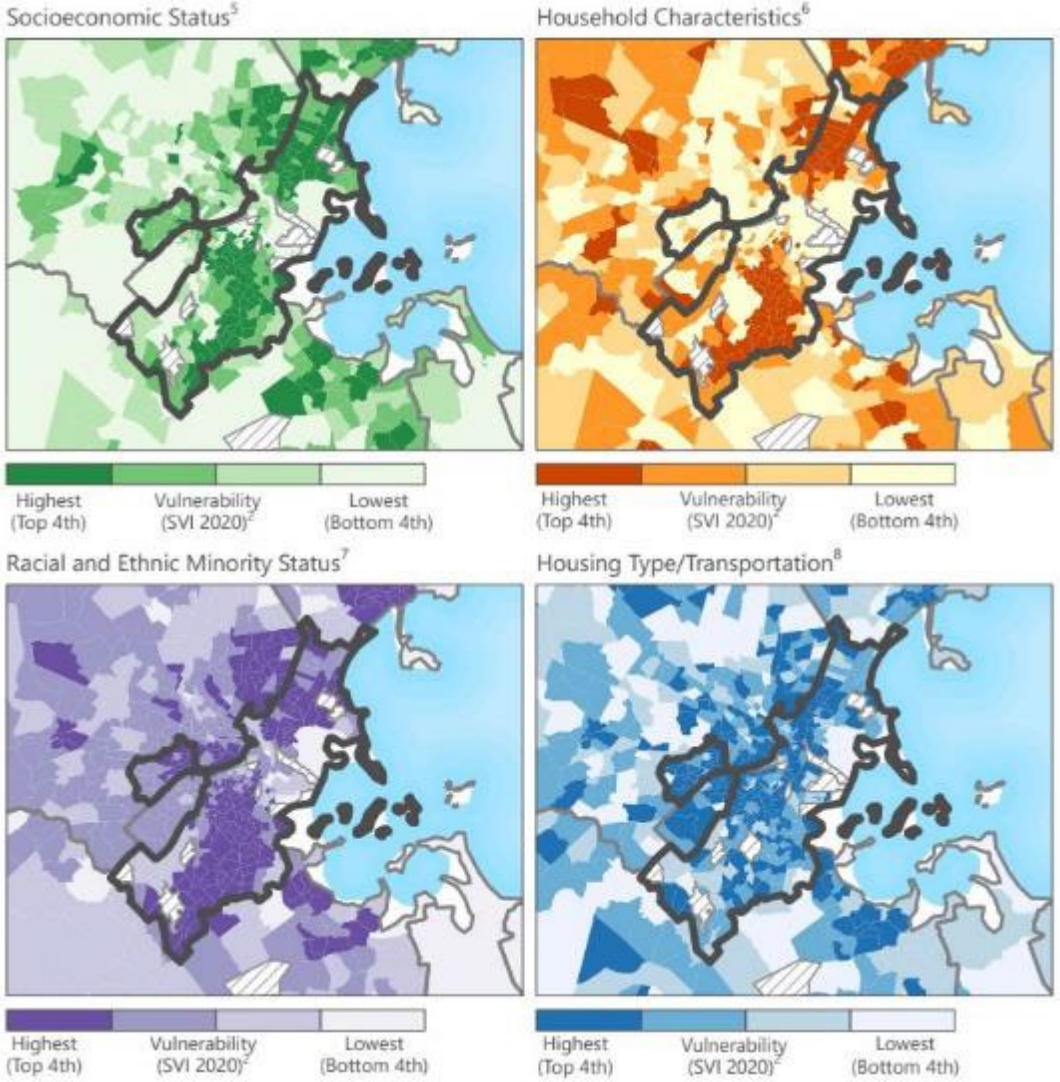
1% 2030

1% 2070

Neighborhood

IDENTIFYING EJ COMMUNITIES IN BOSTON



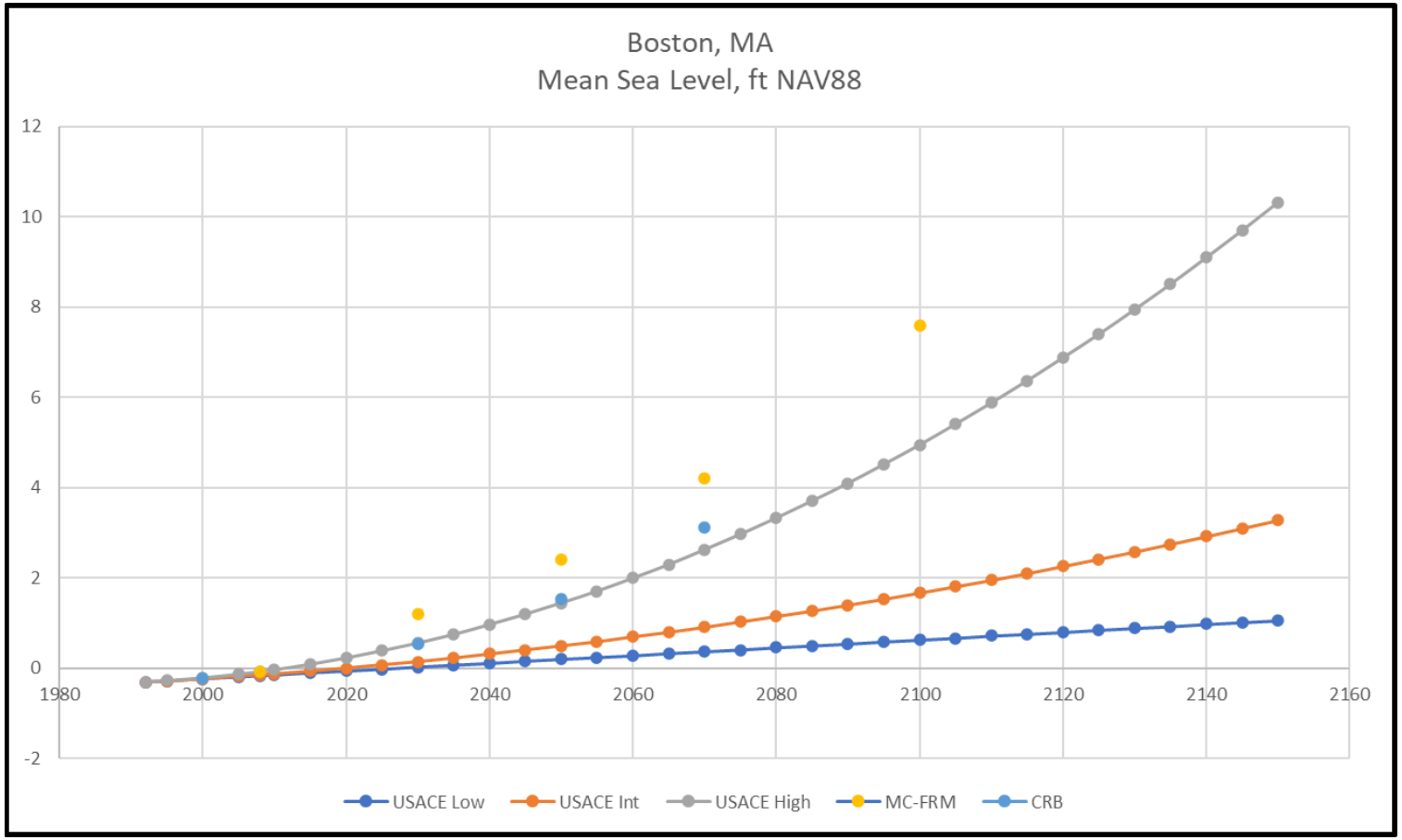


The CDC's Social Vulnerability Index score (2020) for the City of Boston is 0.7786 which is classified as a high level of vulnerability considering a scale of 0 (lowest vulnerability) to 1 (highest vulnerability)

Vulnerability is a community's capacity to prepare for and respond to the stress of a hazardous event.

(Both figures are from the CDC/ATSDR Social Vulnerability Index 2020)

SEA LEVEL CHANGE ANALYSIS

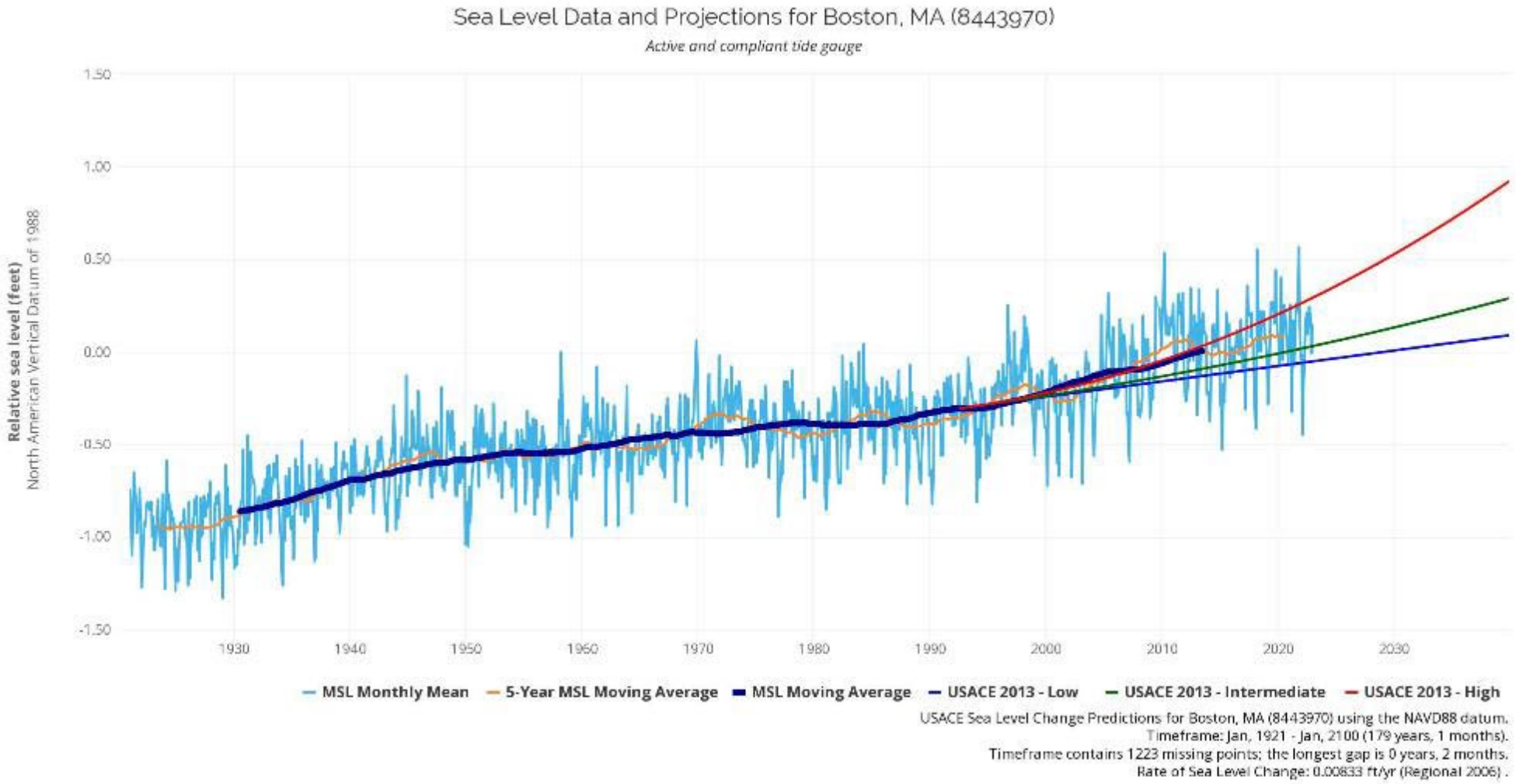


- For AMM, the PDT time shifted SLC based on the USACE High Curve.
  - ❖ Utilized High Curve for uncertainty due to adaptability constraints, dense urban population
    - ❑ Further analysis to be done pre-TSP

