



PLAN: Downtown

Advisory Group Meeting #4
Climate & Resiliency

June 20, 2019



**boston planning &
development agency**

Agenda

Advisory Group Meeting #4 Agenda – Climate & Resiliency

- | | |
|--|------------|
| 1. Advisory Group Update | 5 minutes |
| 2. Climate Change Overview | 5 minutes |
| 3. Climate Mitigation & GHG Emissions
<i>Includes AG Discussion</i> | 35 minutes |
| 4. Climate Adaptation & Resiliency
<i>Includes AG Discussion</i> | 35 minutes |
| 5. Next Steps | 1 minute |
| 6. Public Comment & Questions | 10 minutes |



Advisory Group Overview

Preliminary Advisory Group Schedule—Subject to Change

1	March 7, 2019	Introduction & Project Overview
2	April 24, 2019	Existing Conditions & Character Areas
3	May 22, 2019	Preservation & Growth
4	June 20, 2019	Climate & Resiliency
5	July 17, 2019	Mobility & Public Realm
6	September 2019	Development Scenarios
7	October 2019	Preferred Development Scenario

8	November 2019	Preferred Development Scenario Impact Assessment
9	December 2019 / January 2020	Urban Design Guidelines & Zoning Recommendations
10	February 2020	Urban Design Guidelines & Zoning Recommendations
11	March/April 2020	Draft PLAN: Downtown
	May—July 2020	Meet as needed. PLAN: Downtown must be substantially complete by July 2020.

Meeting dates and subjects are tentative and subject to change. Extra meetings may be scheduled and will be discussed in advance with the Advisory Group. Advisory Group members will be provided with schedule updates as the project progresses.

Advisory Group Meeting #3 Follow Up

What We Heard

- "Preservation downtown should focus on enhancing existing and promoting future layering, juxtapositions and intensity of form, use, culture, and people that uniquely define downtown Boston."
- Small business preservation and strategies to reduce retail vacancies
- Introducing more active and varied green spaces within the study area
- Reduce or, preferably, eliminate residential displacement with growth
- In specific areas of Downtown—balancing residential affordability, ensuring continued commercial growth

Climate & Resiliency

Relevant Draft Goals

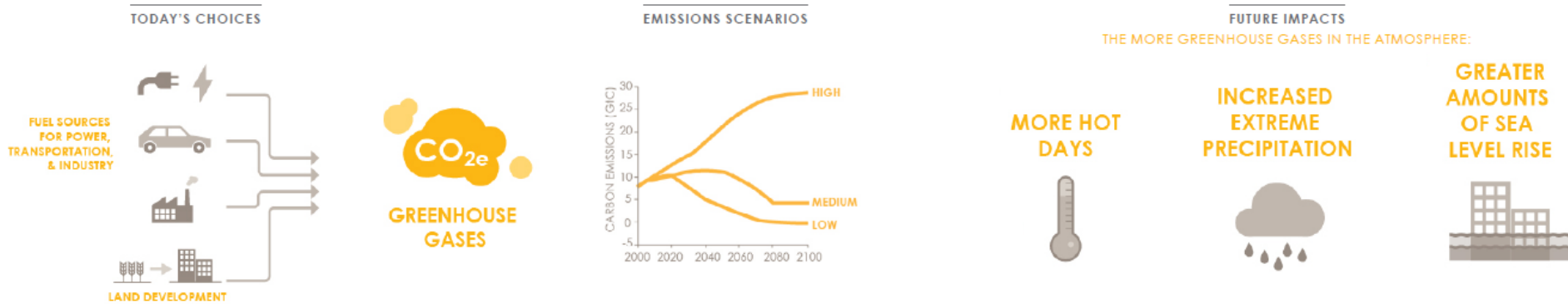
Goal 5

Preserve the cultural heritage, arts and performance venues, and historic building fabric **while advancing climate preparedness and resiliency measures.**

Climate Change Overview



Boston's Future Climate



Source: City of Boston

Climate Mitigation vs. Climate Adaptation

Climate Mitigation

addresses the CAUSE of climate change by reducing emissions from greenhouse gases (GHGs).

Boston mitigation efforts:

- *Carbon Free Boston*
- *Climate Action Plan Update*
- *Net Zero Design Guidelines*

Climate Adaptation

reduces the vulnerability of people, infrastructure, and the environment to the impacts of a changing climate.

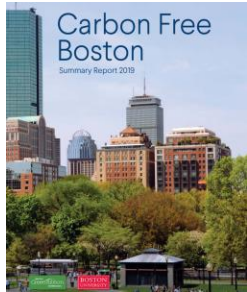
Boston adaptation efforts:

- *Climate Ready Boston and neighborhood plans*
- *Flood Zoning Overlay*
- *Resilient Design Guidelines*



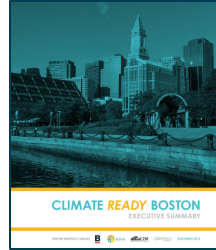
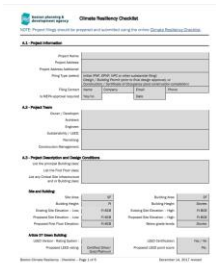
City of Boston's Climate Change Efforts To-Date

Climate Mitigation



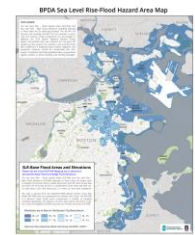
Climate Action Plan Update

Net Zero Carbon & Carbon Ready Design Guidelines and Standards for Affordable Housing



Flood Resilience Zoning Overlay & Design Guidelines

Coastal Resilience Solutions for Downtown



City of Boston's Emergency Management Efforts

SIGN UP FOR EMERGENCY ALERTS

Emergencies can happen anywhere, anytime

Our AlertBoston system is for residents, businesses, and visitors to the City of Boston. We'll notify you by phone, text, or email in the event of an emergency. By enrolling in AlertBoston, you're taking an important step to keep you and your family safe.

You can select different languages for alerts in our form. If you would like alerts through TDD/TTY devices, please contact us at 617-635-1400 or oen@boston.gov.



YOUR EMAIL ADDRESS

OR

YOUR PHONE NUMBER

TEXT ME CALL ME

Message & data rates may apply

FIRST NAME

LAST NAME

ZIP CODE

LANGUAGE

SIGN UP



Timeline of Upcoming Climate Change Projects

- **June**
 - Flood Resilience Zoning Overlay District & Design Guidelines (Draft)
- **September**
 - Coastal Resilience Solutions for Downtown and North End
 - Net Zero Carbon & Carbon Ready Design Guidelines & Standards for Affordable Housing
- **Fall**
 - Climate Action Plan Update
- **Spring**
 - Coastal Resilience Solutions for Dorchester

Questions to Consider

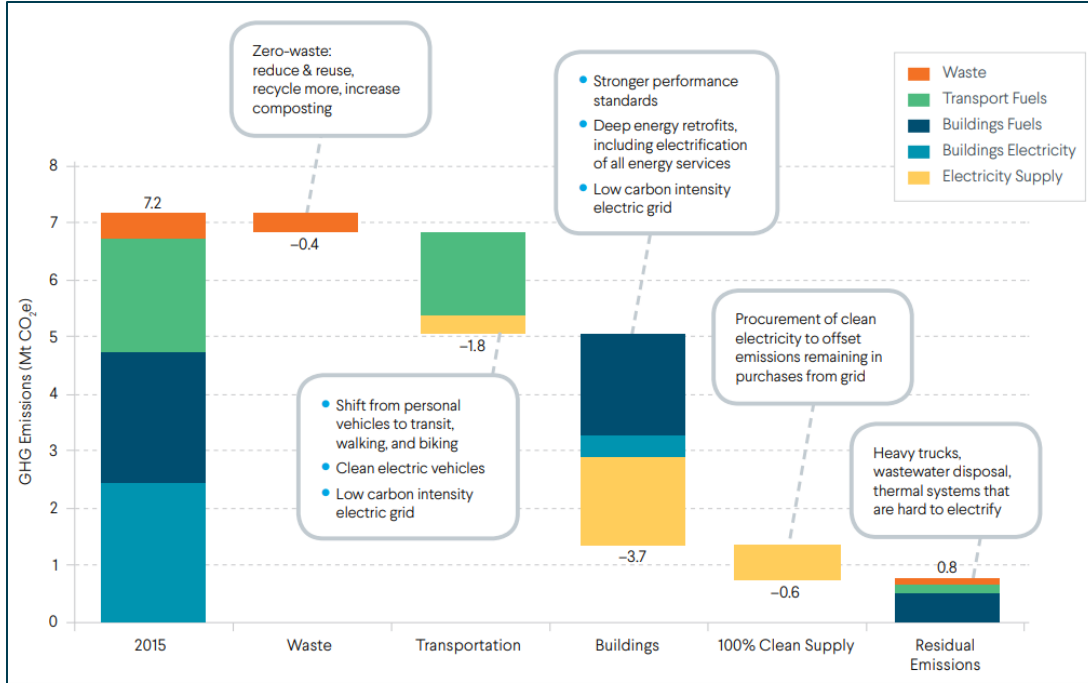
Climate & Resilience

- How do **climate factors affect your experience** in Downtown? What other factors should we consider when defining the climate vision?
- How can Downtown become the **City's first carbon neutral district**, and lead the way for the City's 2050 carbon neutrality goal?
- The City is already developing solutions for coastal flooding. What opportunities exist in Downtown for the **implementation of solutions to mitigate both urban heat island impacts and provide better stormwater management**? What are your priorities for the use of the public realm and streetscape? What tradeoffs are you willing to make?



