A BETTER CITY

REPORT | JANUARY 2025

GREENING THE BLUE LINE:

EVALUATING THE POTENTIAL OF NATURE-BASED SOLUTIONS TO PROTECT CRITICAL TRANSPORTATION INFRASTRUCTURE AND UPLIFT COMMUNITIES ALONG THE BLUE LINE IN EAST BOSTON

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PROJECT TEAM

- A Better City
- Civic Space Collaborative
- Weston & Sampson

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EXECUTIVE SUMMARY

East Boston is a vibrant, growing, transit-dependent community that is profoundly vulnerable to coastal flooding and stormwater flooding, as well as extreme heat. This project, Greening the Blue Line, investigates the potential to deploy nature-based solutions along the Blue Line corridor in East Boston to protect critical transportation infrastructure from coastal and stormwater flooding, to support ecosystem restoration, and to improve the health and vibrancy of marginalized communities and commercial districts.

The research methods used are as follows: 1. Analyze planning documents and vulnerability assessments; 2. Consult with key stakeholders and public officials; 3. Engage with community leaders, community-based organizations, residents, and merchants to explore needs and opportunities and to methodically assess and prioritize desired co-benefits; 4. Develop conceptual design approaches for nature-based solutions for the Orient Heights and Wood Island areas, informed by robust stakeholder and community input; 5. Develop a co-benefit evaluation and monitoring framework to ensure that the projects continue to serve community needs over time; 6. Identify potential funding sources for design and construction; and 7. Publish and brief decision makers on the key findings.

The project team identified five locations of vulnerability representing a range of typical situations and that met the following site selection criteria: 1/4 mile from the Blue Line; low tree canopy coverage; highly impervious surfaces: and high storm inundation risk; and high flood vulnerability in extreme storm events. The team developed design concepts for each site—Wood Island Station and Frankfurt Street, Neptune Road, Intersection of Moore and Cowper Streets, Bennington Street Corridor, and Orient Heights Station and Bennington Street—featuring interventions like rain gardens, swales, inland wetlands, and trees. These designs were informed by a robust stakeholder engagement process that included interviews, focus groups, a survey, and a design charrette.

Based on consultation with city and state partners, this project prioritizes stormwater mitigation interventions that maximize community, environmental, and economic co-benefits. It is important to note that while the nature-based solutions featured in the conceptual designs primarily aim to address stormwater flooding, not coastal flooding, it is possible that optimally sized nature-based solutions like inland wetlands, wet meadows, swales, and rain gardens may provide mitigation benefits during certain coastal flooding events. Additionally, the proposed interventions intend to complement grey or green interventions like berms or coastal wetlands that may be constructed at or near the coastline.

The project demonstrates that nature-based solutions can be designed to effectively protect dense, vulnerable urban neighborhoods, while creating multiple social and economic co-benefits. Next steps may include exploring and advancing select design concepts with city and state partners and community groups, completing additional design and engineering, securing funding, and utilizing the co-benefits tool.

INTRODUCTION

East Boston is a vibrant, growing, transit-dependent community that is profoundly vulnerable to coastal flooding and stormwater flooding, as well as extreme heat. According to the City of Boston's recently adopted "PLAN: East Boston," nearly 60% of the land area—and 80% of Blue Line MBTA stations—will be at risk of flooding during 1-year storm events by the 2070s.[1] "East Boston Today: An Interim Report of PLAN: East Boston" notes that East Boston has just 7% tree cover—the lowest of any Boston neighborhood.[2] Additionally, according to the City of Boston's 2022 "Heat Resilience Solutions for Boston" report, 65% of East Boston's surfaces are impervious, which is more than the city as a whole.[3]

The threat of Blue Line flooding is particularly critical because the Blue Line is a vital transportation resource for East Boston residents. The MBTA Blue Line connects East Boston and Revere, as well as Logan Airport, to the rest of the city. The MBTA Blue Line has five stations across East Boston, including Wood Island and Orient Heights. As of 2017, nearly 58% of East Boston commuters reported taking public transit, the highest rate of any Boston neighborhood. Moreover, while pre-pandemic boardings on the Red, Orange, Green, and Silver Lines are declining, East Boston Blue Line boardings are increasing 1.3% annually.[4]

During the pandemic, Blue Line ridership proved more durable than other lines, providing vital service to essential workers that could not transition to remote work. In June 2021, the Blue Line's ridership level was 53% lower than pre-pandemic levels, where the Orange, Red, and Green Lines were 71% lower than pre-pandemic levels.[5] By the end of 2022, Blue Line ridership rebounded the most, averaging roughly 70% of pre-pandemic ridership through the end of 2022. The Red, Green, and Orange lines by comparison hovered just below 60% during this timeframe.[6] As of summer 2024, Blue Line ridership is 77% of pre-pandemic levels, while the other major subway lines range from 70% on the Green Line to an average of 45% for the Orange and Red lines.[7] Additionally, the MBTA has undertaken significant capital work through the Track Improvement Program to remove all slow zones and to establish less than 5-minute headways on the Blue Line.[8]

This project, "Greening the Blue Line: Evaluating the Potential of Nature-Based Solutions to Protect Critical Transportation Infrastructure and Uplift Communities Along the Blue Line in East Boston," aims to evaluate the potential to deploy nature-based solutions to protect critical transportation infrastructure from flooding, while simultaneously improving stormwater management, supporting ecosystem restoration, and aiding the health and vibrancy of marginalized communities and commercial districts.

Based on consultation with city and state partners, this project prioritizes stormwater mitigation interventions that maximize community, environmental, and economic co-benefits.

This report builds upon past studies to consider conceptual design interventions at five sites near the Orient Heights and Wood Island MBTA stations that would mitigate flooding and create ecological, social, and economic co-benefits. The concept designs include a range of nature-based solutions, including rain gardens, bioswales, and constructed wetlands to manage water and to create recreational, educational, and cultural opportunities.

The project's objectives aim to produce the following high impact research outputs, spurring policy changes and project implementation:

- Generate support and excitement for nature-based solutions that have the potential to produce measurable economic and social co-benefits through the creation of publicly accessible open space and the protection of critical transportation infrastructure to ensure mobility;
- Produce conceptual design approaches for nature-based solutions that can be refined and implemented by the city, state, and federal partners and replicated elsewhere; and
- Develop a framework for prioritizing, evaluating, and monitoring economic and social co-benefits to ensure that the projects continue to serve evolving community needs over time.

METHODOLOGY

The methodology for this report included the following steps.

1. Analysis of existing planning documents and vulnerability assessments.

2. Consultation with key government stakeholders in stakeholder interviews and focus groups.

3. Engagement of community leaders and community-based organizations in stakeholder interviews, community survey, design charrette, and focus groups.

4. Development of conceptual design approaches for nature-based solutions for the Orient Heights and Wood Island areas.

5. Development of a co-benefit evaluation and monitoring framework, informed by robust stakeholder and community input, to ensure that the built nature-based solutions continue to serve evolving community needs over time. The framework will include both quantitative and qualitative criteria to evaluate and measure.

6. Identification of potential funding sources to implement the nature-based solutions from design to construction. Funding sources include a mix of city, state, and foundation sources.

7. Production of a final report with key findings.

STAKEHOLDER ENGAGEMENT

In alignment with the methodology described above, the project team deployed several strategies to ensure robust stakeholder engagement to inform research, analysis, site selection, and design. Stakeholder engagement spanned six months and overall approaches included interviews, focus groups, a survey, and a design charrette.

The project team kicked off consultation with key government stakeholders in February 2022, conducting a series of individual interviews, as well as two focus groups, with the first one in June and the second one in November. Individual interviews or briefings were held with the Boston Planning and Development Agency (BPDA), Boston Water and Sewer Commission (BWSC), City of Boston Environment Department, City of Boston Transportation Department (BTD), Massachusetts Bay Transportation Authority (MBTA), Massachusetts Department of Conservation and Recreation (DCR), Massachusetts Port Authority (Massport), and Massachusetts Department of Transportation (MassDOT). This engagement was instructive in identifying current priorities and barriers for climate projects.

Consultation with community leaders began in March 2022, and included a survey distributed in English and Spanish, a design Charrette held on July 21st at the East Boston Branch Library, live intercept surveys, individual interviews, and focus groups. As a result of this approach, the following groups were actively engaged for stakeholder interviews and the first focus group: Eastie Trees, Friends of Belle Isle Marsh, Friends of the Mary Ellen Welch Greenway, Harbor View Neighborhood Association, and Mystic River Watershed Association. For the second community member focus group to review the design, the 12 focus group participants were compensated for their time and translation services were made available. Engagement and partnership with these organizations and residents was key to identifying preferred design elements and garnering support for community investment. Additionally, local and state elected officials were briefed on the project.

KEY STAKEHOLDERS

The following departments, agencies, and community groups were engaged as part the stakeholder interviews, surveys, design charrettes, and/or focus groups. Their input informed the site selection and design concepts, as well as needs and opportunities and to methodically assess and prioritize desired co-benefits.

GOVERNMENT STAKEHOLDERS

- Boston Planning and Development Authority (BPDA)
- Boston Water and Sewer Commission (BWSC)
- City of Boston Environment Department
- City of Boston Transportation Department (BTD)
- Massachusetts Bay Transportation Authority (MBTA)
- Department of Conservation and Recreation (DCR)
- Massachusetts Port Authority (Massport)
- Massachusetts Department of Transportation (MassDOT)

COMMUNITY STAKEHOLDERS

- Friends of Belle Isle Marsh
- Friends of the Mary Ellen Welch Greenway
- Harbor View Neighborhood Association
- Orient Heights Neighborhood Association
- Neighborhood of Affordable Housing (NOAH)
- Trustees + Summer Ambassadors

CO-BENEFIT EVALUATION

Each site design concept was scored by category on a scale of no benefit (zero points), low benefit (one point), and high benefit (two points). This evaluation framework is intended to be translatable to other contexts and for other projects outside of this research. The co-benefit evaluation for each site included the three categories outlined in the table below.

CO-BENEFITS CATEGORIES	
COMMUNITY BENEFITS:	• Mobility and public realm improvements
ENVIRONMENTAL BENEFITS:	• Flooding and heat mitigation
ECONOMIC BENEFITS:	• Access and protection during extreme weather

RELATED PLANNING EFFORTS

PLAN: EAST BOSTON
CITY OF BOSTON | 2024

"PLAN: East Boston" is the City of Boston's neighborhood-wide planning initiative to guide growth in East Boston. The Boston Planning and Development Agency (BPDA) initiated the PLAN following a City Council hearing in the summer of 2018. These stakeholders called on the BPDA and all other relevant City of Boston departments to confront the many challenges facing the East Boston community, naming specifically the pressures of growth, the threats of climate change, and the need for planning that prioritizes equity, resilience, and quality of life. Following six years of planning and community engagement, the BPDA Board formally adopted the PLAN on January 18, 2024. The adopted plan, as well as the 2019 "East Boston Today" interim existing conditions report, highlight the imperative to advance climate preparedness, enhance the public realm, and ensure reliable access to transit, among other objectives.

Flooding at Bremen Street in East Boston, 2018 (source: Plan: East Boston Existing Conditions Report, City of Boston 2020-2021)

COASTAL RESILIENCE SOLUTIONS FOR EAST BOSTON
CITY OF BOSTON | 2017 & 2022

As part of the Climate Ready Boston initiative, the "Coastal Resilience Solutions for East Boston" plans developed near-term and long-term strategies to adapt the East Boston waterfront to coastal flooding and sea level rise. The city studied the waterfront in East Boston in two phases. The Phase I plan was completed in 2017 and studied the waterfront from Logan Airport to Chelsea Creek and the Phase II plan was completed in 2023 and studied the remainder of the East Boston waterfront. Together, the coastal resilience strategies create a vision for the future of the East Boston coastline that reduces coastal flood risk, improves connectivity and accessibility, and enhances recreation and natural ecosystems.

Since the publication of these plans, progress has been made on several of the recommended projects. A new deployable floodwall has been installed on the Mary Ellen Welch Greenway; the ribbon has been cut on Piers Park 2; and City-led design and permitting efforts are well underway near coastal sections of Bennington Street, Border Street, and Lewis Street, which will result in critical flood resilience projects.

RELATED PLANNING EFFORTS

CLIMATE READY BOSTON CITY OF BOSTON | 2016

"Climate Ready Boston" is the City of Boston's initiative to prepare the city for climate change-related impacts. The 2016 Report provides a complete review of extreme temperatures and associated impacts, sea-level rise, extreme precipitation, storms, and associated stormwater, coastal, and riverine flooding impacts throughout the city.

Several areas in East Boston are highlighted for ongoing resilience efforts, including four MBTA Blue Line stations located within the 2070 flood hazard zone. Vulnerable flood entry points exist immediately adjacent to the Wood Island and Orient Heights MBTA Stations, leaving them exposed to storm surges if interventions are not made.

One percent annual chance flooding (left) in 2030-2050 will cover approximately the same land area as 10% annual chance flooding in 2050-2100 (center) and monthly as early as the 2070s (right) (source: Climate Ready Boston, City of Boston 2016)

HEAT RESILIENCE SOLUTIONS FOR BOSTON: FINAL REPORT CITY OF BOSTON | APRIL 2022

The City of Boston's "Heat Resilience Plan" assesses factors that contribute to extreme heat conditions and where they exist throughout the city. The plan provides updated temperature projections, extreme temperature models, resilience strategies, and plans to advance heat resilience.

East Boston, on average, experiences 7-10 degrees warmer temperatures compared to rural ambient temperatures, with the hottest locations around Logan Airport, Day Square, and Eagle Hill. This is partly due to the neighborhood's high prevalence of impervious surface (65%) and its low prevalence of open space (7%). Bennington Street, Lexington Street, and Meridian Street were identified as hot streets with high levels of pedestrian and transit use.

Since the publication of this plan and aligned with its recommendations, the City has increased its capacity to plant and maintain street trees. It has also started a new program to support tree planting on private property and expanded its toolkit to help residents during heat emergencies, with additional outreach, misting stations, shade structures, and other interventions.

SITE SELECTION

The site selection criteria was informed by qualitative and quantitative methods that included a review of relevant planning efforts, government and community stakeholder interviews, community surveying, and an environmental analysis using GIS. Flooding data is sourced from the Massachusetts Coastal Flood Risk Model (MC-FRM) and thunderstorm inundation data is sourced from the Boston Water and Sewer Commission's Inundation Model.

SITE SELECTION: COMMUNITY INPUT

- East Boston residents shared their preference for the performance of nature-based solutions at or near the MBTA Orient Heights and Wood Island stations. A few commonly mentioned themes included:
- Desire for improved walkability to/from MBTA stations
- Preferences for cooling and comfort, including seating, shade, and water features
- Great concern for:
  - Stormwater flooding along open spaces, greenways, and streets;
  - Heat traveling to stations; and
  - Not being able to go places as much and enjoy public life.

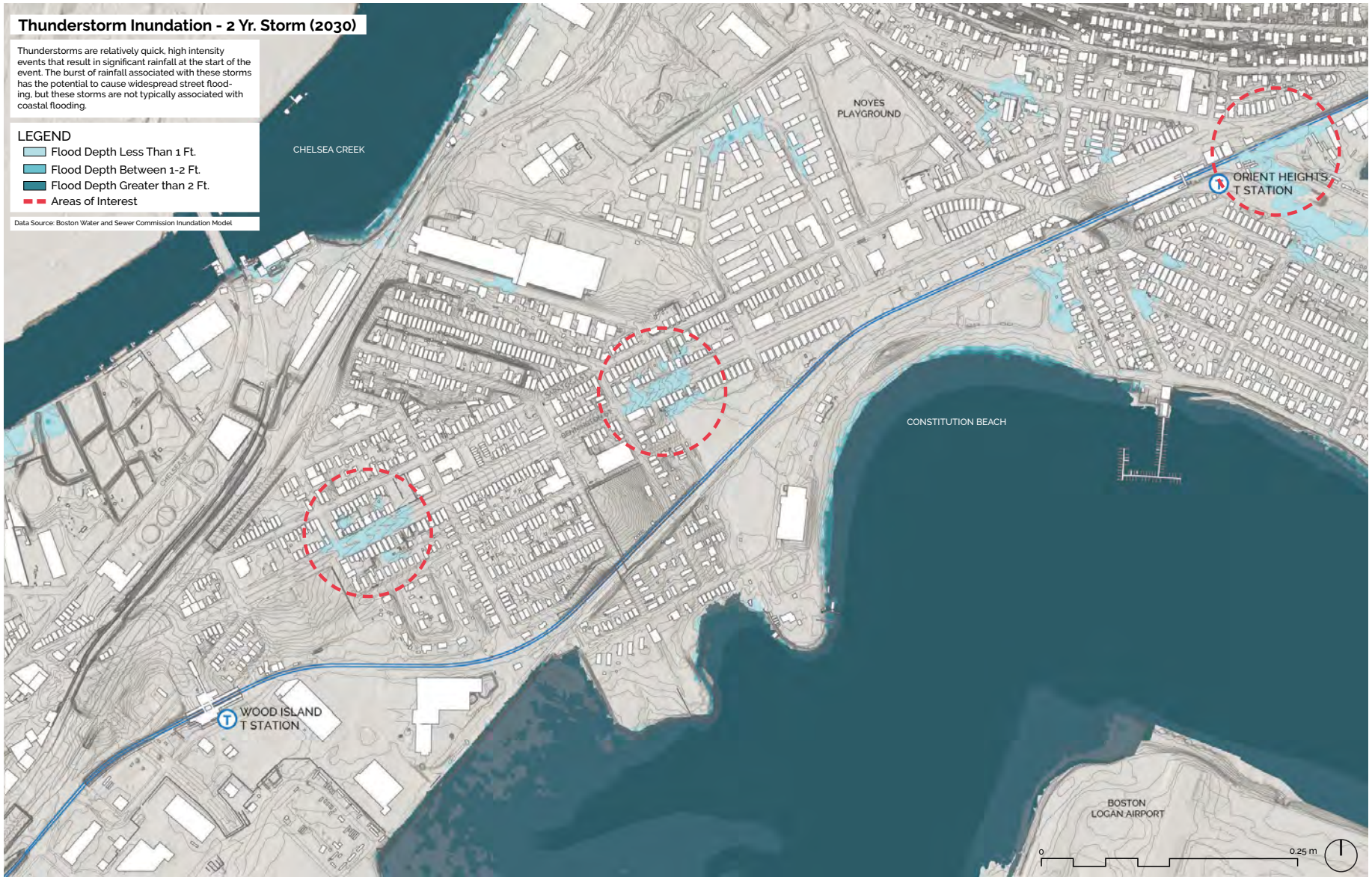
SITE SELECTION: CLIMATE CHANGE

The GIS environmental analysis considered impervious surface, tree canopy cover, and flooding from storms events in the study area along the Blue Line.

WHAT WE LEARNED

- During storm rain events flooding will be heaviest at low points on Bennington Street between the two station areas, especially the Harbor View neighborhood, which is near Orient Height Station and located entirely within ¼ mile of the Blue Line.
- Streets have an incredibly low presence of tree canopy, particularly Bennington Street.