- ➢ MC-FRM 2070= USACE High 2090: ~4.1’
- ➢ MC-FRM 2050= USACE High 2070: ~2.5’
- ➢ MC-FRM 2030= USACE High 2045: ~1.2’

8443970, Boston, MA			
NOAA's 2006 Published Rate: 0.00863 feet/yr			
All values are expressed in feet relative to NAVD88			
Gauge Status: Compliant			
Year	**USACE Low**	**USACE Int**	**USACE High**
1992	-0.3	-0.3	-0.3
2020	-0.06	0.01	0.23
2040	0.11	0.32	0.97
2090	0.54	1.4	4.1
2140	0.98	2.92	9.1

SEA LEVEL CHANGE PROJECTIONS



STRUCTURES AT RISK

AMM-level estimates of FWOP damages to structures and contents:

Neighborhood	Structure count	AAEQ Low/Intermed SLC	PV Low/Intermed SLC	AAEQ High SLC	PV High SLC
Charlestown	1,760	$ 3,990,000	$ 113,200,000	$ 48,300,000	$ 1,370,000,000
Dorchester	2,791	$ 1,690,000	$ 47,900,000	$ 45,400,000	$ 1,288,000,000
Downtown	5,029	$ 4,880,000	$ 138,400,000	$ 109,300,000	$ 3,100,000,000
East Boston	4,228	$ 10,250,000	$ 290,700,000	$ 106,400,000	$ 3,018,000,000
South Boston	4,505	$ 8,330,000	$ 236,300,000	$ 111,800,000	$ 3,171,000,000
TOTAL	18,313	$ 29,140,000	$ 826,500,000	$ 421,200,000	$ 11,947,000,000

Data sources and tools used: NSI (updated 2022), WSEs from WHG, NACCS depth-damage functions, non-residential damage functions from April 2009 expert elicitation, Paul Morelli's Python script to estimate AMM-level damages

MEASURES SCREENING

- The team considered the universe of CSRM measures to determine which measures would contribute to meeting study objectives and would be engineeringly feasible in the study area

- When identifying locations for specific measures, the PDT utilized existing information including:

  - Inundation map data provided by the city from the Woods Hole Group model: MC-FRM
  - Information available to the team from the North Atlantic Coast Comprehensive Study
  - Python Script GIS analysis identifying inundation damage to those structures according to the NSI
  - Project recommendations from the Climate Ready Boston Reports
  - Input from various stakeholders at the Planning Charette (OCT ‘22) and neighborhood formulation workshops (NOV and DEC ‘22)
  - Federal and State environmental resource GIS data layers and screening tools (e.g., USFWS: IPaC; NMFS: EFH Mapper & ESA Mapper; Massachusetts: MassMapper & MassGIS)

STRUCTURAL MEASURES CONSIDERED

Measure	Measure Type	Notes	Carried Forward?
Breakwaters	Structural	Where beach nourishment is recommended the area is already in a relatively protected area	N
Revetment	Structural	In areas where there is existing revetment or sloped bank	N
Sea Walls	Structural	Seaward of existing seawall or replacing existing seawall	Y
Floodwalls	Structural	Behind existing seawall "T" and "I" foundations	Y
Deployable Floodwalls/Closure Structures	Structural	Due to the road and traffic infrastructure along the coast; may be necessary to close system	Y
Levees	Structural		Y
Elevated Harbor Walk	Structural	Cost sharing implications; potential betterment; however, there is an existing harbor walk along much of the study area.	Y
Storm Surge Barriers	Structural		N
Beachfill/Dunes	Structural/ NNBF		Y

NATURAL AND NATURE-BASED FEATURES CONSIDERED

Measure	Measure Type	Notes	Carried Forward?
Beachfill/Dunes	Structural/ NNBF	Possibly in the area of Carson Beach and Moakley Park; other areas (Revere) have performed with little re- nourishment requirements.	Y
Reef Habitat Restoration/Creation	NNBF	Based on previous research in this wave environment, reef habitat is ineffective	N
Marsh/Wetland Restoration/Creation	NNBF	Could be used for wave attenuation in areas like Wood Island Marsh and Belle Island	Y
Living Shorelines/ Ecological Revetment	NNBF	Could be effective in areas along the Neponset River or E. Boston	Y
Submerged Aquatic Vegetation	NNBF	With the extreme tidal swings of 9’; sea level change; wave energy; this measure is unlikely to be successful over the economic period of analysis	N
Drainage Improvements/Water Storage Features	NNBF	Will be considered where structural measures are proposed that cutoff existing drainage	Y

NONSTRUCTURAL MEASURES CONSIDERED

Measure	Measure Type	Notes	Carried Forward?
Buyout/Acquisition	Nonstructural	Not evaluated prior to AMM but will be evaluated prior to TSP	Y
Building Retrofit	Nonstructural	Multiple structures already going through this- includes wet floodproofing first floor and elevating all mechanical and electrical infrastructure above BFE or 2nd floor.	Y
Dry/Wet Floodproofing	Nonstructural		Y
Structure Relocation	Nonstructural	Not expected to be as efficient as retro-fitting or floodproofing	N
Warning Systems	Nonstructural	Non-Federal Sponsor implemented	Y
Emergency Planning	Nonstructural	Non-Federal Sponsor implemented	Y
Land Use Planning	Nonstructural	Non-Federal Sponsor implemented. Includes floodplain development restrictions, building code and zoning updates, etc.	N

PLAN FORMULATION STRATEGIES

- Evaluate each neighborhood independently, and then evaluate as a system
- Prioritize penetration flood pathways
- Prioritize managing risk to EJ/Socially Vulnerable Communities and reducing risk to human life, health, and safety
- Consider projects and actions by others (including CRB) to develop complete and closed system
- Consider direct and indirect environmental impacts associated with project alternatives
- Phased Approach based on SLC Scenarios
- Maximize net benefits across all four accounts (comprehensive benefits)
- Reasonably maximize net NED benefit

PLAN FORMULATION BREAKDOWN

Each Neighborhood is uniquely impacted by Coastal Storm Risk. The neighborhoods are demographically diverse, as well as geographically and geologically diverse.

Each Neighborhood was evaluated individually for existing and future condition; as well as, risk management. Once the neighborhoods were evaluated, the study area was evaluated for completeness, effectiveness, efficiency and acceptability.

The City participates in the National Flood Insurance Program and has been a part of the Community Rating System (CRS) since 1992. The City is currently a class level 10 in the CRS.

Neighborhood Breakdown:

