



Everett Hazard Mitigation Plan 2021 Update

Everett, Massachusetts

July 22, 2021

submitted to
Federal Emergency Management Agency (FEMA)
Massachusetts Emergency Management Agency (MEMA)

Draft

submitted by **City of Everett**

prepared by **Fort Point Associates, Inc., a Tetra Tech Company**



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Urban Planning Environmental Consulting Project Permitting
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CITY OF EVERETT HAZARD MITIGATION PLAN
2021 PLAN UPDATE

< CITY LETTERHEAD >

CERTIFICATE OF ADOPTION
CITY COUNCIL

CITY OF EVERETT, MASSACHUSETTS

A RESOLUTION ADOPTING THE CITY OF EVERETT
HAZARD MITIGATION PLAN 2021 UPDATE

That the City of Everett, by and through its Mayor and City Council, is hereby authorized to adopt the *City of Everett Hazard Mitigation Plan 2021 Update*.

WHEREAS, the City of Everett, MA established a Committee to prepare the Hazard Mitigation Plan Update; and

WHEREAS, the City of Everett participated in the development of the *City of Everett Hazard Mitigation Plan 2021 Update*;

and WHEREAS, the *City of Everett Hazard Mitigation Plan 2021 Update* contains several future projects to mitigate potential impacts from natural hazards in the City of Everett, including those hazards such as flooding and extreme heat that are intensified due to the impacts of climate change, in the City of Everett, and

WHEREAS, a duly-noticed public meeting was held by the Conservation Commission on July 15, 2021 for the public and municipality to review prior to consideration of this resolution, and

WHEREAS, the City of Everett authorizes responsible departments and/or agencies to execute their responsibilities demonstrated in the plan update,

NOW, THEREFORE BE IT RESOLVED that the Everett City Council adopts the *City of Everett Hazard Mitigation Plan 2021 Update*, in accordance with M.G.L. 40 §4 or the charter and ordinances of the City of Everett.

ADOPTED AND SIGNED this Date. _____

Name(s)/Title(s)

Signature(s)

RECORD OF CHANGES

This Local Hazard Mitigation Plan, including Appendices, will be reviewed and approved on a biannual basis by the Local Planning Committee (LPC) and following any major disasters. All updates and revisions to the plan will be tracked and recorded in the following table. This process will ensure the most recent version of the plan is disseminated and implemented by the city.

<u>Date of Change</u>	<u>Entered By</u>	<u>Summary of Changes</u>

ACKNOWLEDGEMENTS AND CREDITS

The following individuals and agency staff have contributed their time to support and develop this Plan. Their contributions join the numerous comments of stakeholders and members of the public who contributed their time and thoughts to develop a more robust hazard mitigation planning study. We would like to extend a special thanks to the City of Everett and the Office of Mayor Carlo DeMaria for supporting this work and allocating municipal funds to support this project.

Local Planning Committee Members

Tom Philbin - HMP Project Manager, Conservation Agent
Erin Deveney - Mayor's Office
Deanna Deveney - Communications
Sabrina Firicano - Health Department
Captain Anthony O'Brien - Fire Department
Deputy Chief Michael Imbornone - Fire Department
Dennis Gooding - Inspectional Services Department
Matt Lattanzi - Planning and Development
Rana Wehbe - Grant Administration

Stakeholder Working Group Members

Kathleen O'Brien - Everett Community Growers
Nicole Bowden - Eversource
Tom Martin - Middlesex Gases
Daniel Cameron - National Grid
Patrick Herron - Mystic River Watershed Association (MyRWA)
Julie Wormser - Resilient Mystic Collaborative
Colin Kelly - Schnitzer Steel
Natalie Brown - Wynn Design and Development, Encore Boston Harbor

Regional Stakeholders

Erik Hokenson - Massachusetts Office of Coastal Zone Management (CZM)
Emma DeSimone - Homeland Security Region 1 Program Manager/Boston Office of Emergency Management (OEM)
Joy Duperault - Massachusetts Department of Conservation & Recreation (DCR)
Carolyn Meklenburg - Massachusetts Executive Office of Energy & Environmental Affairs (EEA)
MVP Program
Alex Train - City of Chelsea Housing & Community Development
Ben Cares - City of Chelsea Planning Department
Lou Mammolette - City of Chelsea Department of Public Works
Oliver Sellers-Garcia - City of Somerville Office of Sustainability and Environment
Thomas Graney - City of Somerville Department of Public Works
Hannah Lyons-Galante - Massachusetts Bay Transportation Authority (MBTA)

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 - Stakeholder Working Group Meeting – September 9, 2020
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EXECUTIVE SUMMARY

INTRODUCTION

Hazard mitigation is defined by the Federal Emergency Management Agency (FEMA) as “any sustainable action that reduces or eliminates long-term risk to people and property from future disasters.”¹ Mitigation plans are focused on creating a collaborative, locally-specific study that identifies risks and vulnerabilities associated with natural hazards in order to diminish their likely financial and personal impacts on the community. Under the requirements of the Federal Disaster Mitigation Act of 2000, hazard mitigation plans must be updated and re-submitted to FEMA every five years for a locality or state to maintain funding eligibility.

PLANNING PROCESS

The Local Planning Committee (LPC), comprised of members of city staff, lead the *Everett Hazard Mitigation Plan 2021 Update* (the “2021 HMP Update” or “Plan”) planning effort. The LPC was supported by a group of local stakeholders, including members of the business community, neighboring municipal staff members, nonprofit organizations, relevant state agencies, and other participants who guided this work. In total, more than a half dozen meetings were held with city officials and stakeholders as the 2015 Plan was reviewed in full and the updated Plan began to take form.

To broaden the spectrum of community input in this hazard mitigation planning process, a robust community survey was prepared in three languages – English, Portuguese, and Spanish. The survey was launched in late 2020 and was open for different periods coordinated with other public engagements through the end of the planning process in July 2021. The City of Everett communications team periodically advertised the community survey in three distinct timeframes - December 2020/January 2021, near Earth Day in April 2021, and in July 2021. Input from the community was gathered continuously to inform this update and is featured in the Plan.

The *Everett Hazard Mitigation Plan 2021 Update* is also strongly guided by public outreach and education within the Everett community. Two workshops were conducted, one in December 2020 and another in July 2021. These workshops brought a mix of the LPC, a wide range of stakeholders, and the full Everett Community Growers urban agriculture nonprofit staff, including their high school student interns, into this hazard mitigation planning.