Existing conditions of the Canopy Cover map created by Weston & Sampson (data source: MassGIS Data: 2016 Land Cover/Land Use, Boston Public Street Tree Inventory 2021)



Thunderstorm Inundation - 2 Year Storm (2030) map created by Weston & Sampson (data source: Boston Water and Sewer Commission Inundation Model)

SITE SELECTION CRITERIA

Together, the quantitative and qualitative process informed the development of the following site selection criteria, as well as the conceptual designs featured later in this report. This analysis suggests that points vulnerable to coastal inundation are also points vulnerable to acute stormwater flooding.

CATEGORY		DATA SOURCE
WITH 1/4 MILE OF THE BLUE LINE	✓	MassGIS Data
HIGH VULNERABILITY TO COASTAL FLOODING	✓	Massachusetts Coastal Flood Risk Model (MC-FRM)
HIGH VULNERABILITY TO STORMWATER FLOODING	✓	Massachusetts Coastal Flood Risk Model (MC-FRM), Boston Water and Sewer Commission Inundation Model
HIGH PERCENTAGE OF IMPERVIOUS GROUND COVER	✓	MassGIS Data: 2016 Land Cover/Land Use, Boston Public Street Tree Inventory 2021
LOW PERCENTAGE OF TREE CANOPY COVER	✓	MassGIS Data: 2016 Land Cover/Land Use, Boston Public Street Tree Inventory 2021
OPPORTUNITY FOR PUBLIC REALM IMPROVEMENT	✓	Site visit + stakeholder interviews
OWNED BY GOVERNMENT DEPARTMENT OR AGENCY	✓	MassGIS Data: 2016 Land Cover/Land Use

Sites of Interest map created by Weston & Sampson (data source: Massachusetts Coastal Flood Risk Model (MC-FRM), Boston Water and Sewer Commission Inundation Model)

Images of potential sites shared at the design charrette. Final sites were selected after community input and further consideration. (source: Google earth, photos by Civic Space Collaborative)

SITE DESIGN CONCEPTS

Using the site selection criteria, which was informed by community input and technical modeling, the project team developed conceptual designs for five sites:

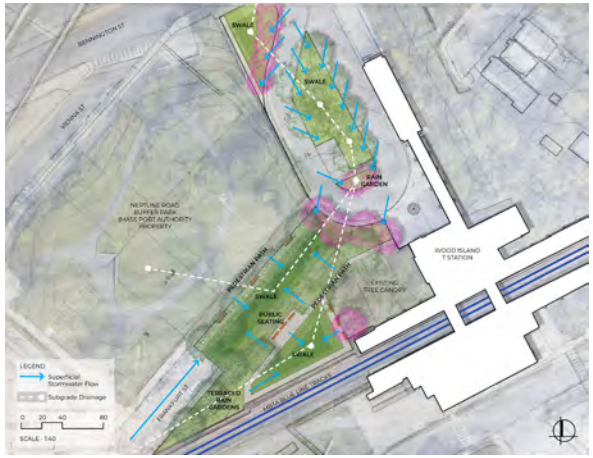
- Wood Island Station and Frankfurt Street
- Neptune Road
- Intersection of Moore and Cowper Streets
- Bennington Street Corridor
- Orient Heights Station and Bennington Street

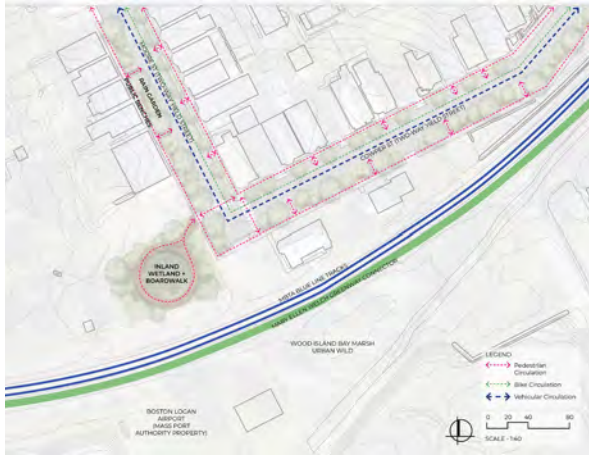
Nature-based solutions are a foundational component of each site design concept. The featured nature-based solutions include bioswales, rain gardens, constructed wetlands, and new trees, which help to address flooding and create shade. East Boston residents and government stakeholders provided feedback on the draft design concepts, and the designs were refined based on their comments.

It is important to note that while the nature-based solutions featured in the conceptual designs primarily aim to address stormwater flooding, not coastal flooding, it is possible that optimally sized nature-based solutions like inland wetlands, wet meadows, swales, and rain gardens may provide mitigation benefits during certain coastal flooding events. Additionally, the proposed interventions intend to complement grey or green interventions like berms or coastal wetlands that may be constructed at or near the coastline.

As part of the design charrette and focus groups, residents shared their ideas about site improvements to create new public space, improve commutes to the stations, incorporate public art, and mitigate climate impacts. Several of the designs improve walking and biking to Wood Island and Orient Heights Stations by improving sidewalks and crosswalks and could also include adding additional bike racks and enhanced bus stops. In addition, the sites create new open spaces for people to gather and host community events.

SITE DESIGN CONCEPTS





Design concept maps clockwise from top left: Wood Island Station and Frankfurt Street, Neptune Road, Intersection of Moore and Cowper Streets, Bennington Street Corridor, Orient Heights Station and Bennington Street

WOOD ISLAND STATION + FRANKFURT STREET

CURRENT SITE CONDITIONS

Wood Island Station is an MBTA Blue Line rapid transit and bus station located off Bennington Street near Day Square. Pedestrians and bicyclists can access the Station from Bennington Street to the north and the Mary Ellen Welch Greenway via the pedestrian bridge.

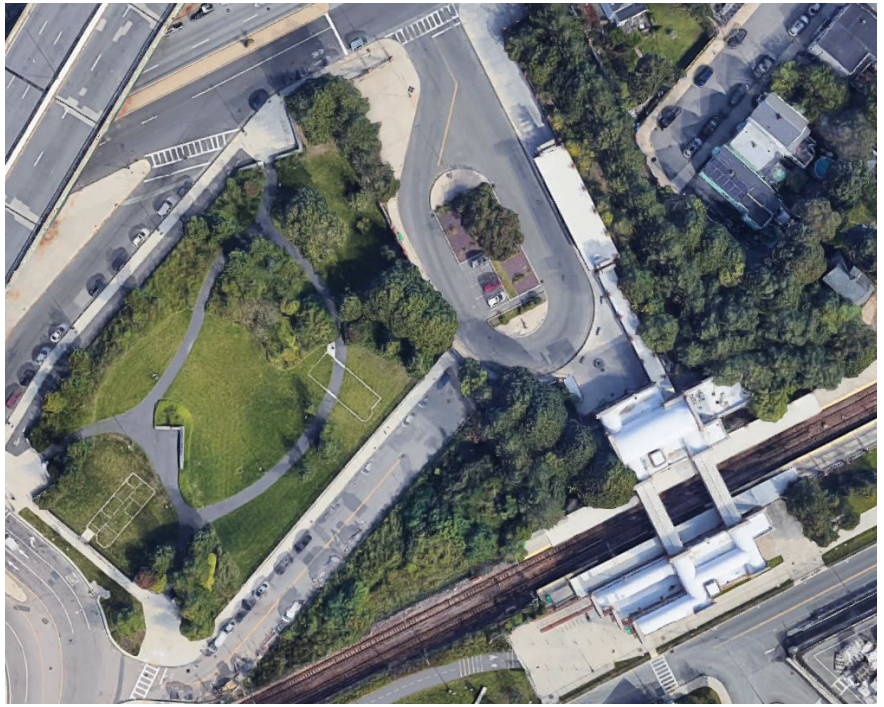
The MBTA busway serves as the Station's main entry and includes a bus loop, bus shelter, sidewalks, and a center island for MBTA employee parking. To the busway's west is a small portion of Frankfort Street, which is used mainly for car parking and is severed from the busway with a fence. Adjacent to the site is Massport's Neptune Road Airport Edge Buffer Park, completed in 2015.

Current green infrastructure at the site includes limited tree canopy and grass in the center traffic island and on Massport's parcel.

CURRENT CONDITIONS	
SITE OWNERSHIP	• MBTA, City of Boston, Massport
LOT SIZE	• 1.5 Acres
CURRENT USE	• MBTA Busway + Blue Line
RELATED PLANS	• Plan: East Boston
SITE CONCERNS + DESIGN CONSIDERATIONS	• MBTA bus operations • Abundance of impermeable surface • Poor pedestrian connectivity
FLOOD VULNERABLITY	• Risk of flooding during 1-year flooding events as early as 2070 • Vulnerable to coastal flooding and storm surges • Vulnerable to stormwater flooding, with limited stormwater collection
HEAT IMPACTS	• Limited tree canopy

WOOD ISLAND STATION CURRENT CONDITIONS:

Wood Island Station's Blue Line and busway entrance is the station's main entrance. (source: photo by Civic Space Collaborative)



An overhead view of Wood Island Station with Massport's Neptune Road Airport Edge Buffer Park on the left (source: Google Earth)

WOOD ISLAND STATION: DESIGN CONCEPT

The concept design for Wood Island Station at Frankfurt Street would transform the station entrance through a layering of nature-based solutions including terraced rain gardens, swales, and native plantings, as well as new pedestrian paths and public seating in the new green space.

FLOODING

To address flooding at the site, two swales and two rain gardens would collect stormwater runoff from the bus circle. The swale along the tracks and the swale shown on Frankfurt Street are intended to act as a collection and holding points for stormwater after it is funneled into the swale and rain garden along the circle. This would slow the stormwater's entry into the existing infrastructure, helping to prevent system washouts and generally reduce flooding in the area and clean the water before it penetrates the ground or is piped elsewhere. There is a wall between the swale closest to the tracks and the tracks themselves, so it would not reduce impacts to the rail directly. Terraced rain gardens between these swales would be planted with native species, creating natural habitat and pollination areas for insects and birds, and for slowing and holding runoff as well.

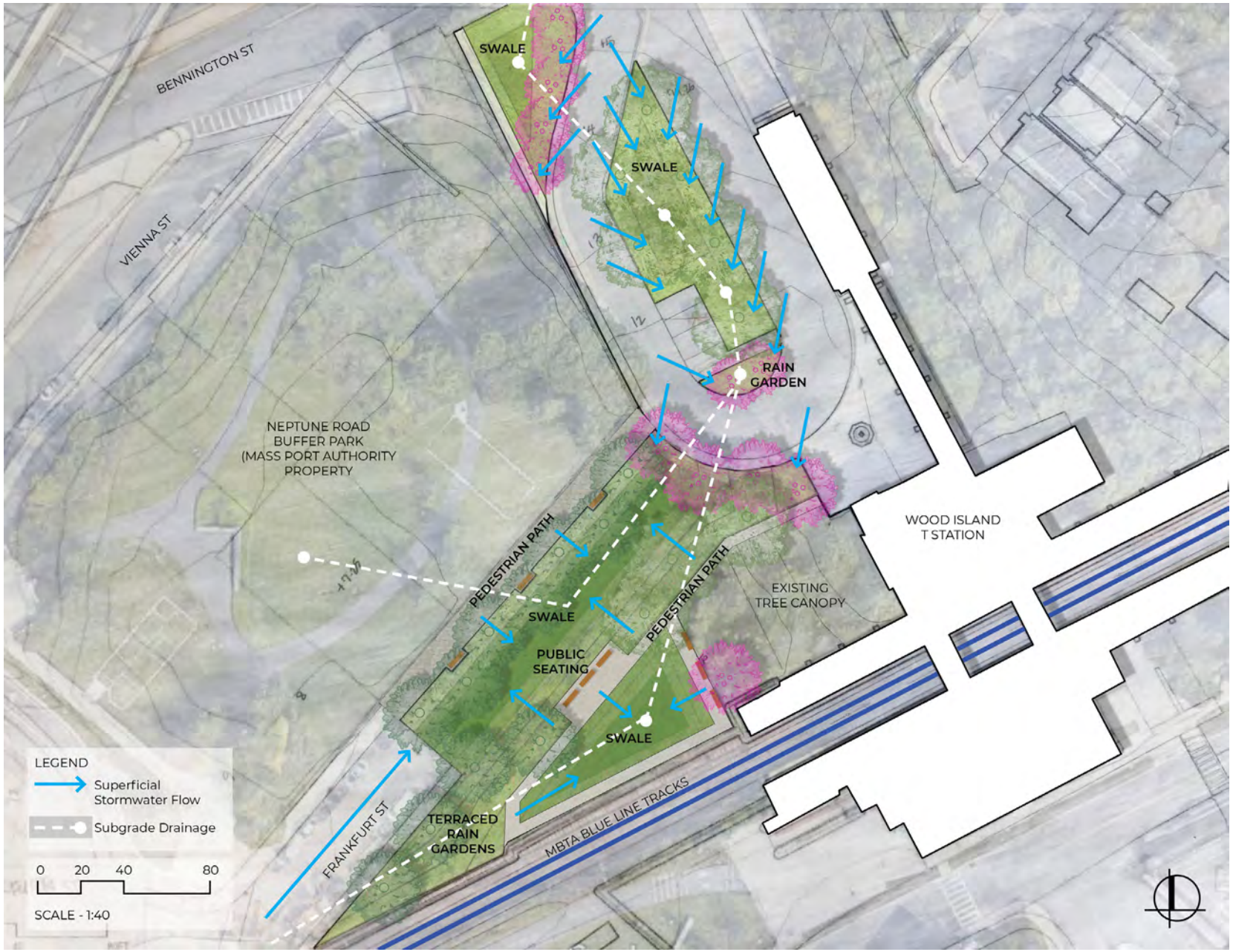
HEAT

Adding new trees and preserving existing trees would help provide shade and mitigate extreme heat, especially for people walking to the station and waiting for buses or trains.

COMMUNITY RESILIENCE

Additional resiliency elements could include solar-powered benches and kiosks for phones and other small device charging. Other community amenities here could include water foundations or misting stations.

DESIGN CONCEPT	
OVERALL DESIGN CONCEPT	• Green, accessible station access
NATURE-BASED SOLUTIONS	• Rain gardens + terraced rain garden • Swales,native plantings, including increased tree canopy



Wood Island Station and Frankfurt Street Design Concept

WOOD ISLAND STATION: CO-BENEFITS

COMMUNITY BENEFITS

ACCESS TO THE BLUE LINE

Improves general walkability	2
Improves bicycle infrastructure	1
Improves walkability in extreme weather	2
Improves multi-modal connections	2
Protects MBTA right-of-way	2

PUBLIC REALM

Creates new public space	2
Creates sitting/gathering space (plaza, pergola)	2
Creates additional site amenities (bike parking, educational opportunities)	2
Provides public space to environmental justice community	2

ENVIRONMENTAL BENEFITS

FLOODING

Increases stormwater capture	2
Improves permeability	2
Improves flood protection	2
Improves erosion control	1
Increases stormwater surge mitigation	2

HEAT MITIGATION

Preserves existing healthy trees	2
Adds new shade trees	2
Adds additional shade structures (pergola, shelter)	0
Reduces impervious surface	2

ECONOMIC BENEFITS

Improves T access during storm + heat events	2
Protects/reduces flooding of the Blue Line	2

TOTAL SCORE
36

NEPTUNE ROAD

CURRENT SITE CONDITIONS

Neptune Road is a short, tree-lined boulevard owned by the City of Boston. It is currently utilized as an access road to Massport's maintenance facility, which surrounds the site on three sides. In the center of the site there is a landscaped buffer surrounded by vehicle travel lanes and unimproved sidewalks.

The site remains the only in-tact vestige of Wood Island Park, a park designed by Frederick Law Olmsted and completed in the late 19th century that was deconstructed for the creation of Boston Logan Airport. This site was also once part of a bustling neighborhood street that led to Olmsted Park. When the airport was expanded, the park was paved, and homes and businesses were taken by eminent domain.

To the north of the site is Massport's Neptune Road Airport Edge Buffer Park and is adjunct to the Mary Ellen Welch Greenway Connector, which provides off-street access for bicyclists and pedestrians to Wood Island Station.

The current green infrastructure at the site includes mature oak trees and modest permeable ground cover.

CURRENT CONDITIONS	
SITE OWNERSHIP	• City of Boston
LOT SIZE	• 1.1 Acres
CURRENT USE	• Access road for Massport's Logan Airport maintenance facility
RELATED PLANS	• n/a
SITE CONCERNS + DESIGN CONSIDERATIONS	• Residential neighborhood context • Abundance of paved surface • Noise, air, and stormwater managementpollution from abutting properties • Opportunity for community use and co-benefits
FLOOD VULNERABILITY	• Vulnerable to flooding during 1-year flooding events as early as 2070 • Vulnerable to coastal flooding and storm surge • Vulnerable to stormwater flooding, with limited stormwater collection

NEPTUNE ROAD CURRENT CONDITIONS:

The section of Neptune Road identified as a site currently includes modest landscaping, vehicle travel lanes, and traffic island (source: photo by Civic Space Collaborative)

Map of Neptune Road (source: Google Earth)

NEPTUNE ROAD: DESIGN CONCEPT

The design concept for Neptune Road would restore the street into a public park for the East Boston Community, featuring an inland wetland, wet meadow, rain garden, swale, and native plantings, as well as a raised boardwalk and public plaza.

STORMWATER FLOODING + NATURE BASED SOLUTIONS

Due to its location, Neptune Road offers a unique opportunity to collect and retain runoff or floodwater that would otherwise overwhelm existing infrastructure and remain wet for long periods of time. Reintroducing a wet meadow and inland wetland to the site pays homage to the original marsh landscape and can create educational opportunities for generations to come.

HEAT

The tree canopy would be improved by adding trees, with existing healthy trees remaining on-site. Since the site is next to Logan Airport, the selected tree species do not interfere with airport operations. Native trees and shrubs would be planted in a gradient, from high to low, as they approach the end of the street. This design would bring shade to the site but avoid conflicts with nearby runways. Species that produce fruit would be avoided to reduce bird activity.

PUBLIC REALM

Located just off the Mary Ellen Welch Greenway, the public plaza at Neptune Road would offer space for community members to rest along their commute, gather, or perform. The boardwalk hovering over an inland wetland habitat creates space to walk through and engage with a large-scale nature-based solution.

VEHICLE ACCESS

Large vehicle access to the Logan Airport Maintenance facility would remain on the two-lane Neptune Road and Neptune Court.

DESIGN CONCEPT

OVERALL DESIGN CONCEPT	• Restore Public Park
NATURE-BASED SOLUTIONS	• Inland wetland • Wet meadow • Rain garden • Swale • Native plantings, including increased tree canopy

Neptune Road Design Concept

NEPTUNE ROAD: CO-BENEFITS

COMMUNITY BENEFITS

ACCESS TO THE BLUE LINE

Improves general walkability	2
Improves bicycle infrastructure	0
Improves walkability in extreme weather	2
Improves multi-modal connections	1
Protects MBTA right-of-way	2

PUBLIC REALM

Creates new public space	2
Creates sitting/gathering space (plaza, pergola)	2
Creates additional site amenities (bike parking, educational opportunities)	2
Provide public space to environmental justice community	2

ENVIRONMENTAL BENEFITS

FLOODING

Increases stormwater capture	2
Improves permeability	2
Improves flood protection	2
Improves erosion control	1
Increases stormwater surge mitigation	2

HEAT MITIGATION

Preserves existing healthy trees	2
Adds new shade trees	2
Adds additional shade structures (pergola, shelter)	0
Reduces impervious surface	2

ECONOMIC BENEFITS

Improves T access during storm + heat events	2
Protects/reduces flooding of the Blue Line	1

TOTAL SCORE
33

INTERSECTION OF MOORE + COWPER STREETS

CURRENT SITE CONDITIONS

Moore Street is a residential two-way street owned by the City of Boston between Bennington Street and the MBTA Blue Line. As a residential street, Moore Street has limited motor vehicle traffic and hosts residential parking on both sides of the vehicle travel lane. A sidewalk is located on both sides of the street.