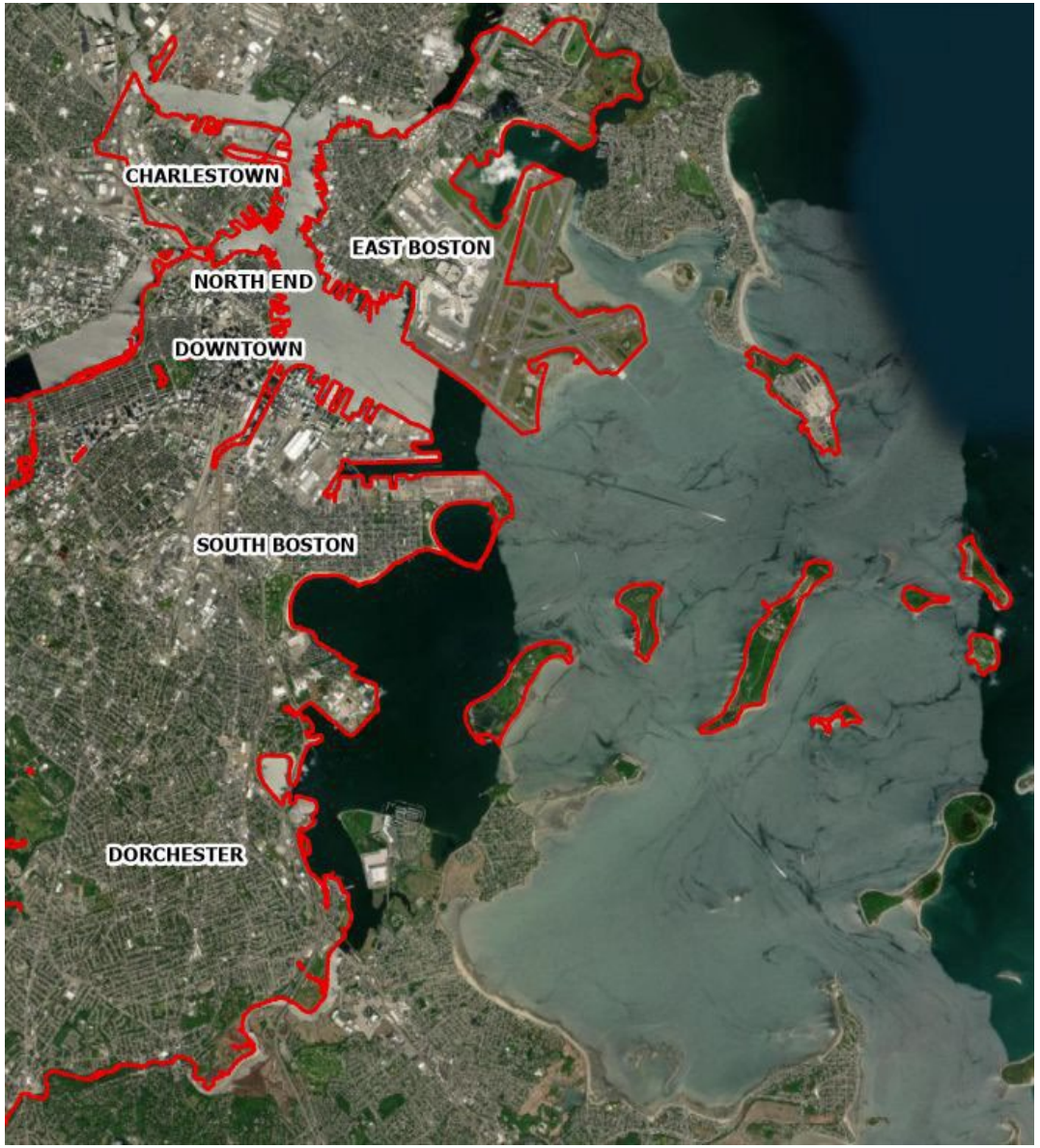
Downtown and North End

Dorchester

Charlestown

South Boston

East Boston



DOWNTOWN AND NORTH END

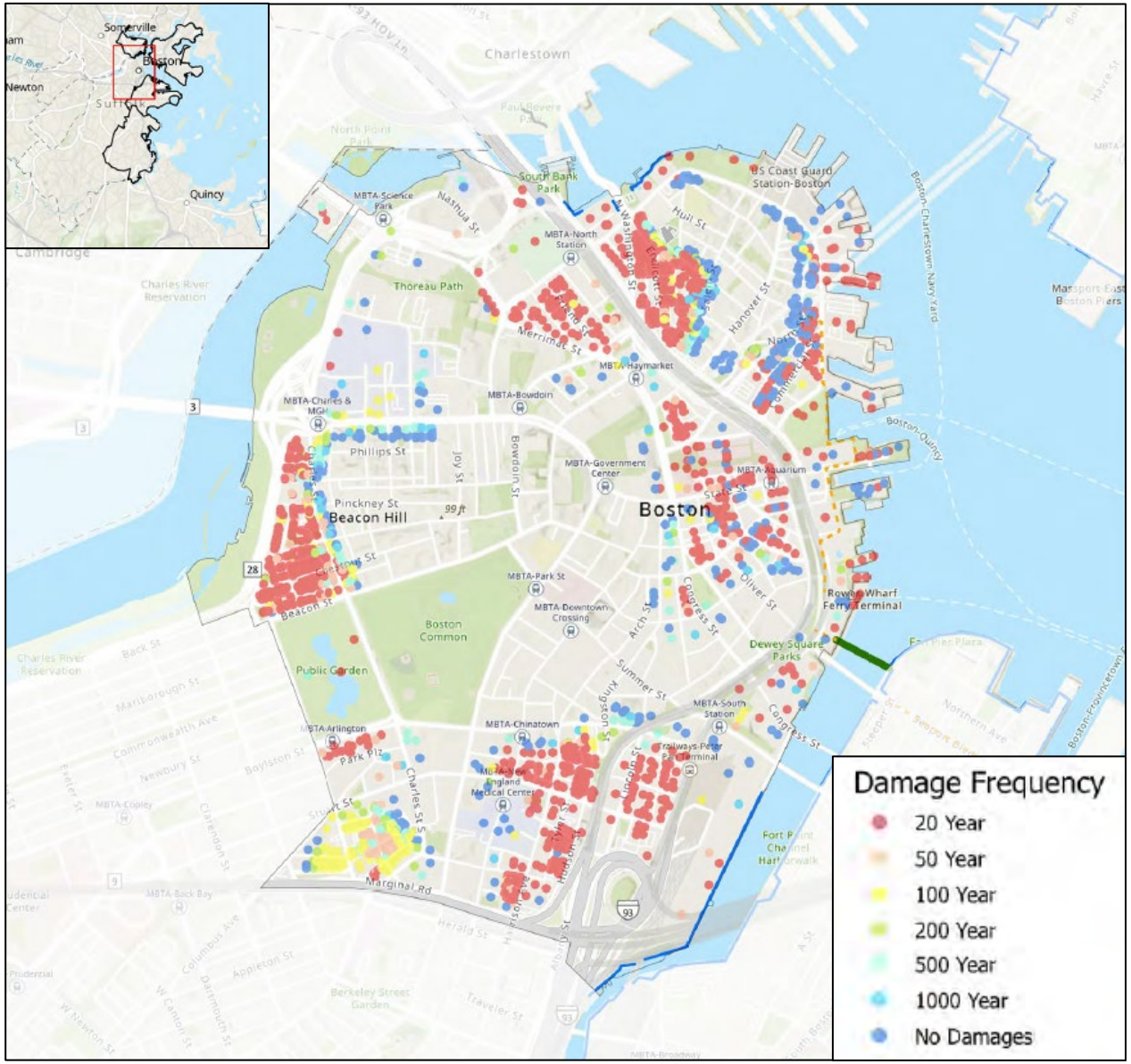
Highlights-

- New Charles River Dam is not part of this study.
- Historic Long Wharf and New England Aquarium is inundated by frequent events under existing condition

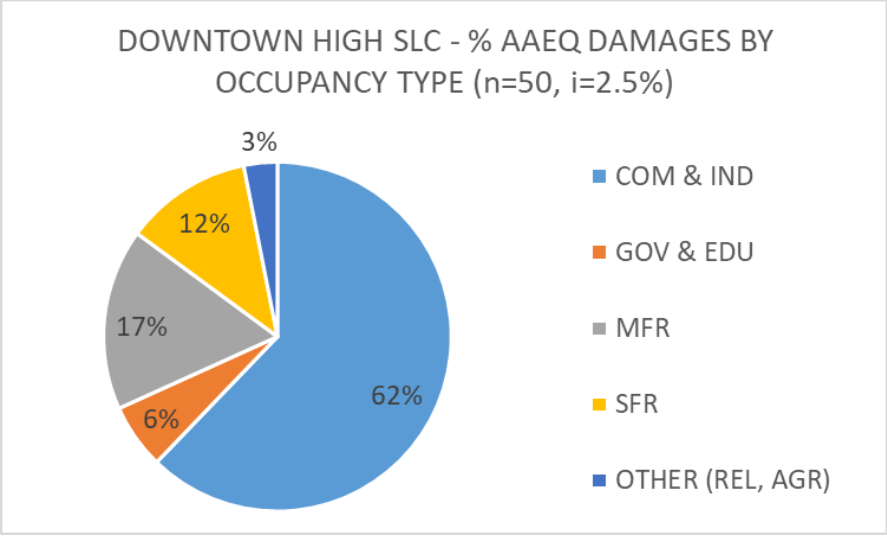
Coastline is home to-

- USCG Station Boston
- Old North Church
- Long Wharf
- New England Aquarium
- USACE New Charles River Dam
- Harborwalk

FWOP DAMAGES HIGH SLC – DOWNTOWN

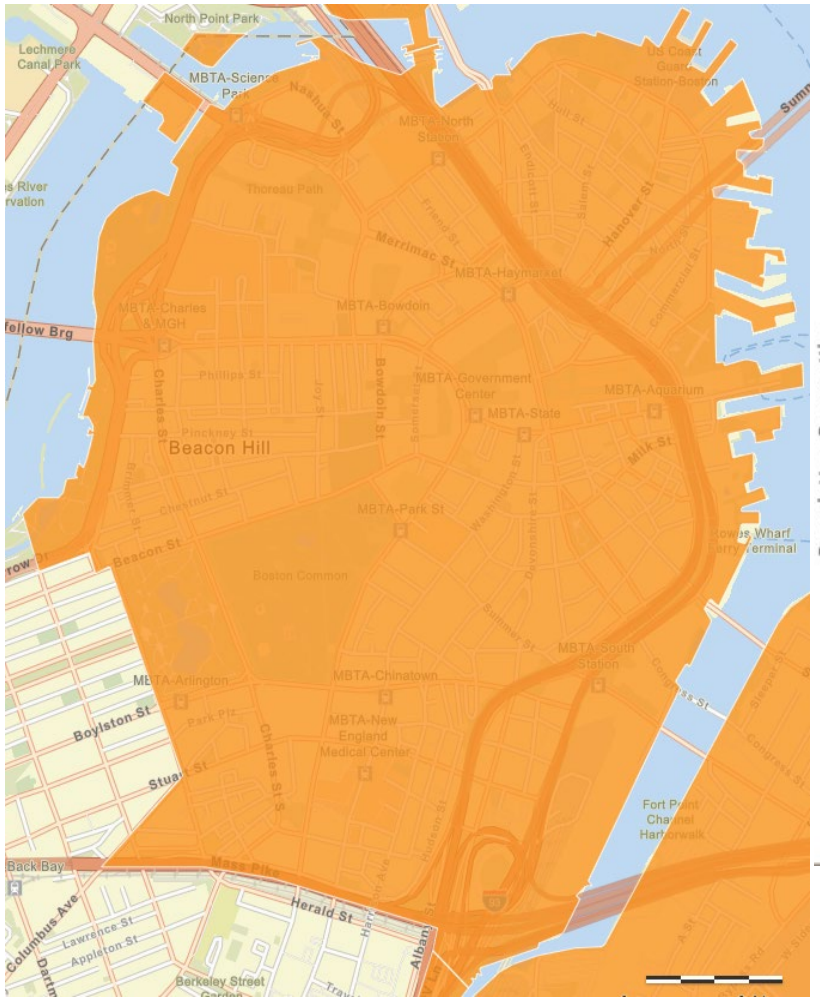


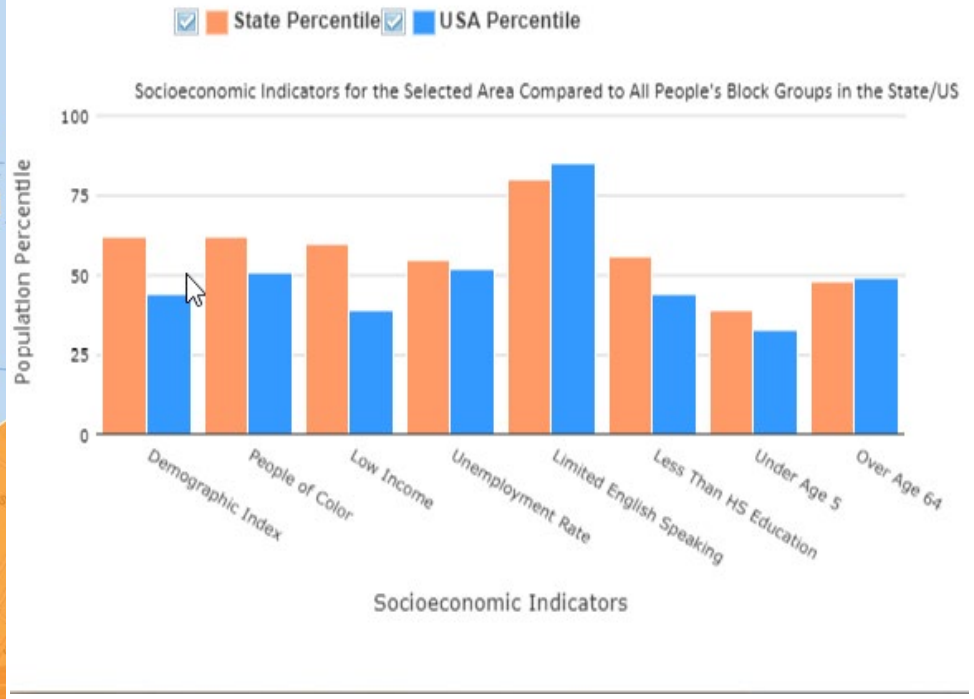
- 5,029 structures in Downtown in 1000-year floodplain based on WHG 2070 SLC (~USACE 2090 high curve)
- 3,999 structures receiving damage over 50-year period of analysis
- ~$109 million AAEQ; ~$3.1 billion PV (n=50, i=2.5%, FY23 price level)



Data sources and tools used: NSI (updated 2022), WSEs from WHG, NACCS depth-damage functions, non-residential damage functions from April 2009 expert elicitation, Paul Morelli's Python script to estimate AMM-level damages

EXISTING CONDITIONS-SOCIOECONOMIC INDICATORS: DOWNTOWN/NORTH END





Source: EPA's EJScreen Version 2.1 – Socioeconomic Indicators (2022)

- Relatively high percentage of households with limited English speaking compared to U.S. (85th percentile) and state (80th percentile)

INITIAL ARRAY OF ALTERNATIVES DOWNTOWN AND NORTH END

Alternative	Description/Measures	Notes
1	No Action	
2	Retrofit buildings in 1% AEP floodplain and harden MBTA locations. Harden tunnels, ventilation buildings, MBTA Stops.	
3	Outer Harbor Surge Barrier	NOT CARRIED FORWARD
4	Inner Harbor Barrier	NOT CARRIED FORWARD
5	Flood wall from NCRD to Langone Park and flood wall from Rowes Wharf along east side of Downtown to Fleet Street	
6	Perimeter sea wall from Langone Park to Rowe's Wharf	
7	Combination of ALT 2 with ALT 5. Structural and Nonstructural Elements seaward of flood wall.	