¹ <https://www.fema.gov/grants/mitigation>

Additionally, an advertised public meeting was held on July 15, 2021 with the Everett Conservation Commission. During this meeting, the Commission and the public received an update on the hazard mitigation planning process, reviewed the risk assessment, and discussed current and future mitigation projects. The draft Plan was posted on the City's website for a period of ten days from July 22, 2021 through July 31, 2021.

RISK ASSESSMENT

The Plan provides risk assessment for the following natural hazards in Everett: flooding, landslides, drought, severe thunderstorms, severe winter storms, dam failures, and earthquakes. The Plan also considered projected coastal flood and coastal hazard risks associated with sea level rise impacts and increasing heat hazards due to climate change. This evaluation focused on the 2030 and 2070 time horizons for coastal flooding and the 2050 time horizon for extreme heat impacts.

Approximately 18.9% of the City's land area, and approximately 62 buildings worth an estimated \$429,952,200 were identified by the LPC as areas where flooding most frequently occurs based upon the anticipated 2020 mapped FEMA 100-year floodplain. Based upon FEMA guidance, the estimated losses in this area would range from 10% (\$42,995,220) and 50% (\$214,976,100) of total building value. Approximately 62.6% of the City's land area, and approximately 1,067 buildings worth an estimated \$972,165,000 were identified by the LPC as areas where flooding is projected to frequently occur in 2070 time-horizon based the Massachusetts Coastal – Flood Risk Model. Based upon FEMA guidance, the estimated losses in this area would range from 10% (\$97,165,000) and 50% (\$486,082,500) of total building value.

MITIGATION GOALS

The Plan is guided by nine Mitigation Goals, which build upon the nine goals endorsed in the 2015 HMP Update. These goals broadly represent the community's priorities and vision for mitigating the risk of natural hazards in Everett as follows:

1. Prevent and reduce the loss of life, injury and property damages resulting from all major natural hazards.
2. Identify and seek funding for measures to mitigate or eliminate each known significant flood hazard area.
3. Integrate hazard mitigation planning as an integral factor in all relevant municipal departments, committees, and boards.
 - Review zoning regulations to ensure that the ordinance incorporates all reasonable hazard mitigation provisions.
 - Ensure that all relevant municipal departments have the resources to continue to enforce codes and regulations related to hazard mitigation.

4. Prevent and reduce the damage to public infrastructure resulting from all hazards, incorporating a particular focus on flooding and extreme heat hazards, which are likely to intensify due to climate change.
5. Encourage the business community, major institutions, and non-profits to work with the City to develop, review and implement the hazard mitigation plan.
6. Work with surrounding communities, state, regional and federal agencies to ensure regional cooperation and solutions for hazards affecting multiple communities.
 - Continue to partner with the City of Chelsea to focus on the significant coastal flood hazards occurring now and in the future at the Island End River.
7. Ensure that future development meets federal, state, and local standards for preventing and reducing the impacts of natural hazards.
8. Educate the public about natural hazards and mitigation measures that can be undertaken by property-owners.
 - Provide information on hazard mitigation activities in the languages most frequently spoken in Everett.
9. Take maximum advantage of resources from FEMA, MEMA, and other federal and state agencies to fund large-scale hazard mitigation projects

KEY HAZARD MITIGATION ACTIONS

The following mitigation actions were highlighted through this Plan:

- Constructing a coastal flood barrier near the Island End River to protect regional food distribution hub and surrounding industrial area from storm surge.
- Complete repair of the Market and Beacham Street culverts near the Island End River and identify needed tide gate and pump station infrastructure in this corridor.
- Upgrade stormwater pipe infrastructure in the Second Street corridor to alleviate flooding and treat stormwater runoff.
- Model stormwater flood risk throughout the City to identify additional mitigation projects needed.
- Implement new floodplain overlay district zoning to incorporate sustainable planning into new developments and significant renovations into Chapter 9 of the Everett General Ordinances – Flood Damage Prevention.
- Implement a green standard for the City that incorporates updated engineering design guides and eventually a zoning ordinance that incentivizes the use of low impact development strategies and nature-based solutions in new developments and significant renovations.

- Enhance community cooling centers to attract community residents to these facilities during heat waves.
- Increase and protect urban tree canopy in Everett through increased tree planting and public education about benefits of healthy shade trees.

PLAN REVIEW AND UPDATE PROCESS

Table 1-1: Plan Review and Update

Chapter	Reviews and Updates
III – Public Participation	Public participation was a key feature of the Plan. In addition to the LPC, a Stakeholder Working Group comprised of local business leaders, nonprofit organizations, neighboring municipal staffs, state agency representatives, and others led this Plan. The City of Everett focused on reaching out to the community in their primary written and/or spoken language to gather feedback. A community survey was conducted in English, Portuguese, and Spanish and was open for different periods coordinated with other public engagements through the end of the planning process. It was promoted on the City's social media accounts, shared through LPC and stakeholder listservs and other connections, and available on the City website. An advertised public meeting was held in coordination with the Everett Conservation Commission in July 2021. The Plan was also available on the City's website.
IV – Risk Assessment	The Consultant Team gathered recent available hazard and land use data and met with the LPC to identify any recent changes in land use and development trends. The critical infrastructure list was updated to incorporate new features and eliminate any facilities that were no longer operational in Everett. The best available projected coastal flood mapping from the State of Massachusetts's endorsed MC-FRM was analyzed as part of this plan review and update. The latest version of HAZUS was also used to evaluate flooding and earthquake hazards.
V - Goals	The Hazard Mitigation Goals were reviewed and updated by the LPC.
VI – Existing Mitigation Measures	The list of existing mitigation measures was updated to reflect current mitigation activities in the City.
VII & VIII – Hazard Mitigation Strategy	Mitigation measures from the 2015 Plan were reviewed to identify the status (complete, ongoing, or deferred) of each measure. The LPC identified additional mitigation measures to support these efforts and new mitigation measures to address growing hazards due to the impacts of climate change. Mitigation measures were reprioritized based upon LPC, stakeholder, and community input.
IX – Plan Adoption & Maintenance	This section of the Plan was updated with a new implementation plan and five year update process that will aid the City in continuing their progress tackling hazard mitigation measures throughout the City.