Climate Mitigation & GHG Emissions

Carbon Free Boston



Source: City of Boston

Steps to Carbon Neutrality in Boston

The report presents policy and technology options for how the City of Boston can achieve carbon neutrality by 2050. Its results are informing the ongoing Climate Action Plan Update.

Transportation

Buildings

Energy

Waste

Most relevant to PLAN:
Downtown

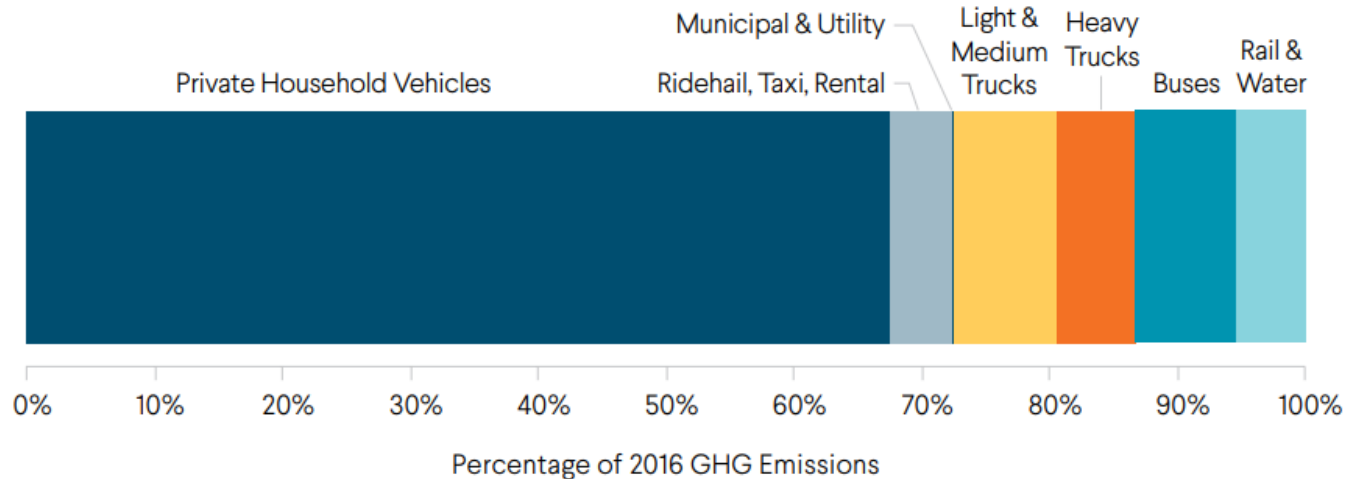


Transportation

Carbon Free Boston

Figure 20. Transportation Emissions by Mode of Travel in 2016

Rail refers to the MBTA commuter and subway lines. Water refers to MBTA water ferries. Source: Institute for Sustainable Energy model calculations.



Source: City of Boston



Potential Strategies for Transportation

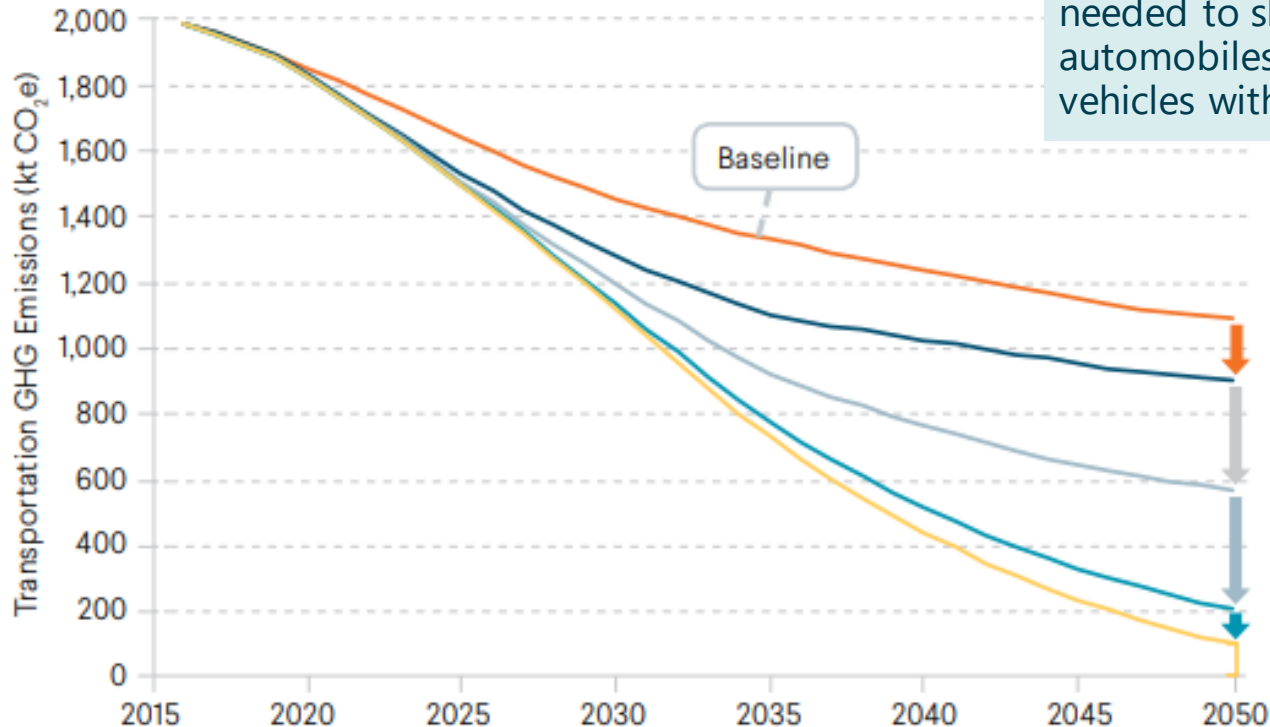
Climate Mitigation

- **Reduce trips in passenger vehicles**
 - Expansion and improvement of bike network (e.g. protected bike lanes, better bike connectivity between neighborhoods, etc.)
 - Expansion and improvement of pedestrian infrastructure (e.g. improved sidewalks and safer street crossings, expansion of Downtown Crossing pedestrian zone, etc.)
 - Improved public transit options (both bus network and rail), including access, frequency, cost, and connectivity
 - Private vehicle pricing (e.g., parking fees, VMT fees, etc.)
- **Convert vehicles to zero-GHG electricity** (and provide necessary infrastructure)



Potential Pathway for Carbon-Neutral Transportation

Carbon Free Boston



Key Takeaway: Decisive action is needed to shift people out of automobiles, and power the remaining vehicles with zero-GHG electricity

We carry out all of Go Boston 2030, expand transit, and set new travel pricing and ride-sharing fees.

All remaining vehicles are electrified; electric vehicles are more efficient.

The state reaches its 80% clean grid goal, making EVs increasingly cleaner.