INTERAGENCY CONCERNS AND/OR CONSIDERATIONS?

Downtown/North End discussion points

FEDERAL

STATE

SOUTH BOSTON

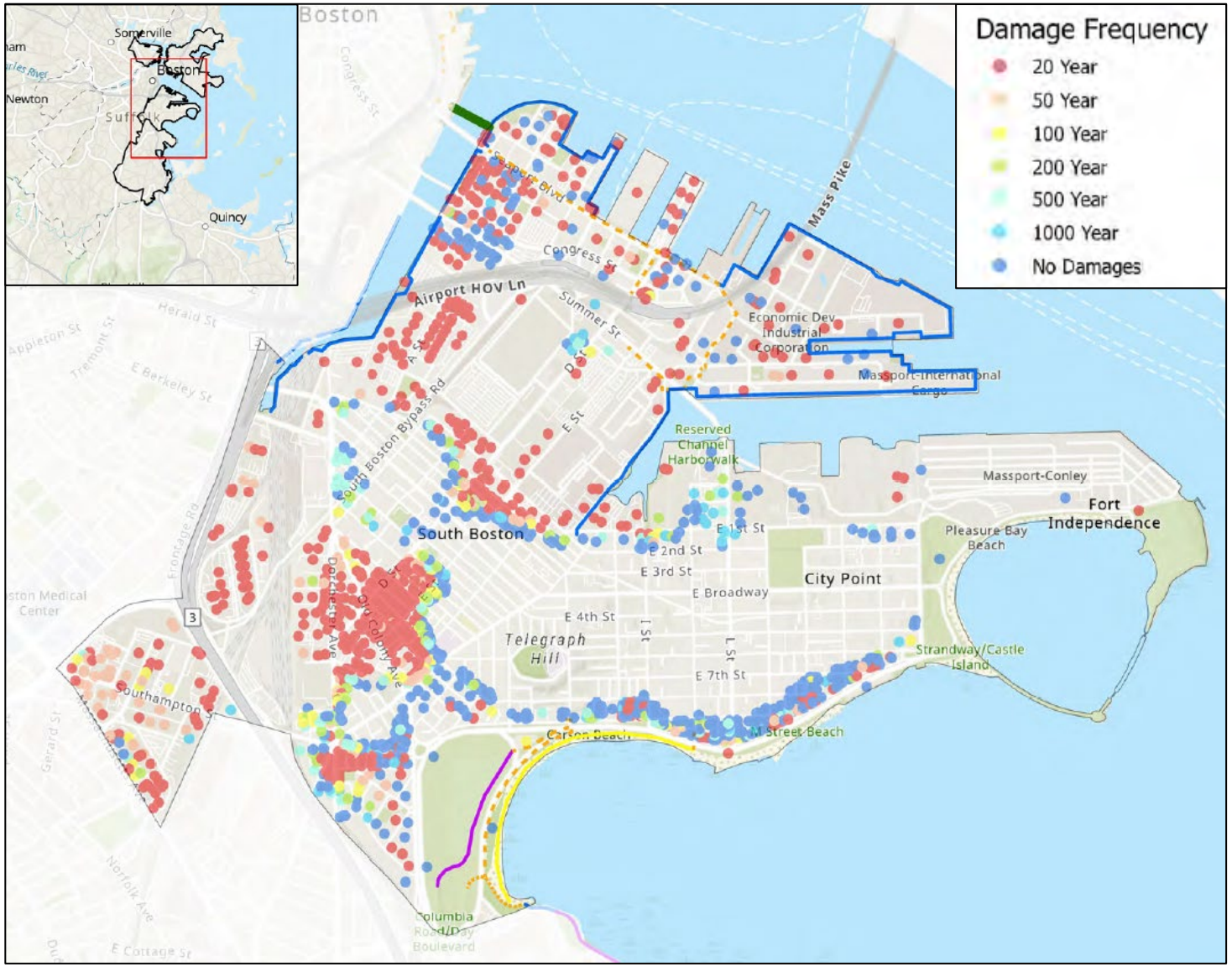
Highlights-

- Fort Point Channel is significant flood pathway into South Boston under existing and FWOP
- City is already working projects for Moakley Park IVO Carson Beach and may become part of FWOP.

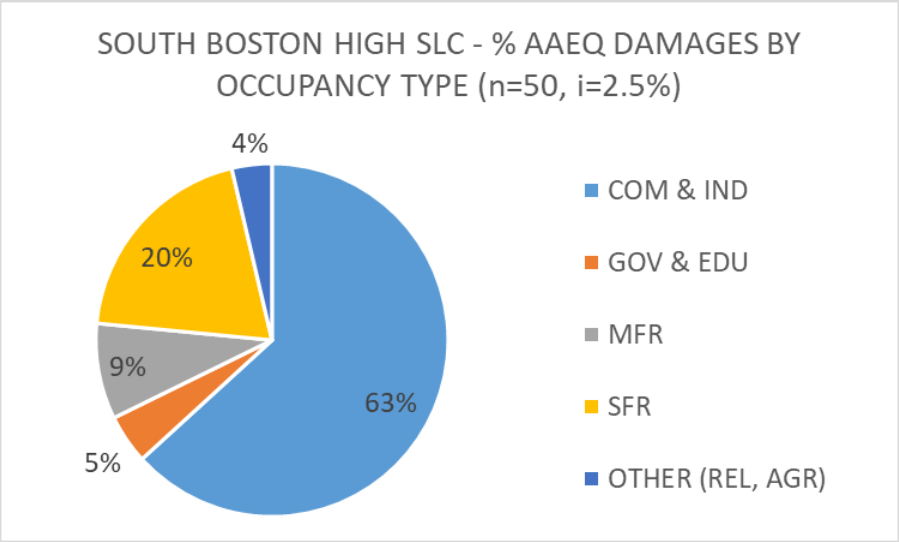
Coastline is home to-

- Boston Children's Museum
- Joe Moakley Federal Courthouse
- Institute for Contemporary Arts
- Boston Tea Party Ships and Museum
- Seaport Business District
- Joe Moakley Park and Carson Beach

FWOP DAMAGES HIGH SLC – SOUTH BOSTON

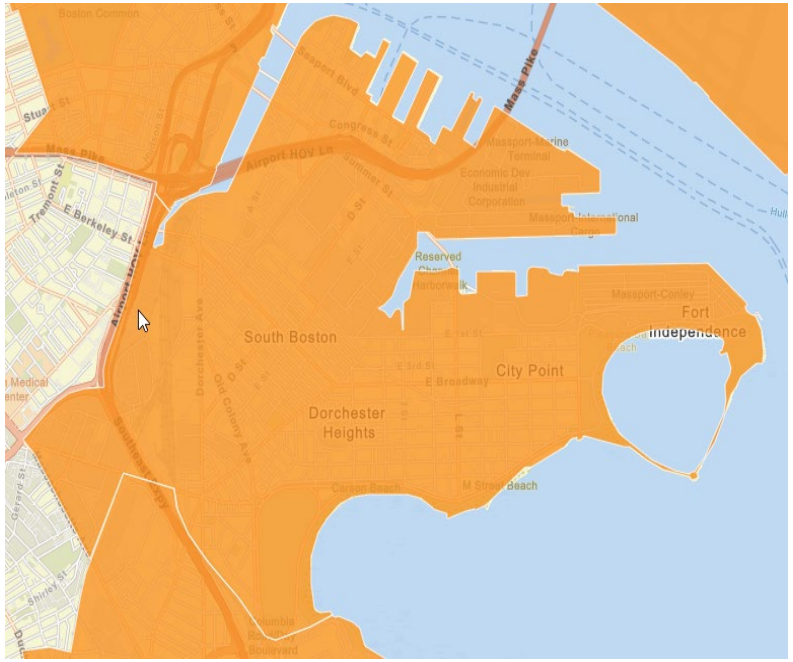


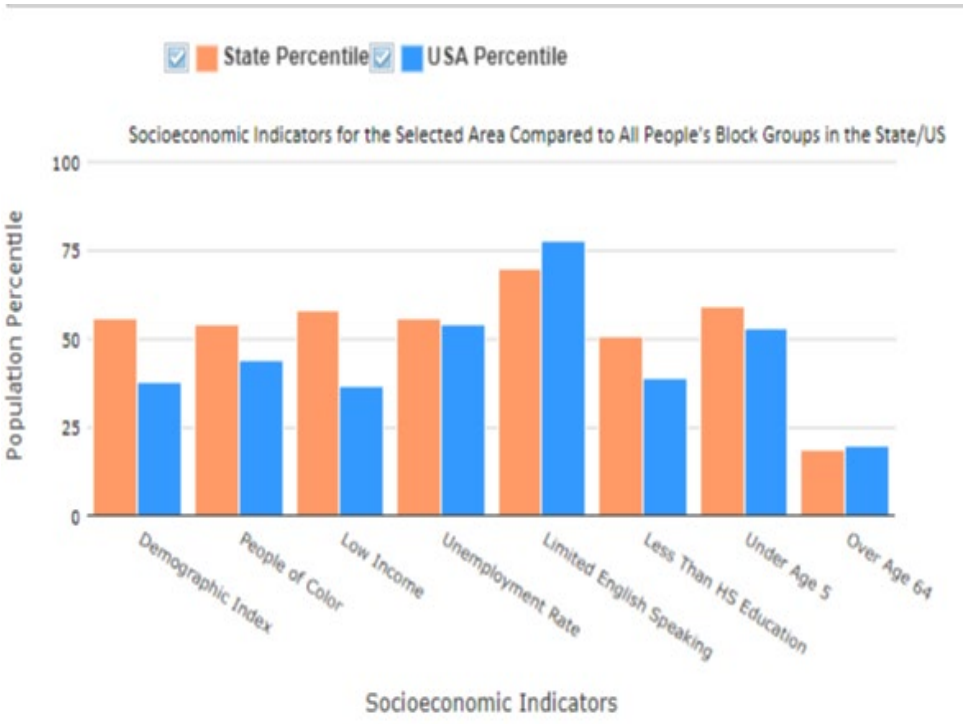
- 4,505 structures in South Boston in 1000-year floodplain based on WHG 2070 SLC (~USACE 2090 high curve)
- 3,198 structures receiving damage over 50-year period of analysis
- ~$112 million AAEQ; ~$3.2 billion PV (n=50, i=2.5%, FY23 price level)



Data sources and tools used: NSI (updated 2022), WSEs from WHG, NACCS depth-damage functions, non-residential damage functions from April 2009 expert elicitation, Paul Morelli's Python script to estimate AMM-level damages

EXISTING CONDITIONS-SOCIOECONOMIC INDICATORS: SOUTH BOSTON





- Relatively high percentage of households with limited English speaking compared to U.S. (78th percentile) and state (70th percentile)
- Falls below the national and state 25th percentiles in its population of individuals over age 64 (U.S. 20th percentile, state 19th percentile)

Source: EPA's EJScreen Version 2.1 – Socioeconomic Indicators (2022)

FOCUSED ARRAY OF ALTERNATIVES
S. BOSTON

Alternative	Description/Measures	Notes
1	No Action	
2	Retrofit buildings in 1% AEP floodplain and harden MBTA locations. Harden tunnels, ventilation buildings, MBTA Stops.	
3	Fort Point Channel Surge Barrier; Floodwall along Seaport Blvd crossing I-90 Tunnel at Northern Ave.; Retrofit structures seaward of Seaport Blvd, Harden tunnels, ventilation buildings, MBTA Stops.; Berm through Moakley Park with 1025 LF floodwall and deployable tie-in.	
4	Fort Point Channel Perimeter floodwall; Floodwall along Seaport Blvd crossing I-90 Tunnel at Northern Ave.; Retrofit structures seaward of Seaport Blvd, Harden tunnels, ventilation buildings, MBTA Stops.; Berm through Moakley Park with 1025 LF floodwall and deployable tie-in.	
5	Fort Point Channel Perimeter floodwall; ~24,000LF South Boston Perimeter Solution behind existing seawall and harborwalk IVO Contemporary Arts Inst. and perimeter piers crossing I-90 tunnel in-water; berm through Moakley Park with 1025 LF floodwall and deployable tie-in.	