Some mitigation measures, such as the construction of a large-scale coastal flood resilience barrier at the Island End River, will require significant monetary investment. The City of Everett and its regional partners are exploring funding opportunities through the FEMA Building Resilient

Infrastructure & Communities (BRIC) grant program, as well as other state and federal funding opportunities.

Chapter 1

INTRODUCTION

CHAPTER 1: INTRODUCTION

1.1 PLANNING REQUIREMENTS UNDER THE FEDERAL DISASTER MITIGATION ACT

Each year, natural disasters in the United States cause loss of life and damage to infrastructure and property at the local, state, and federal levels. The Federal Emergency Management Agency (FEMA), established in 1979, has a primary purpose to not only respond to these disasters when they strike, but to prepare for and protect against the impacts of natural hazards such as floods, storms, and extreme temperatures before they turn into disasters.

To aid this effort, FEMA provides technical and financial natural disaster assistance to state and local governments through the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act). The law as originally adopted authorized the President of the United States to declare an emergency at the local and state levels following a natural disaster, thereby allowing Congressional funds and federal assistance to be provided. Recognizing that proactively planning for natural disasters would allow local, tribal, and state communities to reduce their vulnerability to loss of life and property, Congress further amended the Stafford Act with the Federal Disaster Mitigation Act of 2000 on October 30, 2000. The law requires that after November 1, 2004, municipalities who wish to be eligible for certain types of FEMA funding must adopt a local multi-hazard mitigation plan.

Hazard mitigation is defined by FEMA as “any sustainable action that reduces or eliminates long-term risk to people and property from future disasters.”¹ Mitigation plans are focused on creating a collaborative, locally-specific study that identifies risks and vulnerabilities associated with natural hazards in order to diminish their likely financial and personal impacts. Hazard mitigation plans must be updated and re-submitted to FEMA every five years for a locality or state to maintain funding eligibility.

The City of Everett has formally participated in local hazard mitigation planning since 2004, when it and eight other Metro Boston communities developed the Metro Boston Multi-Jurisdictional Hazard Mitigation Plan under the guidance of the Metropolitan Area Planning Council (MAPC). This regional plan allowed the neighboring communities to jointly identify inter-community hazard mitigation issues during the early years of the Federal Disaster Mitigation Act.

On September 23, 2015, the City of Everett individually filed a Hazard Mitigation Plan Update (the “2015 HMP Update”) with FEMA in compliance with the requirements of the

¹ <https://www.fema.gov/grants/mitigation>

Federal Disaster Mitigation Act. Based on the State of Massachusetts' prior regional approach, the 2015 HMP Update built upon the multijurisdictional MAPC plan and was the first document prepared solely for the City of Everett. This document serves as an update to the 2015 HMP Update as required by FEMA.

1.2 PURPOSE OF THE PLAN

The purpose of the *Everett Hazard Mitigation Plan 2021 Update* (the “2021 HMP Update” or “Plan”) is to provide the City of Everett with an assessment of the natural hazards it has experienced in the 2015-2021 period, as well as strategies to reduce or eliminate the loss of life and property damage resulting from likely future hazards, including those hazards exacerbated by the impacts of climate change. With a robust community engagement process and a comprehensive inventory of Everett’s existing mitigation tools, the 2021 HMP Update suggests improvements to the City’s planning, policy, and programs to reduce vulnerability and risk.

The City of Everett has experienced 22 hazards that triggered federal or state disaster declarations since 1991. These are listed in Table 1-1, Previous Federal/State Disaster Declarations and are reflective of the most significant hazard within the community consistently being flood hazards.

Table 1-1: Previous Federal/State Disaster Declarations²

Disaster Number - Disaster Name (Date of Event)	Type of Federal Assistance Provided	Declared Areas in MA
914 - Hurricane Bob (August 1991)	FEMA Public Assistance Project Grants	Counties of Barnstable, Bristol, Dukes, Essex, Hampden, Middlesex, Plymouth, Nantucket, Norfolk, Suffolk
	Hazard Mitigation Grant Program	Counties of Barnstable, Bristol, Dukes, Essex, Hampden, Middlesex, Plymouth, Nantucket, Norfolk, Suffolk (16 projects)
920 - No-Name Storm (October 1991)	FEMA Public Assistance Project Grants	Counties of Barnstable, Bristol, Dukes, Essex, Middlesex, Plymouth, Nantucket, Norfolk, Suffolk

² FEMA Disaster Declarations for States and Counties, <https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties>

Disaster Number - Disaster Name (Date of Event)	Type of Federal Assistance Provided	Declared Areas in MA
	FEMA Individual Household Program	Counties of Barnstable, Bristol, Dukes, Essex, Middlesex, Plymouth, Nantucket, Norfolk, Suffolk
	Hazard Mitigation Grant Program	Counties of Barnstable, Bristol, Dukes, Essex, Middlesex, Plymouth, Nantucket, Norfolk, Suffolk
975 - Winter Coastal Storm (Dec. 11-13, 1992)	FEMA Public Assistance	Counties of Barnstable, Bristol, Dukes, Essex, Middlesex, Plymouth, Nantucket, Norfolk, Suffolk
3103 - March Blizzard (March 1993)	FEMA Public Assistance Project Grants	Statewide
1090 - January Blizzard (January 1996)	FEMA Public Assistance Project Grants	Statewide
3119 - October Flood (October 1996)	FEMA Public Assistance Project Grants	Counties of Essex, Middlesex, Norfolk, Plymouth, Suffolk
	FEMA Individual Household Program	Counties of Essex, Middlesex, Norfolk, Plymouth, Suffolk
	Hazard Mitigation Grant Program	Counties of Essex, Middlesex, Norfolk, Plymouth, Suffolk
(1997)	Community Development Block Grant – HUD	Counties of Essex, Middlesex, Norfolk, Plymouth, Suffolk
1224 - June Flood (June 1998)	FEMA Individual Household Program	Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester
	Hazard Mitigation Grant Program	Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester
	Community Development Block Grant - HUD	Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester

Disaster Number - Disaster Name (Date of Event)	Type of Federal Assistance Provided	Declared Areas in MA
1364 - March Flood (March 2001)	FEMA Individual Household Program	Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester
	Hazard Mitigation Grant Program	Counties of Bristol, Essex, Middlesex, Norfolk, Suffolk, Plymouth, Worcester
3175 - February Snowstorm (Feb 17-18, 2003)	FEMA Public Assistance Project Grants	Statewide
January Blizzard (January 22-23, 2005)	FEMA Public Assistance Project Grants	Statewide
3252 - Hurricane Katrina (August 29, 2005)	FEMA Public Assistance Project Grants	Statewide
1642 - May Rainstorm/Flood (May 12-23, 2006)	Hazard Mitigation Program Grants	Statewide
1701 - April Nor'easter (April 15-27, 2007)	Hazard Mitigation Program Grants	Statewide
1895 - Flooding (March, 2010)	FEMA Public Assistance, FEMA Individuals and Household Program, SBA Loan	Counties of Bristol, Essex, Middlesex, Suffolk, Norfolk, Plymouth, Worcester
	Hazard Mitigation Grant Program	Statewide
3330 - Tropical Storm Irene (August 27-28, 2011)	FEMA Public Assistance	Statewide
3350 - Hurricane	FEMA Public Assistance	Statewide

Disaster Number - Disaster Name (Date of Event)	Type of Federal Assistance Provided	Declared Areas in MA
Sandy (October 27-30, 2013)		
4110 - Severe Snowstorm and Flooding (Feb. 8-9, 2013)	FEMA Public Assistance	Statewide
4214 – Severe Winter Storm, Snowstorm, and Flooding (Jan. 26-28, 2015)	FEMA Public Assistance	Statewide
4379 – Severe Winter Storm and Snowstorm (March 13-14, 2018)	FEMA Public Assistance	Counties of Essex, Middlesex, Norfolk, Suffolk, Worcester
3438 - COVID-19 (2020)	FEMA Public Assistance	Statewide
4496 – COVID-19 Pandemic	FEMA Individual Household Program	Statewide
	FEMA Public Assistance	Statewide

1.3 NATIONAL FLOOD INSURANCE PROGRAM (NFIP)

The National Flood Insurance Program (NFIP), managed by FEMA, makes federally-backed flood insurance available to property owners, renters, and businesses in those states and communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage.³ Flood insurance is required by government-backed mortgage lenders for homes and businesses in areas with a high flood risk. Table 1-2 provides a summary of the NFIP participation within Everett as of July 7, 2020.

³ FEMA Flood Insurance, <https://www.fema.gov/flood-insurance>

Table 1-2: NFIP Participation as of July 7, 2020

Flood insurance policies in force (as of July 7, 2020)	17
Coverage amount of flood insurance policies	\$5,573,000
Premiums Paid	\$11,431
Total number of closed paid losses	11
Total payments of closed paid losses	\$66,458

1.4 MITIGATION GOALS

The 2021 HMP Update is guided by nine Mitigation Goals, which build upon the nine goals endorsed in the 2015 HMP Update. These goals broadly represent the community's priorities and vision for mitigating the risk of natural hazards in Everett.

The Local Planning Committee (LPC) endorsed the following goals, further described in Chapter 6: Mitigation:

1. Prevent and reduce the loss of life, injury and property damages resulting from all major natural hazards.
2. Identify and seek funding for measures to mitigate or eliminate each known significant flood hazard area.
3. Integrate hazard mitigation planning as an integral factor in all relevant municipal departments, committees, and boards.
 - Review zoning regulations to ensure that the ordinance incorporates all reasonable hazard mitigation provisions.
 - Ensure that all relevant municipal departments have the resources to continue to enforce codes and regulations related to hazard mitigation.
4. Prevent and reduce the damage to public infrastructure resulting from all hazards, incorporating a particular focus on flooding and extreme heat hazards, which are likely to intensify due to climate change.
5. Encourage the business community, major institutions, and non-profits to work with the City to develop, review and implement the hazard mitigation plan.
6. Work with surrounding communities, state, regional and federal agencies to ensure regional cooperation and solutions for hazards affecting multiple communities.
 - Continue to partner with the City of Chelsea to focus on the significant coastal flood hazards occurring now and in the future at the Island End River.
7. Ensure that future development meets federal, state, and local standards for preventing and reducing the impacts of natural hazards.

8. Educate the public about natural hazards and mitigation measures that can be undertaken by property-owners.
 - Provide information on hazard mitigation activities in the languages most frequently spoken in Everett.
9. Take maximum advantage of resources from FEMA, MEMA, and other federal and state agencies to fund large-scale hazard mitigation projects

1.5 PLAN REVIEW AND UPDATE

Table 1-3: Plan Review and Update

Chapter	Reviews and Updates
III – Public Participation	Public participation was a key feature of the Plan. In addition to the LPC, a Stakeholder Working Group comprised of local business leaders, nonprofit organizations, neighboring municipal staffs, state agency representatives, and others led this Plan. The City of Everett focused on reaching out to the community in their primary written and/or spoken language to gather feedback. A community survey was conducted in English, Portuguese, and Spanish and was open for different periods coordinated with other public engagements through the end of the planning process. It was promoted on the City's social media accounts, shared through LPC and stakeholder list servs and other connections, and available on the City website. An advertised public meeting was held in coordination with the Everett Conservation Commission in July 2021. The Plan was also available on the City's website.
IV – Risk Assessment	The Consultant Team gathered recent available hazard and land use data and met with the LPC to identify any recent changes in land use and development trends. The critical infrastructure list was updated to incorporate new features and eliminate any facilities that were no longer operational in Everett. The best available projected coastal flood mapping from the State of Massachusetts's endorsed Massachusetts Coast – Flood Risk Model (MC-FRM) was analyzed as part of this plan review and update. The latest version of HAZUS was also used to evaluate flooding and earthquake hazards.
V - Goals	The Hazard Mitigation Goals were reviewed and updated by the LPC.
VI – Existing Mitigation Measures	The list of existing mitigation measures was updated to reflect current mitigation activities in the City.
VII & VIII – Hazard	Mitigation measures from the 2015 Plan were reviewed to identify the status (complete, ongoing, or deferred) of each measure. The LPC identified additional mitigation measures to support these efforts and new mitigation measures to address growing hazards due to the

Mitigation Strategy	impacts of climate change. Mitigation measures were reprioritized based upon LPC, stakeholder, and community input.
IX – Plan Adoption & Maintenance	This section of the Plan was updated with a new implementation plan and five year update process that will aid the City in continuing their progress tackling hazard mitigation measures throughout the City.