Bostonians buy 100% clean electricity.
Residual emissions



Buildings

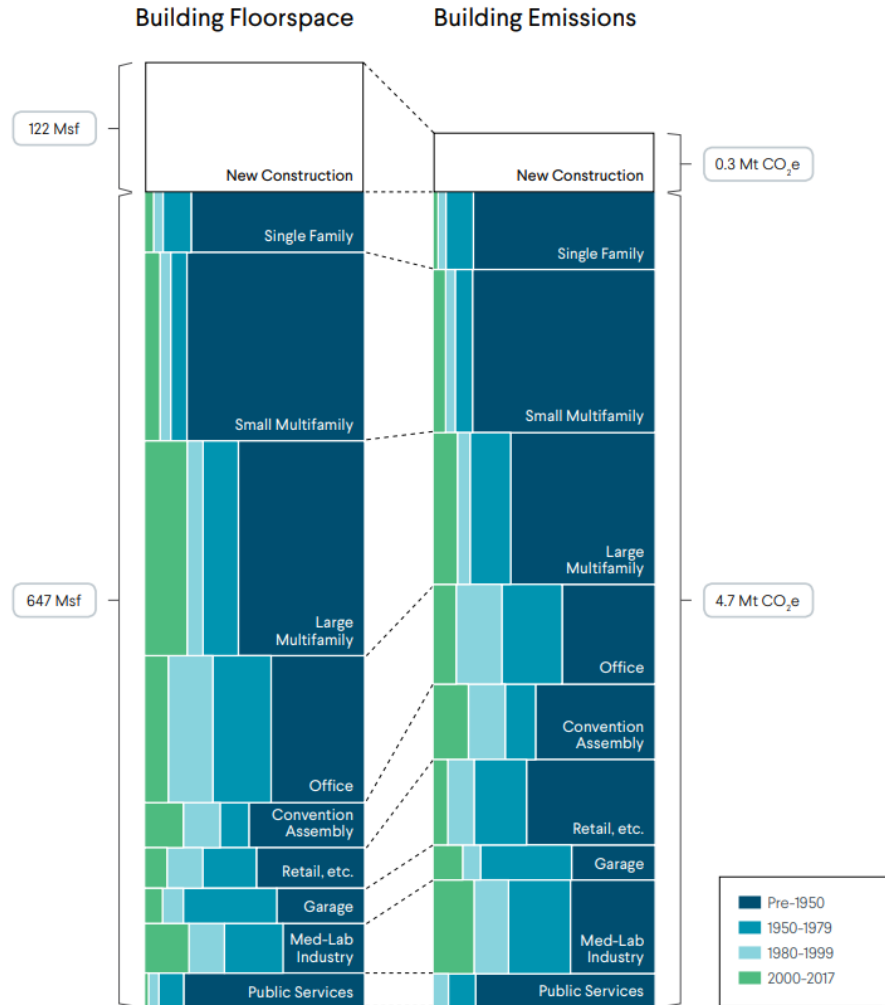
Carbon Free Boston Analysis

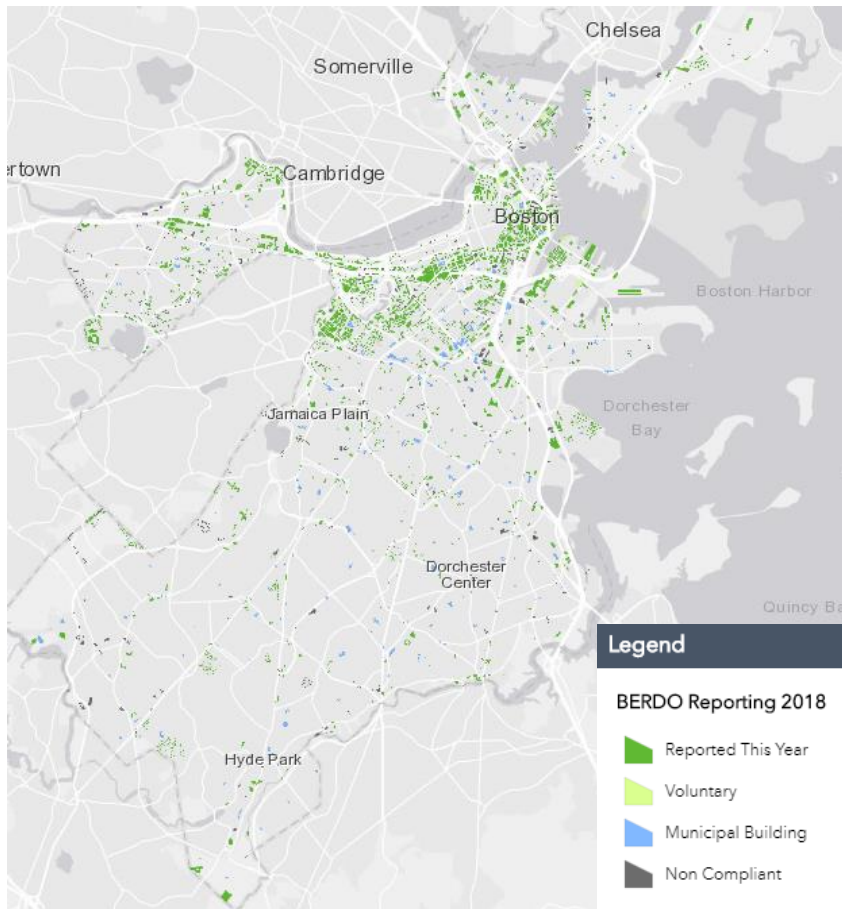
Buildings account for **more than 2/3** of Boston's total emissions.

Around half of Boston's buildings were **built before 1950**.

85% of floor space that will exist in 2050 has already been built.

- We need new buildings to be built to a carbon-neutral standard.
- We need to carry out deep energy retrofits in ~86,000 buildings.





Source: City of Boston

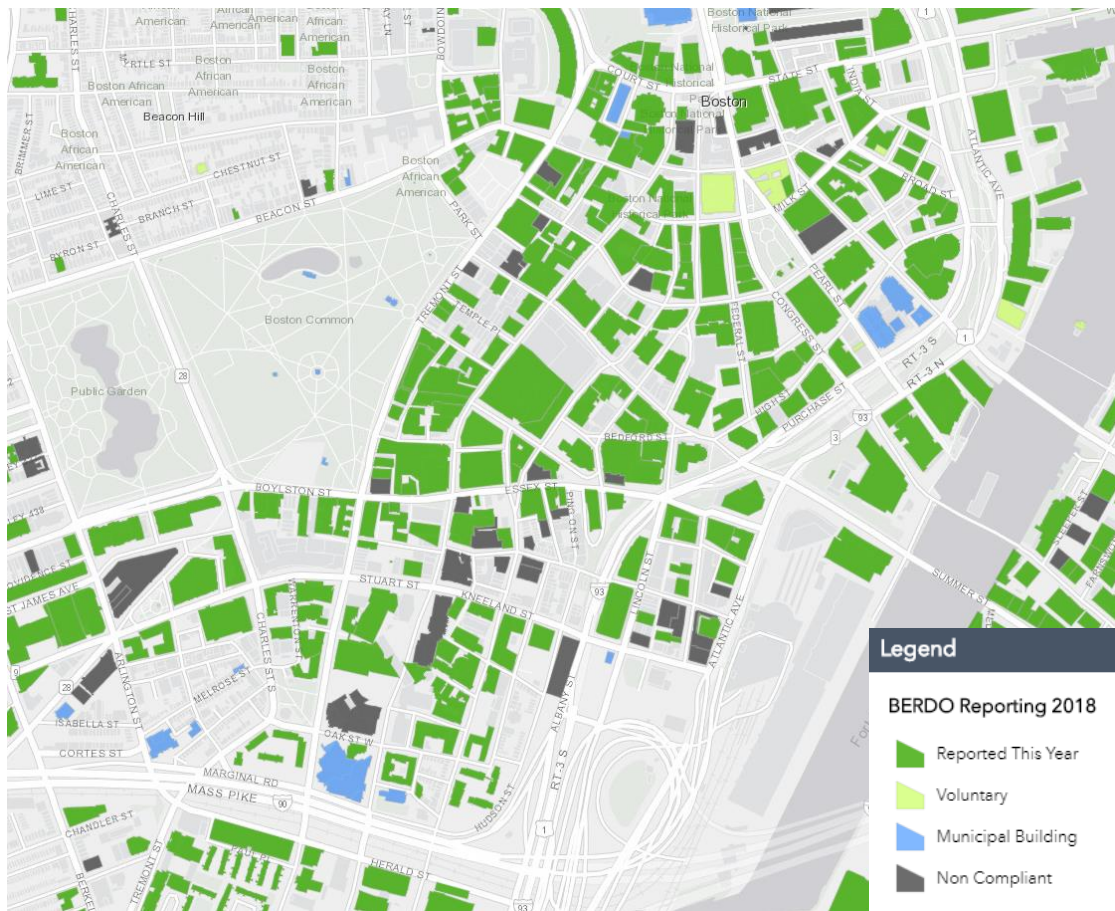
BERDO Reporting 2018

Building Energy Reporting & Disclosure Ordinance (BERDO)

