

# South Boston

**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.**

South Boston is a peninsula located to the southeast of Downtown Boston, bounded by Fort Point Channel and Dorchester Bay. The community includes the South Boston Waterfront to the north, also referred to as the Seaport or the Innovation District, and the Fort Point Channel Landmark District and a historic residential district to the south.

High ground within South Boston, such as Telegraph Hill, illustrates the original landforms of Boston waterfronts before land filling began in the early 1800s; significant portions of the community are filled-in mudflats. South Boston was annexed to the city in 1804 to accommodate Boston's need for additional residential and commercial land. The Old Colony Railroad opened in 1845.

In recent years, South Boston has experienced rapid transformation as the result of a development boom and significant investment. From 2010–2013,

the South Boston Waterfront was the fastest-growing urban area in the commonwealth, adding approximately ten million square feet of development. The waterfront has become a hub for recreation and culture, with the expansion or opening of numerous attractions, including the Boston Convention and Exhibition Center (opened 2004), Institute of Contemporary Art (opened 2006), and Boston Children's Museum (renovated 2007), among others. The South Boston Waterfront is expected to increasingly become a mixed-use neighborhood with a large residential population. Seaport Square and Fan Pier are examples of large mixed-use development projects. The area still maintains marine industrial uses to the northeast, tied to the Port of Boston, the Raymond L. Flynn Industrial Park (former Boston Marine Industrial Park), and the Fish Pier.

The historic residential neighborhood to the south has experienced significant real estate appreciation, with an influx of young professionals. The area's commercial district is centered around East and West Broadway. South Boston contains several large Boston Housing Authority (BHA) housing developments, including West Broadway, West Ninth Street, Old Colony, and Foley.

Due to the rapid changes occurring in this area, the City recently has begun the planning process for several key projects focused on transportation and public realm improvements. Examples include the South Boston Waterfront Plan, the 100 Acres Master Plan process for the areas around the Procter & Gamble Gillette plant, and the Dorchester Avenue Corridor Plan, which is focused on supporting a diversity of mixed uses between Andrew and Broadway Red Line MBTA Stations.

Image courtesy of Sasaki





# FLOOD PROGRESSION

## DEFINITIONS

**Near term:** Beginning 2030s, assumes 9 inches of sea level rise

**Midterm:** Beginning 2050s, assumes 21 inches of sea level rise

**Long term:** Beginning 2070s or later, assumes 36 inches of sea level rise

**Exposure:** Can refer to people, buildings, infrastructure, and other resources within areas likely to experience hazard impacts. Does not consider conditions that may prevent or limit impacts.

**Vulnerability:** Refers to how and why people or assets can be affected by a hazard. Requires site-specific information.

**Consequence:** Illustrates to what extent people or assets can be expected to be affected by a hazard, as a result of vulnerability and exposure. Consequences can often be communicated in terms of economic losses.

**Annualized losses:** The sum of the probability-weighted losses for all four flood frequencies analyzed for each sea level rise scenario. Probability-weighted losses are the losses for a single event times the probability of that event occurring in a given year.

\*For a full list of definitions, refer to the Glossary in the Appendix.

South Boston is exposed to climate change impacts including heat, increased precipitation and stormwater flooding, and sea level rise and coastal and riverine flooding. Exposure to heat and stormwater flooding are addressed in the Citywide Vulnerability Assessment (see p.12), while exposure and consequences to coastal and riverine flood risk are further discussed in this section.

In the near term, a significant portion of the South Boston Waterfront is exposed to high-probability coastal storms (10 percent annual chance events), particularly near Fort Point Channel and to the north along Boston Harbor.

South Boston's exposure will increase significantly over the course of the century, with a substantial portion of the South Boston Waterfront exposed to both chronic high-tide flooding and more severe flooding during coastal storms. Over the century, flooding from Fort Point Channel and Dorchester Bay will increase, exposing residential areas.



9 INCHES SEA LEVEL RISE



21 INCHES SEA LEVEL RISE



36 INCHES SEA LEVEL RISE

- LEGEND
- Average Monthly High Tide
  - 10% Annual Chance Storm
  - 1% Annual Chance Storm
  - Parks
  - Roads
  - Major Roads
  - Major Tunnels
  - Evacuation Route
  - Evacuation Route Tunnels
  - MBTA Blue Line
  - MBTA Silver Line Station
  - MBTA Station
  - I-90 On/Off Ramp Tunnel Entrances
  - I-90 Tunnel Entrances
  - Frontage Road BTD/PWD
  - City of Boston Police
  - State Police Station E-4, Tunnels
  - State Police, Massachusetts Turnpike
  - BPD Harbor Patrol
  - College or University
  - School
  - Police Station
  - Fire Station
  - Electric Substation or Pump Station
  - Healthcare Center
  - Condon Community Center (BCYF)
  - Curley Community Center (BCYF)
  - EMS Station 6 (A6)
  - EMS Harbor Unit
  - Tynan Community Center (BCYF)
  - Senior Housing
  - Longterm Care Facility
  - BHA Public Housing