1.6 AUTHORITY AND ASSURANCES

The City of Everett will continue to comply with all applicable Federal laws and regulations during the periods for which it receives future grant funding, in compliance with 44 CFR 201.6. It will amend the Plan whenever necessary to reflect changes in city, state, or federal laws and regulations, as required in 44 CFR 201.6.

The LPC acknowledges the following FEMA publications, which were used in this 2021 HMP Update:

- *Local Mitigation Planning Handbook (March 2013)*
- *Local Mitigation Plan Review Guide (October 2011)*
- *Demonstrating Good Practices Within Local Hazard Mitigation Plans (January 2017, FEMA Region 1)*

1.7 PLAN ADOPTION

The City of Everett will submit the 2021 HMP Update to the Massachusetts Emergency Management Agency (MEMA) for state review before sending the document to FEMA for approval. The City of Everett will adopt the plan when it has received “approved-pending adoption” status from FEMA. The Certificate of Adoption is included on page 4. The Certificate of Adoption is included on page 2 of this Plan.

1.8 DOCUMENT OVERVIEW

The 2021 HMP Update follows FEMA guidelines and is organized into seven chapters in addition to appendices. A summary of the document is found below.

Chapter 2: Community Profile

The Community Profile provides an overview of the City of Everett’s geography and demographics, as well as its community resources, infrastructure, and development patterns.

Chapter 3: Planning Process

The Planning Process describes the community engagement process throughout the development of the 2021 HMP Update, including both internal meetings with the LPC and

the Stakeholder Working Group and engagement efforts with members of the public. In addition to a half-day workshop with the LPC and Stakeholder Working Group, the planning team conducted a public meeting and distributed a Community Preparedness Survey. This work was further enhanced by partnering with the Everett Community Growers, a local nonprofit focused on urban agriculture and food security, to engage their diverse staff in a workshop session that focused on GIS mapping of natural hazards and robust discuss of mitigation measures to address natural hazards.

Chapter 4: Risk and Vulnerability Assessment

The Risk and Vulnerability Assessment summarizes the frequency and severity of natural hazards experienced in Everett. This information is compared against the City's land use and critical infrastructure to evaluate current and future vulnerabilities.

Chapter 5: Capability Assessment

The Capability Assessment inventories the City's available tools and resources for mitigating the impacts of hazards. The chapter inventories and examines Everett's regulations, administrative tools and staffing, policies, regional partnerships, funding sources, and education and communications systems.

Chapter 6: Mitigation Goals and Strategy

The Mitigation Goals and Strategy builds upon the Risk and Vulnerability Assessment and the Capability Assessment to recommend mitigation actions in Everett. These goals were agreed to by the LPC after reviewing and revising those established in the 2015 HMP Update.

Chapter 7: Plan Adoption and Maintenance

The Plan Adoption and Maintenance describes the process for the 2021 HMP Update's approval by City Council and FEMA. The chapter includes a proposed evaluation schedule to monitor hazards and ongoing mitigation efforts in preparation for the forthcoming 2026 HMP Update.

Appendices

The Appendices include supporting documentation from the planning process, such as meeting notes, the Community Preparedness Survey and its results, data sources, and other supporting materials for the 2021 HMP Update.

Chapter 2

COMMUNITY PROFILE

CHAPTER 2: COMMUNITY PROFILE

2.1 INTRODUCTION

Everett was settled in 1630, established as a town in 1870, and incorporated as a city in 1892. Located in Middlesex County, it is bordered by the city of Malden to the north, the cities of Chelsea and Revere to the east, the Malden River to the west, and the Mystic River to the south. The Charlestown neighborhood of the City of Boston and the Assembly Square neighborhood of the City of Somerville are located across the Mystic River. Everett is bisected by a major roadway, Route 16/Revere Beach Parkway, which runs east/west from Medford through Everett and into Chelsea. The city is close to Interstate Highways 93 and 95, has 60 miles of public roads, and is served by the Massachusetts Bay Transportation Authority (MBTA). Boston's Logan International Airport is approximately 15 minutes away by car. Map 2-1 shows Everett and its road network within the regional context.

It is a small city of 3.5 square miles, yet the City of Everett able to provide a high level of educational, public safety, public works and recreational services to its residents at a modest tax rate. The City's public facilities include seven elementary schools, one junior high school, and one senior high school, which offers a vocational education program. Water and sewer services are provided by the Massachusetts Water Resources Authority (MWRA).

A blue-collar working-class community, Everett has served as a gateway city to immigrants for most of its history. The community has a diversified industrial and commercial base. Everett industry contributes significantly to the economic well-being of the Commonwealth of Massachusetts, with many of its companies producing and servicing products in use world-wide. Everett's employment is concentrated in industries associated with its Designated Port Area (DPA) along the Mystic River; in food produce distribution, reflecting the presence of the New England Produce Center and surrounding facilities at Beacham and Market Streets, and in a range of service and retail establishments, especially those serving health care and social services. Many of these jobs are located in industrial and commercial spaces within the city's waterfront along the Mystic River.

Table 2-1 provides a snapshot of the demographics within Everett.

Table 2-1: Estimated Everett Characteristics

Population = 46,118
<ul style="list-style-type: none">• 22% are under the age of 18• 11% are over the age of 65• 30% speak English less than “very well”• 18% of households have no vehicle
Number of Housing Units = 16,021
<ul style="list-style-type: none">• 61% are renter-occupied housing units• 63% of housing units were built before 1940

Source: U.S. Census, 2019 American Community Survey 5-Year Estimates

2.2 GEOGRAPHY

The City of Everett is bound by two major rivers – the Mystic River along the City’s southern perimeter and the Malden River along the City’s western perimeter. The Island End River (IER) is a tributary to the Mystic River and is located south of the Department of Conservation and Recreation (DCR) Amelia Earhart Dam. The dam provides an important tidal management resource on the Mystic River to control upstream flooding in the Mystic River watershed. The community recognizes these rivers as an important source of strength and vulnerability within the community because of the resources they provide and the challenges they present for the City of Everett. Map 2-2 provides an aerial view of the city.