BERDO requires Boston's large- and medium-sized buildings to **report their annual energy and water use**. Buildings subject to BERDO include:

- Nonresidential buildings: 35,000 square feet or larger
- Residential buildings: 35,000 square feet or larger, or 35 or more units
- Parcels with multiple buildings that sum to 100,000 square feet or 100 units





Source: City of Boston

BERDO Reporting 2018

Downtown Buildings

Building Energy Reporting & Disclosure Ordinance (BERDO)

- Downtown is **0.78% of the land area** of the City of Boston
- Of the buildings currently subject to BERDO in the City of Boston, Downtown buildings represent **17.5% of the total square footage** reported through BERDO



Case Studies

New Construction



Winthrop Square

LEED v2009 Platinum +
Passive House:

- Air-tight building envelope with highly efficient mechanical systems & lighting
- Reduced carbon impact from 7,200 tons CO₂ to 4,900 tons CO₂ (32% reduction)

Source: BPDA

Existing Building Retrofit



Castle Square

Deep Energy Retrofit

- Super insulated shell; air sealing; high efficiency boilers, AC, lighting, appliances, and water fixtures; solar hot water; renovated ventilation.
- Retrofitted 192 apartments and achieved 72% energy savings

Source: Better Buildings Initiative



Benefits of Green Buildings

Lower energy costs – potential \$600 million in citywide savings per year in 2050

Improved air quality – 75% reduction in key pollutants in 2050

More comfortable and resilient buildings - a well-insulated building with elevated mechanicals, solar panels and energy storage stays comfortable and keeps the lights on for longer

Regional economic opportunities – new jobs and increased building asset value



Climate Mitigation Goals for Downtown

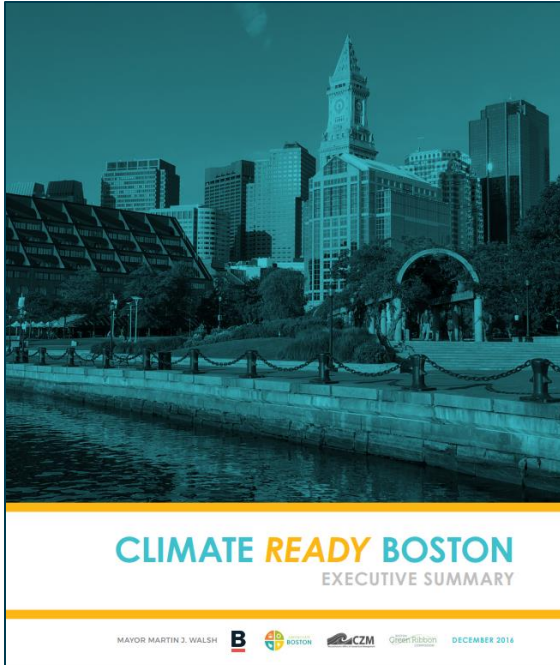
Preserve the cultural heritage, arts and performance venues, and historic building fabric **while advancing climate preparedness and resiliency measures.**

- Set the standard for District-scale mitigation strategy in the City of Boston
- Substantially improve building energy efficiency and reduce emissions (both new construction and existing) in Downtown, at a faster rate than the City's overall emissions reduction efforts
- Create a transportation network that encourages mode shift to low and zero-emissions travel modes and de-prioritizes the personal automobile



Climate Adaptation & Resiliency

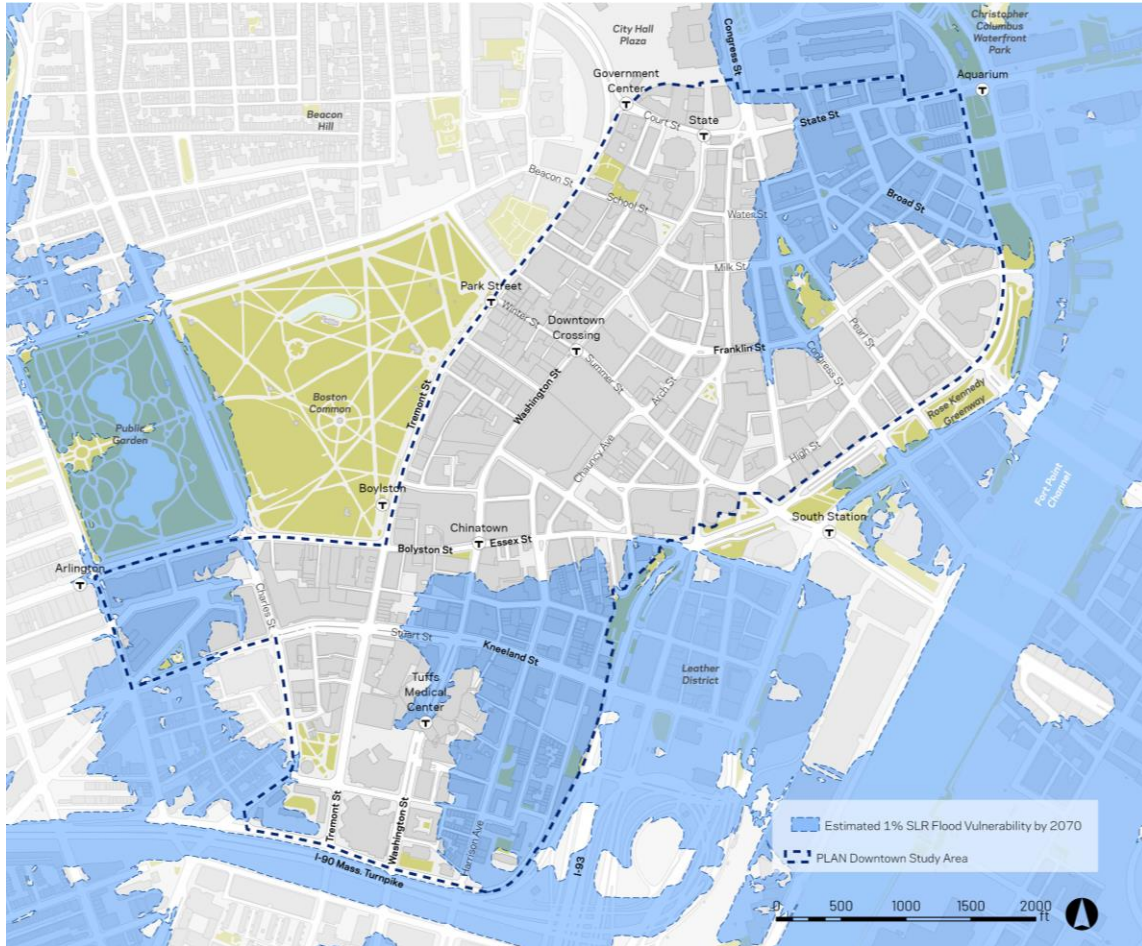
Resiliency Vision for Boston



2070 Flood Vulnerability

Climate Ready Boston

- About **30% of the study area** would be **vulnerable to flooding** by the year **2070**.
- The **Wharf District** will be the **most susceptible** area
- **Chinatown** is the **second most susceptible** to flooding.