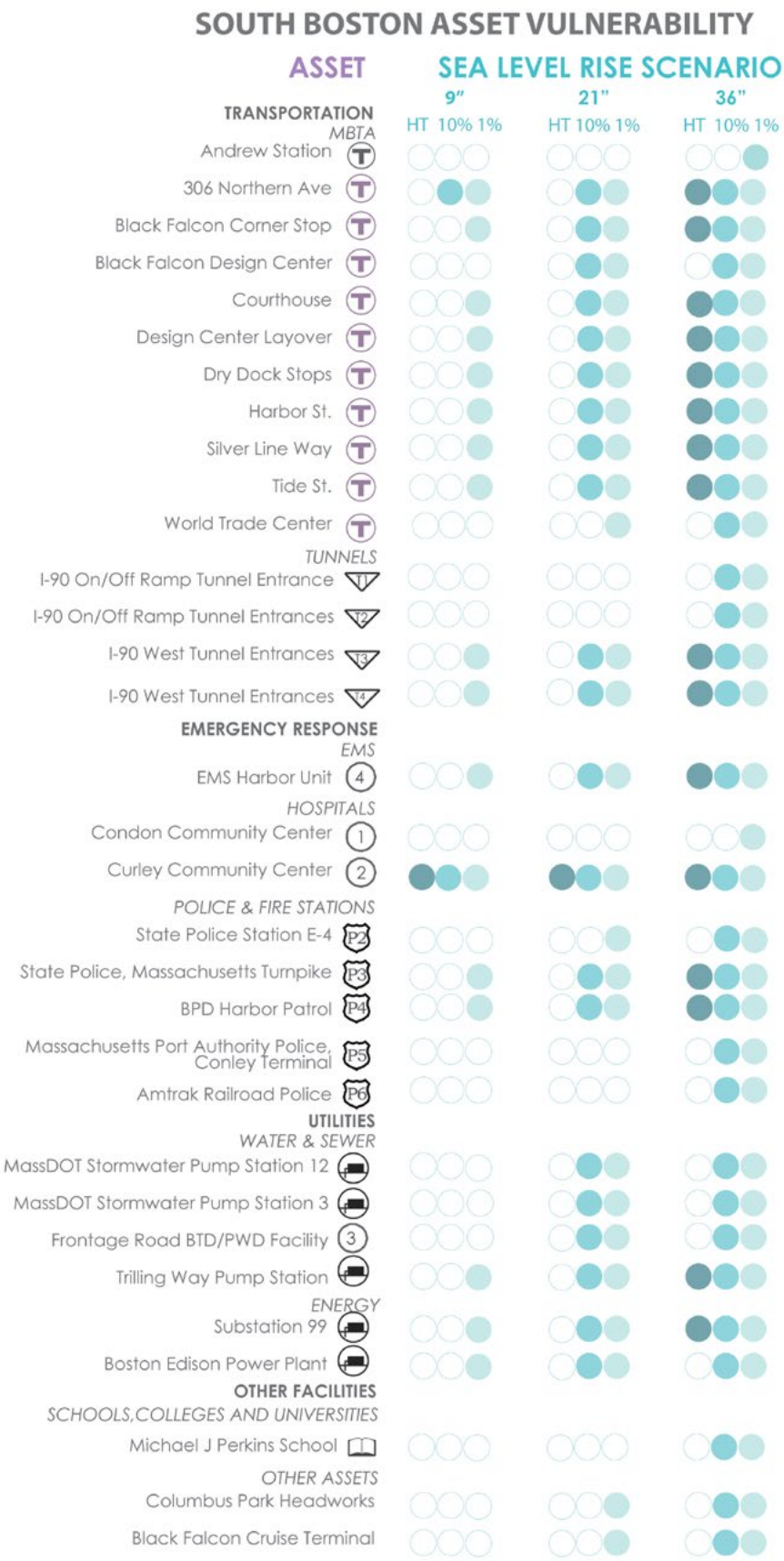
South Boston is the most-exposed<sup>1</sup> neighborhood in Boston, with nearly 25 percent of its land area exposed under 9 inches of sea level rise, 50 percent under 21 inches, and 60 percent under 36 inches at the 1 percent annual chance event. Nearly 20 percent of the neighborhood’s land area will be exposed to high tides with 36 inches of sea level rise.

Resilience planning requires consideration of the South Boston Waterfront’s long, low-lying waterfront edges and flood pathways through Fort Point Channel and Joseph Moakley Park, which create challenges for local flood defenses.

In the first half of the century, expected exposure to coastal flooding is primarily due to the low waterfront edges along Fort Point Channel, Boston Harbor, and the Reserved Channel. During this time, nearly a quarter of South Boston’s land area will be exposed to 1 percent annual chance flood events, with some heavily developed areas along the Fort Point Channel also exposed to higher probability events (10 percent annual chance).

In the second half of the century, flood exposure will increase due to flood entry points at Joseph Moakley Park in the southeast and along the Fort Point Channel that impact inland, largely residential areas in South Boston. With 21 inches of sea level rise, much of the land area north of West First Street and East First Street will be exposed to 10 percent annual chance floods. **The probability of flooding across the neighborhood will increase by an order of magnitude by the second half of the century.**

Toward the end of the century, considerable portions of the South Boston Waterfront will be exposed to flooding from high tide, and many residential areas are exposed to 10 percent annual chance



<sup>1</sup>Based on the percentage of the land area in the neighborhood exposed to coastal flooding

EXPOSURE

POPULATION & INFRASTRUCTURE

POPULATION AND SOCIAL VULNERABILITY

South Boston is currently home to over 31,000 people. Overall, South Boston has lower numbers and percentages of socially vulnerable groups than other Boston neighborhoods. The neighborhood is less racially diverse than neighboring Dorchester and the South End, with people of color comprising just 22 percent of its population (compared to 52 percent citywide). Twenty-six percent of South Boston residents are those with low to no income (compared to 28 percent citywide). In contrast to other Boston neighborhoods that demonstrate widespread social vulnerability, South Boston has vulnerable groups in concentrated pockets in and around public housing projects in the area.

In both the near and long term, South Boston can expect negative impacts to its population from

widespread overland flooding. This flooding is expected to displace residents, interrupt electrical and water service of flooded buildings with mechanical, electrical, and plumbing assets in the basement or first floor, and result in employment and sales losses, most significantly to industries that support low- to moderate-income populations (see Risk to the Economy, below). In the near term, roughly 100 people currently live in areas expected to be flooded by high tides, and over 1,600 people currently live in areas expected to be flooded by high-probability flood events (10 percent annual chance event). In a significant expansion of risk, over 2,200 residents currently live in areas expected to be flooded by high tides toward the end of the century. This represents an increase of roughly 22 times from the near term. With 36 inches of sea level rise, between 10,000 and 12,000 people could face displacement under a 1 percent annual chance event.

In the near term, one of South Boston’s emergency shelters (the Curley Center) is expected to be exposed to high-tide flooding. If the Curley Center is compromised, South Boston will lose a quarter of its sheltering capacity (62 people). Further, South Boston’s current sheltering capacity may not be adequate for the scale of flooding expected toward the end of the century, when roughly 1,200 people are expected to require public shelter during a 1 percent annual chance flood event.

In the second half of the century, BHA’s Mary Ellen McCormack Development, the first and still largest public housing development in New England with 1,016 units in 22 buildings, will be exposed to relatively low-probability events (1 percent annual chance). As soon as the 2070s, the development will be exposed to more frequent (10 percent annual chance) floods.