These rivers are an important regional asset for food security and job creation centered around a thriving produce distribution industry at the New England Produce Center. These rivers also serve as a gateway to connect the City of Everett to recent economic development across the Mystic River in Somerville and to public open space along the Mystic and Malden Rivers in Medford and Malden. The IER has been significantly altered historically by industrial development and associated fill activities for sites like the New England Produce Center where the river was culverted in 1968. Due to lack of maintenance and the impacts of significant uncontrolled stormwater and tidal flows, the Market Street Culvert at the New England Produce Center is failing with several collapsed pipe sections and exposed sinkhole areas that pose a risk to public safety, the local produce industry, and water quality in the Mystic River. The Cities of Chelsea, Everett, along with other partners are working aggressively to secure funding through FEMA and other federal, state, and non-government agencies to address this aging utility infrastructure.

These coastal and riverine resources also present a growing flood risk to the City of Everett. The IER and a portion of the Mystic River south of the DCR Amelia Earhart Dam are tidally influenced and experience storm surge effects from Boston Harbor in major storm events. Relatively flat topographic elevations in Everett and neighboring Chelsea

also present overland pathways for coastal/saltwater flooding to impact areas deeper into the community.

2.3 LAND USE

The city is characterized by both densely developed residential neighborhoods bordered by walkable neighborhoods serving commercial retail streets, as well as an intensely used industrial area that includes a power plant and a materials processing facility. There is a large open space in the northeastern portion of the city, comprised of the Woodlawn Cemetery, Beth Israel Cemetery, and Glenwood Cemetery, and smaller parks generally throughout the residential portion of the city. However, this has been changing along the Malden River through recent efforts to increase the amount of public open space and access to the riverfront by Everett's leadership.

The residential neighborhood and commercial areas are generally located in the upland hills while the industrial area is adjacent to the Mystic River and IER. Generally, residential neighborhoods are found north of Route 16. Within the low-lying area near the Mystic River and IER in Everett are a great concentration of largely industrial users: rail yard for MBTA, scrap metal recycling, oil tank farms, and a significant amount of food produce distribution (Beacham Street, Second Street).

Population density is highest north of Route 16, within the residential areas of the city, and lowest along the rivers and industrial/commercial areas. Everett is most dense toward center of city and the Broadway corridor. See Map 2-3, Everett Population Density.

2.4 DEMOGRAPHICS

The estimated population in Everett was 46,118 residents in 2019. The associated city-wide population density of 13,000 people per square mile assumes an even distribution of the population throughout the city. If the population was assumed to be limited to the residential areas predominantly found north of Route 16, the associated population density would be approximately 23,000 people per square mile.

The median household income in Everett is \$65,528 (2019 inflation-adjusted dollars). Table 2-2, Workforce Characteristics, compares the characteristics of the city's working-age population to that of Middlesex County. The city lags the county in educational attainment: 14% of Everett's workers lack a high school degree compared to 3% in Middlesex County and 22% of Everett workers have a Bachelor's degree or higher compared to 57% of workers in Middlesex County. However, more of the city's workers have some high school or a high school degree and more workers with some college or an Associate's degree than is found in greater Middlesex County.

Table 2-2: Workforce Characteristics

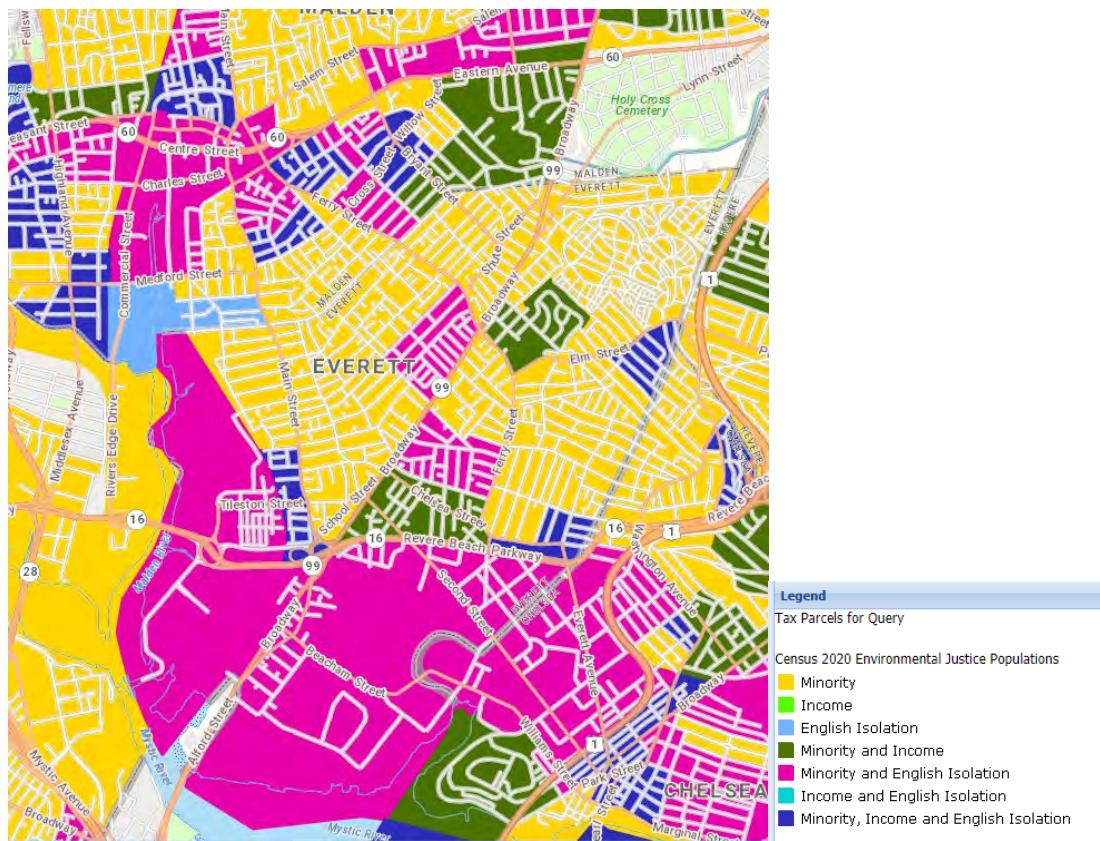
Education	City of Everett	Middlesex County
Population Age 25+	31,559	1,137,894
Less than 9 th grade	13%	3%
Some High School or High School Graduate (or GED)	36%	22%
Some college or Associate Degree	29%	18%
Bachelor's Degree or higher	22%	57%

All census block groups are considered Environmental Justice (“EJ”) populations within Everett. The state of Massachusetts defines a neighborhood as an EJ population if any of the following conditions are true:¹

- Annual median household income is not more than 65% of the statewide annual median households income;
- Minorities comprise 40% or more of the population;
- 25% or more of households lack English proficiency; or
- Minorities comprise 25% or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150% of the statewide annual median household income.