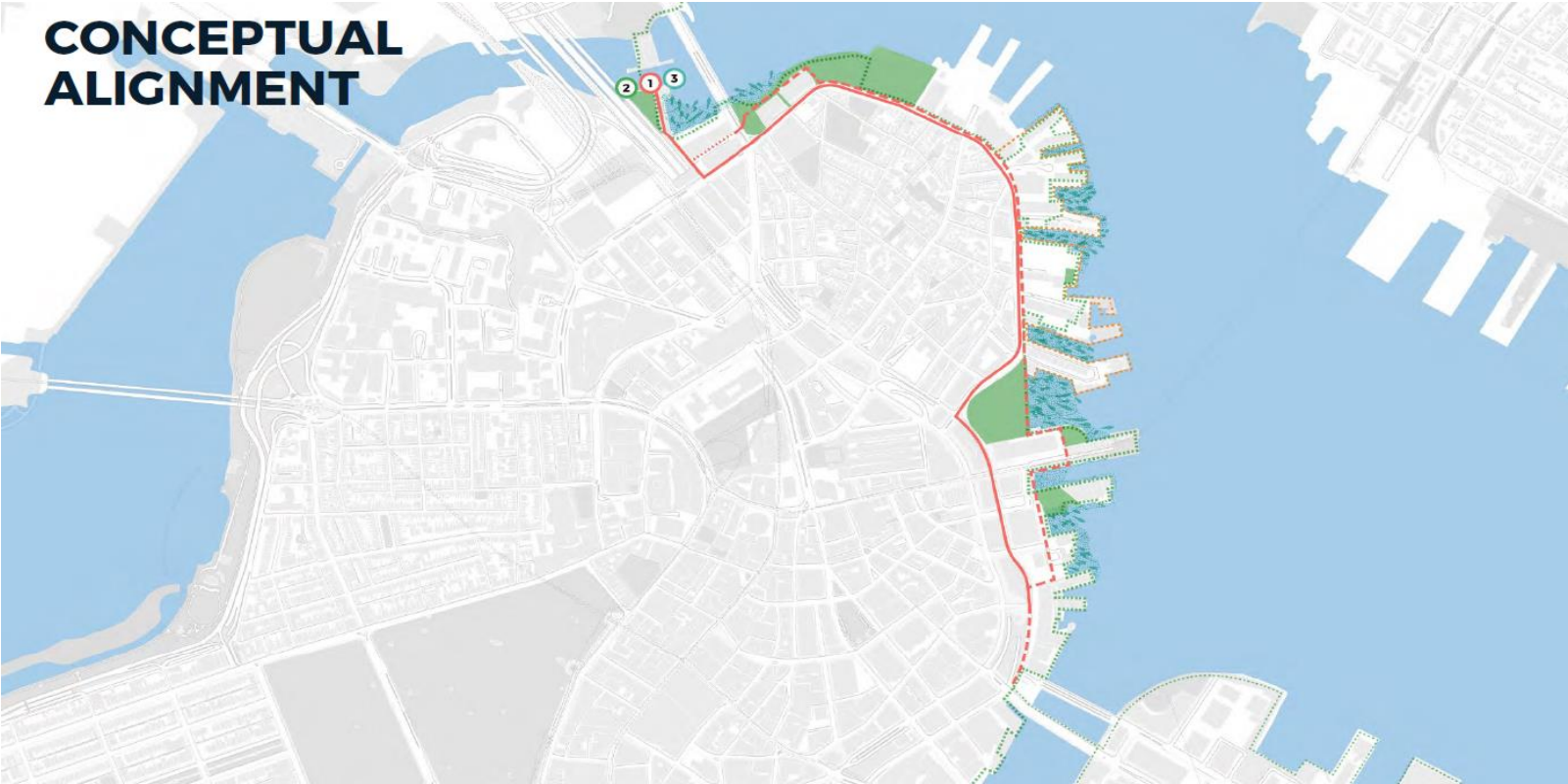
Source: City of Boston



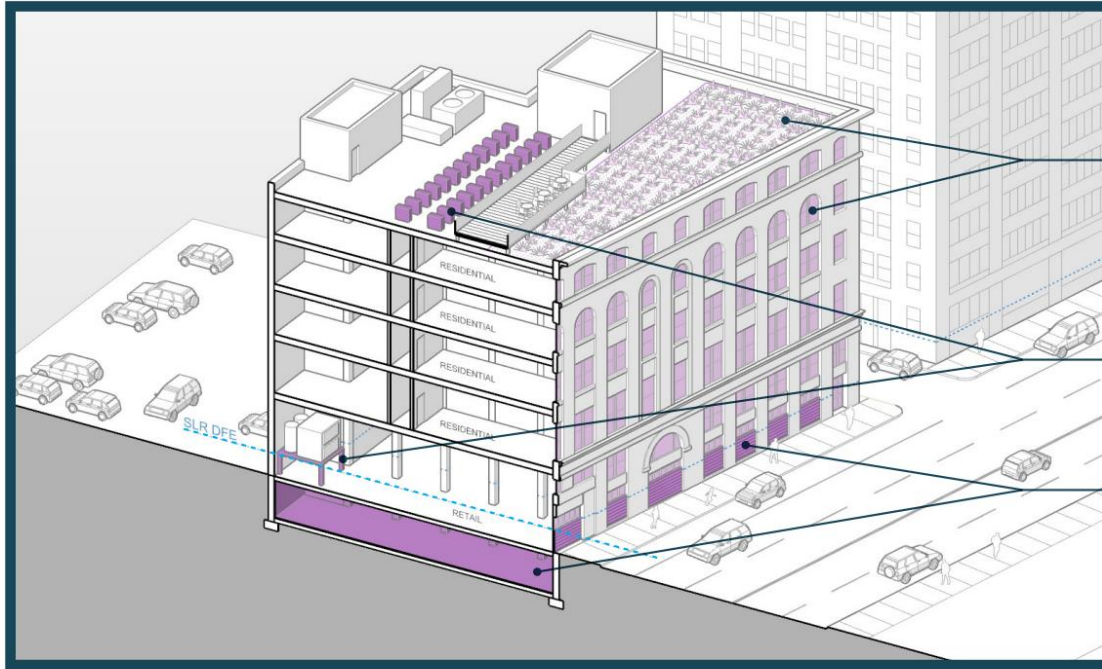
Wharf District Flood Protection

Coastal Resilience Solutions for Downtown

CONCEPTUAL ALIGNMENT



Flood Resilience Zoning Overlay & Design Guidelines



Long-term Retrofit Strategy

Enhanced Envelope

Upgrade windows to historically sensitive low-e, low-U-factor units. Add extensive green roof.

Protect Critical Systems

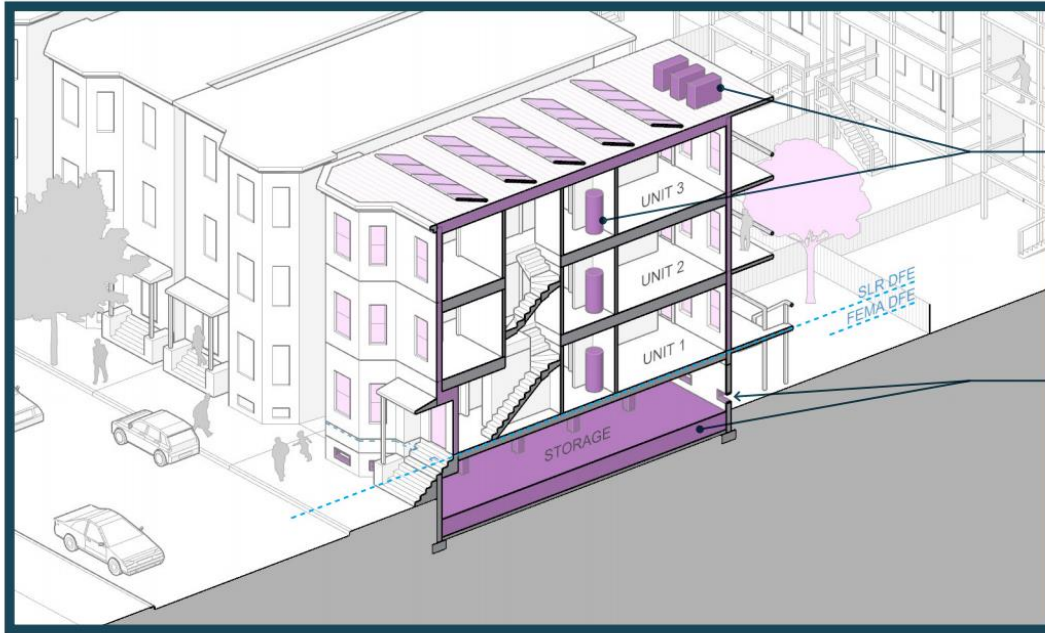
Locate systems above SLR-DFE.

Dry-Floodproof

Install historically sensitive brackets for temporary shields at windows and doors below the SLR-DFE. Structurally reinforce stone foundation. Install sump pumps for backup drainage.



Flood Resilience Zoning Overlay & Design Guidelines



Long-term Retrofit Strategy *Estrategia de adaptación de largo plazo*

Protect Critical Systems *Proteger sistemas críticos*

Locate heating and cooling equipment, as well as water heaters, above the SLR-DFE. Upgrade to a high-efficiency mini-split heat pump system with equipment located outside and above the SLR-DFE.