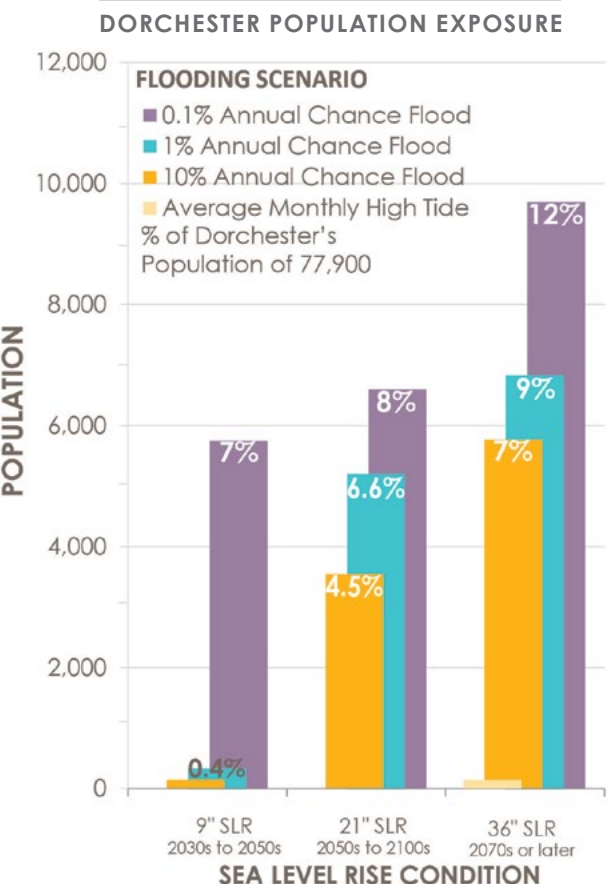
INFRASTRUCTURE EXPOSURE<sup>2</sup>

South Boston has important transportation assets located in the future floodplain, including I-90 (Massachusetts Turnpike), the Ted Williams Tunnel entrances and exits, the South Boston Bypass/Massport Haul Road, and William J. Day Boulevard.

In the near term, I-90 and the Ted Williams Tunnel are expected to be exposed to low-probability coastal flooding (1 percent annual chance). The Ted Williams Tunnel links South Boston to East Boston (Logan International Airport) by carrying I-90 under the Boston Harbor, allowing direct access to Route 1A in East Boston. Congress Street and Summer Street, which connect South Boston to Downtown, have portions exposed to a high-probability coastal flood event in the near term. As soon as the 2050s, South Boston’s remaining evacuation routes, including the South Boston Bypass, (linking the South Boston waterfront to South Bay), Dorchester Avenue, I-93, and William J. Day Boulevard (along the southeastern edge of South Boston) will all be exposed to low-frequency storm events (1 percent annual chance), in addition to many local roads, such as Old Colony Avenue and streets around Joseph Moakley Park. MassDOT’s Stormwater Pump Station 3, which protects the South Boston Bypass, is also exposed to high-probability storm events expected as soon as the 2050s.

Flooding of evacuation routes and local roads could affect safe evacuation for residents and potentially isolate South Boston during a storm event. With major roadways blocked by floodwaters within and along the outskirts of the neighborhood, it may be difficult to bring in resources by automobile during an emergency situation. In addition, road closures and flooded tunnels may have an impact on Silver Line operations; eight Silver Line stations are exposed to lower-probability events in the near term (1 percent chance event) and may be exposed to high tides later in the century. Rail options in South Boston are also limited by flood exposure; the Franklin and Greenbush commuter rail lines that run through South Boston will be exposed to low-probability flooding in the second half of the century, and the MBTA’s Red Line may experience difficulty in maintaining operations at the Andrew Station later in the century during the 1 percent annual chance coastal flood event.

Impacts to transportation infrastructure and services in South Boston could have ripple effects on other neighborhoods—for example, by preventing East Boston residents from traveling down I-90. Tourism may also be affected if conventioners or cruise travelers are unable to access the Boston Convention and Exhibition Center or the Black Falcon Cruise Terminal. The Black Falcon Cruise Terminal itself may experience impacts in lower probability events as soon as the 2050s (1 percent annual chance).



<sup>2</sup>This evaluation is preliminary. Site-specific analysis and detailed cascading impact mapping is necessary to fully understand facility-level and neighborhood vulnerabilities, as well as the extent of potential consequences.



Widett Circle, an area that Boston seeks to redevelop, will be exposed to high-probability flood impacts expected from mid-century storm events.

Widett Circle has been a focus of several redevelopment initiatives proposed by the MBTA and the BRA. Though the site is no longer the primary recommended location of a train yard to accommodate South Station expansions, redevelopment of the area must consider sea level rise and coastal flood impacts to ensure that investments are protected in the long term.

Several power assets in South Boston are expected to be exposed under mid- to late- century sea level rise and coastal storm conditions, including four existing substations and a cogeneration facility.

Eversource Energy has constructed a new substation in the South Boston Waterfront to relieve the strain imposed by rapid waterfront development on power and electric systems in the area. Though Substation 99 is expected to be exposed to low-probability flooding in the near term (1 percent annual chance event), it sits on a 15-foot-high elevated steel platform with reinforced cast-in-place concrete at its base. Sitting almost 26 feet above current mean sea level, this substation is expected to withstand storm surge and flood scenarios throughout this century.

In addition, the former Boston Edison power plant at the corner of Summer and First Streets, near the Reserved Channel, will be exposed to flooding from high-probability storm events in the mid- to late century. While the plant is no longer operational, and the 18-acre site is being offered for redevelopment following environmental

remediation, any remaining contamination at the site could present a threat to public health and safety with flooding.

South Boston's sanitary sewage system is exposed to coastal flooding and sea level rise in the near term. Planned improvements to the sanitary sewage system could mitigate service interruption due to expected flooding.

South Boston's sanitary sewage system is largely dependent upon two pump stations, one of which will be exposed to a 1 percent annual chance flood event in the near term and a 10 percent annual chance flood event by the second half of the century. While the sewage system and pumps have the capacity to handle large flows in dry weather conditions, overflows are likely during storm events, causing sewage backup into streets, homes, and businesses. Since roads surrounding the pump station are also expected to flood, repair crews might not be able to remedy loss of function right away if the pump station were to fail. A redundant force main is being constructed in order to limit service disruption; these improvements may also mitigate flood impacts.<sup>3</sup>

The Columbus Park Headworks facility, which will be exposed to low-probability storms in the mid-century, screens wastewater for inorganics and removes sticks, stones, grit, and sand to protect and reduce wear on the Deer Island Wastewater Treatment Plant. The facility currently services a tributary area of approximately 13 miles.<sup>4</sup>

<sup>3</sup>A detailed analysis is needed to understand coastal storm impacts to South Boston's sanitary sewage system.

<sup>4</sup>Impacts to Boston's wastewater infrastructure due to flood impacts at this facility require detailed analysis.

Local access roads to the facility are exposed to mid-century low-probability flooding as well, which may inhibit repair crews from addressing potential facility damage.

South Boston is expected to experience reduced emergency response capacity as a result of sea level rise.