Any or all of these neighborhood characteristics indicate that residents may be at a heightened risk for experiencing environmental hazards, and as such, merit particular attention during environmental resilience planning processes. EJ block groups within Everett include Minority; Minority and Income; Minority and English Isolation; and Minority, Income and English Isolation EJ communities. See Figure 2-1, Census 2020 Environmental Justice Populations, below.

¹ Environmental Justice Populations in Massachusetts, <https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts>

Figure 2-1: Census 2020 Environmental Justice Populations

Source: MassGIS Oliver, accessed in July 2021

2.5 SERVICES AND FACILITIES

Municipalities in Massachusetts are responsible for the administration and delivery of almost all city services. The public services and facilities of Everett serve as a foundation for the quality of life for residents and function of the community as a whole. Their adequacy affects the ability of the City to serve the community. As noted above, the City's educational facilities include seven elementary schools, one junior high school, and one senior high school, which offers a vocational education program. The Police Department is centrally located on Elm Street. The Fire Department has three stations: Central Station on Broadway, Hancock Street Station, and Ferry Street Station.

Drinking water enters the city from the MWRA's water distribution in five locations throughout the city. The city's water distribution system consists of approximately 70 miles of pipe, 724 fire hydrants, and over 8,200 service connections. The city's wastewater collection system consists of approximately 70 miles of pipe. The city's wastewater travels via gravity through city pipes and then enters the MWRA's wastewater collection system where it is transmitted to MWRA's Deer Island Treatment Plant.

Chapter 5: Capability Assessment contains additional discussion of the City's infrastructure and its vulnerability to hazards is found in Chapter 4: Risk and Vulnerability Assessment.

2.6 HOUSING

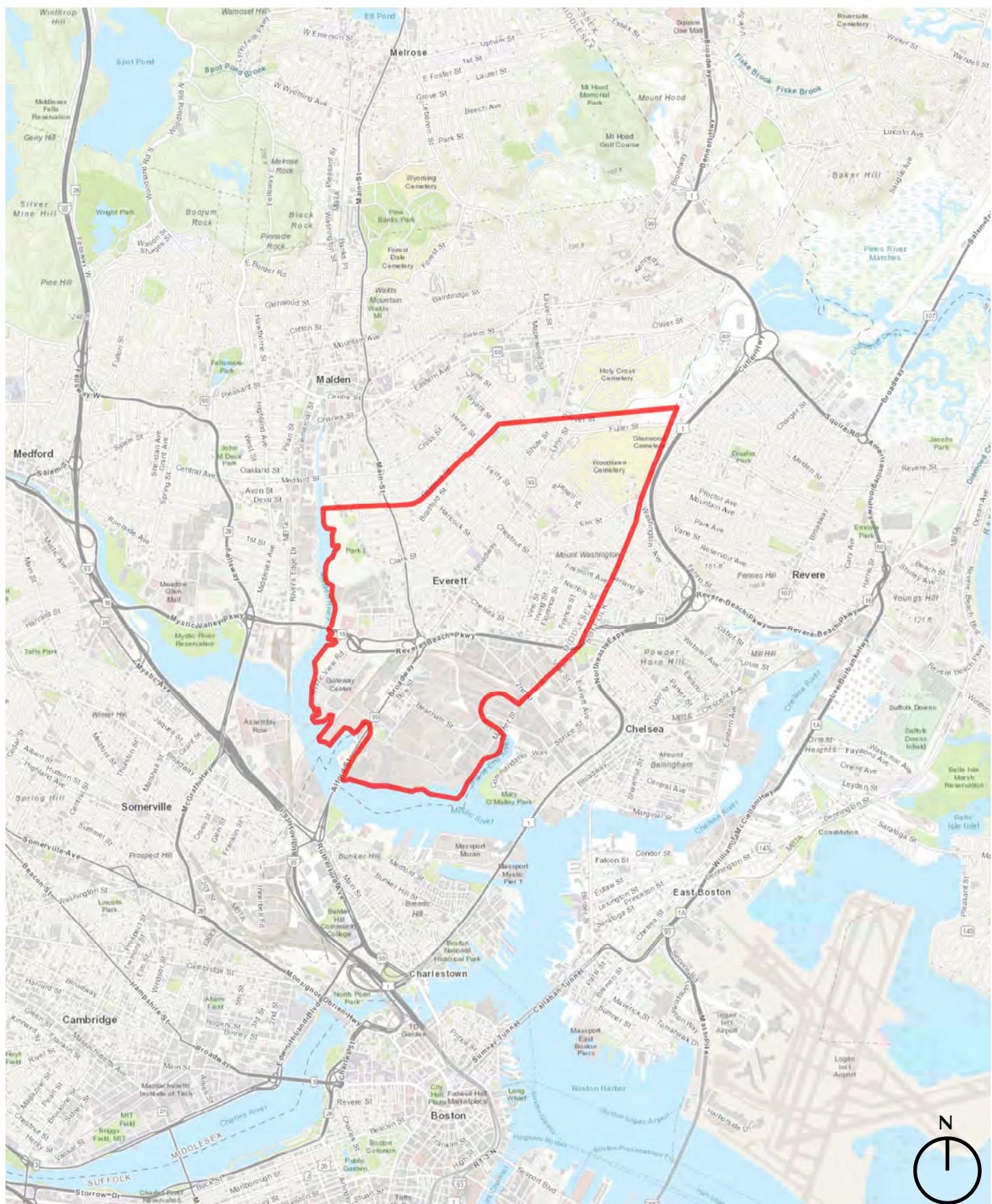
The City of Everett, like many cities, developed around the Broadway. Over time, the city spread out with residential homes found generally within the upland hills portion of the city, north of Route 16. Everett has 17,066 total housing units, the majority of which are multi-unit homes, as shown in Table 2-3, Type of Everett Housing Units (2019 Estimate). Approximately 39% of housing units in Everett are owner-occupied and 61% of units are renter-occupied.