A small, undeveloped parcel owned by Massport is located immediately to the southwest of Moore Street. It is currently unprogrammed and does not have a designated use.

Current green infrastructure includes a small number of street trees on Moore Street and permeable surface on the Massport property.

CURRENT CONDITIONS	
SITE OWNERSHIP	• City of Boston, Massport
LOT SIZE	• 1.1 Acres
CURRENT USE	• Residential street, undeveloped parcel
RELATED PLANS	• Plan: East Boston
SITE CONCERNS + DESIGN CONSIDERATIONS	• Residential neighborhood context • Abundance of paved surfaces • Opportunities for community use and co-benefits
FLOOD VULNERABLITY	• Vulnerable to coastal and flooding and storm surge events, as it is a low point and major flood entry point • Vulnerable to stormwater flooding, with limited stormwater collection
HEAT IMPACTS	• Limited tree canopy

INTERSECTION OF MOORE + COWPER STREETS CURRENT CONDITIONS:

The undeveloped parcel owned by Massport on Moore Street immediately abuts the MBTA Blue Line right-of-way (source: Google Earth)

Map of study area (source: Google Earth)

INTERSECTION OF MOORE + COWPER STREET: DESIGN CONCEPT

The design concept for the intersection of Moore Street and Cowper Street would create a new pocket park, while greening and calming the intersection. The pocket park features an inland wetland and raised boardwalk, and the street redesign includes rain gardens, street trees, and public seating. Additionally, the creation of a yield condition for moving vehicles would calm traffic and allow for the preservation of residential street parking.

STORMWATER FLOODING + NATURE BASED SOLUTIONS

The design for the two streets includes a rain garden that collects stormwater and runoff through curb cuts. In addition, street trees and public seating would line the length of the street.

HEAT

The addition of new green space and street trees would help to cool the neighborhood.

PUBLIC REAM

The new pocket park would include a pedestrian walking loop on a boardwalk around the inland wetland. This pocket park would function as a new public space for the surrounding blocks and a robust nature-based solution to support the existing stormwater infrastructure along both streets. In addition, there would be public seating along the boardwalk under the shaded canopy.

DESIGN CONCEPT	
OVERALL DESIGN CONCEPT	• Pocket park and green streets
NATURE-BASED SOLUTIONS	• Rain gardens on the streets • Inland wetland • Increased tree canopy along the street and in a pocket park

Map of the study area at Moore and Cowper Street Design Concept

INTERSECTION OF MOORE + COWPER STREET: CO-BENEFITS

COMMUNITY BENEFITS

ACCESS TO THE BLUE LINE

Improves general walkability	2
Improves bicycle infrastructure	2
Improves walkability in extreme weather	2
Improves multi-modal connections	2
Protects MBTA right-of-way	2

PUBLIC REALM

Creates new public space	2
Creates sitting/gathering space (plaza, pergola)	2
Additional site amenities (bike parking, educational opportunities)	2
Provide public space to environmental justice community	2

ENVIRONMENTAL BENEFITS

FLOODING

Increases stormwater capture	2
Improves permeability	2
Improves flood protection	1
Improves erosion control	1
Increases stormwater surge mitigation	2

HEAT MITIGATION

Preserves existing healthy trees	1
Adds new shade trees	2
Adds additional shade structures (pergola, shelter)	0
Reduces impervious surface	1

ECONOMIC BENEFITS

Improves T access during storm + heat events	0
Protects/reduces flooding of the Blue Line	2

TOTAL SCORE
32

BENNINGTON STREET CORRIDOR

CURRENT SITE CONDITIONS

Bennington Street is owned by the City of Boston and serves as one of East Boston's busiest arterial streets. The section of focus is at the intersection of Moore Street, which is one of the street's lowest points and is more prone to stormwater flooding.

Measuring 100 feet wide, Bennington Street's right-of-way is primarily utilized for vehicle throughput and parking. There are residential and commercial buildings, wide sidewalks for pedestrians, and the MBTA Route 120 bus line.

Current green infrastructure includes street trees of varying size, health, and age.

CURRENT CONDITIONS	
SITE OWNERSHIP	• City of Boston
LOT SIZE	• 11.25 Acres
CURRENT USE	• Arterial street
RELATED PLANS	• Currently being studied for redesign as part of Plan: East Boston
SITE CONCERNS + DESIGN CONSIDERATIONS	• MBTA bus operations • Need for traffic calming • Abundance of paved surfaces • No bike infrastructure
FLOOD VULNERABLITY	• Vulnerable to flooding during 1-year flooding events as early as 2070 • Low-points particularly vulnerable to flooding • Limited stormwater filtration or collection
HEAT IMPACTS	• Limited tree canopy

BENNINGTON STREET CORRIDOR CURRENT CONDITIONS:

An image of public right-of-way on Bennington Street (source: Google Earth)

Map of study area at Bennington and Moore Streets (source: Google Earth)

BENNINGTON STREET: DESIGN CONCEPT

The design concept would create a complete, green street on Bennington Street at its intersection with Moore Street. The concept includes a rain garden, swale, street trees to complement a broader roadway redesign to establish a raised intersection, one-way bike lane, and improved bus stop access at new bus shelters. Elements of the design concept could be included along other areas of the Bennington Street corridor.

STORMWATER FLOODING + NATURE BASED SOLUTIONS

A rain garden, median swale, and street trees are parallel to the walking and biking facilities along the corridor.

HEAT

Protecting existing street trees and improving the green space along Bennington Street would help cool the neighborhood.

PUBLIC REALM

The proposed roadway redesign concept would maintain a wide sidewalk and establish a raised crosswalk to help reduce traffic speeds and provide a dryer space to cross during flooding events. Additionally, a one-way cycle track on both sides of the street would protect and shade cyclists.

On Bennington Street, there is a large pullover space at the existing bus stop with a bus shelter. Forty feet is preserved for vehicle travel and parking lanes, where appropriate. However, parking would also be strategically eliminated at the road's low points to prioritize impervious surfaces and stormwater capture.

DESIGN CONCEPT	
OVERALL DESIGN CONCEPT	• Green and complete street
NATURE-BASED SOLUTIONS	• Rain garden • Swale

Bennington Street Design Concept

BENNINGTON STREET CORRIDOR: CO-BENEFITS

COMMUNITY BENEFITS

ACCESS TO THE BLUE LINE

Improves general walkability	2
Improves bicycle infrastructure	2
Improves walkability in extreme weather	2
Improves multi-modal connections	2
Protects MBTA right-of-way	1

PUBLIC REALM

Creates new public space	1
Creates sitting/gathering space (plaza, pergola)	1
Creates additional site amenities (bike parking, educational opportunities)	1
Provides public space to environmental justice community	2

ENVIRONMENTAL BENEFITS

FLOODING

Increases stormwater capture	2
Improves permeability	2
Improves flood protection	2
Impoves erosion control	0
Increases stormwater surge mitigation	2

HEAT MITIGATION

Preserves existing healthy trees	2
Adds new shade trees	2
Adds additional shade structures (pergola, shelter)	0
Reduces impervious surface	1

ECONOMIC BENEFITS

Improves T access during storm + heat events	2
Protects/reduces flooding of the Blue Line	1

TOTAL SCORE
30

ORIENT HEIGHTS STATION + BENNINGTON STREET

CURRENT SITE CONDITIONS

Bennington Street between Saratoga Street and Ashley Street serves as one of East Boston's busiest arterial streets, and includes access to the MBTA Orient Heights Station, businesses in Orient Heights, and cross-neighborhood vehicle and bicycle traffic.

Bennington Street's right-of-way is 100 feet wide and is primarily utilized for vehicle throughput, parking, and MBTA buses, though the access to the Blue Line is also prominent. Residential and commercial development and wide sidewalks for pedestrians also span this section of the corridor.

Current green infrastructure includes street trees and a landscaped median in front of MBTA Orient Heights Station.

CURRENT CONDITIONS	
SITE OWNERSHIP	• City of Boston
LOT SIZE	• 1.6 Acres
CURRENT USE	• Arterial street
RELATED PLANS	• Plan: East Boston's Corridors and Squares
SITE CONCERNS + DESIGN CONSIDERATIONS	• MBTA Orient Height station access and operations • No biking infrastructure • Abundance of paved surfaces
FLOOD VULNERABLITY	• Vulnerable to flooding during 1-year flooding events as early as 2070 • Low point vulnerable to coastal flooding, storm surge, and stormwater collection
HEAT IMPACTS	• Lack of shade and seating

ORIENT HEIGHTS STATION + BENNINGTON STREET CURRENT CONDITIONS:

Orient Heights Station and Bennington Street looking north (source: Google Earth)

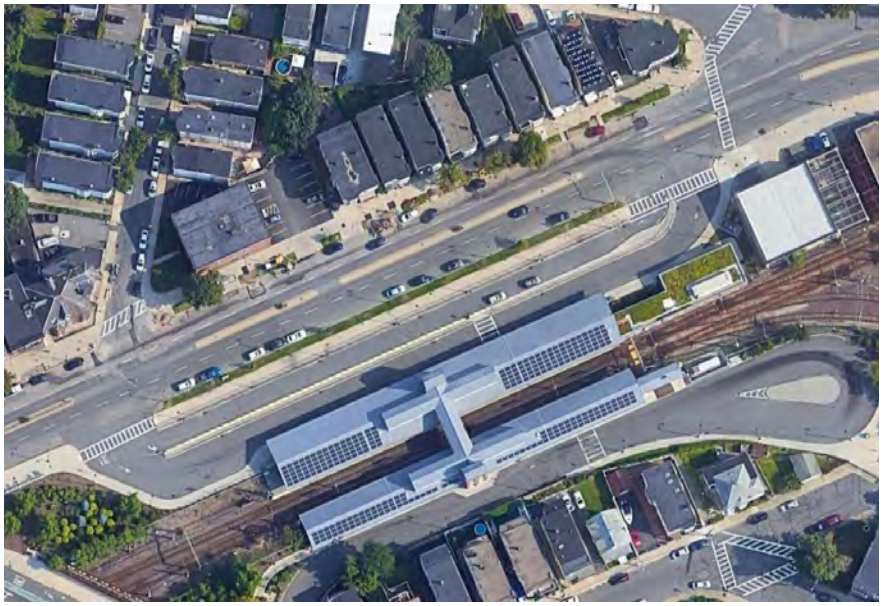


Image of the Orient Heights Station area and Bennington Street (source: Google Earth)

ORIENT HEIGHTS STATION + BENNINGTON STREET: DESIGN CONCEPT

The concept design for the Orient Heights Station Bennington Street entrance would create a green and complete street to enhance access to the Station and bus stop. Features include a large swale, rain garden, and native plantings, as well as a raised roadway, bike path, sidewalk, and public seating.

STORMWATER FLOODING + NATURE BASED SOLUTIONS

A large swale at the center of the street is strategically located at this low point along Bennington Street to capture runoff, stormwater, and excess floodwaters that spill into the street from the marsh during severe storms. Curb cuts added to new and existing curbs and sidewalks will also help direct water into rain gardens parallel to the road that will help slow and retain it before it percolates into the ground or existing infrastructure. Native species planted within the swale and the rain gardens will help shade pedestrians and commuters while increasing natural habitat and permeability.

HEAT

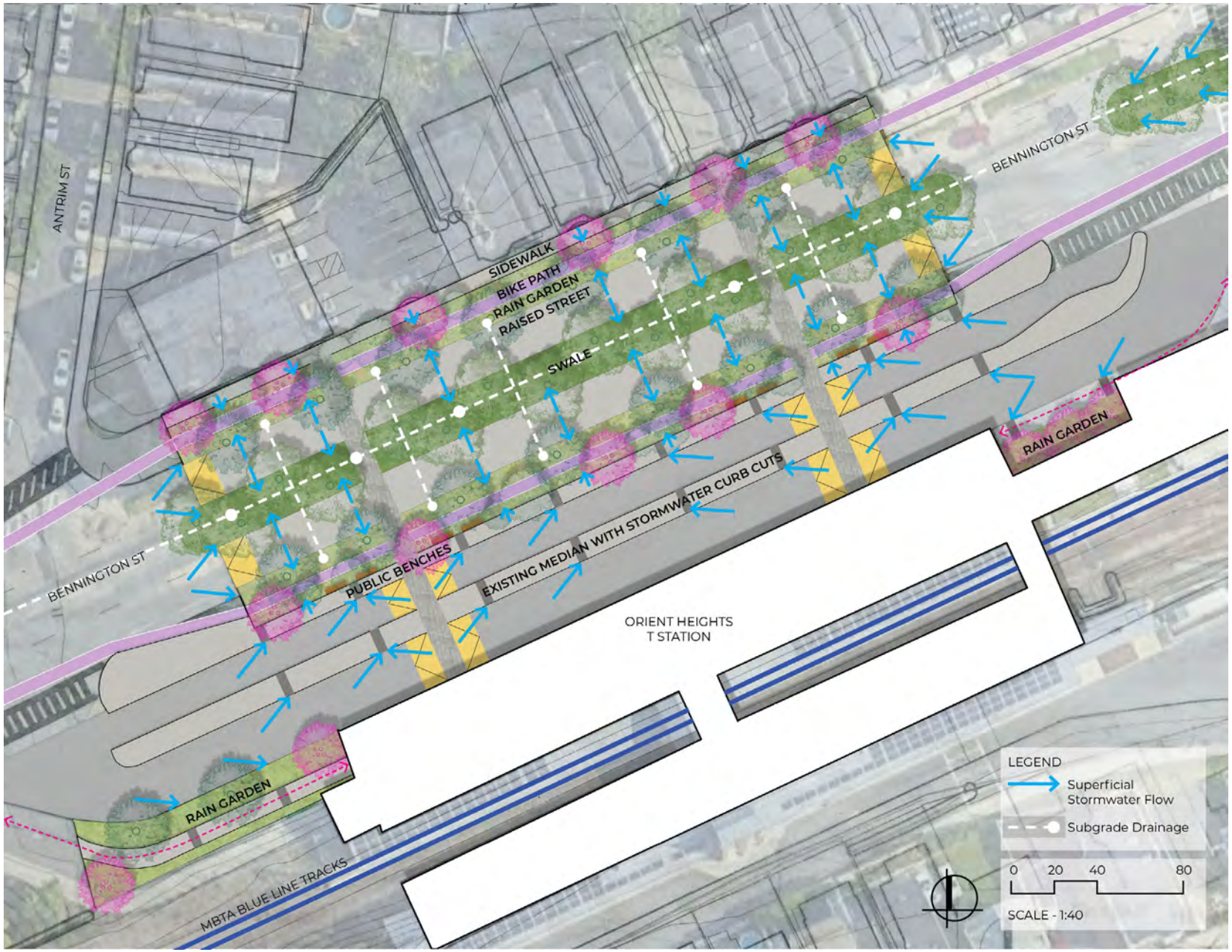
Adding more streets and green infrastructure would help to reduce the heat island effect at the Station, and make a more comfortable environment for people walking and biking to the T.

PUBLIC REALM

Buffered sidewalks and raised crosswalks along Bennington Street would improve pedestrian safety and access the T. Cyclists can travel smoothly along the contiguous and separated one-way cycle tracks along Bennington Street, where they are protected from oncoming traffic and shaded by newly planted street trees.

Additional resiliency elements include adding solar-powered benches and kiosks charging stations, where residents could charge their devices during a power outage.

DESIGN CONCEPT	
OVERALL DESIGN CONCEPT	• Green and complete street with improved station entrance
NATURE-BASED SOLUTIONS	• Rain garden • Swale • Increased street tree canopy



Orient Heights Station and Bennington Street Design Concept

ORIENT HEIGHTS STATION BENNINGTON STREET: CO-BENEFITS

COMMUNITY BENEFITS

ACCESS TO THE BLUE LINE

Improves general walkability	2
Improves bicycle infrastructure	2
Improves walkability in extreme weather	2
Improves multi-modal connections	2
Protects MBTA right-of-way	2

PUBLIC REALM

Creates new public space	2
Creates sitting/gathering space (plaza, pergola)	1
Creates additional site amenities (bike parking, educational opportunities)	1
Provides public space to environmental justice community	2

ENVIRONMENTAL BENEFITS

FLOODING

Increases stormwater capture	2
Improves permeability	2
Improves flood protection	2
Improves erosion control	1
Increases stormwater surge mitigation	2

HEAT MITIGATION

Preserves existing healthy trees	1
Adds new shade trees	1
Adds additional shade structures (pergola, shelter)	0
Reduces impervious surface	1

ECONOMIC BENEFITS

Improves T access during storm + heat events	2
Protects/reduces flooding of the Blue Line	2

TOTAL SCORE
32

CO-BENEFITS SUMMARY

In addition to their primary function of mitigating climate change-related impacts, nature-based solutions offer social, environmental, and economic co-benefits. The evaluation of such co-benefits can help to prioritize consideration for the funding and development of a particular project. For the purposes of this research, a co-benefits framework was developed in an effort to ensure each site design concept had the ability to serve evolving community needs over time.

Each site design concept was scored by category on a scale of no benefit (zero points), low benefit (one point), and high benefit (two points). This evaluation framework is intended to be translatable to other contexts and for other projects outside of this research. The co-benefit evaluation for each site included the three categories outlined in the table below.

CO-BENEFIT CATEGORIES:	
COMMUNITY BENEFITS:	• Mobility and public realm improvements
ENVIRONMENTAL BENEFITS:	• Flooding and heat mitigation
ECONOMIC BENEFITS:	• Access and protection during extreme weather

CO-BENEFIT OVERVIEW

COMMUNITY BENEFITS

ACCESS TO THE BLUE LINE

Wood Island + Frankfurt Street	9
Neptune Road	7
Moore + Cowper Street	10
Bennington Street Corridor	9
Orient Heights Station	10

PUBLIC REALM

Wood Island + Frankfurt Street	8
Neptune Road	8
Moore + Cowper Street	8
Bennington Street Corridor	5
Orient Heights Station	6

ENVIRONMENTAL BENEFITS

FLOODING & HEAT MITIGATION

Wood Island + Frankfurt Street	15
Neptune Road	15
Moore + Cowper Street	12
Bennington Street Corridor	13
Orient Heights Station	12

ECONOMIC BENEFITS

Wood Island + Frankfurt Street	4
Neptune Road	3
Moore + Cowper Street	2
Bennington Street Corridor	3
Orient Heights Station	4

TOTAL SCORES	WOOD ISLAND	NEPTUNE ROAD	MOORE +COWPER	BENNINGTON	ORIENT HEIGHTS
	36	33	32	30	32

FUNDING

Advancing the proposed design concepts along the Blue Line in East Boston will likely require a combination of funding from city, state, and federal funding sources. The funding sources will range from competitive grants to dedicated capital project funding as part of the city or state budget. Private funding related to new developments may also play a role. The illustrative funding table below shows select funding sources. Many of these sources have a specific climate or coastal focus.