Of South Boston's two Emergency Medical Services (EMS) facilities, the EMS Harbor Unit is expected to be exposed to low-probability flooding in the near term (1 percent annual chance). Furthermore, five law enforcement facilities are expected be located within the 1 percent annual chance floodplain in the late century, potentially reducing emergency response capacity within South Boston. South Boston may also become islanded under a late-century storm event, which would limit the ability of outside emergency response vehicles to travel into South Boston. Delayed or reduced emergency response would exacerbate any potential flood impacts.



Image courtesy of Sasaki

# EXPOSURE AND CONSEQUENCES

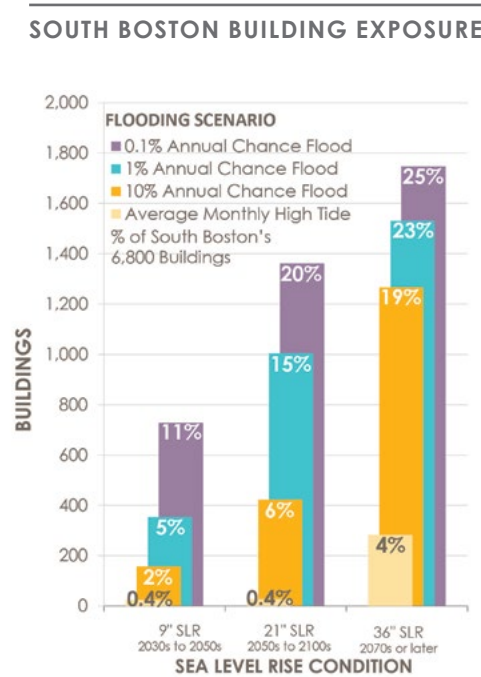
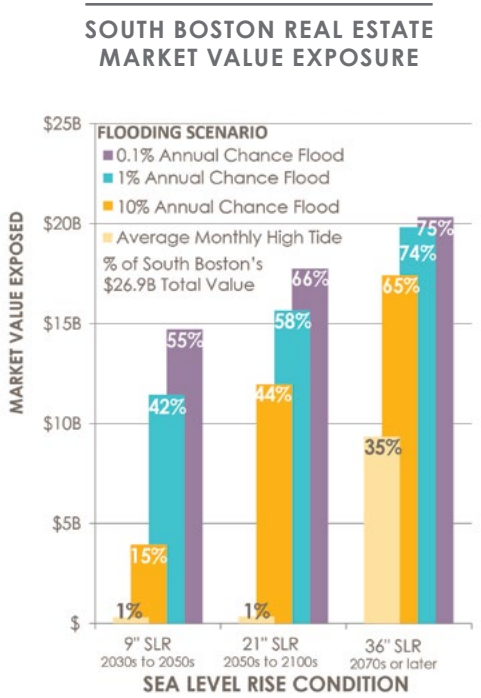
## BUILDINGS AND ECONOMY

### RISK TO BUILDINGS

South Boston comprises close to 60 percent of Boston’s total real estate market value exposed to coastal flooding associated with low-probability events (1 percent annual chance) in the near term. South Boston is second only to Downtown with total real estate market value expected to be exposed to flooding during high tides in the near term. In the late century, the community will continue to have the largest share (25 percent) of Boston’s total real estate market value exposed.

Perceived or actual flood risk can affect the value of existing assets as well as insurance and operating costs and the feasibility of future development. This is particularly the case for areas exposed to frequent flood impacts, such as those associated with high tides or high-probability coastal flood events (10 percent annual chance).

**South Boston represents almost half of the city’s expected losses to buildings in the near term and will maintain its position as the single most-vulnerable neighborhood, as measured by projected damage costs through the end of the century.**



While exposure and expected damage costs in South Boston are the most dramatic across the city, these losses are limited to relatively few, very large structures when compared to other relatively high expected loss neighborhoods.

Compared to other neighborhoods that occupy large shares of Boston’s total expected losses, South Boston has a comparatively small number of buildings exposed to flooding across all coastal storm event scenarios. For example, East Boston has roughly three times as many buildings exposed to low-probability events in the near term as South Boston and ten times as many buildings later in the century. South Boston has a relatively high proportion of large, high-rise buildings exposed, which are expected to experience greater losses than buildings of low and medium height.

While high-rise buildings<sup>5</sup> occupy close to 10 percent of the building footprints within South Boston, they represent close to 15 percent of grade-level exposure within this neighborhood. (In East Boston, high-rise structures occupy less than 1 percent of the current building stock and just over 1 percent of grade-level exposure.) Though South Boston has a smaller number of buildings exposed to flooding under coastal storm events, it has more buildings and grade-level square footage exposed to high-tide flood events in the near term than in any other neighborhood, except Downtown. As a result, flood-related initiatives in South Boston, in the near term, might effectively focus on building-specific retrofits, though area-wide measures will be necessary over the long term to address high-tide flooding.

<sup>5</sup>High-rise buildings are defined for the purposes of this study as structures with greater than ten floors.



RISK TO THE ECONOMY

As of 2014, industries in South Boston contributed more than \$20 billion in annual output (sales and revenues) to Boston’s economy. Legal, financial, real estate, and insurance industries made up more than half of that value and close to half of the neighborhood’s 78,000 jobs.