Ubicar equipos de calefacción y refrigeración, así como calentadores de agua, por encima de la SLR-DFE. Mejorar a un sistema "mini-split" de bomba de calor de alta eficiencia con equipamiento ubicado fuera y por encima de la SLR-DFE.

Wet-Floodproof *Impermeabilizar contra inundaciones*

Elevate the structure so that the first floor is at the SLR-DFE. Fill the basement to the lowest adjacent grade. Install flood vents at foundation walls in order for water to enter and balance hydrostatic forces. Use saltwater damage-resistant materials below the SLR-DFE.

Elevar la estructura para que el primer piso esté en la SLR-DFE. Llenar el subsuelo hasta el nivel adyacente más bajo. Instalar entradas para inundación en las paredes de los cimientos para que el agua ingrese y equilibre las fuerzas hidrostáticas. Usar materiales resistentes al daño causado por agua salada debajo de la SLR-DFE.



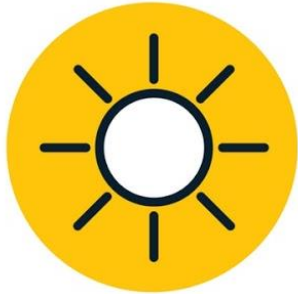
Fort Point Channel Flood Protection

Coastal Resilience Solutions for South Boston & FEMA Grant



Climate Ready Boston

**EXTREME
TEMPERATURES**



HEAT

**EXTREME
PRECIPITATION**



**STORMWATER
FLOODING**

SEA LEVEL RISE



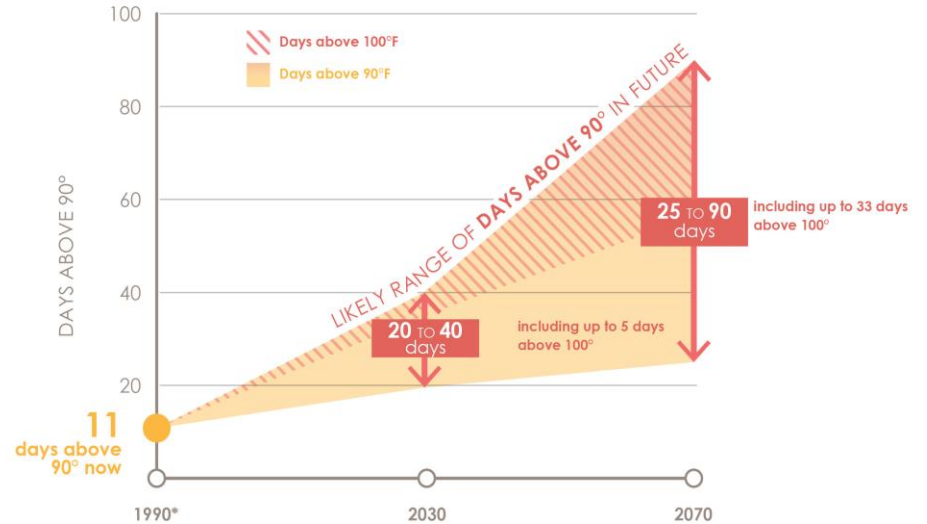
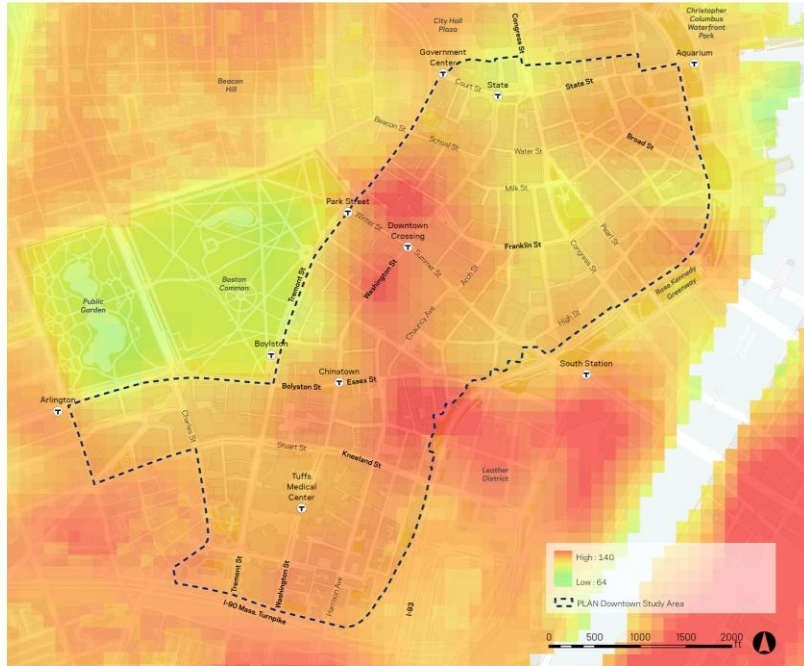
**COASTAL & RIVERINE
FLOODING**

**COASTAL
STORMS**



Rising Temperatures

Climate Ready Boston



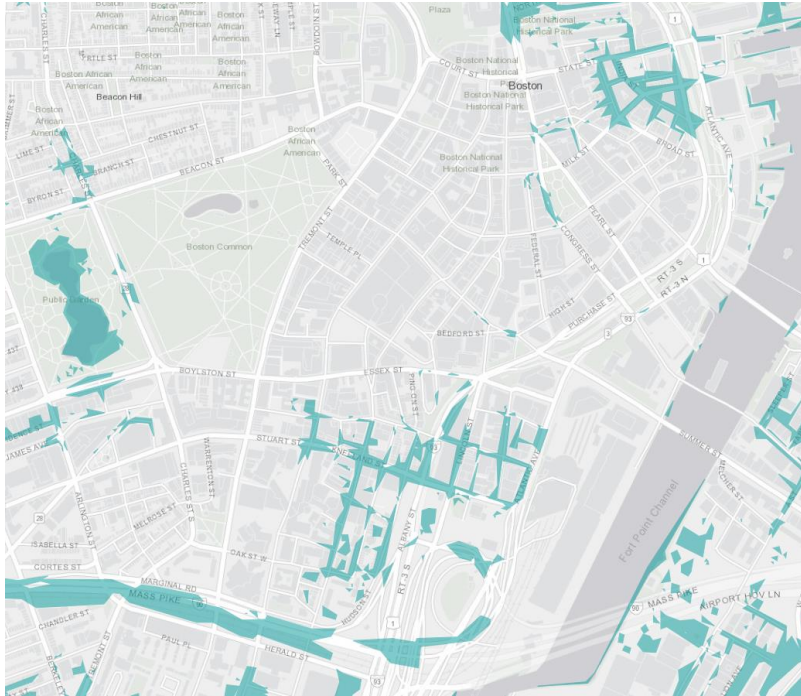
* Baseline represents historical average from 1971-2000
Upper values from high emissions scenario. Lower values from low emissions scenario.