There are several existing reports that detail potential funding sources for nature-based solutions, including the following:

- **THE UMASS BOSTON SUSTAINABLE SOLUTIONS LAB**: In 2018, the UMass Boston Sustainable Solutions Lab released a report, funded by the Barr Foundation and sponsored by the Green Ribbon Commission, called Financing Climate Resilience Report. The report provides a comprehensive overview of potential funding sources and recommends a layered approach of federal, state, city, and private funding. At a high level, it provides a roadmap for public and private entities to work together to confront what researchers estimate will be a $1 to $2.4 billion short- to medium-term price tag for Boston-area protection.
- **THE WHITE HOUSE**: In November 2022, the White House released a report to the National Climate Task Force called Opportunities to Accelerate Nature-Based Solutions: The Roadmap for Climate Progress, Thriving Nature, Equity, and Prosperity. The report features a recommendation to "unlock funding" for nature-based solutions: "Federal agencies can rapidly reduce emissions and promote community resilience by integrating nature-based solutions into financial assistance and incentive programs. Taking early action, the Biden-Harris Administration is guiding agencies to use infrastructure funding to support nature-based solutions." Referenced funding sources include the Bipartisan Infrastructure Law and Inflation Reduction Act, state formula funding, and private sector investment through innovation challenges and emerging finance models.

See the Potential Funding Sources table in the appendix for additional funding sources.

SPOTLIGHT: NEW FUNDING SOURCES

CLIMATE BANK

In brief, a climate bank or green bank is a mission-driven financing institution that operates similarly to a loan agency or investment fund, governed either by a local or state agency or a non-profit organization, that can be established through a combination of public and private funding structures. Climate banks are designed to encourage the deployment of private capital by offering attractive and often highly subsidized financial products for a range of climate initiatives, thereby helping to bridge existing market gaps in financing, to mitigate risk, and to improve access to funding for clean energy and climate initiatives, especially in low- and moderate-income communities.

As of 2023, there are more than 20 climate banks in 17 states and the District of Columbia, with $7 billion in investments since 2011 (see more on current examples of operational banks on the EPA's website). By unlocking opportunities to combine private capital with public funding across budget cycles, a climate bank can help to support transformative green infrastructure projects like those identified in the report. In addition, this mechanism can provide tangible community co-benefits like access to green and open space, more resilient and reliable transportation, and community resilience across multiple climate threats, like extreme heat, flooding, and sea level rise.

There is growing support for the climate bank concept both locally and nationally. At the federal level, the Inflation Reduction Act includes $27 billion for the deployment of a Greenhouse Gas Reduction Fund or national climate bank, with the U.S. EPA launching its first two competitive grant programs for this Fund in July 2023, to help spur equitable clean energy deployment. At the state level, the Healey-Driscoll administration launched a Massachusetts Community Climate Bank in June 2023, with an initial commitment of $50 million in seed funding from the Massachusetts Department of Environmental Protection (MassDEP). While the initial scope of the Massachusetts Community Climate Bank is prioritizing decarbonizing affordable housing and climate mitigation efforts, many are hopeful that the bank's scope and seed funding may grow to also consider resilience investments like green infrastructure over time. Finally, there are several bills in progress within the Massachusetts State Legislature that consider climate resilience funding and, if passed, could be leveraged to support nature-based solutions.

NEXT STEPS

This report aims to investigate the potential to deploy nature-based solutions along the Blue Line corridor in East Boston to protect critical transportation infrastructure from coastal and stormwater flooding, to support ecosystem restoration, and to improve the health and vibrancy of marginalized communities and commercial districts. The concept designs featured in this report are intended to illustrate how site-specific nature-based solutions can provide multiple co-benefits for the local community.

Based on consultation with city and state partners, this project prioritizes stormwater mitigation interventions that maximize community, environmental, and economic co-benefits. It is important to note that while the nature-based solutions featured in the conceptual designs primarily aim to address stormwater flooding, not coastal flooding, it is possible that optimally sized nature-based solutions like inland wetlands, wet meadows, swales, and rain gardens may provide mitigation benefits during certain coastal flooding events. Additionally, the proposed interventions intend to complement grey or green interventions like berms or coastal wetlands that may be constructed at or near the coastline.

This report demonstrates that nature-based solutions can be designed to effectively protect dense, vulnerable urban neighborhoods, while creating multiple social and economic co-benefits. Next steps may include exploring and advancing select design concepts with city and state partners and community groups and completing additional design and engineering analysis. Further analysis may include stormwater retention modeling and scenario planning regarding utility access, public accessibility, and ongoing maintenance. Additional next steps may also include securing funding and utilizing the co-benefits tool.

APPENDIX A: DOCUMENT REVIEW

Note: This deliverable was completed prior to the publication for the City of Boston Coastal Resilience Solutions for East Boston: Phase 2 Report in 2022 and the City of Boston's final PLAN: East Boston report in 2024.

Greening the Blue Line: Document Review

January 2022
Prepared by: Civic Space Collaborative

Plan: East Boston Existing Conditions Report

City of Boston | 2020-2021

- As soon as the 2070s, 58% of the land in the "PLAN: East Boston" study area will be vulnerable to flooding with a 1% annual chance event. Today, 38% of the land area is vulnerable to flooding with a 1% annual chance event, and 23% of the land area of East Boston is in the current FEMA flood hazard zone. (Page: 7 and 74)
- By the 2070s, 80% of **MBTA Blue Line stations**, 22% of bus stops, and 55% of major roads will be vulnerable to flooding with a 1% annual chance event. (Page: 7)
- Since 2014, weekday boardings at East Boston Blue Line stations have grown at an annual rate of 1.3% (1.1% for all Blue Line stations). During this same period, boardings at all other MBTA gated stations on the Red, Orange, Green, and Silver Lines have declined. (Page: 94)
- Only 10% of East Boston resident workers work in East Boston. (Page: 122)

Climate Ready Boston

City of Boston | 2016

- "Climate Ready Boston" reviews extreme temperatures and associated impacts, sea-level rise, extreme precipitation, storms, and the associated stormwater, coastal, and riverine flooding impacts. (Pages 5-21)
- There are several focus area in East Boston, and below are a few examples. (pages 240-263)
    - Four (4) **MBTA Blue Line stations** are located within future flood extends, and if those stations were inoperable ~14,000 people that use the line daily would need alternate transportation.
    - **Airport and Wood Island Stations will be potentially exposed to flooding** as soon as the 2050s. Maverick Station is not expected to be exposed to flooding this century. Aquarium Station is at risk in the near term. **Aquarium Station** service halting would impact Blue Line service from Downtown to East Boston and Revere.
    - Addressing **flood entry points** near Porzio Park, Wood Island, and Orient Heights will be critical for near-term flood protection.

Vision Chelsea Creek

Harborkeepers | November 2020

- **About the Process:** "Vision Chelsea Creek" was a six month-long visioning, planning, and stakeholder engagement process to re-imagine the abandoned railway site along the industrial shoreline of lower Chelsea Creek.
- **Four strategies** were envisioned to advance project goals that included the following. (Page: 4-10).
    1. **A Network of Greenways**: Improve Orient Heights waterfront access.
    2. **A Resilient Edge**: Flood preparedness for the waterfront.
    3. **An Urban Boulevard**: Improving pedestrian and cyclist access in East Boston.
    4. **A Working Waterfront**: Balancing industrial and community uses along the waterfront.

Resiliency Planning & Investments on the Blue Line

A Better City | November 1, 2019

- Most consequential to Blue Line includes flooding at Orient Heights Maintenance Facility from Belle Isle Marsh, major equipment at risk includes electrical equipment, fleet cars, signals, and controls. (Page: 6-8)
- Resilience can be addressed by elevation of equipment and establishing emergency protocols for MBTA vehicle storage. (Page: 8)
- Identify high-need or cost-effective resiliency efforts so that they can be prioritized into the Capital Improvements Plan. (Page: 12)

MBTA Orient Heights maintenance and Storage Facilities: Current and Future Vulnerabilities to Climate Stressors

AECOM | August 24, 2018

- The **Orient Heights facility** will flood in 2070 100-year flood scenarios and will not be able to function. Quick water recession is possible via hardening of power and operations equipment. (Page: 3)
- The most effective mitigation method is to elevate all essential equipment above the highest anticipated flood elevation or the elevation of the 0.2-percent-annual-chance flood recommended by FEMA, whichever is higher. When elevating equipment is not practical, dry flood proofing may be an option. (Page: 11)

Coastal Resilience Solutions for East Boston and Charlestown

City of Boston | 2017

- **Open space strategies** in East Boston include elevated waterfront parks and plazas, elevated waterfront pathways, docks and other in-water features, nature-based features, mobility and connectivity improvements. (Pages 42-46)
- **Infrastructure and development** strategies include: elevated roadways and deployable flood walls, mixed-use development, local businesses, maritime industries (Pages: 42-46)
- **East Boston near term actions** include Greenway flood wall, elevating the greenway entrance and Piers Park II, elevating the Harborwalk between Clippership Wharf, Clipper Ship Apartments, and 99 Sumner Street, elevating the Border Street priority area, and planning and regulatory tools (comprehensive waterfront planning initiative to review zoning and other land use controls). (Pages: 50-61)
- **East Boston long term actions** include elevating parks and pathways at Mario Umana and Shore Plaza, as well as Porzio Park and Massport Harborwalk Park as parks and buildings reach the age of needing renewal investments. Measures built in the 2030s and 2050s will need to be evaluated accordingly to assess if they provide adequate protection. (Page: 62-66)

Go Boston 2030

City of Boston | 2016

- The City's long-term mobility plan that assesses current use and provides vision framework for addressing transportation needs. Guiding principles: equity, economic opportunity, climate responsiveness. (Pages: 1, 8)
    - **Primary goals and targets**: expanding access, improving safety, and ensuring the reliability of transit
    - East Boston has the **highest transit-commuting neighborhood** at ~56%, and ~16% of East Boston residents have a **60+ minute commute**. (Pages: 38, 39)
- **Action Plan highlights** (page: 10)
    - **Projects in East Boston:** Neighborhood Mobility microHUBS (Pages: 146, 147)
    - **Top policies**: state of good repair- particularly bridges, restructure all bus routes, autonomous vehicles, vision zero safety initiatives (corridors, crossings, slow streets).

Heat Resilience Solutions for Boston: Final Report

City of Boston | April 2022

- The Heat Plan asseses where temperatures are highest during a heat wave and the factors that contribute to extreme heat conditions. The plan also provides updated temperature projections, new extreme temperature models, resilience strategies, and plans to advance heat resilience. (page 16)
- **General Stats and Data:** Heat and Neighborhood
  - East Boston is experiencing 7-10 degrees F above the rural ambient temperature. (page 62)
  - Hottest areas of East Boston are around Logan Rental Car Center, Day Square, and northwest Eagle Hill
  - East Boston has 318 park acres, or 11% of the land cover. Only 35% of the land cover is pervious, while the other 65% is buildings, roads, or other paved surfaces. (page 128)
- **Community cooling ideas:** suggested ideas for cooling include
  - increase indoor air conditioned spaces, retrofitting homes, heat resilient zoning, etc
  - planting additional trees, updating maintenance strategies, installing lighter colored pavement, for the development review committee to partner with community organizations and local entrepreneurs, install more hydration stations, cooler playgrounds, shaded bus stops, and T stations. (page 137)
- **Streets:** Bennington, Lexington, and Meridian Streets were identified as hot streets and have high levels of pedestrian and transit use. (page 140)

Coastal Resilience Solutions for East Boston and Charlestown (Phase II) Open House #2

City of Boston | 8/3/2021

- The Coastal Resilience Open House was a virtual meeting that the City of Boston hosted for community members on August 3rd 2021. There was a presentation and breakout rooms.
- **Presentation:** East Boston is at risk for tidal flooding, storm surges, and waves and coastal erosion.
  - With 40 inches of sea level rise, 5,000 East Boston residents could be exposed.
  - More than **4,800 daily trips** on the Blue Line starting at Orient Heights (**Orient Height station will be exposed with 9 inches of sea level rise)** and starting at Suffolk Downs (Suffolk Downs station will be exposed with 40 inches of sea level rise) could be disrupted.
  - With 40 inches of sea level rise over half of income-restricted housing units could be exposed
- Evaluation criteria of proposed resilience solutions: community benefits, health and nature for people, practical impacts, making it a reality, long-term use.
- **Breakout Rooms:** Participants discussed scenarios that reduce risk to the Blue Line and protect the community.
  - **Constitution Beach:** participants expressed support for Scenario 1, a reinforced dune, over Scenario 2, a raised pathway with a floodwall, due to Scenario 1 preserving existing amenities and adding new amenities and green space.
  - **Belle Isle Marsh**: participants expressed support for Scenario 1, a raised berm with living shoreline, over Scenario 2, a raised road with a floodwall, due to Scenario 1 providing more natural benefits and opportunities to expand recreation and educational elements.

Select Images + Graphics

Figure 1: Rendering of East Boston's long-term climate resilient waterfront, parks and plazas connecting Central Park and Border Street's retail center. (Source: Coastal Resilience Solutions for East Boston and Charlestown, page 63)

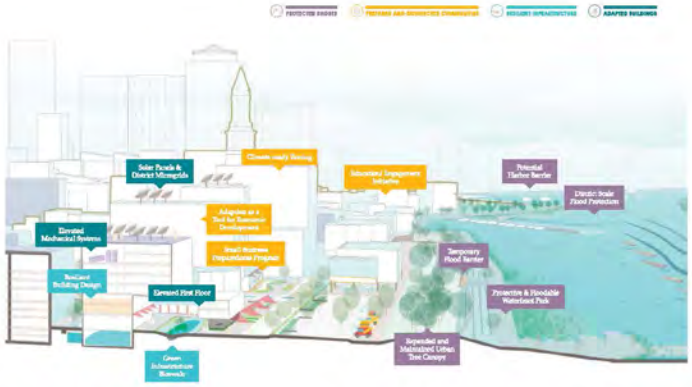


Figure 2: Visualizing layers and strategies for climate readiness. (Source: Climate Ready Boston, Pages 80, 81)

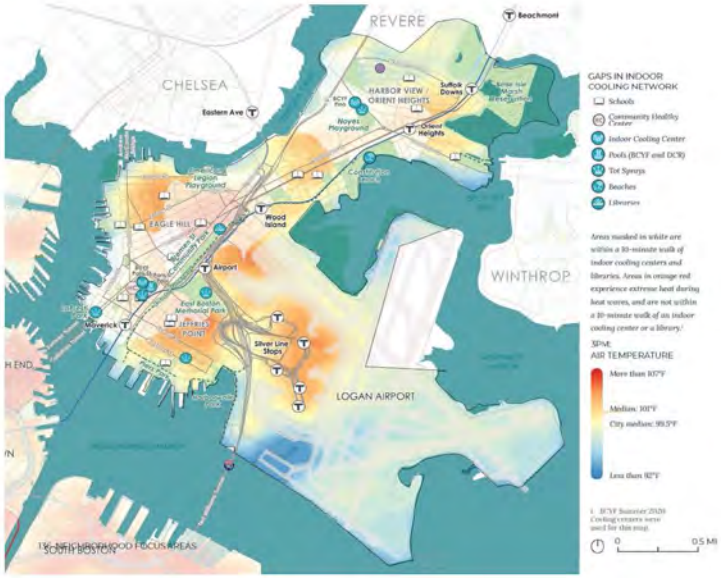


Figure 3: Gaps in Indoor Cooling Network. (Source: Heat Resilience Solutions for Boston: Final Report, Page 136)