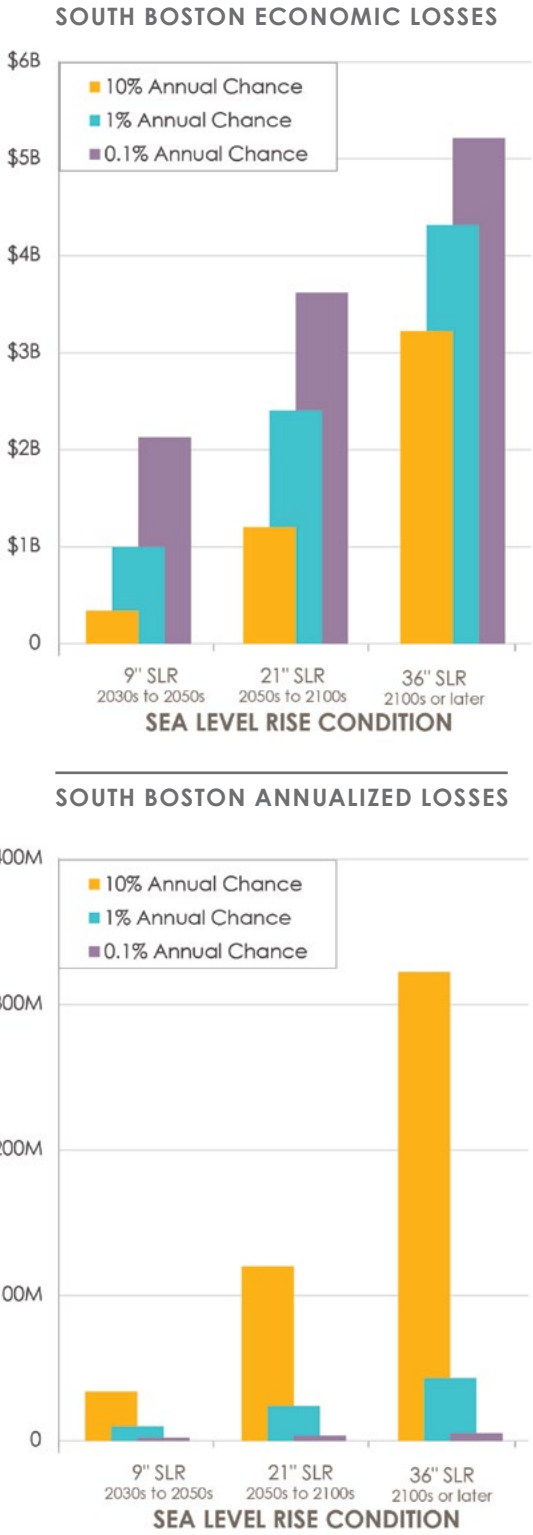
As soon as the 2070s, based on preliminary and conservative-modeled<sup>6</sup> evaluations, Boston could face close to \$80 million in annualized lost output and close to 600 annualized lost jobs due to expected flood damage to structures in South Boston.<sup>7</sup> This estimate includes interruption from businesses directly exposed to flood impacts, as well as the reverberations that impact may have throughout Suffolk County’s economy.<sup>8</sup> Except for the real estate industry, South Boston’s other top-producing industries—legal, financial, and insurance industries—are considered resilient industries. These industries often maintain secure data redundancies and are usually able to operate remotely or relocate operations quickly.

As in other neighborhoods, restaurants and retail are hit hard by flood impacts, representing over 30 percent of lost economic output and 50 percent of lost jobs from expected future flood conditions in the near term and later this century. Restaurants and retail establishments are often small businesses, and tend to employ low- to moderate-income personnel, which makes them important to considering impacts to socially vulnerable populations.

ECONOMIC RISK ASSUMPTIONS

Job and output loss includes direct, indirect, and induced consequences of flood impacts. Direct results are impacts felt within a neighborhood, while indirect and induced results are those expected to be felt throughout Suffolk County as a result of changes in spending patterns. Results for both job and output losses are the sum of annualized values for the four flood frequencies analyzed for each sea level rise scenario. This represents a lower-bound estimate for several reasons. First, not all probabilistic events are considered. Second, the analysis assumes that all impacted businesses eventually reopen, though FEMA estimates that almost 40 percent of small businesses—and up to 25 percent of all businesses—never reopen after experiencing flood impacts. Third, only building areas directly impacted by floodwater are assumed to experience business interruption. This does not consider interruptions of businesses due to loss of power or utility functions. Finally, the analysis only considers existing populations, businesses, and buildings and does not include projections for future growth. Refer to the Appendix for a more detailed explanation of the exposure and consequence analysis.

INDUSTRY	ANNUALIZED LOSS OF ECONOMIC OUTPUT
Restaurants	\$150,000,000
Retail	\$9,700,000
Real estate	\$4,000,000
Insurance and legal services	\$5,900,000
All remaining industries	\$44,500,000
Total	\$78,900,000



Despite occupying a relatively small share of the South Boston economy and employment, restaurant and retail industries could be hardest hit by flood impacts in the near and long term. These industries are sensitive to residential and business activity within an area and must be local to operate.

South Boston’s top-producing industries are considered relatively resilient to disasters, as they are generally expected to have built-in system redundancies, data storage, and the capability to operate remotely.

<sup>6</sup>Economic loss calculations consider only impacts to floors expected to flood, only consider potential losses within the City (as opposed to regional or national losses), and assume all businesses eventually reopen. Please see the Appendix for a full list of assumptions.

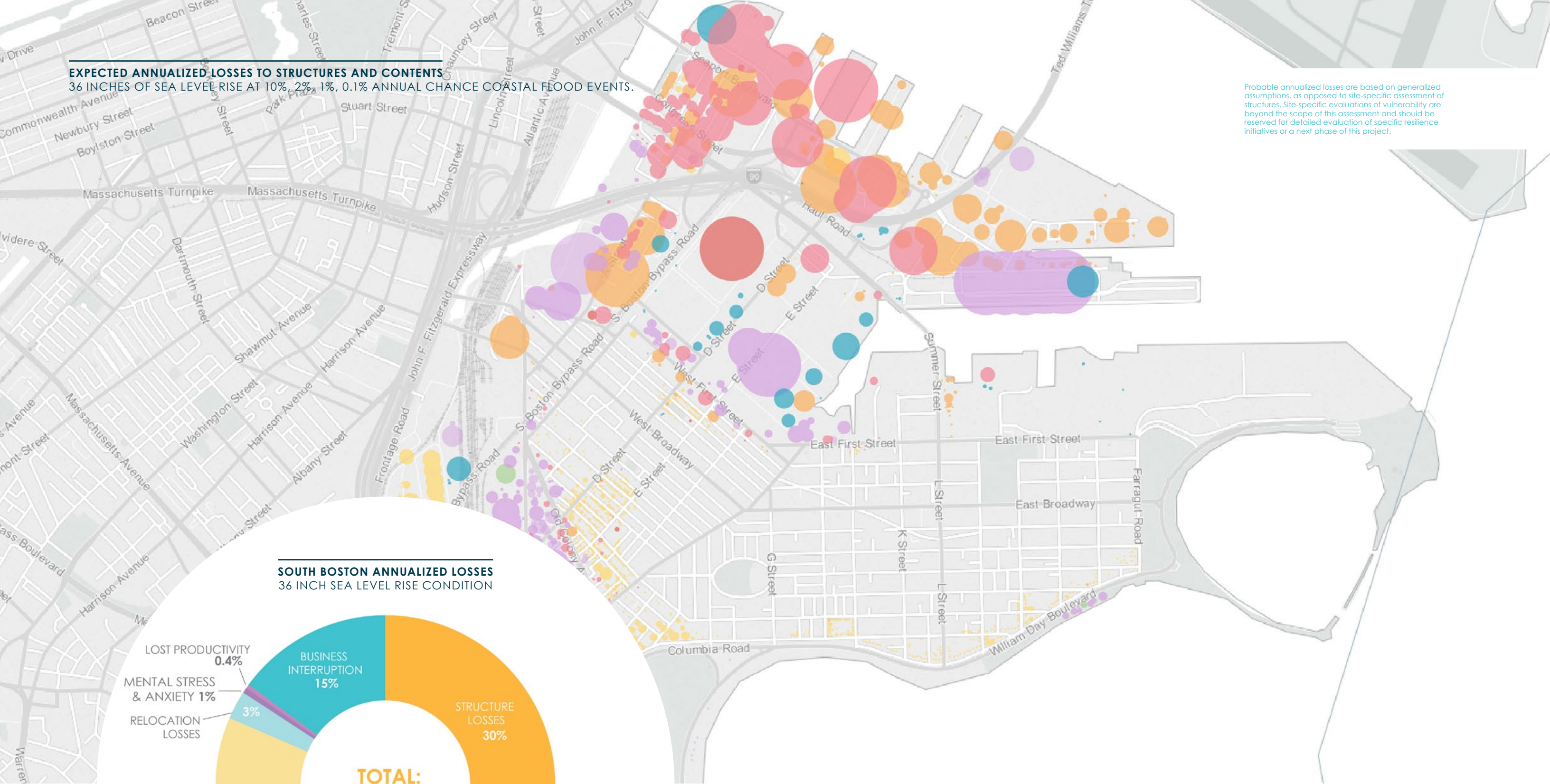
<sup>7</sup>Expected flood damages are calculated for the 10%, 2%, 1%, and 0.1% annual chance flood events only.