INTERAGENCY CONCERNS AND/OR CONSIDERATIONS?

South Boston discussion points

FEDERAL

STATE

DORCHESTER

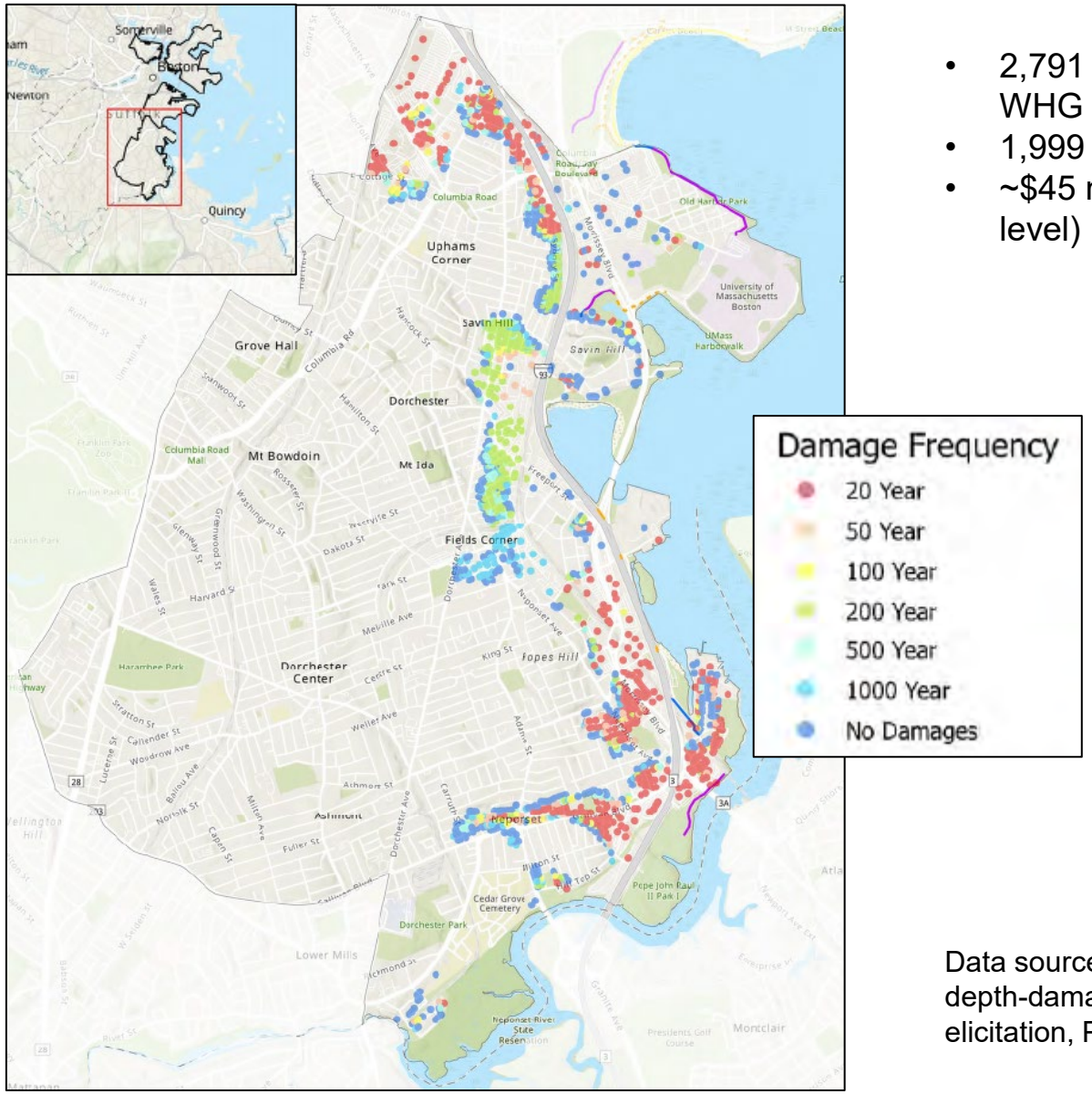
Highlights-

- Dorchester is an EJ Community
- 80% of residents are ESL
- Significant flood pathway into Dorchester is at Neponset River IVO Planet Fitness
- Elevated I-93 creates flood pathways at three underpasses
  - City would like to investigate work with DoT to elevate roads impacted by I-93
- Morrissey Blvd and Castle Isle. Drawbridge flood in existing conditions

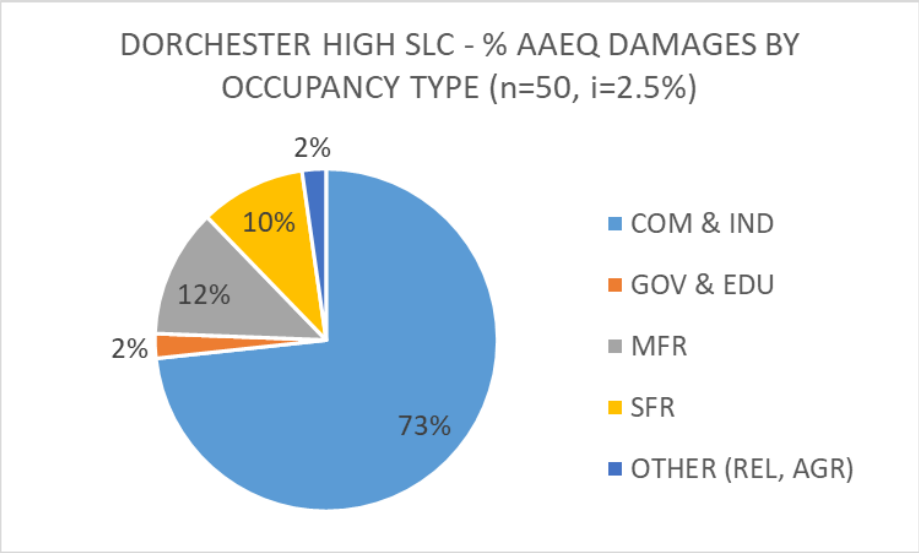
Coastline is home to-

- JFK Library
- U-Mass Boston
- Neponset River Wetlands
- National Grid
- Boston Gas

FWOP DAMAGES HIGH SLC – DORCHESTER

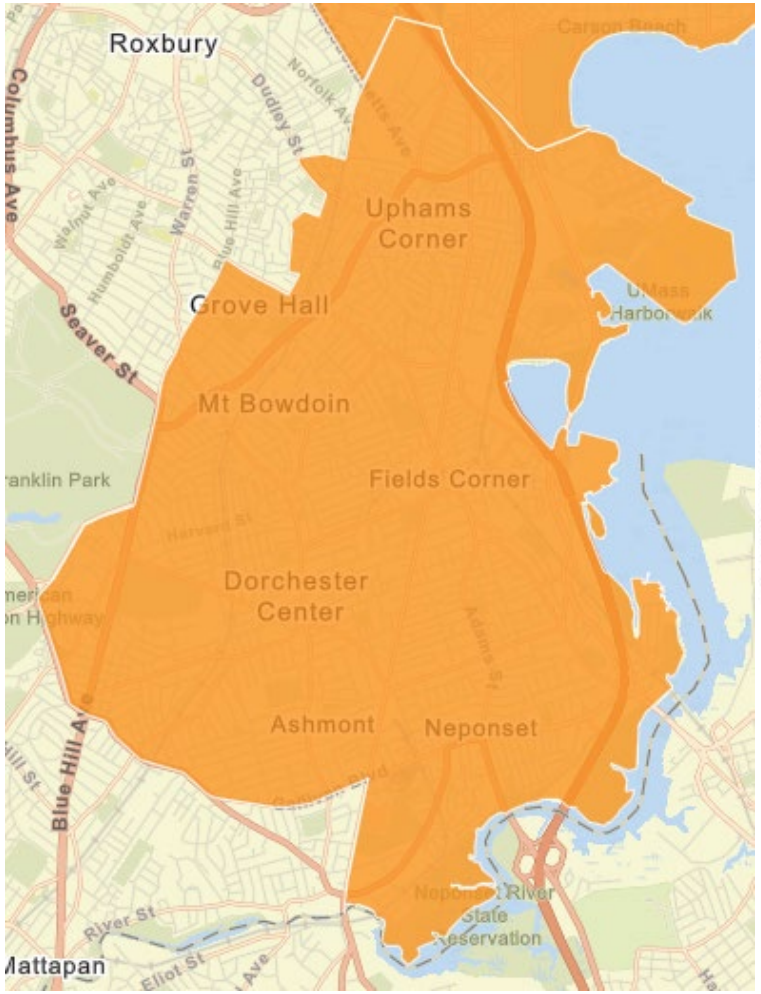


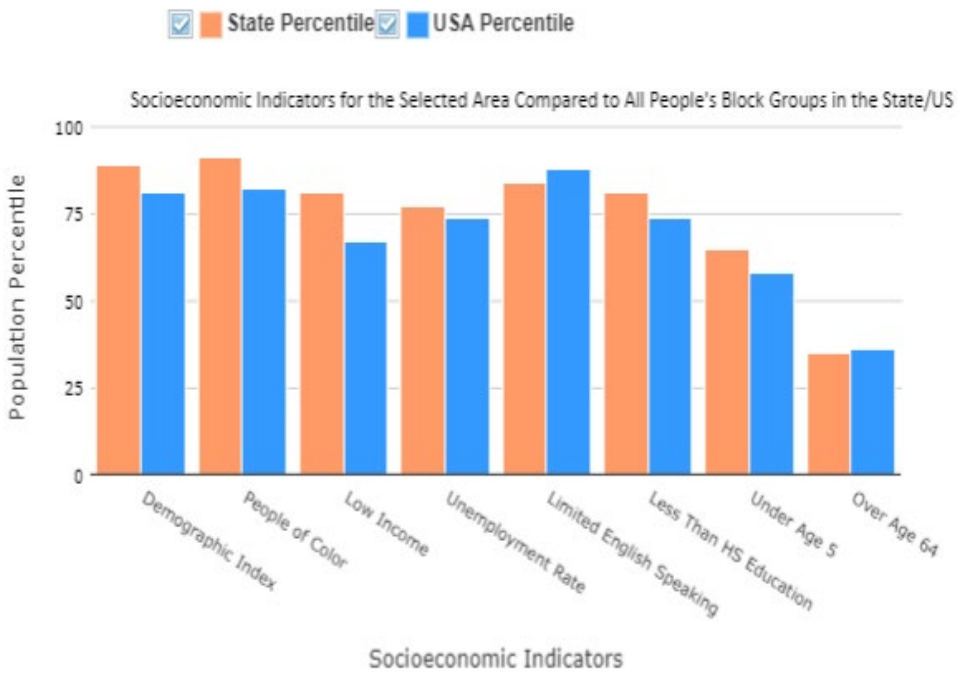
- 2,791 structures in Dorchester in 1000-year floodplain based on WHG 2070 SLC (~USACE 2090 high curve)
- 1,999 structures receiving damage over 50-year period of analysis
- ~$45 million AAEQ; ~$1.3 billion PV (n=50, i=2.5%, FY23 price level)