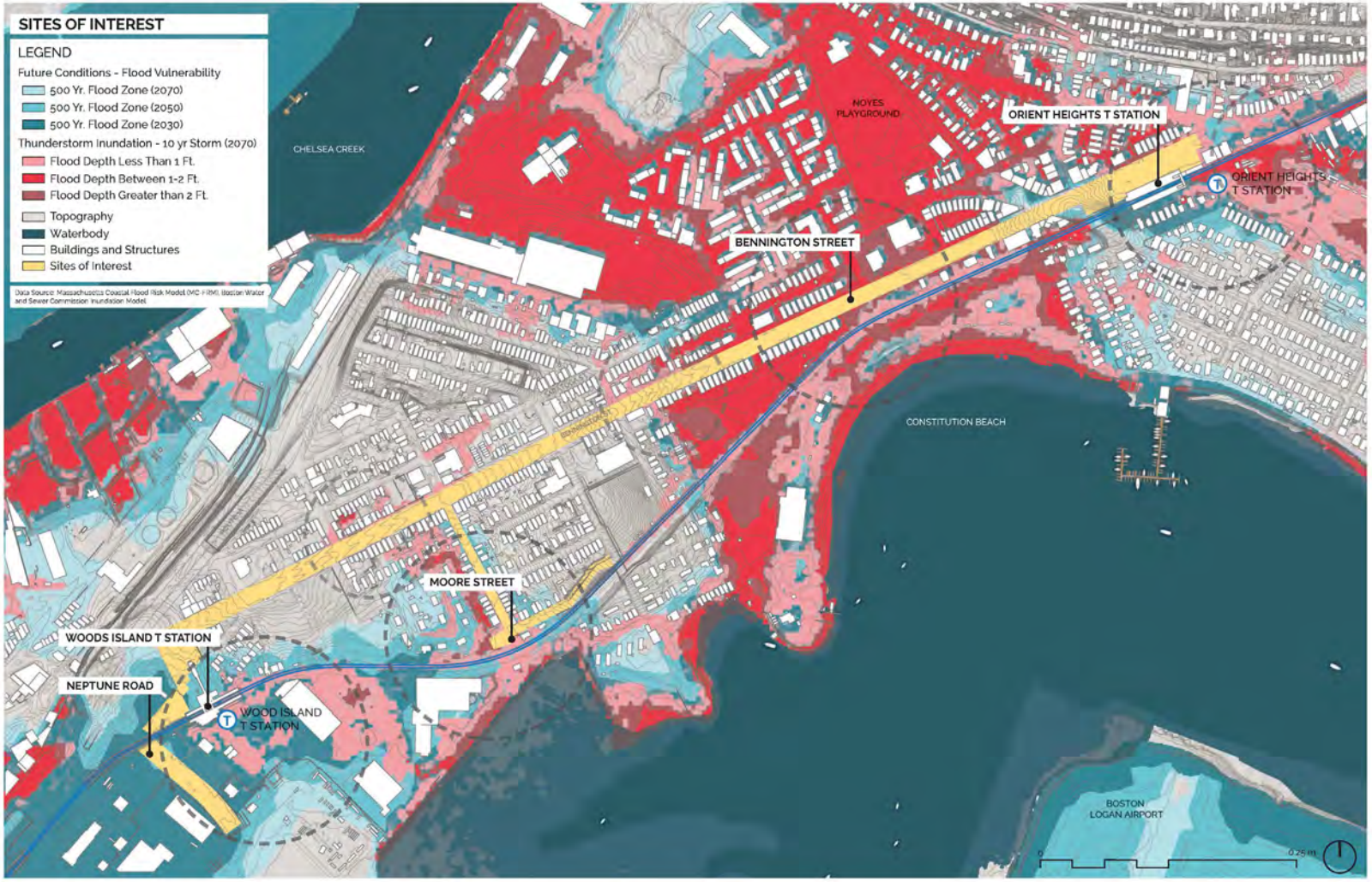
APPENDIX B: SITE MAPS + DESIGNS

GREENING THE BLUE LINE - SITES OF INTEREST

EXISTING CONDITIONS

Weston & Sampson design studio

GREENING THE BLUE LINE - CLIMATE DATA



Weston & Sampson design studio

WOOD ISLAND T STATION

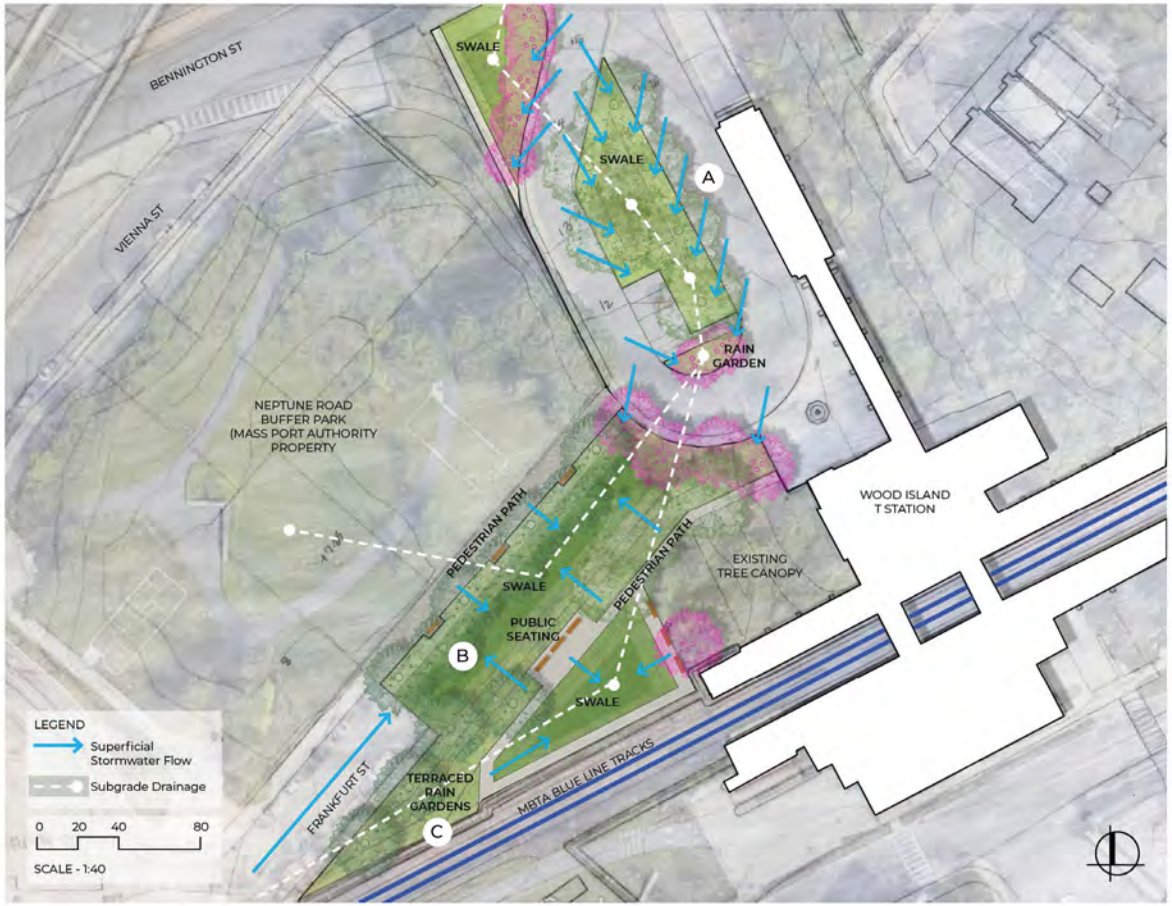
EXISTING CONDITIONS

STREET VIEW

Weston & Sampson design studio

WOOD ISLAND T STATION

CONCEPT DESIGN



PRECEDENT IMAGES

Weston & Sampson design studio

Image sources from top to bottom:A.)https://landperspectives.com/page/7/Showing built storm water management project by City of Portland Oregon, B.) Martin_Luther_King_Park-Atelier Jacqueline Osty & associeshttps://landezine-award.com/martin-luther-king-park/, C.) https://www.archdaily.com/32490/ad-interviews-kieran-timberlake/1250614491-2008av36415Stewart Middle School, Sidwell Friends School, constructed wetland © Albert Vecerka/Esto

NEPTUNE ROAD

CONCEPT DESIGN

PRECEDENT IMAGES

Weston & Sampson design studio

NEPTUNE ROAD

CONCEPT DESIGN

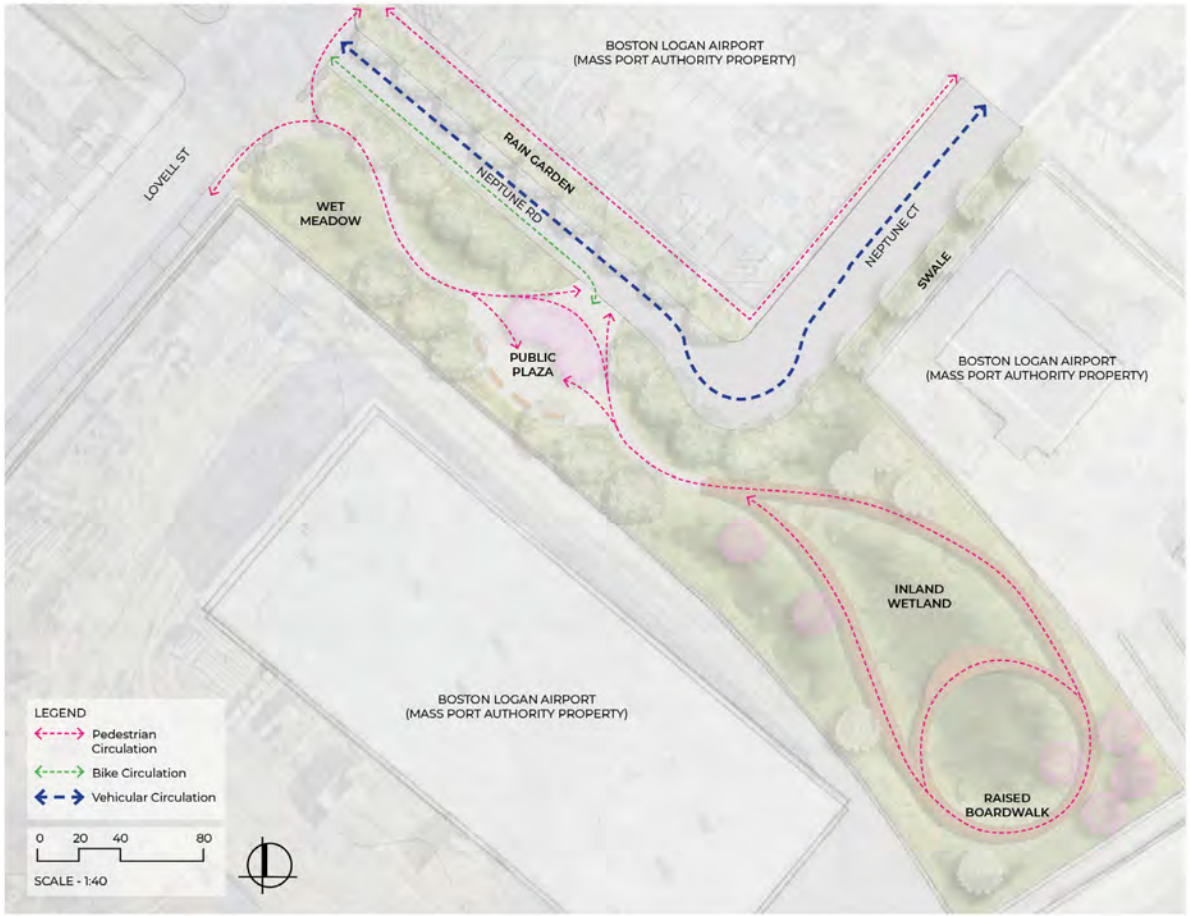
PRECEDENT IMAGES

Weston & Sampson design studio

Image sources from top to bottom:A.)https://landezine.com/ponderosa-commons/Designers: Hapa Collaborative /Project Location: Canada / Vancouver /Show on Google MapsTypology: Campus /Built: 2016 /Published on October 19, 2020, B.) Nelson Byrd Woltzhttps://www.nbwla.com/projects/park/naval-cemetery-landscape, C.) Sophy Tuttle, Rising Tideshttps://sophytuttle.com/rising-tides/

NEPTUNE ROAD

PROPOSED CIRCULATION



PRECEDENT IMAGES

Weston & Sampson design studio

BENNINGTON & MOORE ST

EXISTING CONDITIONS

STREET VIEW

Weston & Sampson

BENNINGTON & MOORE ST

CONCEPT DESIGN

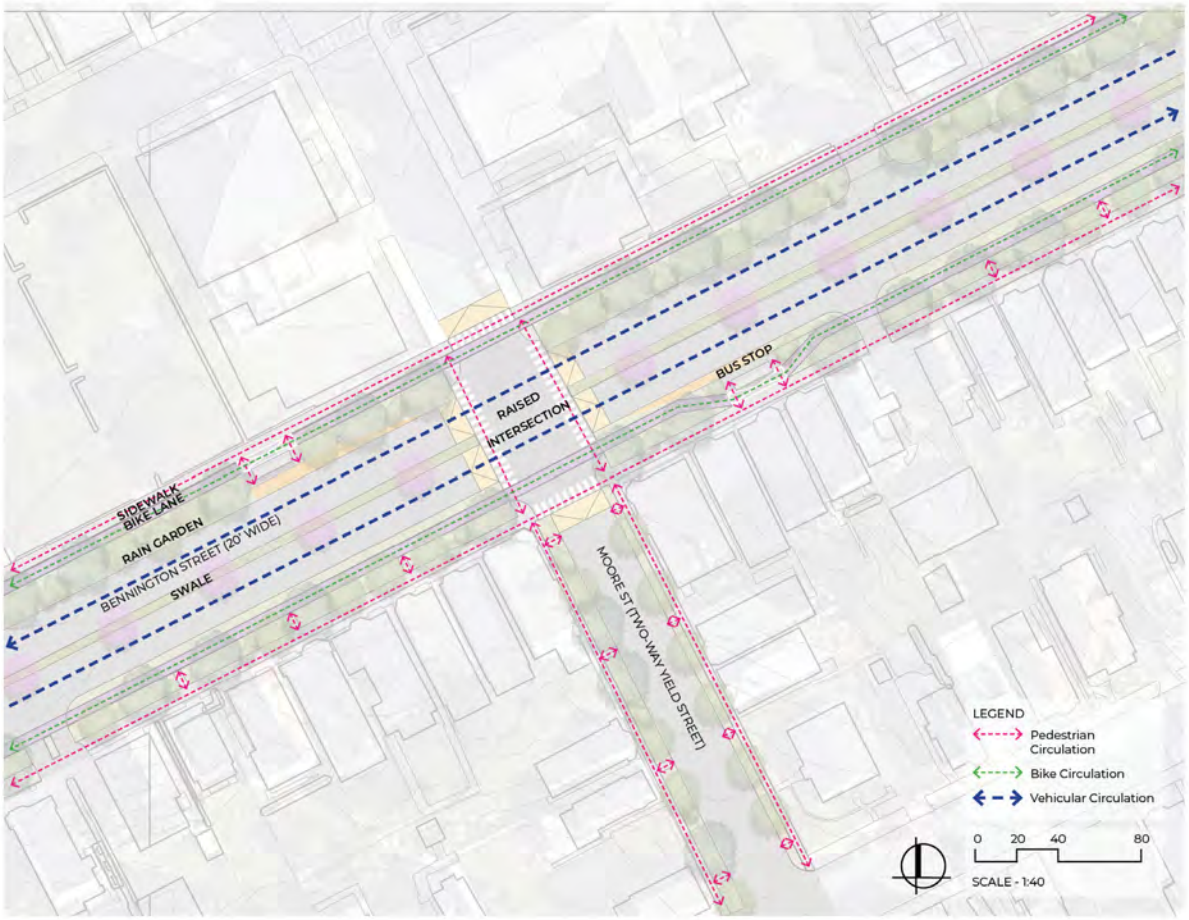
PRECEDENT IMAGES

Weston & Sampson design studio

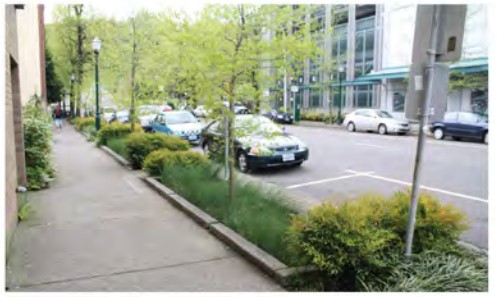
Image sources from top to bottom:A.) https://www.nycstreetdesign.info/geometry/grade-separated-bike-lane Queensboro Bridge Greenway, Queens, B.) Katrina Flora, 2019 Hazelwood Green https://www.hazelwoodgreen.com/lytle-street/z3otm8ijnmphdukns91n3enfbez4a7, C.) https://landperspectives.com/page/7/Showing built storm water management project by City of Portland Oregon

BENNINGTON & MOORE ST

PROPOSED CIRCULATION



PRECEDENT IMAGES



Weston & Sampson design studio

MOORE & COWPER ST

EXISTING CONDITIONS

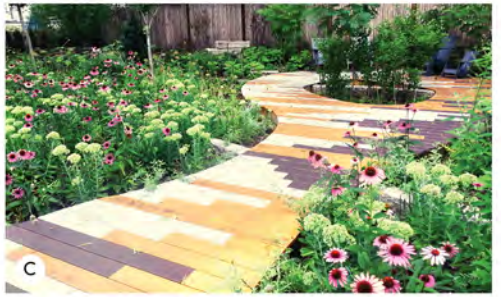
STREET VIEW

Weston & Sampson design studio

MOORE & COWPER ST

CONCEPT DESIGN

PRECEDENT IMAGES

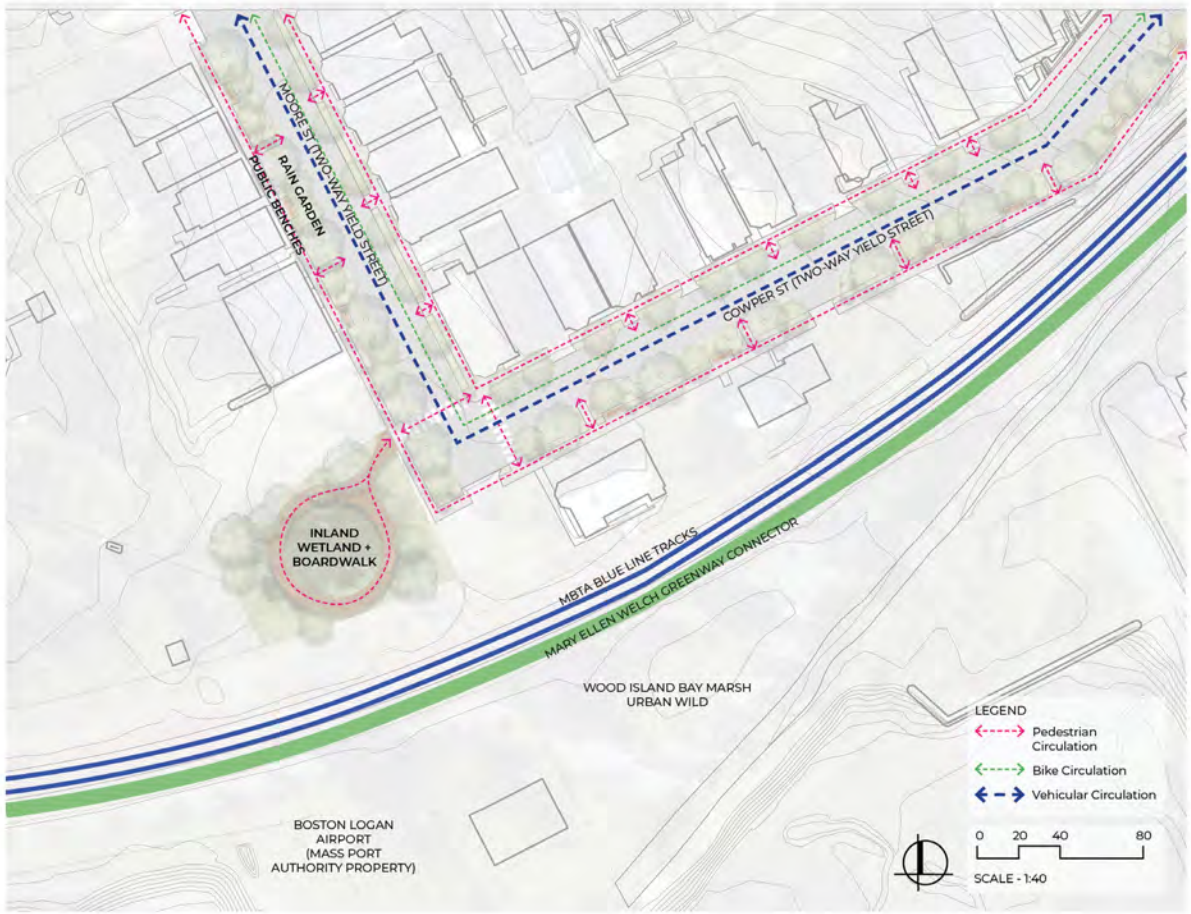


Weston & Sampson design studio

Image sources from top to bottom:A.) WSUD Installation: Wynward Quarter, Auckland, New Zealand (Wraight & Associates) https://www.waal.co.nz/, B.) WSUD Installation: Wynward Quarter, Auckland, New Zealand (Wraight & Associates) https://www.waal.co.nz/ C.) Weston & Sampson Quincy St