<sup>8</sup>Losses to particular industries are based on current development and economic activity in the area, and considering that South Boston is in a period of intense growth, may differ as development continues.



**EXPECTED ANNUALIZED LOSSES TO STRUCTURES AND CONTENTS**  
36 INCHES OF SEA LEVEL RISE AT 10%, 2%, 1%, 0.1% ANNUAL CHANCE COASTAL FLOOD EVENTS.

Probable annualized losses are based on generalized assumptions, as opposed to site-specific assessment of structures. Site-specific evaluations of vulnerability are beyond the scope of this assessment and should be reserved for detailed evaluation of specific resilience initiatives or a next phase of this project.



- Commercial (\$113.2M)
- Cultural/Religious, Edu, Rec (\$32.7M)
- Essential Services (\$44.4M)
- General Government (\$15.3M)
- Industrial/Transportation (\$118.5M)
- Mixed Use (\$98.5M)
- Residential (\$27.3M)
- Total (\$450M)



Each circle represents annualized losses suffered by an individual building. Larger circle size indicates higher contents and structures losses. Annualized losses take into consideration the annual probability of an event occurring, as well as the projected impacts of such an event.



PROTECTED SHORES

DEVELOP LOCAL CLIMATE RESILIENCE PLANS TO SUPPORT DISTRICT-SCALE CLIMATE ADAPTATION

The City should develop a local climate resilience plan for South Boston to support district-scale climate adaptation.

The plan should include the following:

- Community engagement through a local climate resilience committee, leveraging existing local organizations and efforts.
- Land use planning for future flood protection systems, including Flood Protection Overlay Districts in strategically important “flood breach points” identified below (see Potential Flood Protection Locations).
- Flood protection feasibility studies, evaluating district-scale flood protection, including at locations identified below (see Potential Flood Protection Locations).
- Infrastructure adaptation planning through the Infrastructure Coordination Committee. For South Boston, the Massachusetts Port Authority (Massport) is a key partner because they control significant land and assets. Massport is currently working with their tenants in South Boston to do operational preparedness planning.
- Coordination with other plans, including Imagine Boston 2030, GoBoston 2030, Special Planning Areas, and any updates to the South Boston Municipal Harbor Plan.
- Development of financing strategies and governance structures to support district-scale adaptation.

ESTABLISH FLOOD PROTECTION OVERLAY DISTRICTS AND REQUIRE POTENTIAL INTEGRATION WITH FLOOD PROTECTION

The Boston Planning and Development Agency (BPDA) should petition the Boston Zoning Commission to create new Flood Protection Overlay Districts in areas that are strategically important for potential future flood protection infrastructure (see Potential Flood Protection Locations below). Within a Flood Protection Overlay District, a developer would be required to submit a study of how a proposed project could be integrated into a future flood protection system; options may include raising and reinforcing the development site or providing room for a future easement across the site.

PRIORITIZE AND STUDY THE FEASIBILITY OF DISTRICT-SCALE FLOOD PROTECTION

To reduce the risk of coastal flooding at major inundation points, the City should study the feasibility of constructing district-scale flood protection at the primary flood entry points in South Boston (see Potential Flood Protection Locations below for a preliminary identification of locations and potential benefits).

These feasibility studies should take place in the context of local climate resilience plans, featuring engagement with local community stakeholders, coordination with infrastructure adaptation, and considerations of how flood protection would impact or be impacted by neighborhood character and growth. Examples of prioritization criteria include the timing of flood risk, consequences for people and economy, social equity, financial feasibility, and potential for additional benefits beyond flood risk reduction.



POTENTIAL DISTRICT-SCALE FLOOD PROTECTION LOCATIONS<sup>9</sup>

See the District-Scale Flood Protection Systems Overview section (p. 330) for a citywide perspective on district-scale flood protection. District-scale flood protection is only one piece of a multilayered solution that includes prepared and connected communities, resilient infrastructure, and adapted buildings.

Because the entire South Boston Waterfront is low lying, without high ground for a flood protection system to tie into, preventing inundation in this area is particularly challenging.

In the near term, district-scale flood protection is critical to address flood entry points around the entire edge of the **South Boston Waterfront**, from Fort Point Channel to Boston Harbor and the Reserve Channel.