Data sources and tools used: NSI (updated 2022), WSEs from WHG, NACCS depth-damage functions, non-residential damage functions from April 2009 expert elicitation, Paul Morelli's Python script to estimate AMM-level damages

EXISTING CONDITIONS-SOCIOECONOMIC INDICATORS: DORCHESTER





Source: EPA's EJScreen Version 2.1 – Socioeconomic Indicators (2022)

- Relatively high percentage of people of color compared to U.S. (82nd percentile) and state (91st percentile)
- Relatively high percentage of households with limited English speaking compared to U.S. (88th percentile) and state (84th percentile)
- Unemployment rate, people of color, and low-income population percentiles higher in East Boston and Dorchester than other 3 neighborhoods in study area

FOCUSED ARRAY OF ALTERNATIVES DORCHESTER

Alternative	Description/Measures	Notes
1	No Action	
2	Retrofit buildings in 1% AEP floodplain and harden MBTA locations. Harden tunnels, ventilation buildings, MBTA Stops.	
3	Buyout of Parcel (Planet Fitness); Create green space or living levee back to Taylor St. and S. East Expressway; 990LF Floodwall at Conley St. rail yard; gate structures to cut-off Conley St./Morrissey Blvd./Victory Rd. underpasses of I-93; Berm around Pattens Cove; Closure Structure across Morrissey Blvd. IVO Bianculli Blvd.; levee around Dorchester Peninsula IVO of JFK Library, UMASS Boston	
4	Buyout of Parcel (Planet Fitness); Create green space or living levee back to Taylor St. and S. East Expressway; 990LF Floodwall at Conley St. rail yard; gate structures to cut-off Conley St./Morrissey Blvd./Victory Rd. underpasses of I-93; Berm around Pattens Cove; Closure Structure across Morrissey Blvd. IVO Bianculli Blvd.; floodwall behind existing harborwalk around Dorchester Peninsula IVO of JFK Library, UMASS Boston	
5	Floodwall along Neponset River from Rail Bridge to Pope John Paul II Park; 990LF Floodwall at Conley St. rail yard; gate structures to cut-off Conley St./Morrissey Blvd./Victory Rd. underpasses of I-93; Berm around Pattens Cove; Closure Structure across Morrissey Blvd. IVO Bianculli Blvd.; levee around Dorchester Peninsula IVO of JFK Library, UMASS Boston	
6	In any of the above Alternatives, in lieu of closure structures at the underpasses of I-93; elevate Conley, Victory and Morrissey Blvd to cut off flood pathways into Dorchester.	

INTERAGENCY CONCERNS AND/OR CONSIDERATIONS?

Dorchester discussion points

FEDERAL

STATE

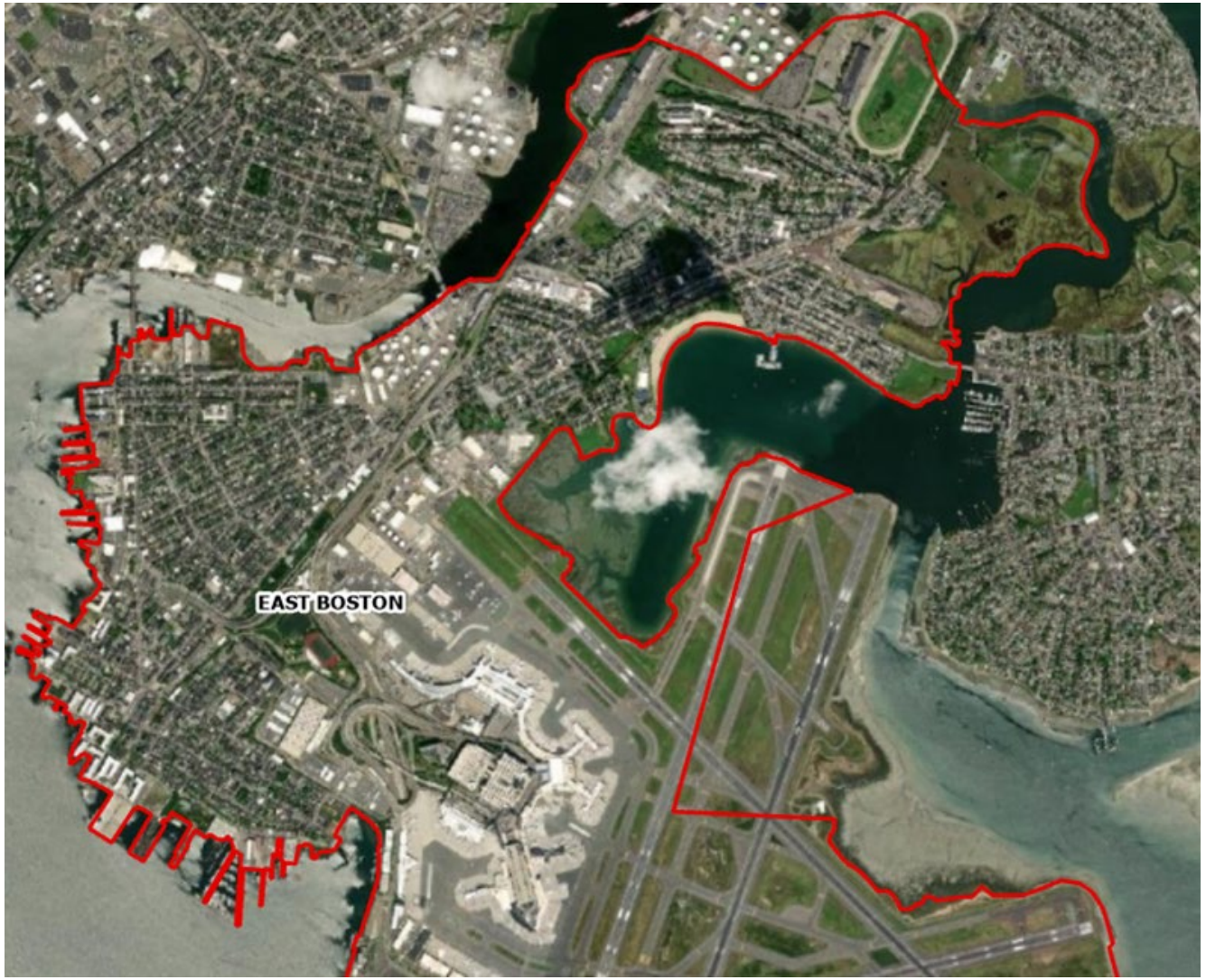
EAST BOSTON

Highlights-

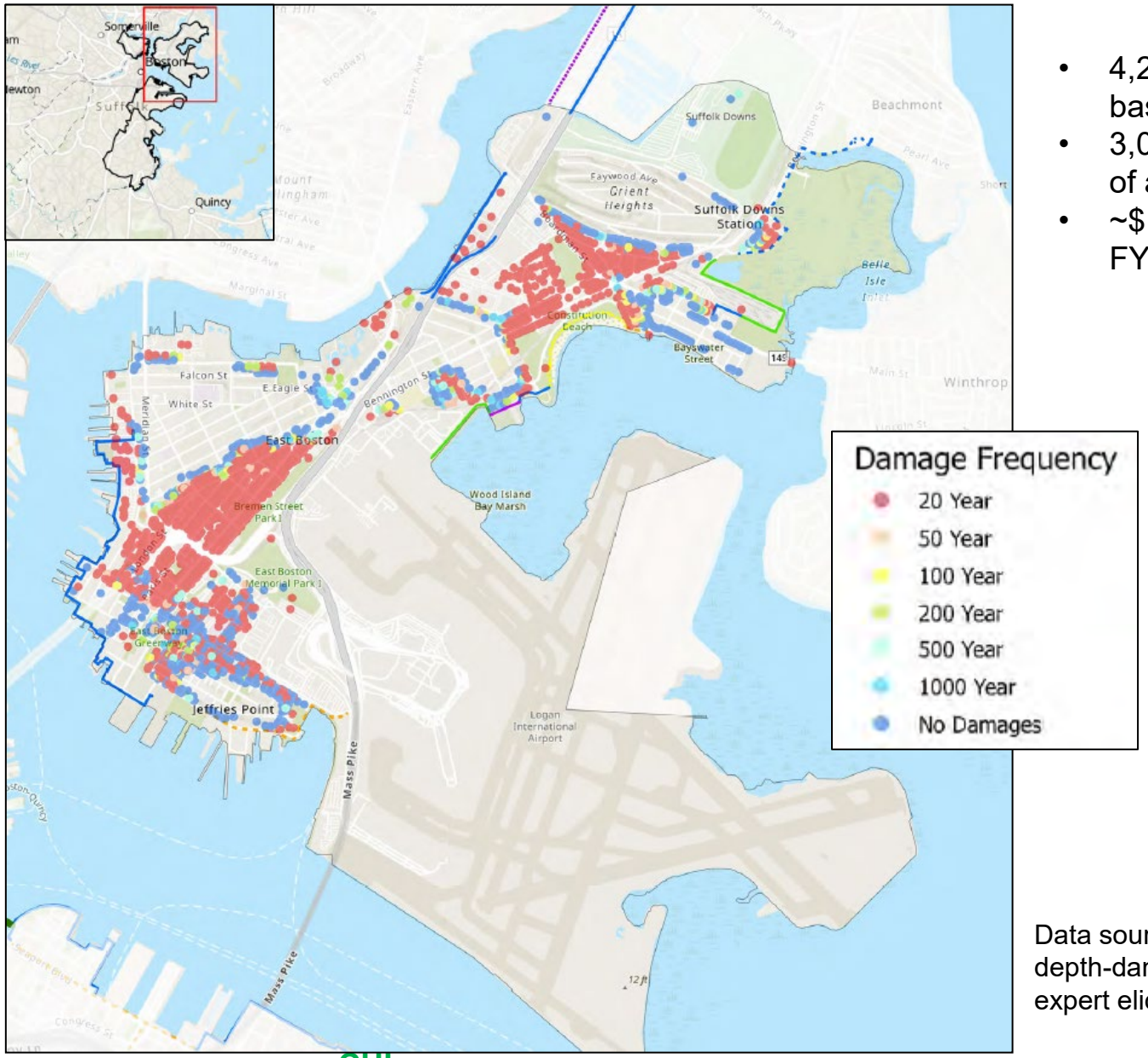
- East Boston is an EJ Community
- One Grocery Store in the Neighborhood
- Logan Airport is only partially considered in the Study
- Belle Isle Marsh is a collaborative effort with ERDC and EWN®
- Wood Isle and Belle Isle are both urban salt marshes and potential NNB
- Alternatives require tie-in outside of COB with the town of Revere