MOORE & COWPER ST

PROPOSED CIRCULATION



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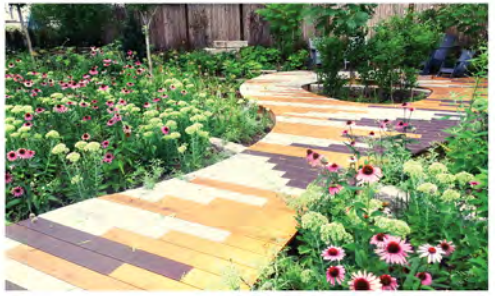
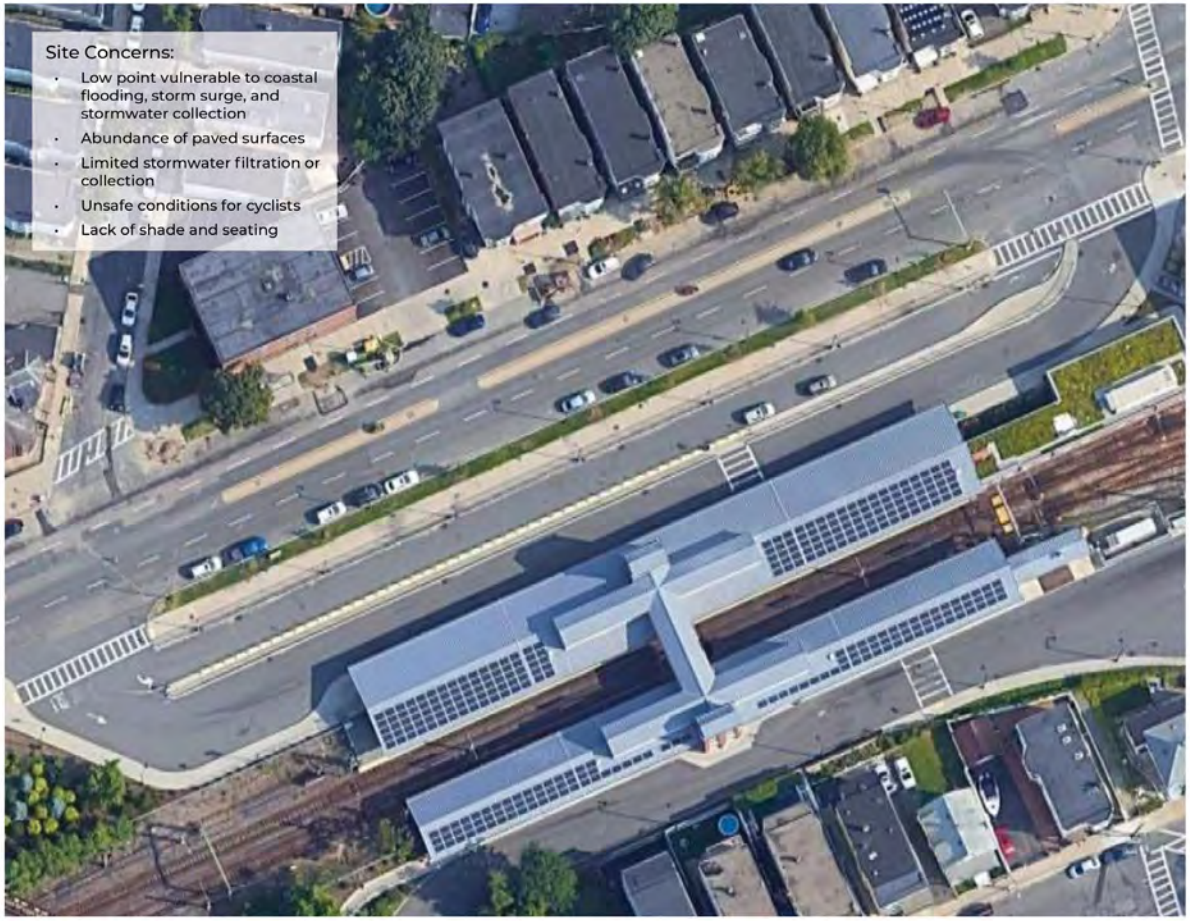


Weston & Sampson design studio

ORIENT HEIGHTS T STATION

EXISTING CONDITIONS

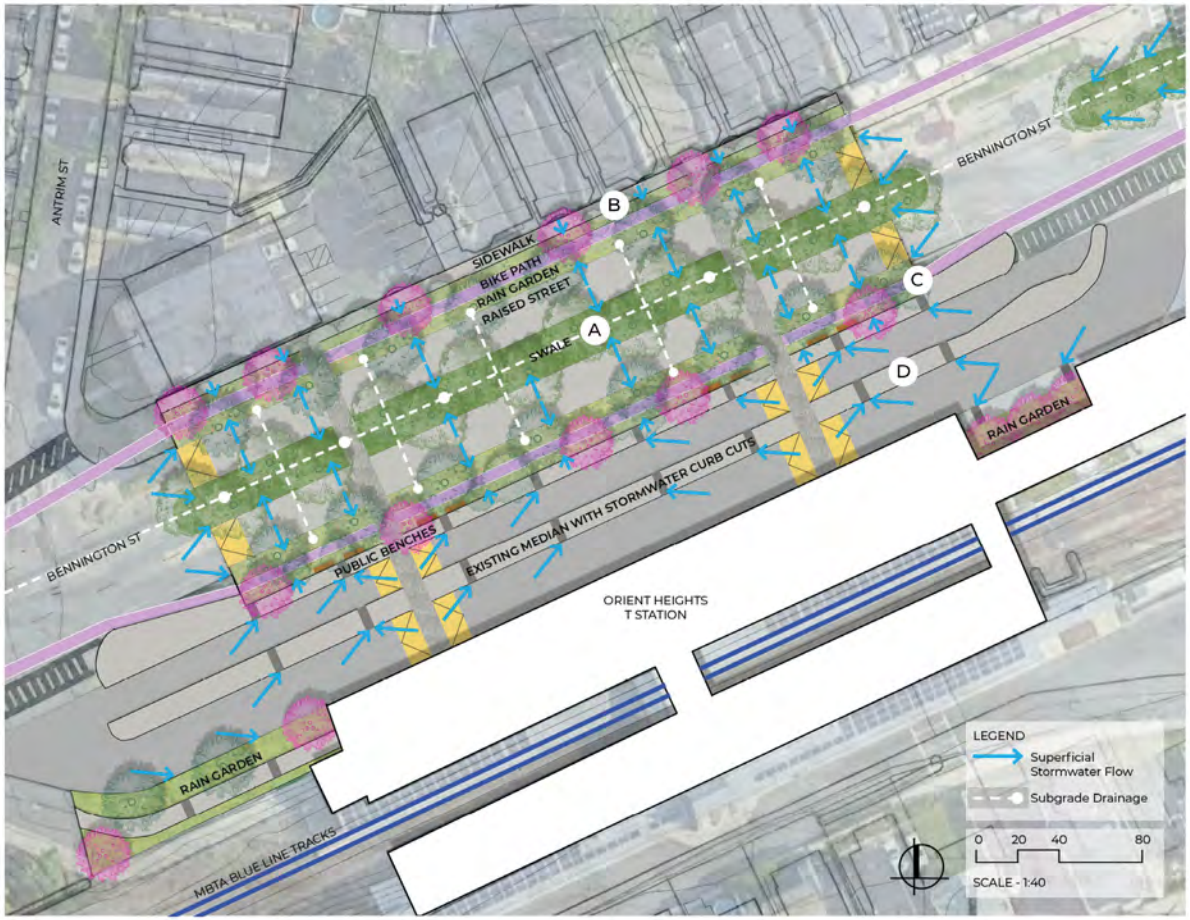


STREET VIEW

Weston & Sampson design studio

ORIENT HEIGHTS T STATION

CONCEPT DESIGN



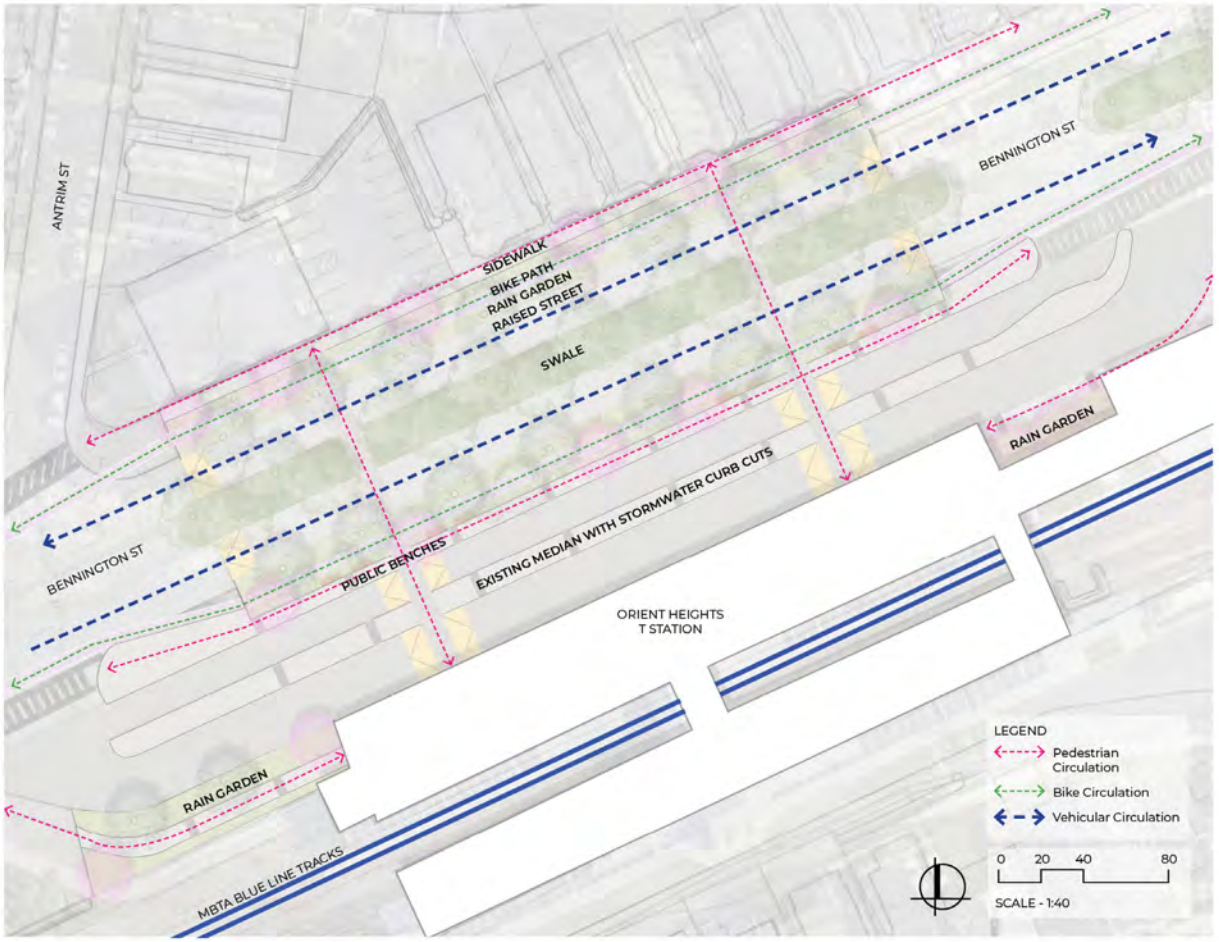
PRECEDENT IMAGES

Weston & Sampson design studio

Image sources from top to bottom:A.) https://landezine-award.com/scandiagade/image source= 1:1 landskabProject location:Scandiagade2450 Sydhavn (South Harbour)CopenhagenDenmarkDesign year: 2017Year Built: 2019, https://landezine.com/north-wharf-promenade-by-taylor-cullity-lethlean/ANDhttps://nzila.co.nz/showcase/north-wharf-promenade© Simon Devitt, B.) WSUD Installation: Wynward Quarter, Auckland, New Zealand(Wraight & Associates)https://www.waal.co.nz/ C.) Philippe Hamelin Landscaper – Chilly Mazarinhttps://www.paris-sud-amenagement.fr/nos-projets/requalification-des-parcs-dactivites-communautaires-deuropessonne/ D.) https://landperspectives.com/page/7/Showing built storm water management project by City of Portland Oregon

ORIENT HEIGHTS T STATION

PROPOSED CIRCULATION



PRECEDENT IMAGES

Weston & Sampson design studio

APPENDIX C: POTENTIAL FUNDING SOURCES

POTENTIAL FUNDING SOURCES	SOURCE	LEVEL
Community Preservation Act (CPA)	City of Boston	City
604(b) Grant Program: Water Quality Management Planning	DEP	State
Building Resilient Infrastructure and Communities (BRIC) & Flood Mitigation Assistance (FMA) Grant Programs	MEMA	State
Coastal Pollutant Remediation (CPR) Grant Program	CZM	State
Coastal Resilience Grant Program	CZM	State
Coastal Zone Management (CZM): Coastal Resilience Grant Program	CZM	State
Global Warming Solutions Trust Fund	Commonwealth of Massachusetts	State
MassBays Healthy Estuaries Grants	CZM	State
MassDEP's Water Utility Resilience Program (WURP)	DEP	State
Massport Capital Funding	MassPort	State
MassWorks Infrastructure Program (Community One Stop for Growth)	EOED	State
MBTA Capital Funding	MBTA	State
Municipal Vulnerability Preparedness Program - Action Grant (MVP)	EOEEA	State
Parkland Acquisitions and Renovations for Communities (PARC) Grant Program	EOEEA	State
Section 319 Nonpoint Source Competitive Grants Program	DEP	State
Statewide Water Management Act Grant	DEP	State
Stormwater MS4 Municipal Assistance Grant Program	DEP	State
Water Quality Monitoring Grant Program	DEP	State
Accelerating Climate Resilience Grants	MPAC	Regional
Clean Water State Revolving Fund (CWSRF)	EPA	Federal/State

FUNDING TABLE	SOURCE	LEVEL
Coastal and Estuarine Land Conservation Program	NOAA	Federal
Coastal Zone Management (CZM) Habitat Protection and Restoration Infrastructure Investment and Jobs Act (IIJA) Competition	NOAA	Federal
Community Development Block Grant (CDBG)	HUD	Federal
Congressional Directed Spending (CDS)	U.S. Congress	Federal
Emergency Watershed Protection	USDA	Federal
EPA Environmental Justice Small Grants	EPA	Federal
Five Star and Urban Waters Restoration Grant Program	NFWF	Federal
Flood Mitigation Assistance (FMA) Grant	FEMA	Federal
Floodplain Management Services Program (FPMS)	USACE	Federal
Green Streets, Green Jobs, Green Towns (G3) Program	EPA	Federal
Hazard Mitigation Grant Program (HMGP)	FEMA	Federal
Healthy Communities Grant Program for New England	EPA	Federal
Inflation Reduction Act: Inflation Reduction Act Environmental and Climate Justice Program	EPA	Federal
Inflation Reduction Act: the Greenhouse Gas Reduction Fund	EPA	Federal
National Coastal Resilience Fund	NFWF	Federal
National Coastal Wetlands Conservation Grants	FWS	Federal
National Estuarine Research Reserve System (NERRS) Land Acquisition and Construction Program	NOAA	Federal
NEP Coastal Watersheds Grant Program	Restore America's Estuaries	Federal
Outdoor Recreation Legacy Partnership (ORLP) Program	DOI	Federal
Pre-Disaster Mitigation (PDM)	FEMA	Federal
Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT) Formula Program	DOT	Federal

FUNDING TABLE	SOURCE	LEVEL
Public Works and Economic Adjustment Assistance	EDA	Federal
Rivers, Trails and Conservation Assistance Program	NPS	Federal
Section 319 Non-Point Source Grants	EPA	Federal
Sewer Overflow and Stormwater Reuse Municipal Grants Program	EPA	Federal
Southeast New England Program (SNEP) Watershed Implementation Grants	Restore America's Estuaries	Federal
Water Infrastructure Finance and Innovation Act (WIFIA)	EPA	Federal
Water Infrastructure Improvements for the Nation (WINN) Grant: Small, Underserved and Disadvantaged Community Grant Program	EPA	Federal
Watershed Protection and Flood Prevention Operations Program (WFPO)	USDA	Federal
Watershed Rehabilitation Program (REHAB)	USDA	Federal
Barr Foundation	Barr Foundation	Foundation
Catalytic Finance	Catalytic Finance	Foundation
East Boston Foundation	East Boston Foundation	Foundation
Mosaic Movement Infrastructure Grant	Tides Center	Foundation
The Boston Foundation	The Boston Foundation	Foundation
ICLEI Transformative Actions Program	ICLEI	International
The Subnational Climate Fund (SnCF)	Subnational Climate Fund	International

Funding Table Source Acronyms:

Federal Emergency Management Agency (FEMA)
National Fish and Wildlife Foundation (NFWF)
National Oceanic and Atmospheric Administration (NOAA)
National Park Service (NPS)
U.S. Army Corps of Engineers (USACE)
U.S. Department of Agriculture (USDA)
U.S. Department of Housing and Urban Development (HUD)
U.S. Department of the Interior (DOI)
U.S. Department of Transportation (DOT)
U.S. Economic Development Administration (EDA)
U.S. Environmental Protection Agency (EPA)
U.S. Fish & Wildlife Service (FWS)
Metropolitan Area Planning Council (MAPC)
MA Department of Environmental Protection (DEP)
MA Emergency Management Agency (MEMA)
MA Executive Office of Economic Development (EOED)
MA Executive Office of Energy and Environmental Affairs (EOEEA)
MA Office of Coastal Zone Management (CZM)
Massachusetts Port Authority (MassPort)
Massachusetts Bay Transportation Authority (MBTA)
ICLEI – Local Governments for Sustainability

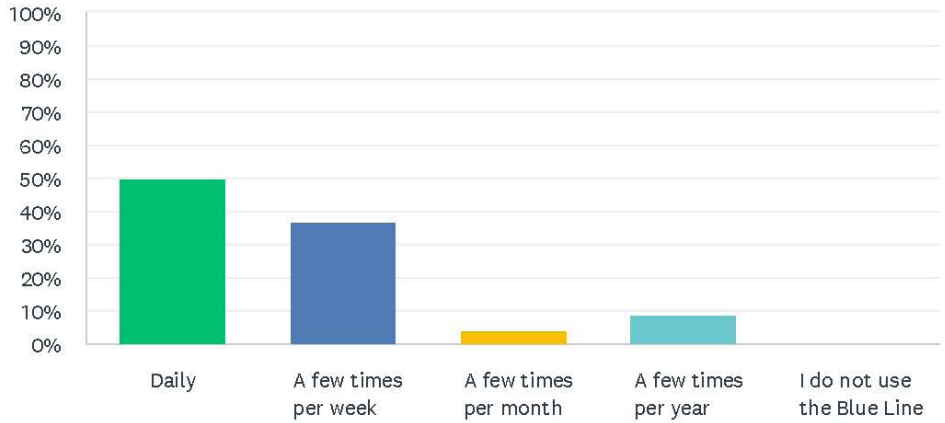
APPENDIX D: SURVEY RESULTS

The survey was distributed to key community groups in East Boston by direct email and emailed newsletters. The survey was also shared on social media. See the Methodology section for stakeholder lists.

How would you like to green the Blue Line?

Q1 How frequently do you use the Blue Line?