To prevent inundation from inland flood pathways, flood protection for the South Boston Waterfront will need to be combined with the following:

- Protection from flood pathways from **Dorchester Bay** expected during very low-probability events in the near term and high-probability events expected by the 2050s
- Protection at the **New Charles River Dam**, addressing potential overtopping or flanking of the dam expected for the 1 percent annual chance event later in the century

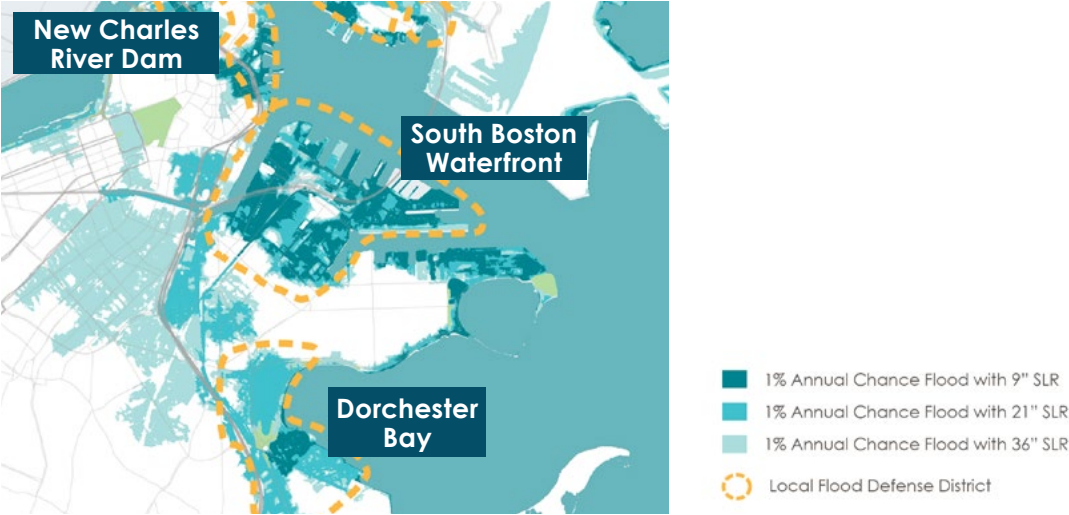
SLR SCENARIO	DISTRICT SCALE FLOOD PROTECTION FOR 1% ANNUAL CHANCE FLOOD <sup>10</sup>
9" SLR (2030s–2050s)	South Boston Waterfront
21" SLR (2050s–2100s)	South Boston Waterfront and Dorchester Bay locations combined
36" SLR (2070s or later)	South Boston Waterfront, Dorchester Bay, and the New Charles River Dam locations combined

LOCATIONS

- **The South Boston Waterfront location** focuses on flood entry points along the edge of the district, including flooding from Fort Point Channel, Boston Harbor, and the Reserve Channel. The low-lying nature of the South Boston Waterfront likely requires flood protection connections to high ground across Fort Point Channel. Potential flood protection solutions include a floodgate aimed at preventing storm surge from flowing into the South Boston Waterfront from Fort Point Channel. The gate could be placed at a number of locations, including the Northern Avenue Bridge, Seaport Boulevard Bridge, Congress Street Bridge, or Summer Street Bridge. The elevation of Summer Street on either side of the bridge is higher than the 1 percent annual chance flood event elevation with 36 inches of sea level rise (SLR), although other portions of Summer Street are lower. In addition to a gate across Fort Point Channel, flood protection solutions would require either a barrier system to connect to high ground south of

<sup>9</sup>These preliminary coastal flood protection concepts are based on a high-level analysis of existing topography, rights-of-way, and urban and environmental conditions. Important additional factors, including existing drainage systems, underground transportation and utility structures, soil conditions and zoning as well as any potential external impacts as a result of the project have not been studied in detail. As described in Initiatives 5-2 and 5-3 (see p.106,110), detailed feasibility studies, including appropriate public and stakeholder engagement, are required in order to better understand the costs and benefits of flood protection in each location.

<sup>10</sup> Additional flood protection may be required for flood events more severe than the 1 percent annual chance flood. See Appendix for more detailed information on expected effectiveness of flood protection systems, including analysis of additional flood protection locations and flood frequencies.



West Broadway, perimeter protection near the Reserve Channel, or a gate across the Reserve Channel. Deployable gates would be required at intersections. *As an alternative to flood protection for the entire South Boston Waterfront, a flood protection system along the southwestern portion of the Fort Point Channel could provide flood protection benefits for parts of South Boston, as well as other areas, from Fort Point Channel flooding. However, since protection for the entire South Boston Waterfront would provide much greater benefit in both the near term and the long term, this Fort Point Channel alternative is unlikely to be necessary. Flood entry points from the southwestern portion of the Fort Point Channel should still be considered among planning and redevelopment projects in the area and potentially addressed in order to provide multiple lines of flood protection for inland areas.*

- **The Dorchester Bay location**, described in the Dorchester focus area (see p.194), addresses flood pathways from the Old Harbor and Savin Hill Cove.
- **The New Charles River Dam location**, described in the Charles River and Downtown focus areas (see pp. 174, 216), addresses potential overtopping or flanking of the dam.

DETAILED CONSIDERATIONS

- **Significant near-term benefits within a single neighborhood:** Given the South Boston Waterfront’s high level of exposure to coastal flooding, flood protection at this location would provide meaningful protection at 9 inches of SLR for the 1 percent annual chance event and more frequent events. In the near term, flooding expected from very low-probability events (0.1 percent annual chance) may require interventions at Dorchester Bay, though further analysis is required to confirm the nature of this risk.
- **Need for multiple alignments in the second half of the century:** In the mid-century, South Boston Waterfront protection may need to be combined with Dorchester Bay protection to provide protection for South Boston, the South End, and Dorchester, due to flooding from the Boston Harbor, Fort Point Channel, the Reserve Channel, and Dorchester Bay. As soon as the 2070s, additional interventions at the New Charles River Dam will be necessary to protect the aforementioned neighborhoods from Charles River flooding expected at the 1 percent annual chance event.



**PREPARED & CONNECTED COMMUNITIES**

**CONDUCT AN OUTREACH CAMPAIGN TO PRIVATE FACILITIES THAT SERVE VULNERABLE POPULATIONS TO ENSURE THAT THEY ENGAGE IN EMERGENCY PREPAREDNESS AND ADAPTATION PLANNING**

The City should conduct outreach to managers of facilities in South Boston that serve significant concentrations of vulnerable populations and are not required to have operational preparedness and evacuation plans under current regulations. Targeted facilities will include affordable housing complexes, substance abuse treatment and rehabilitation centers, daycare facilities, food pantries, small nonprofit offices, and others. Illustrative examples of the types of facilities to which the City might conduct outreach include the Tiny Tots daycare facility on Columbia Road, the Harborview Children’s Center, Bright Horizons at Seaport, and South Boston Head Start. These facilities are exposed to near-term damage from sea level rise and coastal flooding or can expect access issues related to near-term stormwater flooding.