Data source: Rossi et al. 2015

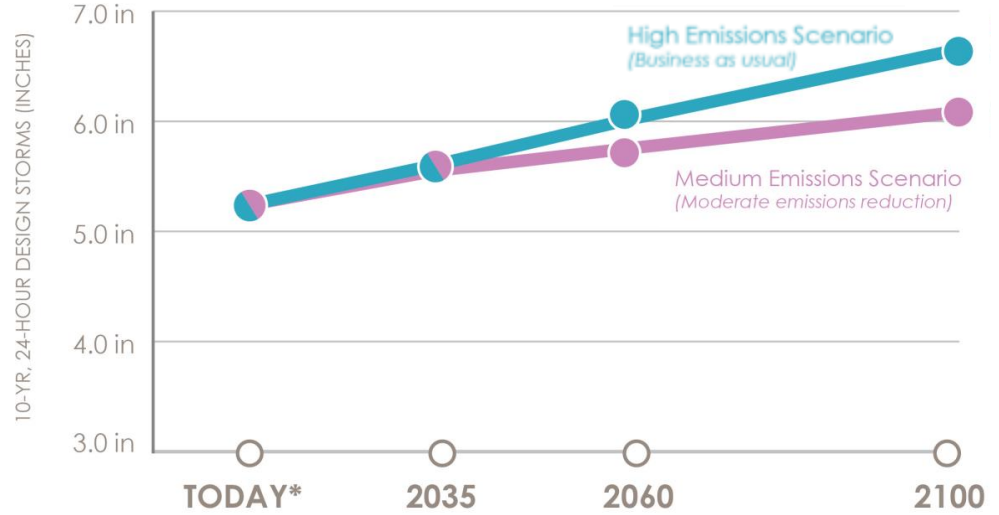


Extreme Precipitation

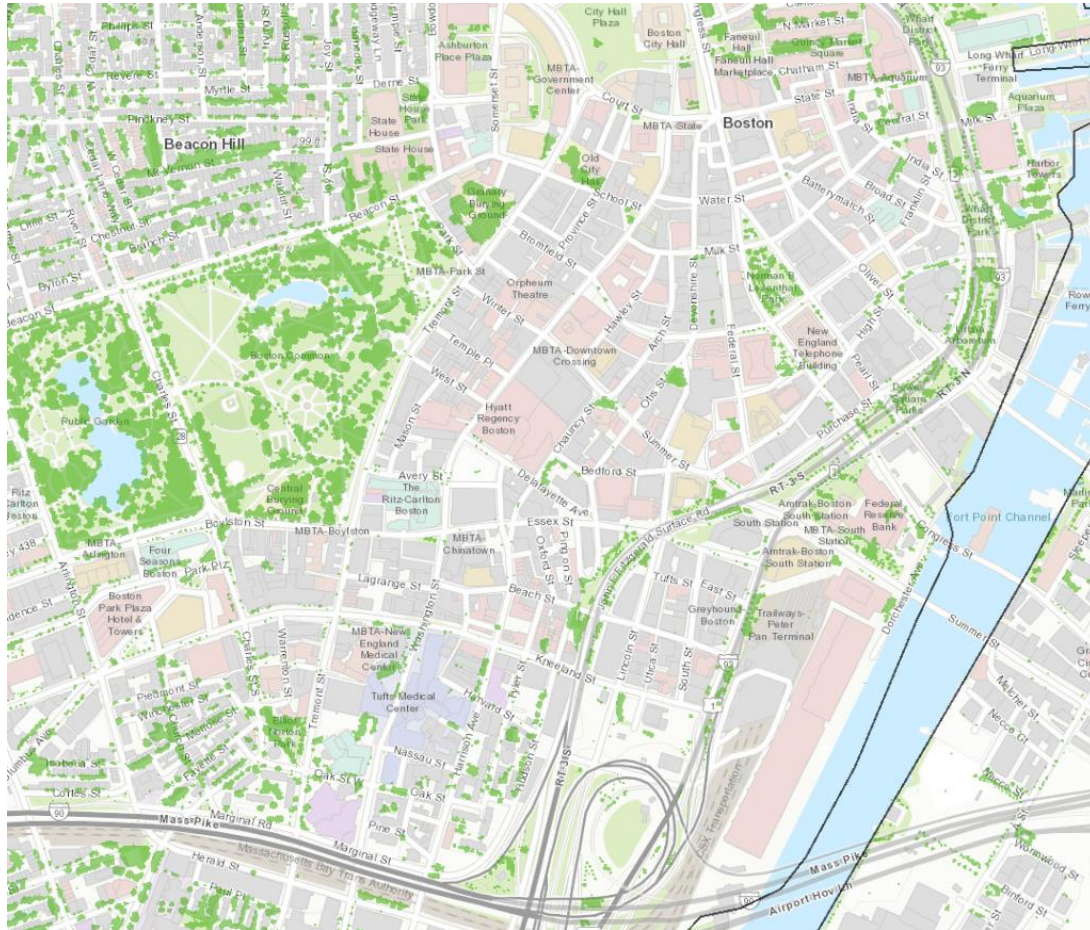
Climate Ready Boston



Source: City of Boston



* "Today" baseline represents historical average from 1948-2012
 Confidence intervals are not available for these projections but are likely large, so these numbers should be considered as the middle of a large range



Tree Canopy

- The City of Boston Climate Action Plan established a **target of reaching 35% tree canopy coverage** in the city by 2030.
- According to the City of Boston Open Space & Recreation Plan 2015-2021, the tree canopy coverage for the majority of the census blocks in Downtown is **less than 10%**.

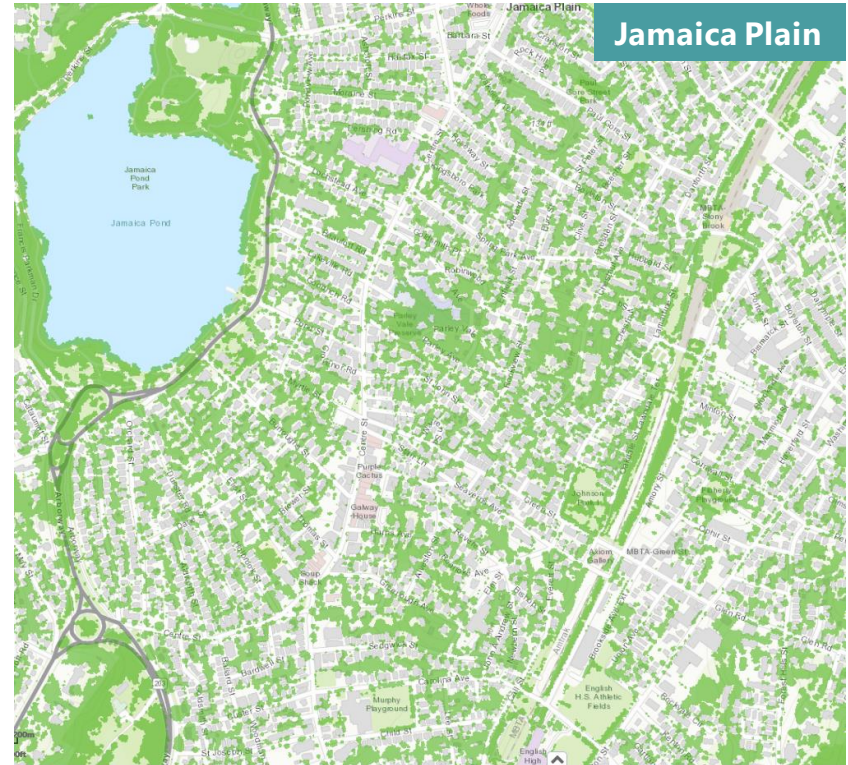
Source: Trust for Public Land, Climate-Smart Cities