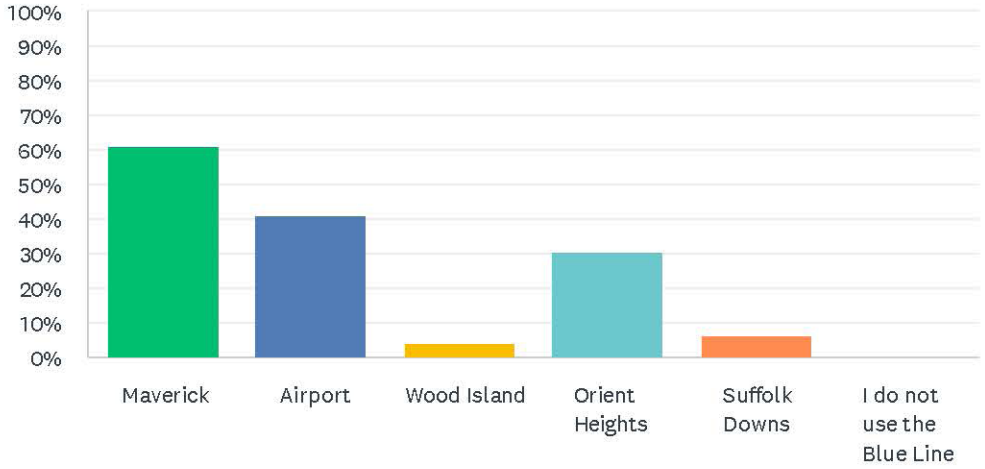
Answered: 46 Skipped: 0



ANSWER CHOICES	RESPONSES	
Daily	50.00%	23
A few times per week	36.96%	17
A few times per month	4.35%	2
A few times per year	8.70%	4
I do not use the Blue Line	0.00%	0
TOTAL		46

Q2 Which Blue Line stations in East Boston do you use most? Check all that apply.

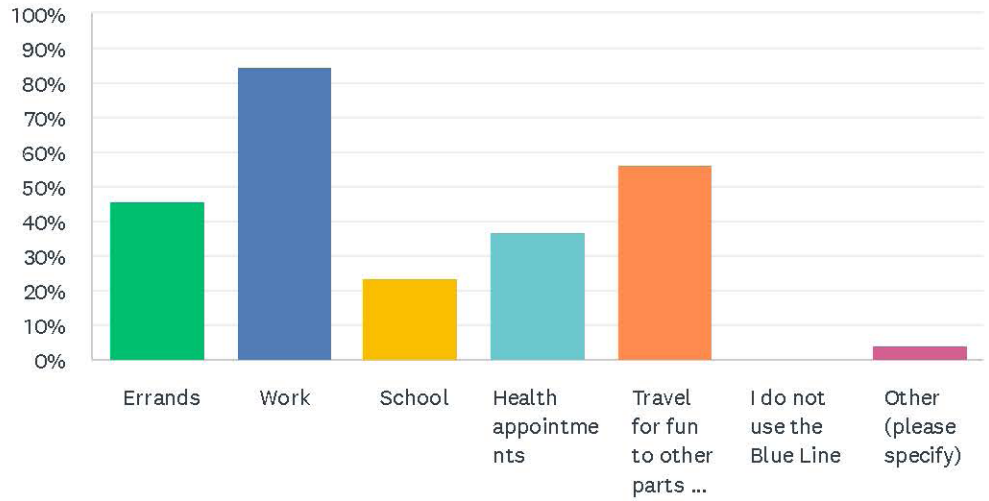
Answered: 46 Skipped: 0



ANSWER CHOICES	RESPONSES	
Maverick	60.87%	28
Airport	41.30%	19
Wood Island	4.35%	2
Orient Heights	30.43%	14
Suffolk Downs	6.52%	3
I do not use the Blue Line	0.00%	0
Total Respondents: 46		

Q3 Why do you use the Blue Line? Check all that apply.

Answered: 46 Skipped: 0

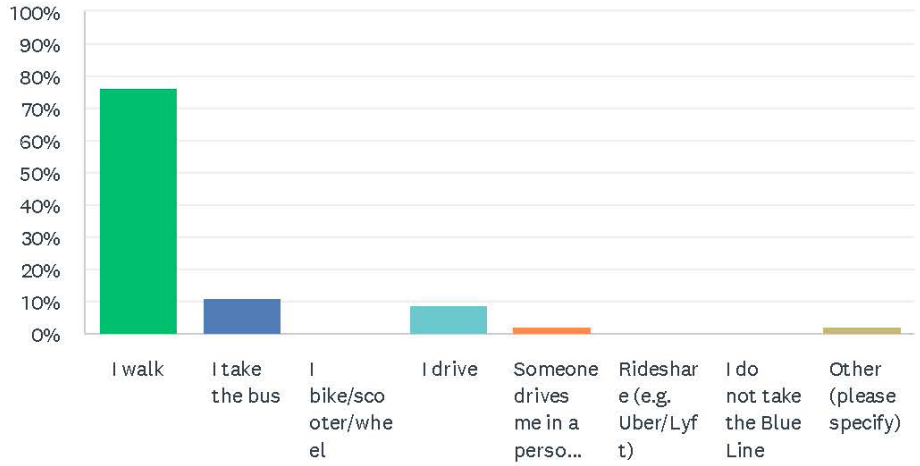


ANSWER CHOICES	RESPONSES	
Errands	45.65%	21
Work	84.78%	39
School	23.91%	11
Health appointments	36.96%	17
Travel for fun to other parts of Boston	56.52%	26
I do not use the Blue Line	0.00%	0
Other (please specify)	4.35%	2
Total Respondents: 46		

How would you like to green the Blue Line?

Q4 How do you usually travel to/from the Blue Line?

Answered: 46 Skipped: 0

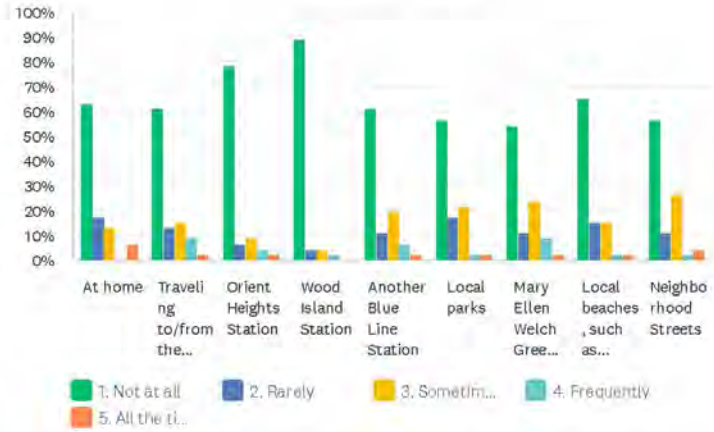


ANSWER CHOICES	RESPONSES	
I walk	76.09%	35
I take the bus	10.87%	5
I bike/scooter/wheel	0.00%	0
I drive	8.70%	4
Someone drives me in a personal vehicle	2.17%	1
Rideshare (e.g. Uber/Lyft)	0.00%	0
I do not take the Blue Line	0.00%	0
Other (please specify)	2.17%	1
TOTAL		46

How would you like to green the Blue Line?

Q5 Flooding from extreme weather or sea-level rise can cause water to accumulate in undesirable locations, such as at home and on your commuting route. On a scale from 1 to 5, how does flooding impact your routine at the following locations?

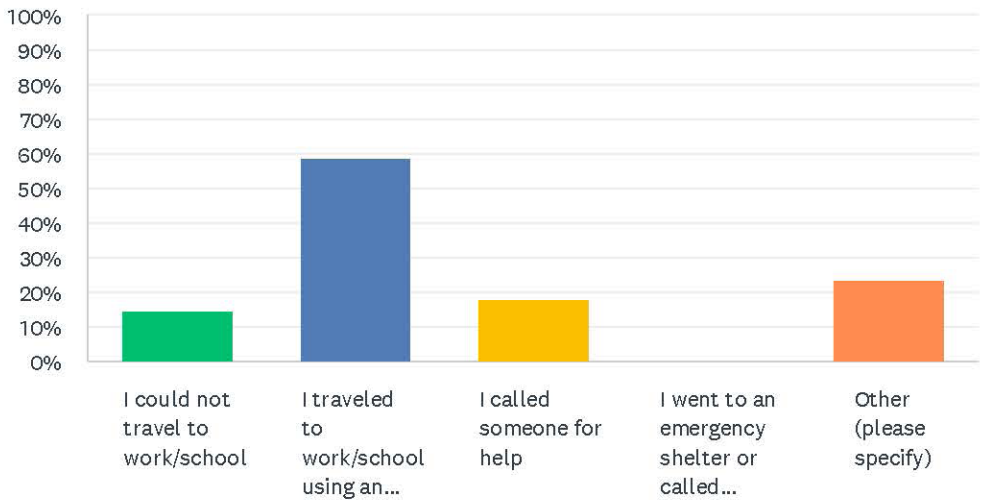
Answered: 46 Skipped: 0



	1. NOT AT ALL	2. RARELY	3. SOMETIMES	4. FREQUENTLY	5. ALL THE TIME	TOTAL	WEIGHTED AVERAGE
At home	63.04% 29	17.39% 8	13.04% 6	0.00% 0	6.52% 3	46	1.70
Traveling to/from the Blue Line	60.87% 28	13.04% 6	15.22% 7	8.70% 4	2.17% 1	46	1.78
Orient Heights Station	78.26% 36	6.52% 3	8.70% 4	4.35% 2	2.17% 1	46	1.46
Wood Island Station	89.13% 41	4.35% 2	4.35% 2	2.17% 1	0.00% 0	46	1.20
Another Blue Line Station	60.87% 28	10.87% 5	19.57% 9	6.52% 3	2.17% 1	46	1.78
Local parks	56.52% 26	17.39% 8	21.74% 10	2.17% 1	2.17% 1	46	1.76
Mary Ellen Welch Greenway	54.35% 25	10.87% 5	23.91% 11	8.70% 4	2.17% 1	46	1.93
Local beaches, such as Constitution Beach	65.22% 30	15.22% 7	15.22% 7	2.17% 1	2.17% 1	46	1.61
Neighborhood Streets	56.52% 26	10.87% 5	26.09% 12	2.17% 1	4.35% 2	46	1.87

Q6 What additional impacts have you experienced during flooding events? Check all that apply.

Answered: 34 Skipped: 12

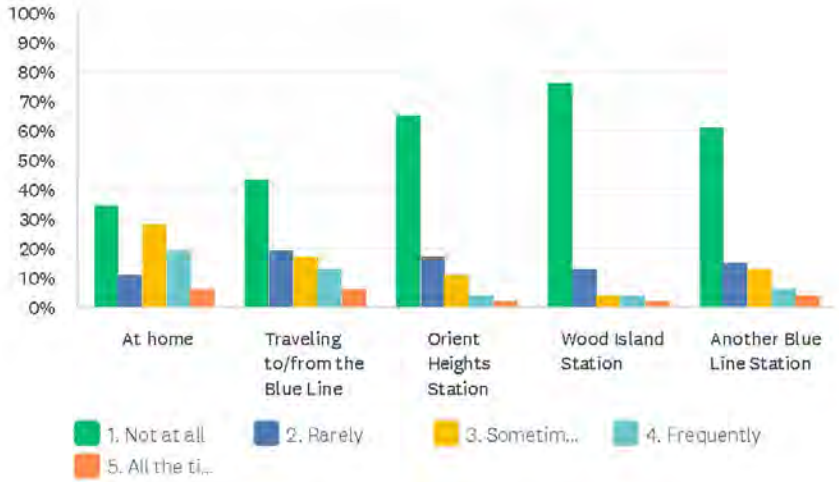


ANSWER CHOICES	RESPONSES	
I could not travel to work/school	14.71%	5
I traveled to work/school using an alternative route or another Blue Line station	58.82%	20
I called someone for help	17.65%	6
I went to an emergency shelter or called emergency services (e.g. 911)	0.00%	0
Other (please specify)	23.53%	8
Total Respondents: 34		

How would you like to green the Blue Line?

Q7 A heat wave is defined as a period of three consecutive days where temperatures rise above 90°F, or two consecutive days over 95 degrees. On a scale from 1 to 5, how have heat waves impacted your routine in the summer at the following locations?

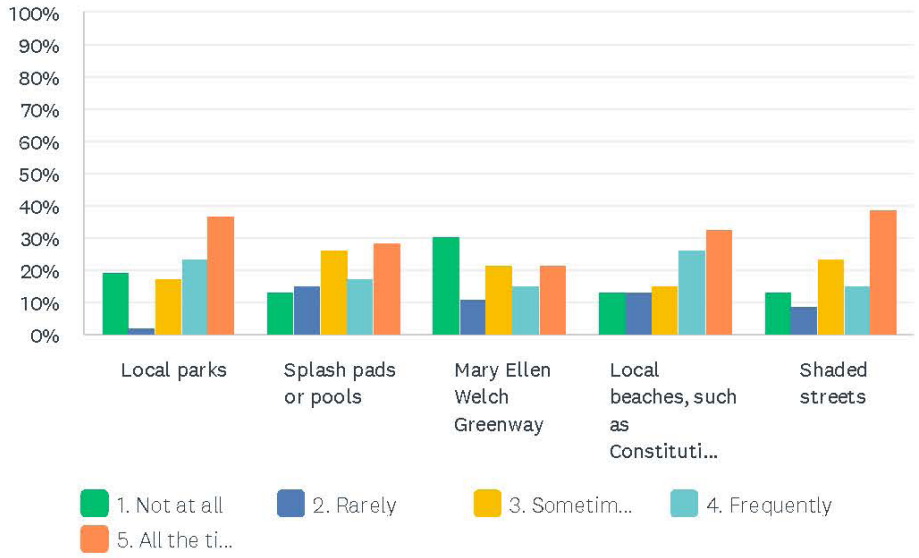
Answered: 46 Skipped: 0



	1. NOT AT ALL	2. RARELY	3. SOMETIMES	4. FREQUENTLY	5. ALL THE TIME	TOTAL	WEIGHTED AVERAGE
At home	34.78% 16	10.87% 5	28.26% 13	19.57% 9	6.52% 3	46	2.52
Traveling to/from the Blue Line	43.48% 20	19.57% 9	17.39% 8	13.04% 6	6.52% 3	46	2.20
Orient Heights Station	65.22% 30	17.39% 8	10.87% 5	4.35% 2	2.17% 1	46	1.61
Wood Island Station	76.09% 35	13.04% 6	4.35% 2	4.35% 2	2.17% 1	46	1.43
Another Blue Line Station	60.87% 28	15.22% 7	13.04% 6	6.52% 3	4.35% 2	46	1.78

Q8 On a scale from 1 to 5, what type of green space would you and your family look for to stay cool?

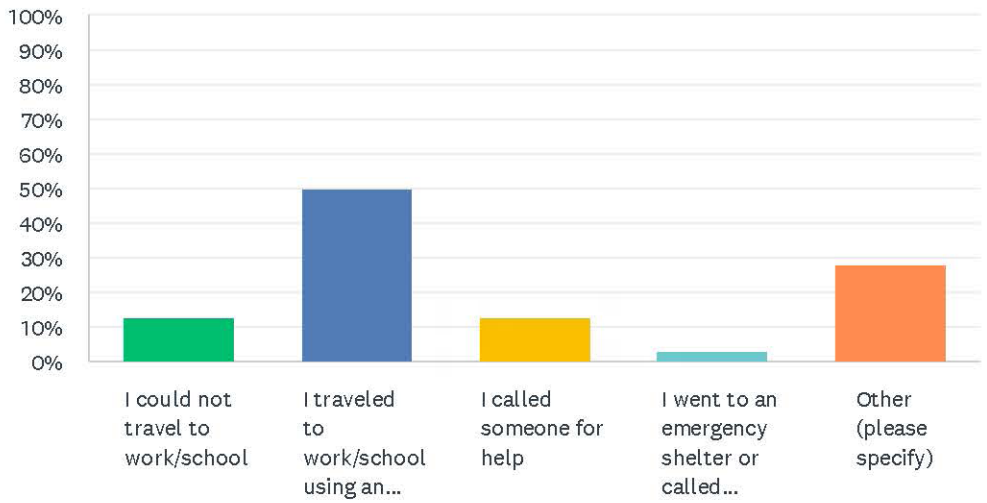
Answered: 46 Skipped: 0



	1. NOT AT ALL	2. RARELY	3. SOMETIMES	4. FREQUENTLY	5. ALL THE TIME	TOTAL	WEIGHTED AVERAGE
Local parks	19.57% 9	2.17% 1	17.39% 8	23.91% 11	36.96% 17	46	3.57
Splash pads or pools	13.04% 6	15.22% 7	26.09% 12	17.39% 8	28.26% 13	46	3.33
Mary Ellen Welch Greenway	30.43% 14	10.87% 5	21.74% 10	15.22% 7	21.74% 10	46	2.87
Local beaches, such as Constitution Beach	13.04% 6	13.04% 6	15.22% 7	26.09% 12	32.61% 15	46	3.52
Shaded streets	13.04% 6	8.70% 4	23.91% 11	15.22% 7	39.13% 18	46	3.59

Q9 What additional impacts have you experienced during heat waves? Check all that apply.

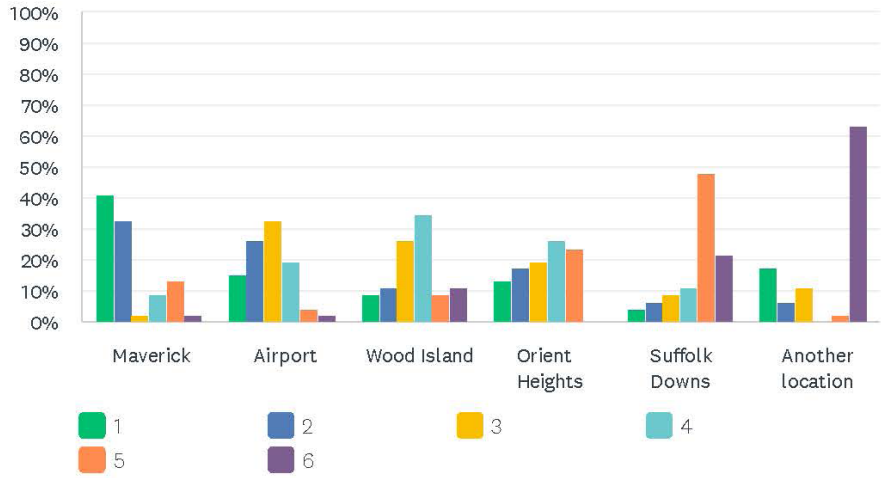
Answered: 32 Skipped: 14



ANSWER CHOICES	RESPONSES	
I could not travel to work/school	12.50%	4
I traveled to work/school using an alternative route or Blue Line station	50.00%	16
I called someone for help	12.50%	4
I went to an emergency shelter or called emergency services (e.g. 911)	3.13%	1
Other (please specify)	28.13%	9
Total Respondents: 32		

Q11 In order of importance, Please rank where you would like to see improvements made to help reduce the risk of flooding and extreme heat in East Boston.