Coastline is home to-

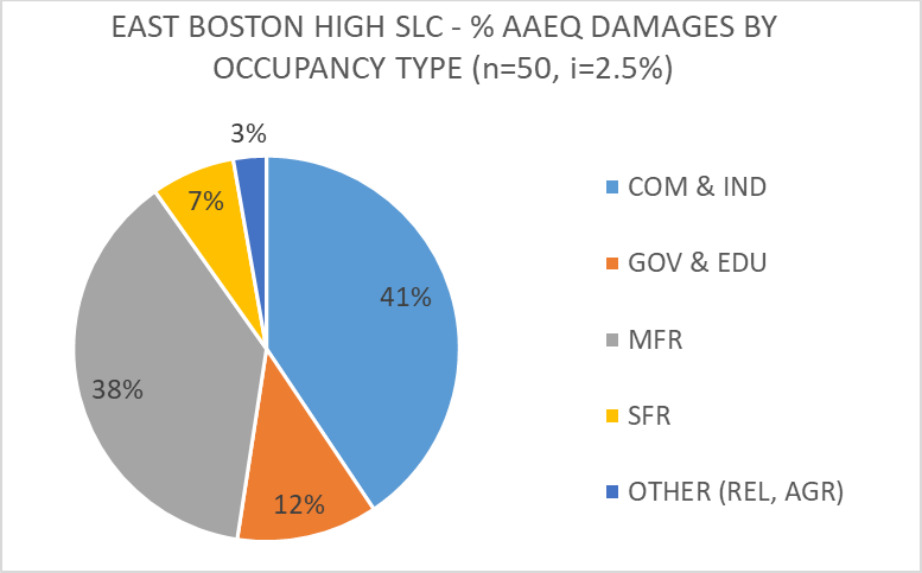
- Logan International Airport
- Chelsea Creek and Airport Fuel Farm



FWOP DAMAGES HIGH SLC – EAST BOSTON

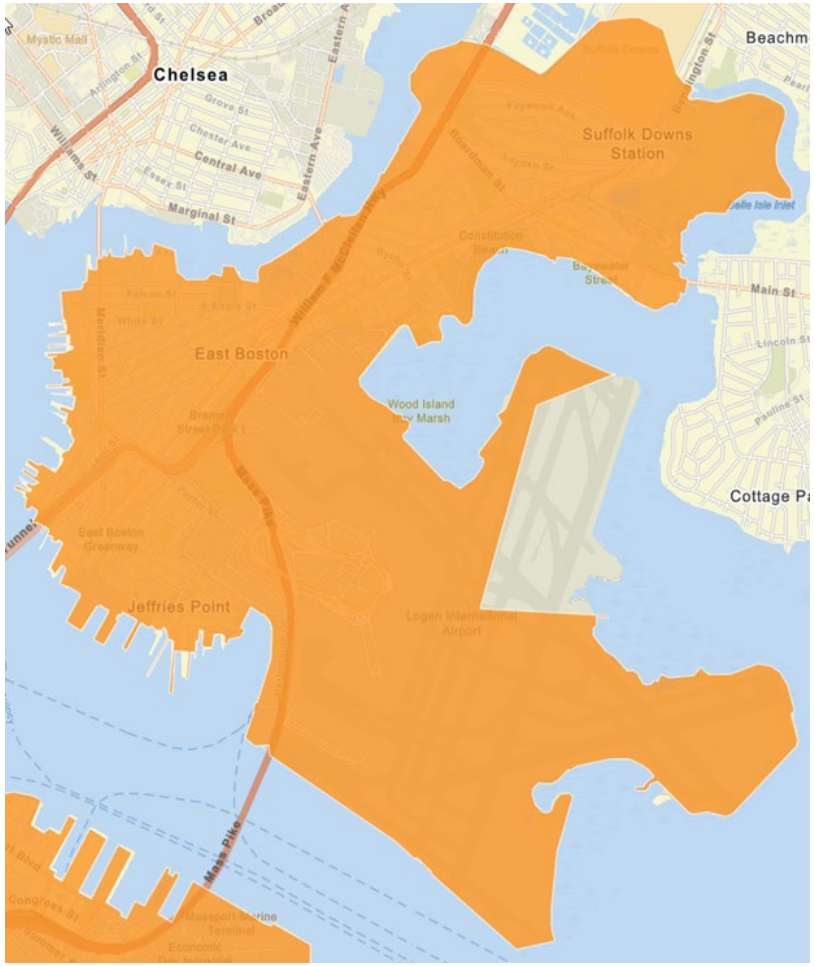


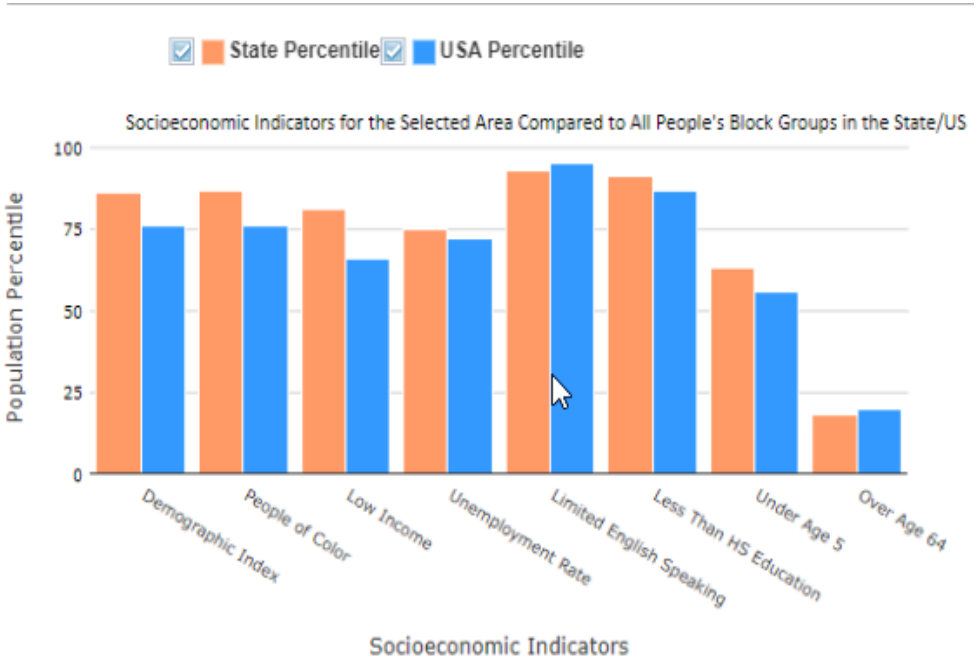
- 4,228 structures in East Boston in 1000-year floodplain based on WHG 2070 SLC (~USACE 2090 high curve)
- 3,020 structures receiving damage over 50-year period of analysis
- ~$106 million AAEQ; ~$3.0 billion PV (n=50, i=2.5%, FY23 price level)



Data sources and tools used: NSI (updated 2022), WSEs from WHG, NACCS depth-damage functions, non-residential damage functions from April 2009 expert elicitation, Paul Morelli's Python script to estimate AMM-level damages

EXISTING CONDITIONS - SOCIOECONOMIC INDICATORS: EAST BOSTON





Source: EPA's EJScreen Version 2.1 – Socioeconomic Indicators (2022)

- High percentage of households with limited English speaking compared to U.S. (95th percentile) and state (93rd percentile)
- Falls above the national 85th percentile in its population of individuals aged 25 or older with less than a high school degree
- Unemployment rate, people of color, and low-income population percentiles higher in East Boston and Dorchester than other 3 neighborhoods in study area

FOCUSED ARRAY OF ALTERNATIVES E. BOSTON

Alternative	Description/Measures	Notes
1	No Action	
2	Retrofit buildings in 1% AEP floodplain and harden MBTA locations. Harden tunnels, ventilation buildings, MBTA Stops.	
3	Living Levee along Wood Isle Marsh and Constitution Beach; Living Levee along Belle Isle Marsh IVO Railyard; Living Levee along Belle Isle Marsh; Intermittent flood Porizo Park at the Airport to Border Street/Shaws Grocery Store; Intermittent flood wall along Chelsea Creek;	
4	Living Levee along Wood Isle Marsh and Constitution Beach; Living Levee along Belle Isle Marsh IVO Railyard; Living Levee along Belle Isle Marsh; Intermittent flood Porizo Park at the Airport to Border Street/Shaws Grocery Store; Intermittent flood wall along Route 1A set back from Chelsea Creek; Retro Fit eligible structures seaward of LoP	
5	In any of the above two locations where a flood wall is able to be replaced with a levee; it is preferred for cost and aesthetics. Where flood walls are necessary, betterment to bury the flood wall to be investigated.	
6	In any of the above Alternatives, in lieu of a living levee, COB would like to investigate road elevations to serve as levees without degradation to salt marshes.	

INTERAGENCY CONCERNS AND/OR CONSIDERATIONS?

East Boston discussion points

FEDERAL

STATE

CHARLESTOWN

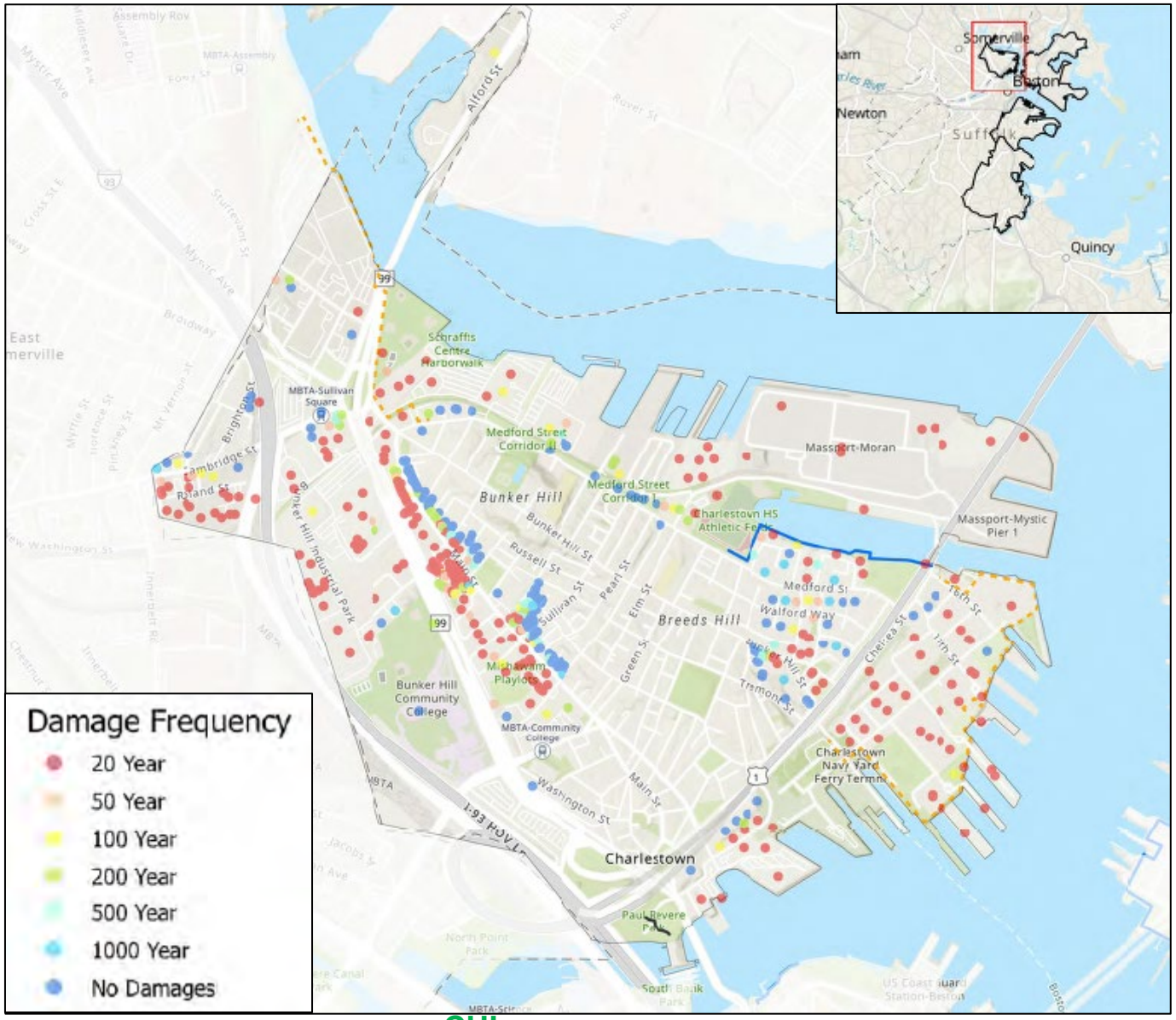
Highlights-

- EJ Community abuts Little Mystic Channel
- MBTA Garage requires a LoP that extends beyond COB into Somerville
- Mystic River is part of the Federal Navigation Project
- Schrafft City Center is part of an ongoing COB project and will likely be part of FWOP Condition