**EXPAND BOSTON’S SMALL BUSINESS PREPAREDNESS PROGRAM**

The City should reach out to small businesses in South Boston exposed to stormwater flooding in the near term or coastal flooding under a 1 percent annual chance event at 9 inches of SLR to help them develop business continuity plans, evaluate insurance coverage needs, and identify low-cost physical adaptations. Under a 1 percent annual chance event at 9 inches of SLR, 88 commercial buildings and 131 mixed-use buildings that could host small businesses are exposed to flood risk. Though South Boston’s primary commercial corridor along Broadway is located along high ground and is not exposed to flooding under the 1 percent annual chance event even with 36 inches of SLR, substantial numbers of small businesses in City Point, Telegraph Hill, and the South Boston Waterfront adjacent to new office developments are exposed under 9 inches of SLR.

<sup>11</sup>The City did not review the extent of existing preparedness planning as part of this study.

**RESILIENT INFRASTRUCTURE**

**ESTABLISH INFRASTRUCTURE COORDINATION COMMITTEE**

The Infrastructure Coordination Committee (ICC) should support coordinated adaptation planning for South Boston’s key infrastructure systems, including energy, transportation, water and sewer, and environmental assets. The City should support the MBTA in conducting a full asset-level vulnerability assessment of its system, including the Red Line and Silver Line. Though neither of South Boston’s two Red Line stops (Broadway and Andrew) are exposed to coastal flooding at 9 inches of SLR under the 1 percent annual chance flood event, flooding of tunnels and stops in Downtown Boston could impede the ability of residents to access jobs and essential services. The Silver Line has significant exposure to flooding at 9 inches of SLR under the 1 percent annual chance flood event

**PRIORITIZE AND STUDY THE FEASIBILITY OF DISTRICT-SCALE FLOOD PROTECTION**

The Office of Emergency Management should work with the Boston Transportation Department, Department of Public Works, and private utilities to provide guidance on critical roads to prioritize for adaptation planning, including evacuation routes and roads required to restore or maintain critical services. South Boston has four evacuation routes that are exposed at 9 inches of SLR under the 1 percent annual chance flood event, including Haul Road, Summer Street, Ted Williams Tunnel, and Congress Street. It is important to prepare roads in South Boston to avoid islanding in the later century.

**CONDUCT FEASIBILITY STUDIES FOR COMMUNITY ENERGY SOLUTIONS**

The 2016 Boston Community Energy Study identified East Broadway near Emerson Street as a potential location for an emergency microgrid, based on its concentration of critical facilities. The Environment Department will work with local stakeholders and utility providers to explore this location. The site is not exposed to expected coastal storm impacts in this century. The City also has been exploring the opportunity for a pilot microgrid project at Ray Flynn Marine Park. The proposed site is significantly exposed to coastal and stormwater flooding in the near term, and the City should consider climate change impacts in its planning process.



ADAPTED BUILDINGS

PROMOTE CLIMATE READINESS FOR PROJECTS IN THE DEVELOPMENT PIPELINE

Upon amending the zoning code to support climate readiness (see Initiative 9-2, p.135), the Boston Planning and Development Agency (BPDA) should immediately notify all developers with projects in the development pipeline in the future floodplain that they may alter their plans in a manner consistent with the zoning amendments (e.g., elevating their first-floor ceilings without violating building height limits), without needing to restart the BPDA permitting process.

The South Boston Waterfront is one of the most active development locations in Boston. Currently, 91 residential and 34 commercial buildings are under construction or permitted in South Boston, representing 3,900 additional housing units and 1.4 million square feet of new commercial space. In addition, General Electric is building a new headquarters facility adjacent to Fort Point Channel, the Massachusetts Convention and Exhibition Center has been proposed for expansion, and the Massachusetts Port Authority is offering a 23-acre site for development in the Massport Marine Terminal, making it critical to focus on building resilience now.

INCORPORATE FUTURE CLIMATE CONDITIONS INTO AREA PLANS AND ZONING AMENDMENTS

The Boston Planning and Development Agency should incorporate future climate considerations (long-term projections for extreme heat, stormwater flooding, and coastal and riverine flooding) into major planning efforts in South Boston. The City and state are funding a \$100 million redesign and reconstruction of the Northern Avenue Bridge. In addition, the state is dedicating \$25 million to improve pedestrian and bicycle infrastructure in South Boston and considering building an underground tunnel for buses at D Street. The City is currently leading a planning effort for the Dorchester Avenue Corridor between the Andrew and Broadway MBTA Stations. The City also is pursuing implementation of the 100 Acres Plan, completed in 2006.

ESTABLISH A CLIMATE READY BUILDINGS EDUCATION PROGRAM FOR PROPERTY OWNERS, SUPPORTED BY A RESILIENCE AUDIT PROGRAM

The City should develop and run a Climate Ready Buildings Education Program and a resilience audit program to inform property owners about their current and future climate risks and actions they can undertake to plan for these risks. To address the most immediate risks, the City should prioritize audits for buildings with at least a 1 percent annual chance of exposure to coastal and riverine flooding in the near term, under 9 inches of sea level rise. In South Boston, this includes 353 structures, with 41 percent of these consisting of residential and mixed-use buildings that house residents. A resilience audit should help property owners identify cost-effective, building-specific improvements to reduce flood risk, such as backflow preventers, elevation of critical equipment, and deployable flood barriers; promote interventions that address stormwater runoff or the urban heat island effect, such as green roofs or “cool roofs” that reflect heat; and encourage owners to develop operational preparedness plans and secure appropriate insurance coverage. The resilience audit program should include a combination of mandatory and voluntary, market-based and subsidized elements.

PREPARE MUNICIPAL FACILITIES FOR CLIMATE CHANGE

The Office of Budget Management should work with City departments to prioritize upgrades to municipal facilities in South Boston that demonstrate high levels of vulnerability (in terms of the timing and extent of exposure), consequences of partial or full failure, and criticality (with highest priority for impacts on life and safety) from coastal flooding in the near term. In the near term, at 9 inches of SLR, the EMS Harbor Unit, Boston Police Department Harbor Patrol Unit, and the Boston Marine Industrial Park, which is owned by the BRA, are exposed under the 1 percent annual chance flood event. In addition, the Boston Housing Authority Old Colony, Mary Ellen McCormack, and West Ninth Street housing developments will be exposed to coastal flooding in the second half of the century.

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The City should develop and run a Climate Ready Buildings Education Program and a resilience audit program to inform property owners about their current and future climate-related risks, and actions they can undertake to address these risks. To address the most immediate risks, the City should prioritize audits for buildings with at least a one percent annual chance of exposure to coastal and riverine flooding in the near term, under nine inches of sea level rise. In South Boston, this includes 353 structures, with 41% of these consisting of residential and mixed-use buildings that house residents.

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The resilience audit program should include a combination of mandatory and voluntary, market-based and subsidized elements.