Answered: 46 Skipped: 0

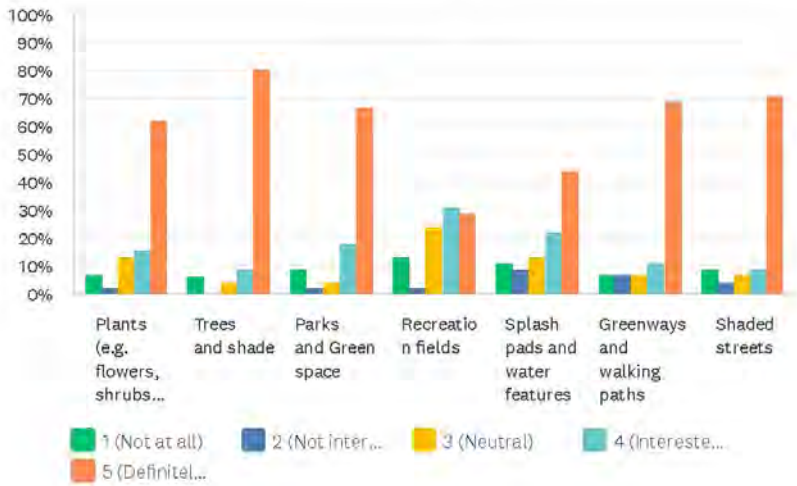


	1	2	3	4	5	6	TOTAL	SCORE
Maverick	41.30% 19	32.61% 15	2.17% 1	8.70% 4	13.04% 6	2.17% 1	46	4.74
Airport	15.22% 7	26.09% 12	32.61% 15	19.57% 9	4.35% 2	2.17% 1	46	4.22
Wood Island	8.70% 4	10.87% 5	26.09% 12	34.78% 16	8.70% 4	10.87% 5	46	3.43
Orient Heights	13.04% 6	17.39% 8	19.57% 9	26.09% 12	23.91% 11	0.00% 0	46	3.70
Suffolk Downs	4.35% 2	6.52% 3	8.70% 4	10.87% 5	47.83% 22	21.74% 10	46	2.43
Another location	17.39% 8	6.52% 3	10.87% 5	0.00% 0	2.17% 1	63.04% 29	46	2.48

How would you like to green the Blue Line?

Q12 On a scale of 1 to 5, please rank landscape improvements you would like to see more of at or near the Blue Line stations.

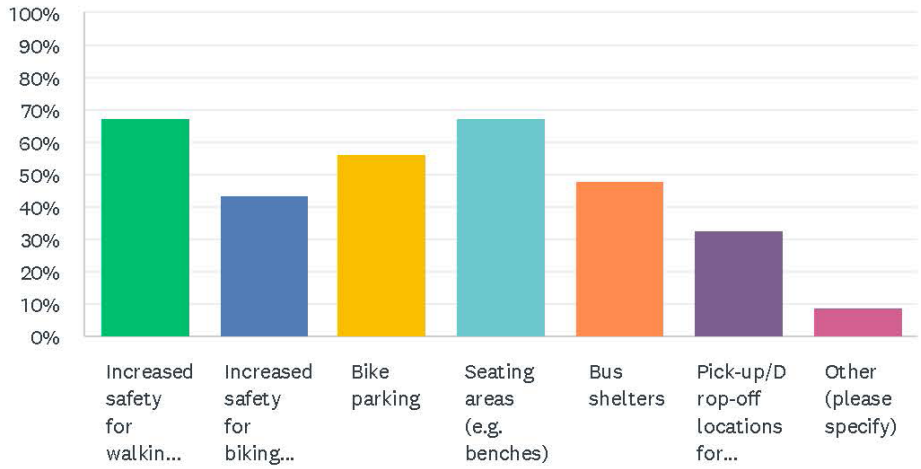
Answered: 46 Skipped: 0



	1 (NOT AT ALL)	2 (NOT INTERESTED)	3 (NEUTRAL)	4 (INTERESTED)	5 (DEFINITELY YES!)	TOTAL	WEIGHTED AVERAGE
Plants (e.g. flowers, shrubs, ground cover)	6.67% 3	2.22% 1	13.33% 6	15.56% 7	62.22% 28	45	4.24
Trees and shade	6.52% 3	0.00% 0	4.35% 2	8.70% 4	80.43% 37	46	4.57
Parks and Green space	8.89% 4	2.22% 1	4.44% 2	17.78% 8	66.67% 30	45	4.31
Recreation fields	13.33% 6	2.22% 1	24.44% 11	31.11% 14	28.89% 13	45	3.60
Splash pads and water features	11.11% 5	8.89% 4	13.33% 6	22.22% 10	44.44% 20	45	3.80
Greenways and walking paths	6.67% 3	6.67% 3	6.67% 3	11.11% 5	68.89% 31	45	4.29
Shaded streets	8.89% 4	4.44% 2	6.67% 3	8.89% 4	71.11% 32	45	4.29

Q13 What physical infrastructure would you like to see more of at or near the Blue Line stations? Check all that apply.

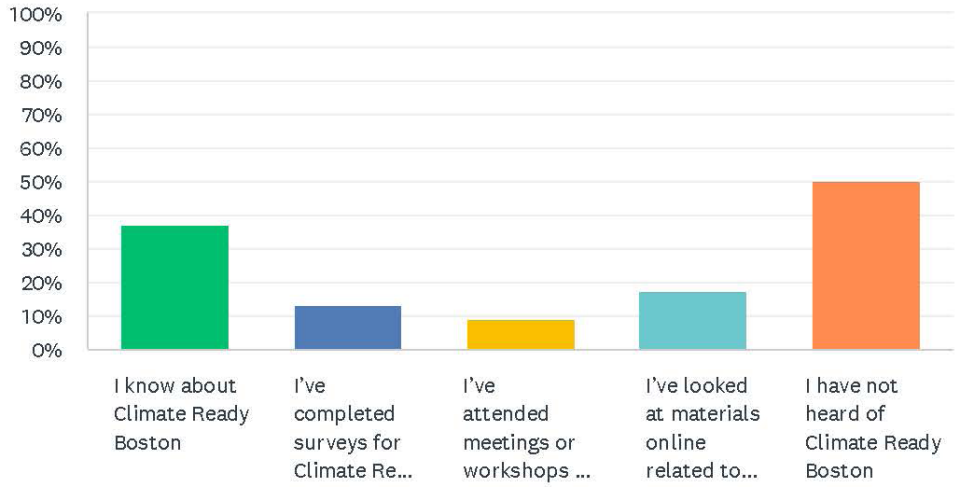
Answered: 46 Skipped: 0



ANSWER CHOICES	RESPONSES	
Increased safety for walking (e.g. crosswalks, wider sidewalks, improved accessibility for people with disabilities)	67.39%	31
Increased safety for biking/scooters/wheeling (e.g. bike lanes)	43.48%	20
Bike parking	56.52%	26
Seating areas (e.g. benches)	67.39%	31
Bus shelters	47.83%	22
Pick-up/Drop-off locations for vehicles	32.61%	15
Other (please specify)	8.70%	4
Total Respondents: 46		

Q14 Climate Ready Boston is the City's initiative to help Boston plan for the impacts of climate change and build a resilient future. Have you participated in any work related to Climate Ready Boston? Check all that apply.

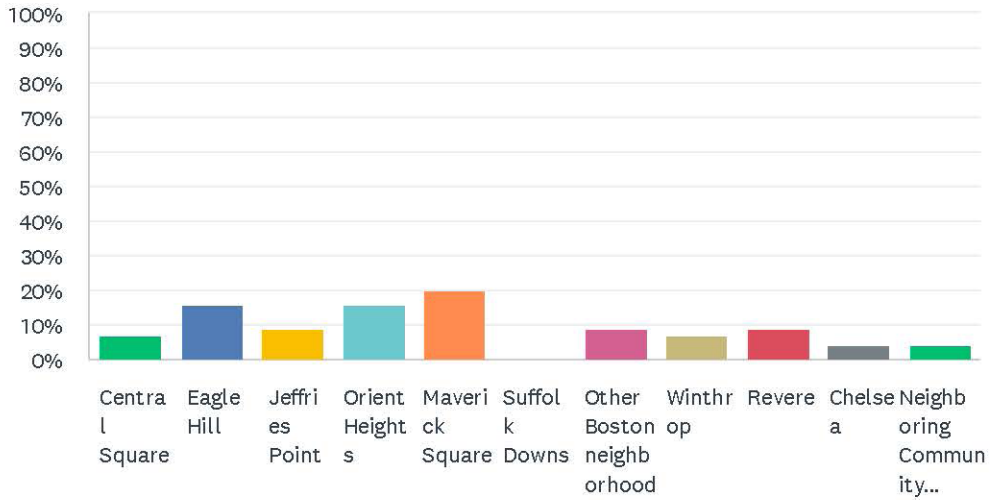
Answered: 46 Skipped: 0



ANSWER CHOICES	RESPONSES	
I know about Climate Ready Boston	36.96%	17
I've completed surveys for Climate Ready Boston	13.04%	6
I've attended meetings or workshops for Climate Ready Boston	8.70%	4
I've looked at materials online related to Climate Ready Boston	17.39%	8
I have not heard of Climate Ready Boston	50.00%	23
Total Respondents: 46		

Q16 What neighborhood do you live in?

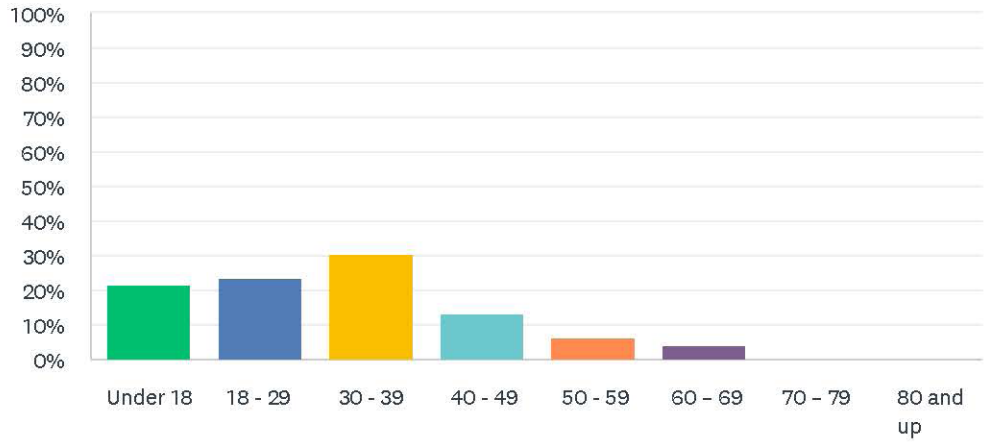
Answered: 45 Skipped: 1



ANSWER CHOICES	RESPONSES	
Central Square	6.67%	3
Eagle Hill	15.56%	7
Jeffries Point	8.89%	4
Orient Heights	15.56%	7
Maverick Square	20.00%	9
Suffolk Downs	0.00%	0
Other Boston neighborhood	8.89%	4

Q17 What is your age?

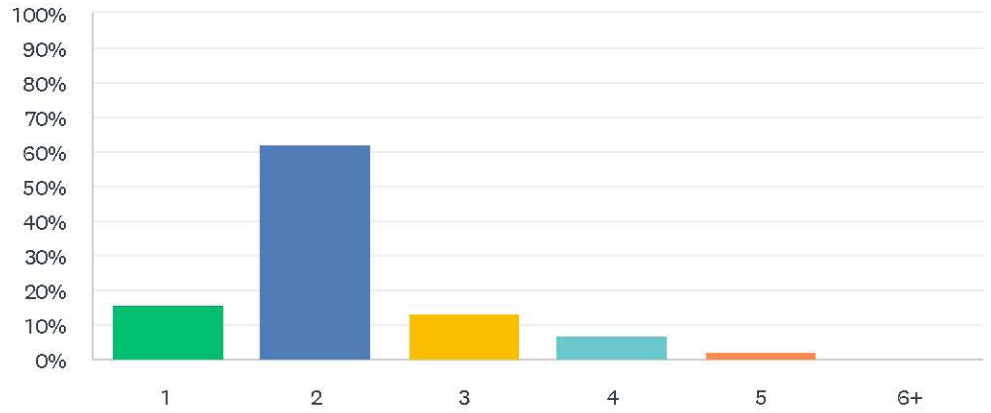
Answered: 46 Skipped: 0



ANSWER CHOICES	RESPONSES	
Under 18	21.74%	10
18 - 29	23.91%	11
30 - 39	30.43%	14
40 - 49	13.04%	6
50 - 59	6.52%	3
60 – 69	4.35%	2
70 – 79	0.00%	0
80 and up	0.00%	0
TOTAL		46

Q18 How many adults (18 or older) live in your household?

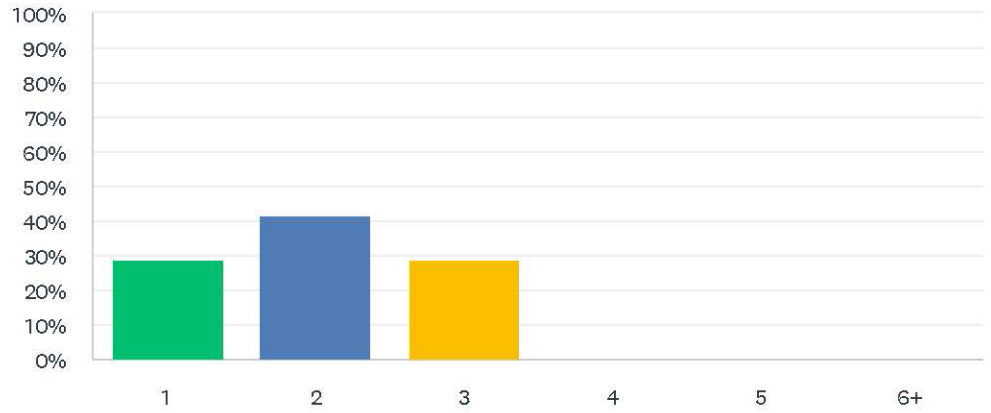
Answered: 45 Skipped: 1



ANSWER CHOICES	RESPONSES	
1	15.56%	7
2	62.22%	28
3	13.33%	6
4	6.67%	3
5	2.22%	1
6+	0.00%	0
TOTAL		45

Q19 How many minors (under 18) live in your household?

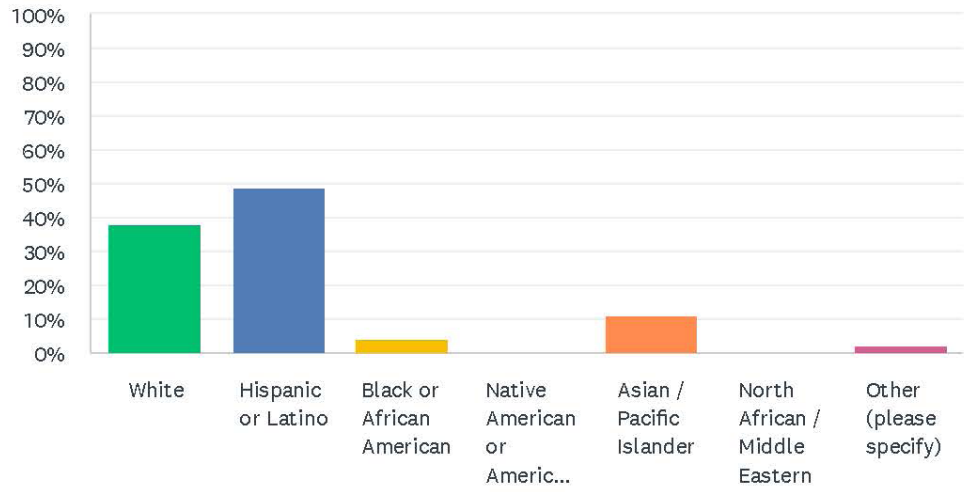
Answered: 24 Skipped: 22



ANSWER CHOICES	RESPONSES	
1	29.17%	7
2	41.67%	10
3	29.17%	7
4	0.00%	0
5	0.00%	0
6+	0.00%	0
TOTAL		24

Q20 How do you self-identify by race and/or ethnicity? Check all that apply.

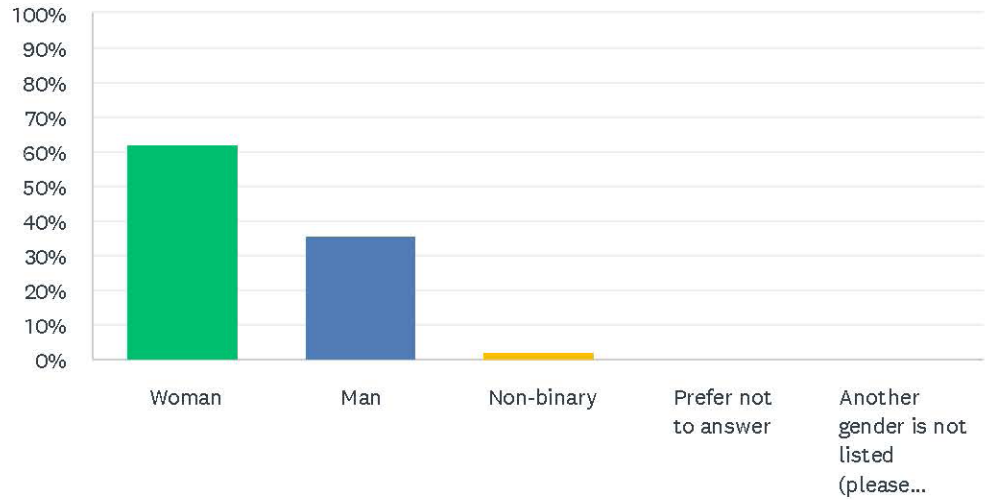
Answered: 45 Skipped: 1



ANSWER CHOICES	RESPONSES	
White	37.78%	17
Hispanic or Latino	48.89%	22
Black or African American	4.44%	2
Native American or American Indian	0.00%	0
Asian / Pacific Islander	11.11%	5
North African / Middle Eastern	0.00%	0
Other (please specify)	2.22%	1
Total Respondents: 45		

Q21 How do you self-identify by gender?

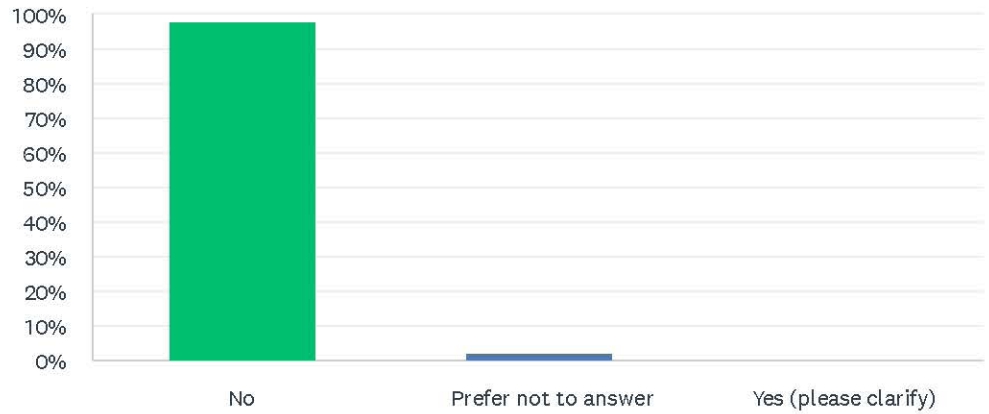
Answered: 45 Skipped: 1



ANSWER CHOICES	RESPONSES	
Woman	62.22%	28
Man	35.56%	16
Non-binary	2.22%	1
Prefer not to answer	0.00%	0
Another gender is not listed (please specify)	0.00%	0
TOTAL		45

Q22 Do you identify as a person with a disability or are you a person with accessibility needs?

Answered: 46 Skipped: 0



ANSWER CHOICES	RESPONSES	
No	97.83%	45
Prefer not to answer	2.17%	1
Yes (please clarify)	0.00%	0
TOTAL		46

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