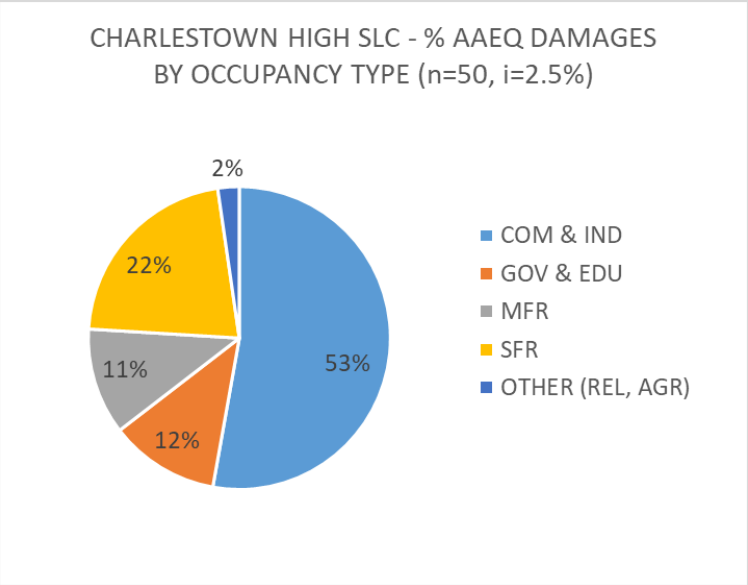
Coastline is home to-

- Schrafft City Center
- MASSPORT Auto Port
- Charlestown Naval Shipyard
- NCRD

FWOP DAMAGES, HIGH SLC – CHARLESTOWN

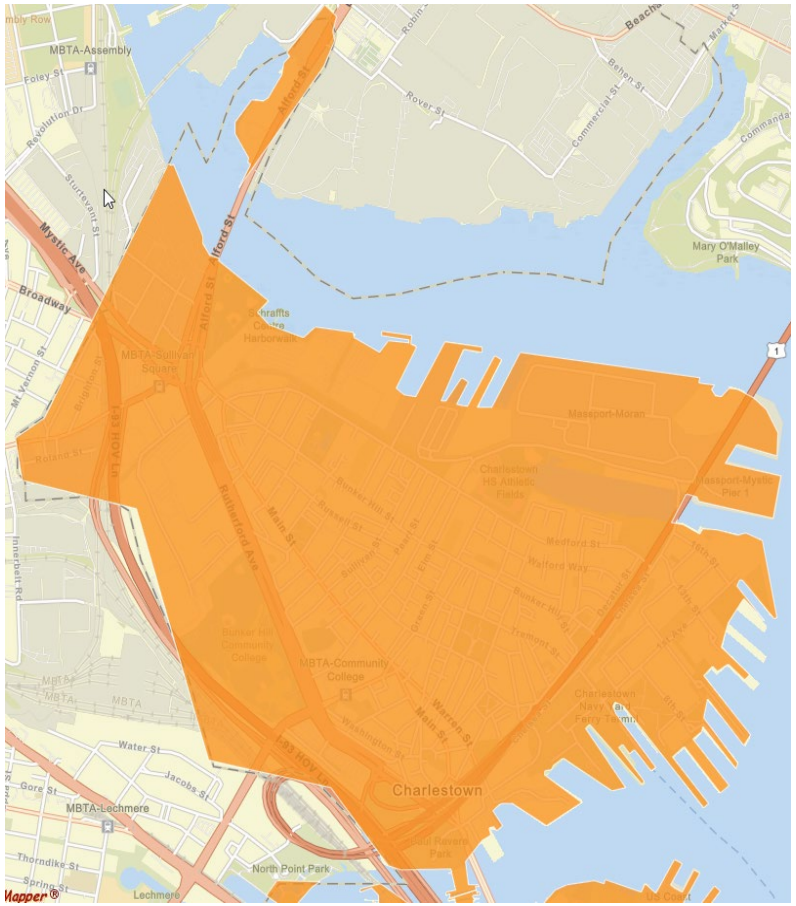


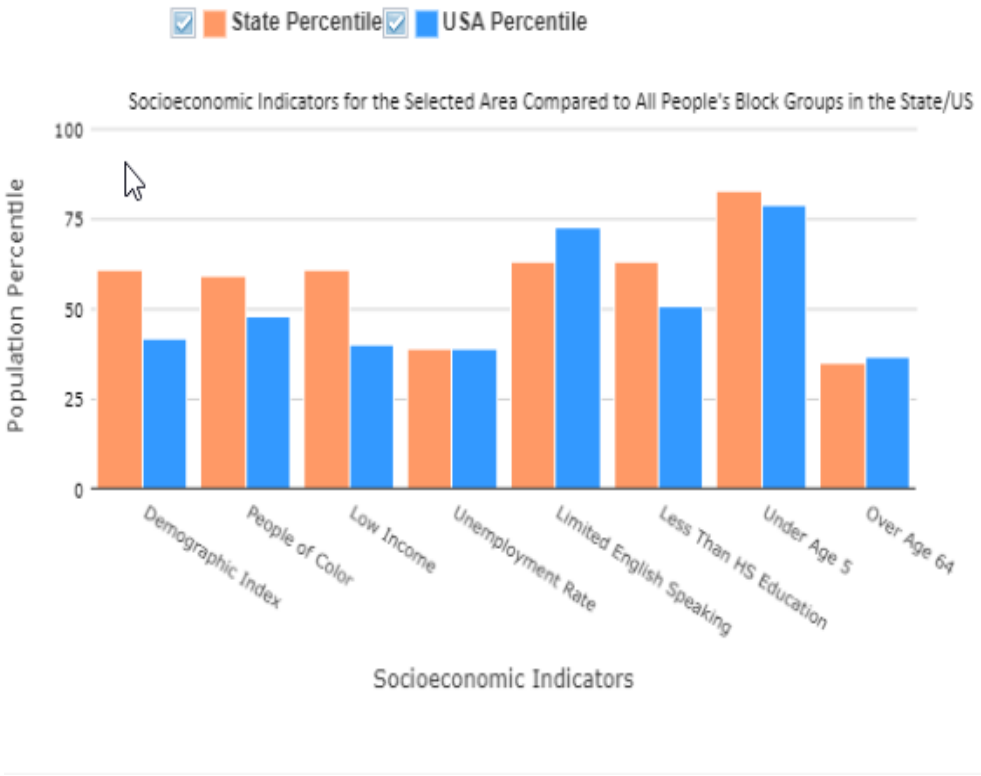
- 1,760 structures in Charlestown in 1000-year floodplain based on WHG 2070 SLC (~USACE 2090 high curve)
- 1,561 structures receiving damage over 50-year period of analysis
- ~$48 million AAEQ; ~$1.3 billion PV (n=50, i=2.5%, FY23 price level)



Data sources and tools used: NSI (updated 2022), WSEs from WHG, NACCS depth-damage functions, non-residential damage functions from April 2009 expert elicitation, Paul Morelli's Python script to estimate AMM-level damages

EXISTING CONDITIONS-SOCIOECONOMIC INDICATORS: CHARLESTOWN





- Relatively high percentage of households with individuals under age 5 compared to U.S. (79th percentile) and state (83rd percentile)
- Percentage of households with limited English-speaking falls just below the 75th percentile nationally

Source: EPA's EJScreen Version 2.1 – Socioeconomic Indicators (2022)

FOCUSED ARRAY OF ALTERNATIVES CHARLESTOWN

Alternative	Description/Measures	Notes
1	No Action	
2	Retrofit buildings in 1% AEP floodplain and harden MBTA locations. Harden tunnels, ventilation buildings, MBTA Stops.	
3	330' long, 1' high Berm from NCRD through Paul Revere Park (elevation 11.7' NAVD); Flood walls and deployables for MBTA Garage up to railyard at Somerville; Closure structure for 99 St. Bridge; Barrier along Ryan Playground in front of Schrafft across access road behind fire station; Little Mystic Channel flood barrier along bank for Sec. 8 Housing Development; Perimeter solution behind existing sea wall IVO of Naval Yard around Menino Park to Chelsea St. Bridge	
4	330' long, 1' high Berm from NCRD through Paul Revere Park (elevation 11.7' NAVD); Flood walls and deployables for MBTA Garage up to railyard at Somerville; Closure structure for 99 St. Bridge; Barrier along Ryan Playground in front of Schrafft across access road behind fire station;	
5	330' long, 1' high Berm from NCRD through Paul Revere Park (elevation 11.7' NAVD); Flood walls and deployables for MBTA Garage up to railyard at Somerville; Closure structure for 99 St. Bridge; Barrier along Ryan Playground in front of Schrafft across access road behind fire station; Little Mystic Channel flood barrier along bank for Sec. 8 Housing Development;	

INTERAGENCY CONCERNS AND/OR CONSIDERATIONS?

Charelstown discussion points

FEDERAL

STATE

PATH TO DRAFT NEPA DOCUMENT

- Complete the economic structure inventory (July ‘23)
- Identify and coordinate changes to the existing and future without project condition through survey, research, as-builts, and CAD (July ‘23)
- Modeling of FWOP condition+ (Nov ‘23)
- Identify environmental impacts of the FWOP condition (No Action) (Feb ‘24)
- Evaluate Life Safety, determine qualitative or semi-quantitative analysis (Feb ‘24)
- Refine structural and nonstructural alternatives based on FWOP model results (Apr ‘24)
- Refine NNBF measures (Apr ‘24)
- Modeling of with project alternatives (May ‘24)
- Evaluate FWP environmental impacts and coordinate with resource agencies on alternatives (Sep ‘24)
- Publish NOI and public meetings (if EIS) (Sep’24)
- Confirm final array of alternatives (Oct’24)
- Evaluate residual risk, project performance, and SLC adaptation capacity (Nov ‘24)
- Compare environmental impacts, benefits and costs (Nov ‘24)
- Identify NED Plan and Maximum Benefit Plan (Nov ‘24)
- Discuss NED Plan, Max Benefits Plan, and tentatively selected plan (TSP) (Jan ‘25)
- Release Draft NEPA Document (April ‘25)

COMMENTS AND DISCUSSION

Open Discussion notes: