

EXTREME WEATHER & ITS EFFECTS ON THE GREATER BOSTON POPULATION

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ASSIGNMENT 3: FINDING DATA
PLG577: INTRO TO GIS FOR URBAN PLANNING

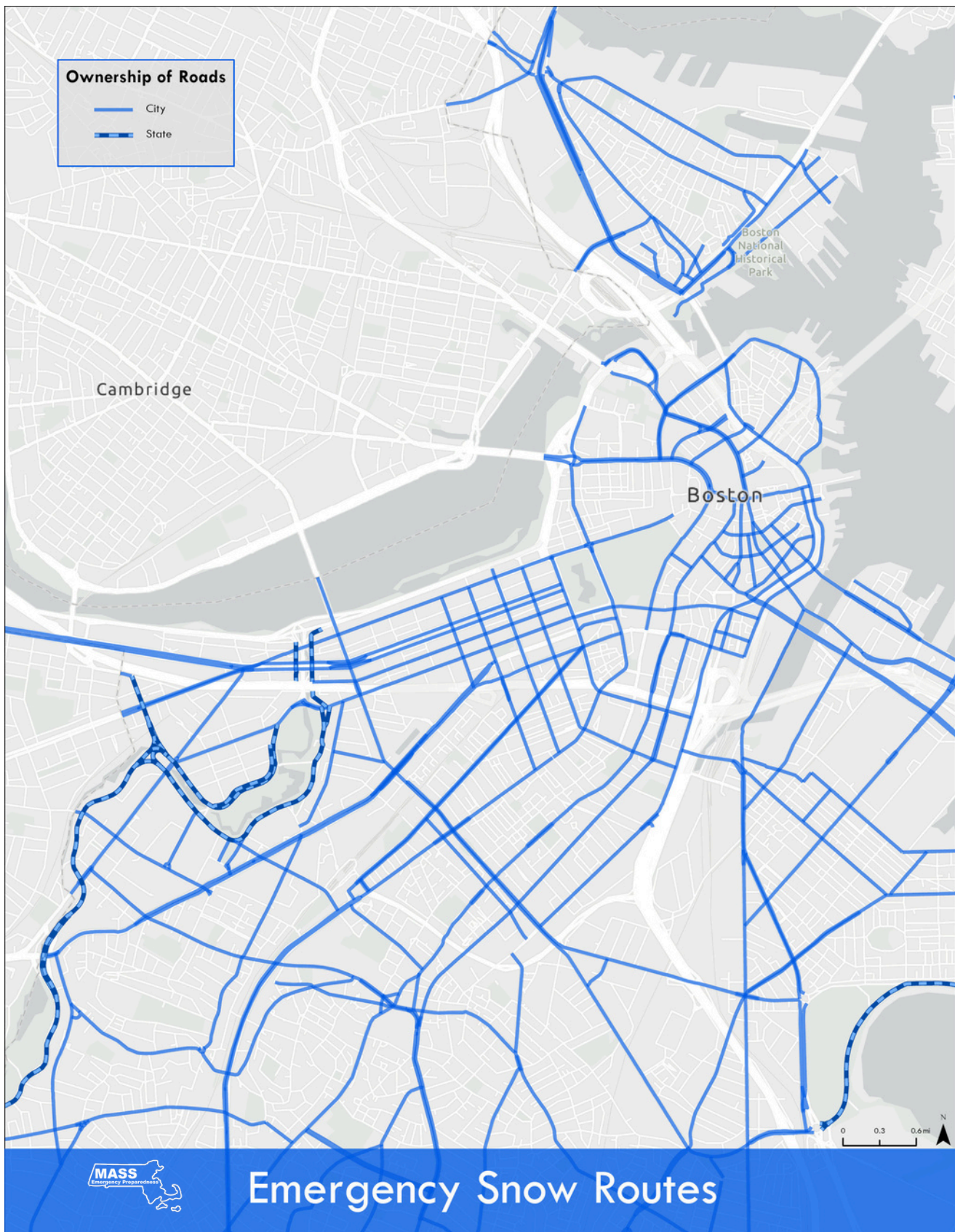
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Introduction

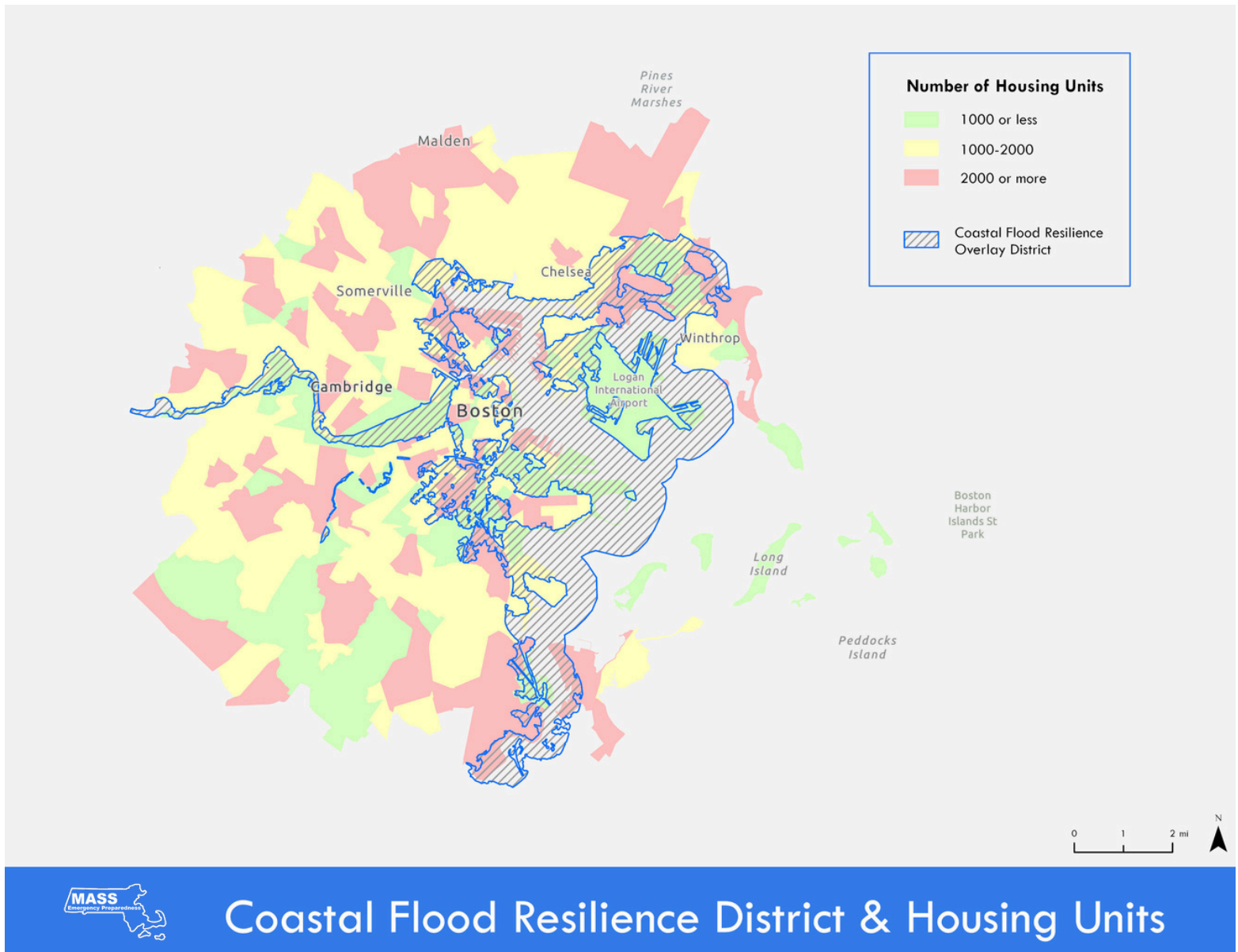
Located in the heart of New England, Boston, Massachusetts often feels the effects of extreme weather during all seasons. Additionally, Boston is a coastal city that experiences intense rainstorms, putting them at risk of hurricanes and floods. To combat this, the City of Boston and State of Massachusetts has developed mitigation measures, such as emergency road routes and coastal flood overlay districts. The purpose of this report is to visually display these mitigation measures in relation to the Boston population that it affects.

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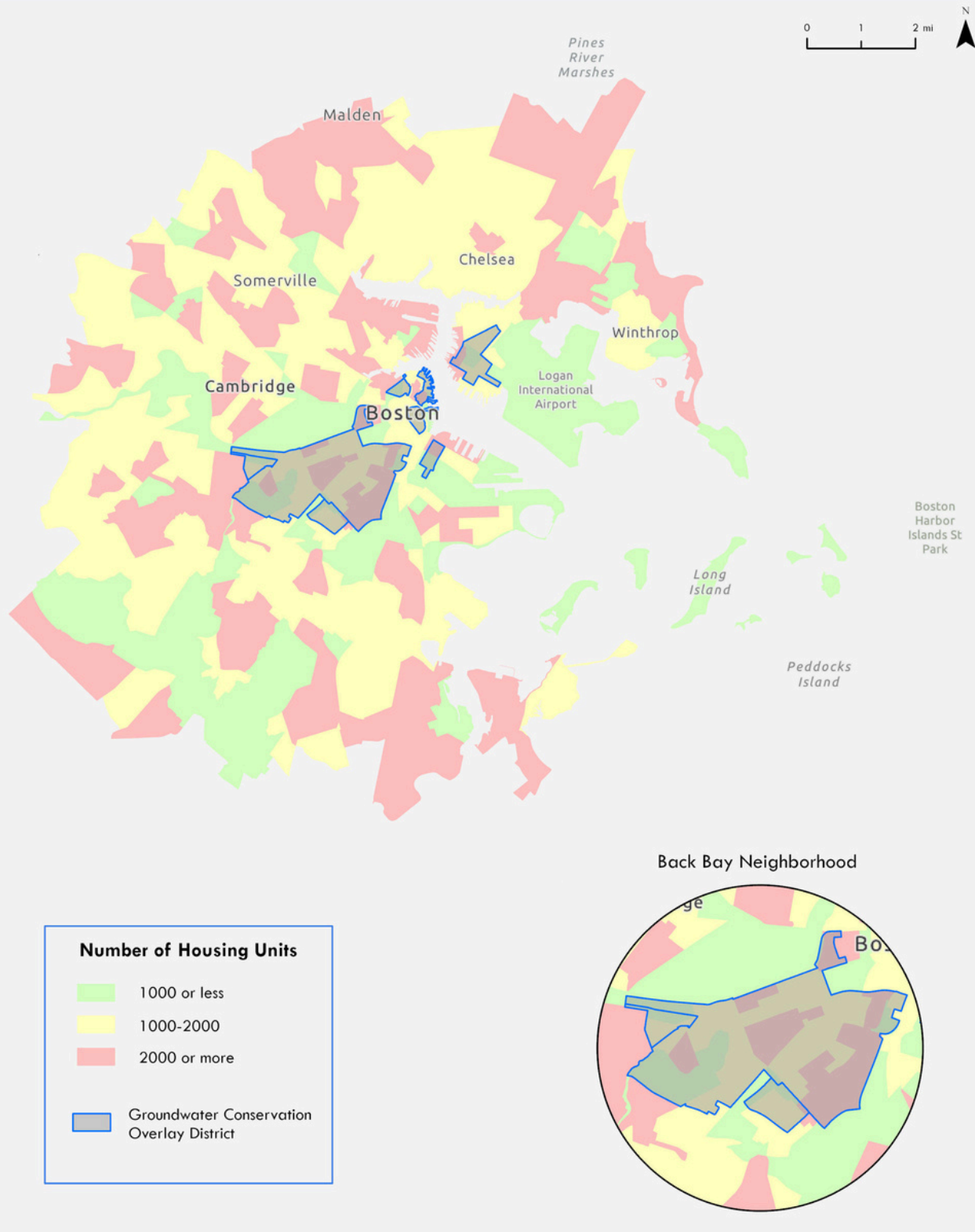
One of the most common weather phenomena in the Boston area is extreme snow. This map displays the routes that were created in case of emergency to provide more accessibility in Boston roadways, and whether they are city or state owned. It would most greatly benefit the citizens of Boston who often travel in any weather condition, who need to plan alternate routes in case of emergency.



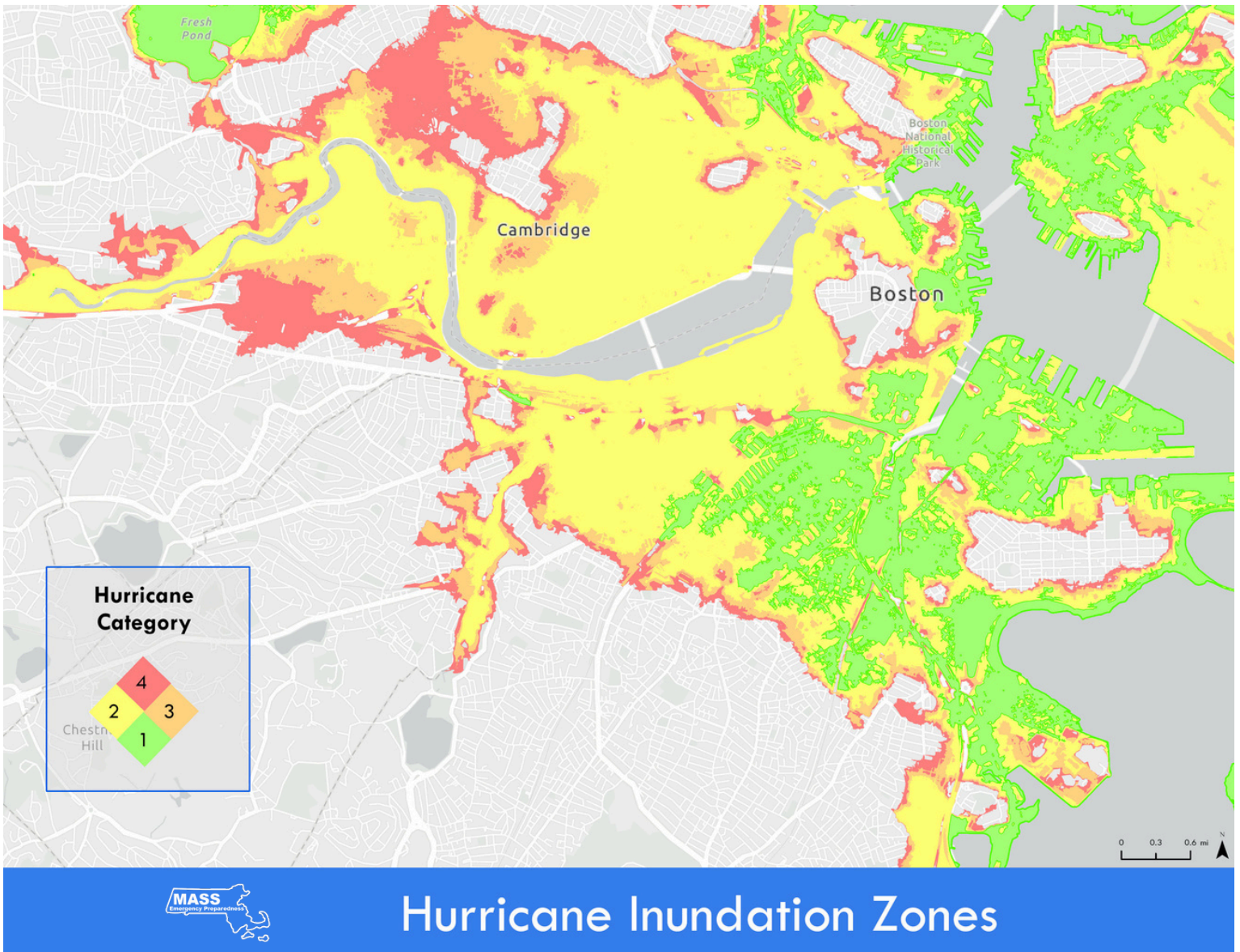
In addition to extreme snow, Boston also experiences intense rainstorms when temperatures are above freezing. Because of this, the city is at a greater risk of coastal flooding. To mitigate this, the City of Boston established a Coastal Flooding Resilience Overlay Zoning District to identify those housing units that are at a great risk. To further identify how many Bostonians are effected, this map also displays the number of housing units by Census Tract, grouped numerically based on the median number of housing units. Both Bostonians and those working in emergency preparedness would benefit from this data by being able to identify the specific areas of Boston that have the most housing units affected by coastal flooding.



Groundwater Conservation District & Housing Units

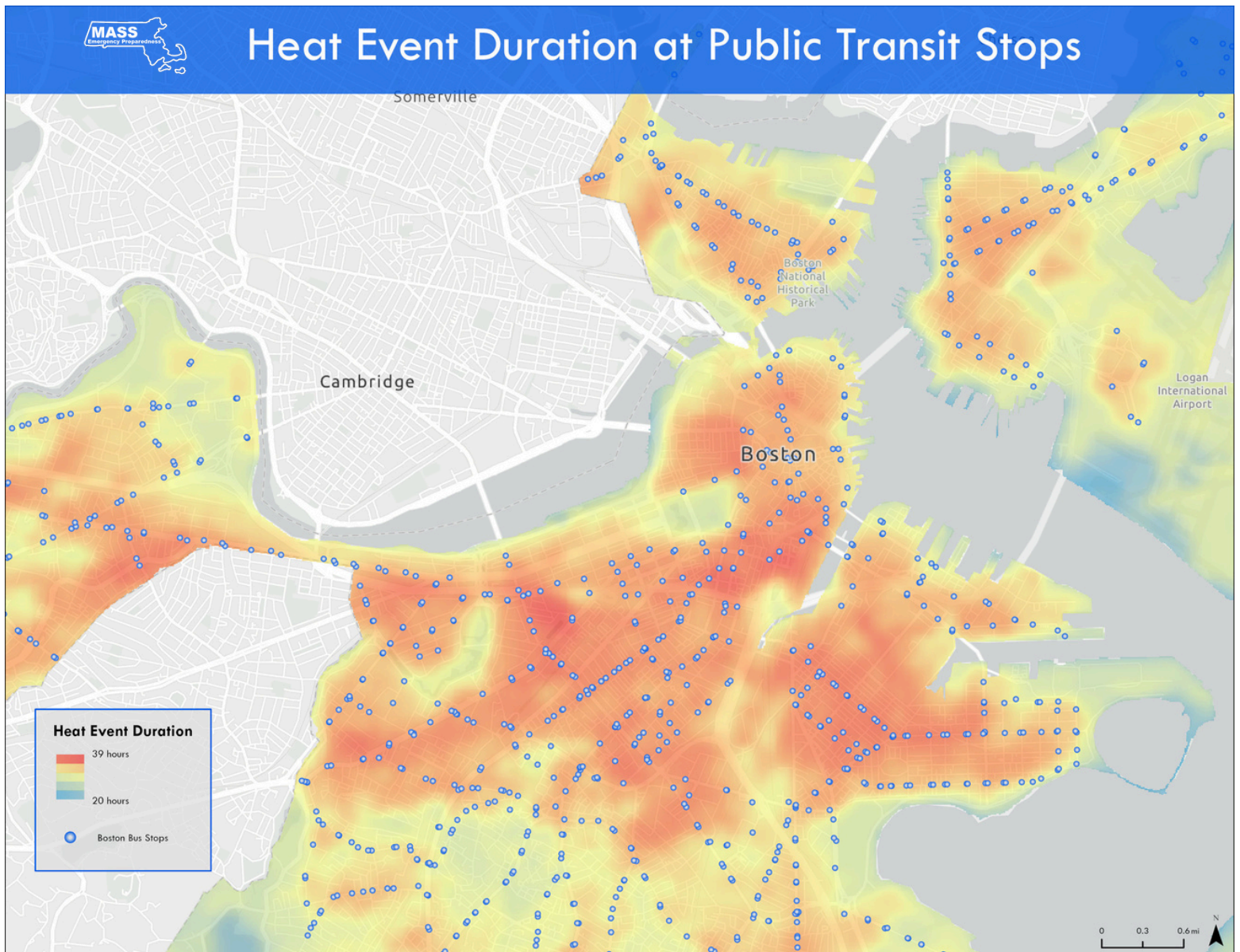


Similar to the Coastal Flood Resilience Map (Map 2), the Boston Planning Authority created data that identifies homes that are at greater risk for low groundwater damage, by creating the Groundwater Conservation Overlay district. This data is compared to total housing unit data to further identify areas with more homes at risk. This map also points out the Back Bay Neighborhood, which is a large portion of the Groundwater Conservation District.