Existing Tree Canopy: Downtown vs. Jamaica Plain



Source: Trust for Public Land, Climate-Smart Cities

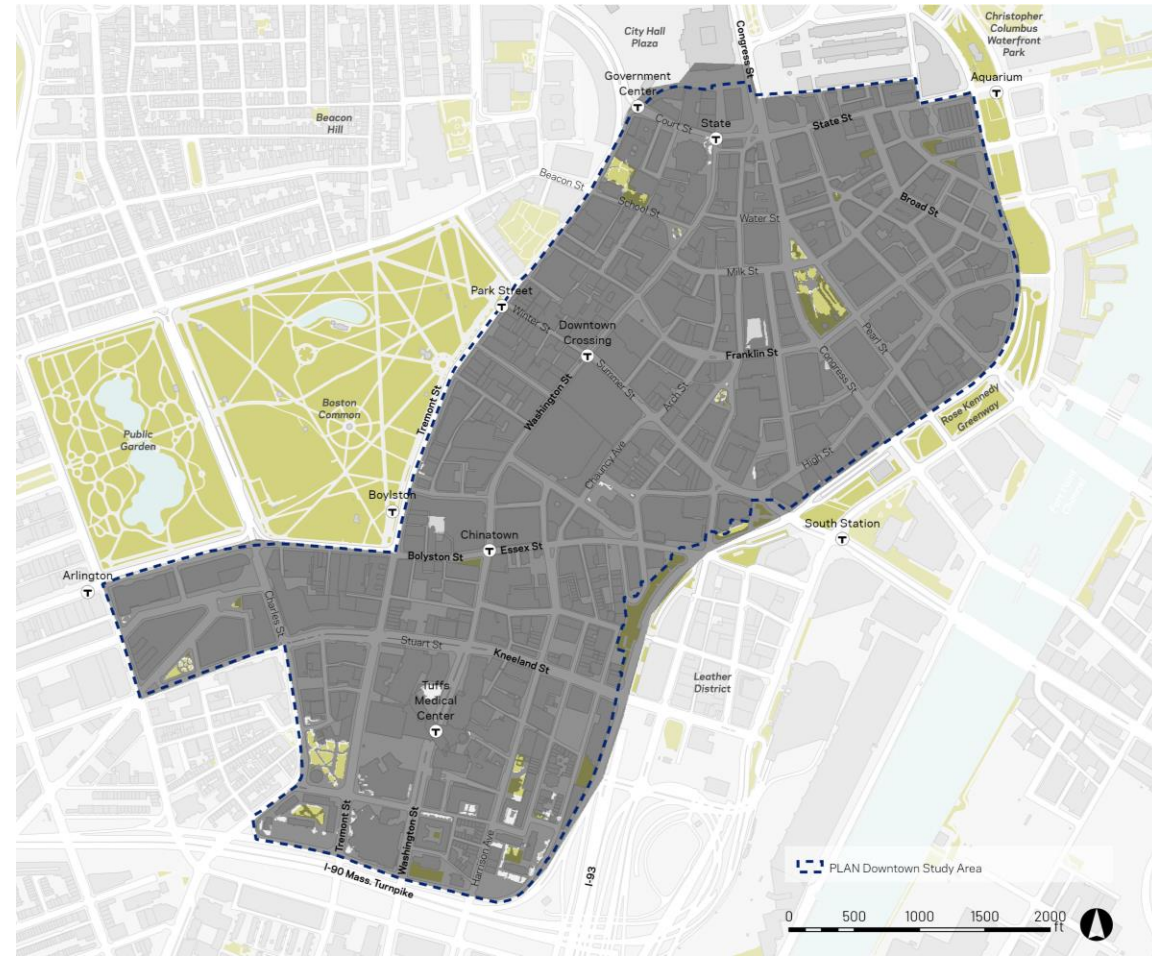


Source: Trust for Public Land, Climate-Smart Cities

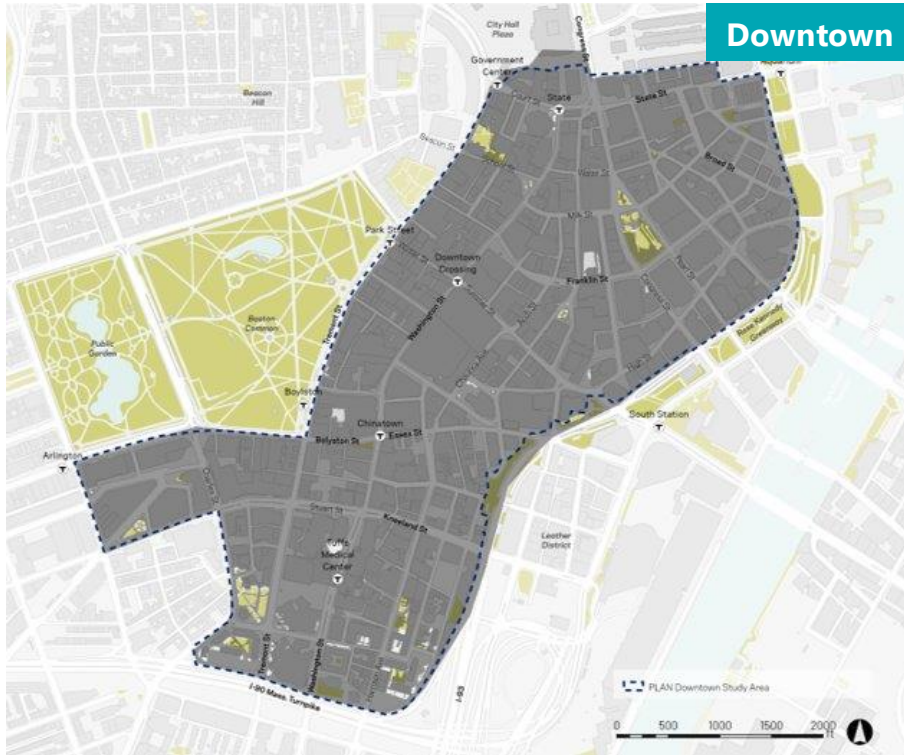


Impervious Surface

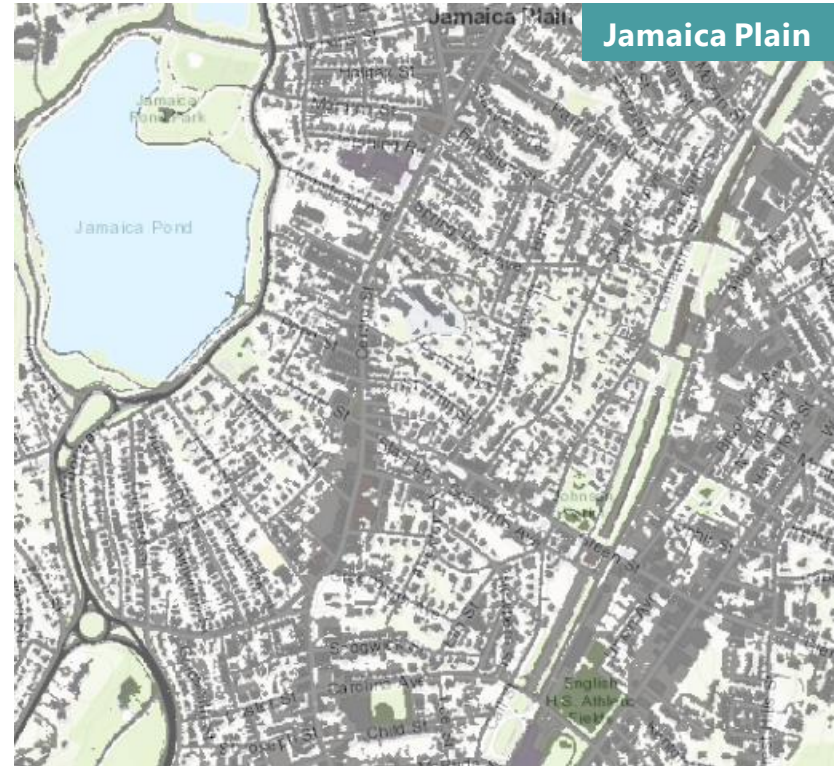
- Impervious surfaces are surfaces that allow **little or no stormwater infiltration** into the ground. This results in increased stormwater runoff, which contributes to greater flood risk.
- Examples of impervious surfaces include streets, roofs, parking lots, sidewalks and walkways, asphalt, and concrete.
- **98.5%** of Downtown is currently considered **impervious surface**.



Impervious Surface: Downtown vs. Jamaica Plain



Source: City of Boston



Source: Trust for Public Land, Climate-Smart Cities



Potential Adaptation Strategies

Urban Heat Island and Stormwater Management



Rain Garden/Bioswale



Grass Swale



Stormwater Planter



Pervious Paving



Green Roof



Stormwater ROW
Bumpout



Downspout Planter



Stormwater Tree Pit



Stormwater Tree
Trench



Pocket Parks



Climate Adaptation & Resiliency Goals for Downtown

Preserve the cultural heritage, arts and performance venues, and historic building fabric **while advancing climate preparedness and resiliency measures.**

- Align with the City's on-going coastal flooding initiatives and integrate relevant aspects of the resilience design guidelines and zoning overlay district recommendations into the PLAN: Downtown analysis
- Prioritize efforts to mitigate stormwater flooding and urban heat island within Downtown by leveraging opportunities for implementing green infrastructure solutions, reducing impervious surfaces, and integrating more street trees in the public realm.

Discussion & Next Steps

Questions to Consider

Climate & Resilience

- How do **climate factors affect your experience** in Downtown? What other factors should we consider when defining the climate vision?
- How can Downtown become the **City's first carbon neutral district**, and lead the way for the City's 2050 carbon neutrality goal?
- The City is already developing solutions for coastal flooding. What opportunities exist in Downtown for the **implementation of solutions to mitigate both urban heat island impacts and provide better stormwater management**? What are your priorities for the use of the public realm and streetscape? What tradeoffs are you willing to make?



Next Steps

Upcoming Public Meetings

- **Next Advisory Group Meeting: Mobility and Public Realm**
July 17, 2019, 6:00–8:00 pm
BPDA Board Room
- **Climate Ready Downtown & North End Presentation & Open House #2**
July 16, 2019, 6:00–8:00 pm
BSA Space, 290 Congress Street, Suite 200
- **Urban Renewal Community Meeting—Park Plaza**
June 19, 2019, 6:00–7:00 pm
- **Urban Renewal Community Meeting—Central Business District Boylston Essex**
July 15, 2019, 6:00–7:00 pm
Revere Hotel, 200 Stuart Street
- **Article 42A Zoning Amendment**
(Downtown Municipal Harbor Plan)
July 25, 2019, 6:00–8:00 pm
Piedmonte Room, Boston City Hall,
5th Floor