Due to its coastal location, Boston experiences heavy rainstorm and even hurricanes.

In order to become better prepared in case of a hurricane, these inundation zones were created as a way to visualize the worst case scenario for flooding as a result of a hurricane. The severity of the flooding is represented through hurricane categories, where the least severe category (1) reaches the coastal areas, while a more severe hurricane (3 or 4) has the potential to reach more inland. This data is beneficial to all Bostonians, as it allows citizens to visually view what locations are effected by a hurricane, and in what scenarios they are effected.



To counteract the severe winters, Boston also exhibits high temperatures during the Summer as well. This map identifies areas of Boston, their extreme heat, and the duration of the extreme heat events. In the context of this map, “extreme heat” is characterized by temperatures that are at or above 95 degrees F during the day, or at or above 75 degrees F at night. The data on the map identifies the duration of extreme heat, with periods lasting as low as 20 hours and as high as 39 hours.

One of the populations most vulnerable to these extreme heat events is public transit riders, which is why bus stops are also identified on this map. This data is beneficial to all Bostonians, as they can identify the hottest locations in the city, but particularly public transit riders who may spend more time outside on average, waiting for a bus.

Metadata

Map 1 - Emergency Snow Routes

Who: City of Boston Public Works Department (PWD)

What: Feature layer. Snow emergency routes, both city and state owned.

Where: Boston, Massachusetts and surrounding areas

Why: It outlines routes that are maintained during extreme snowy weather, both by the city and state.

When: Created in February 8, 2015. Last updated January 25, 2026

Map 2 - Coastal Flood Resilience

Who: Boston Planning & Development Agency

What: Feature layer. Coastal Flood Resilience Zoning Overlay District (CFR), part of Boston Zoning Code Article 25A.

Where: Boston, Massachusetts and surrounding areas

Why: It identifies the parts of the city that are at greater risk for flood during major storms.

When: Created November 16, 2021. Last updated May 20, 2024.

Map 2 & 3 - Coastal Flood Resilience/Groundwater Conservation

Who: 2024 American Community Survey: 5-year data

What: Total Housing Units

Where: Census Tract, United States

Why: Determines total number of housing units within a specific census tract block, for the entire United States

When: 5 year period, 2020-2024, specifically estimates for 2024.

Map 3 - Groundwater Conservation Overlay District

Who: Boston Planning & Development Agency, Boston Groundwater Trust

What: Feature layer. Groundwater Conservation Overlay District (GCOD), part of Boston Zoning Code Article 32

Where: Boston, Massachusetts and surrounding areas

Why: It identifies the parts of the city that are at greater risk for home damage due to lower groundwater levels

When: Created August 28, 2022. Last updated April 3, 2025.

Map 4 - Hurricane Inundation Zones

Who: MassGIS (Massachusetts Bureau of Geographic Information)

What: Shape file. Hurricane Surge Inundation Zones.

Where: Boston, Massachusetts and surrounding areas

Why: It identifies the parts of the city that are at greater risk for flooding/excess water as a result of hurricanes.

Breaks down the risk by location and category of hurricane.

When: Created October 2013.

Map 5 - Heat Event Duration

Who: City of Boston Heat Resilience Study

What: Feature layer. Duration of Extreme Heat Event

Where: Boston, Massachusetts and surrounding areas

Why: Identifies the areas of Boston that reached/exceeded a certain temperature threshold over 20 hours.

When: Study conducted July 18-24, 2019. Data created September 17, 2021. Updated April 21, 2022.

Map 5 - Public Transit Stops

Who: MassGIS, Massachusetts Bay Transportation Authority (MBTA)

What: Shape file. All bus stops served by the MBTA in the Boston metro area.

Where: Boston, Massachusetts and surrounding areas

Why: Data that visualizes every bus stop along all routes as part of the MBTA, in both directions, inbound & out.

When: Published May 15, 2017. Last updated January 30, 2024.