Table 2-3: Type of Everett Housing Units (2019 Estimate)

Type of Housing Unit	Percentage of Total Housing
Single-family detached and attached	26.4%
Multi-family (up to 4 units)	55.5%
Multi-family (more than 4 units)	17.6%
Mobile home	0.5%
TOTAL	100%

Source: U.S. Census, 2019 American Community Survey 5-Year Estimates

Housing stock in Everett tends to be older with 63% homes built before 1940. Only 13% of homes were constructed since 1980. See Chapter 5: Capability Assessment for a listing of Everett's housing planning studies and their applicability to this Plan.



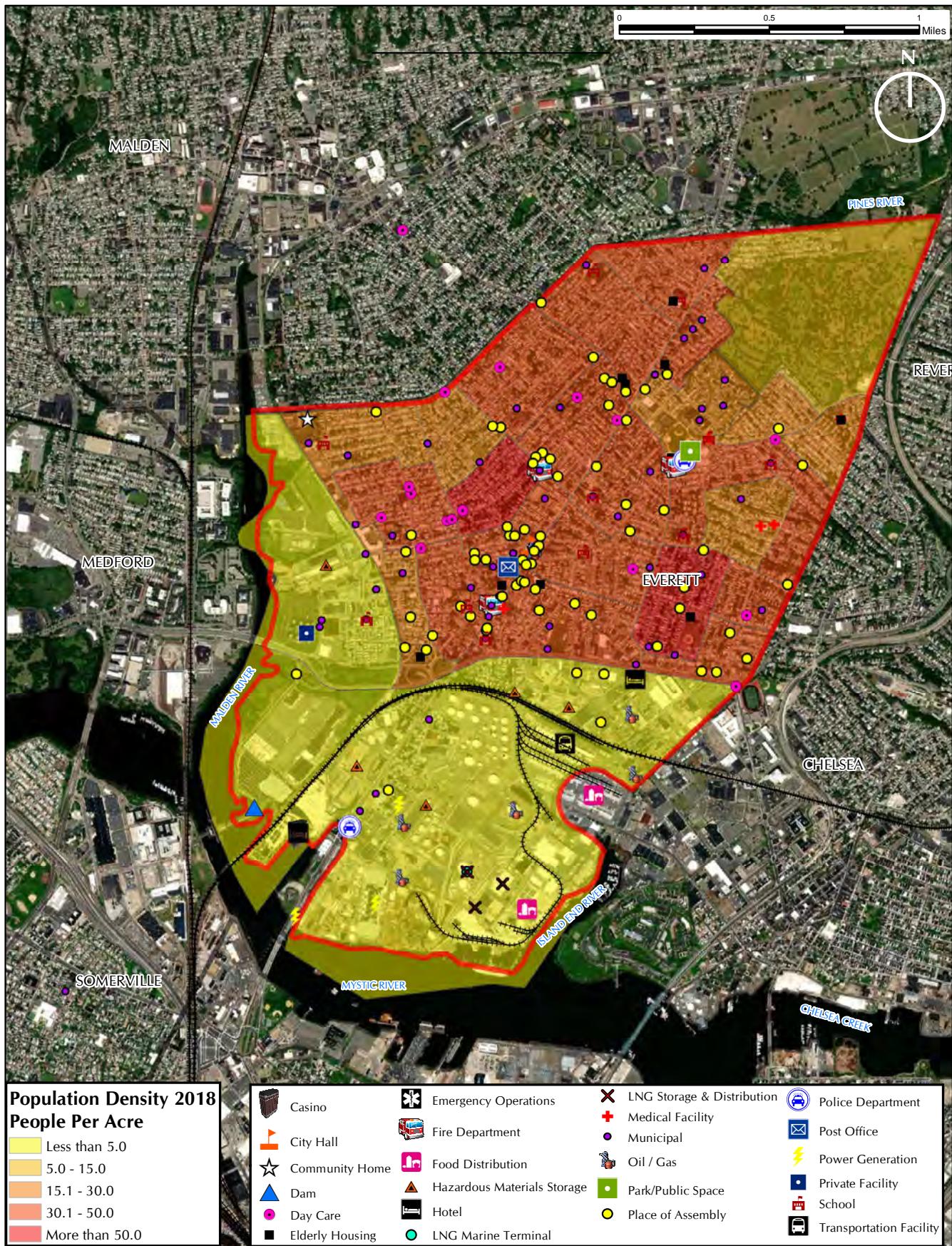
Everett, Massachusetts

Map 2-1
Everett Context
Source: USGS, 2021



Everett, Massachusetts

Map 2-2
Aerial View of City of Everett
Source: Google Earth, 2021



Chapter 3

PLANNING PROCESS

CHAPTER 3: PLANNING PROCESS

3.1 INTRODUCTION

The Hazard Mitigation Plan (HMP) Update planning process provided an opportunity for the City to engage the public and stakeholders to join the City in ensuring their systems, infrastructure, and people are prepared for potential hazards. Outreach and incorporating feedback received creates an engaged community with inherent interest in the long-term quality of their neighborhoods and the quality of municipal infrastructure and services.

To create a planning process where public and stakeholder participation is equitable and effective – especially given concerns surrounding COVID-19 – participation was sought through a variety of methods, such as working through partner organizations and using non-traditional outreach methods. To adhere to social distancing and public health guidelines, virtual meetings were used; however, effort was made to engage all community voices, including those that are not frequently represented, such as youth and elderly residents.

3.2 PLANNING TEAM

The City of Everett established a Local Planning Committee (LPC) to lead this hazard mitigation planning effort. Members of the LPC, listed in Table 3-1, Local Planning Committee Members, collaborated regularly and was responsible for providing relevant information and data, reviewing the hazard assessment, evaluating goals and objectives for hazard mitigation, participating during stakeholder working group and public workshops and meetings, reviewing and providing comments on the draft Plan, and maintaining the Plan following adoption.

Table 3-1: Local Planning Committee Members

Name	Department
Tom Philbin - HMP Project Manager	Planning & Development
Erin Deveney	Mayor's Office
Deanna Deveney	Communications
Sabrina Firicano	Health Department
Captain Anthony O'Brien	Fire Department
Deputy Chief Michael Imbornone	Fire Department

Name	Department
Dennis Gooding	Inspectional Services Department
Matt Lattanzi	Planning & Development
Rana Wehbe	Grant Administration
* Gregory St. Louis, P.E.	Public Works & Engineering
* Tony Sousa	Planning & Development

* Indicates an individual that is no longer serving in this role in the City of Everett.

The LPC met via video conference on August 27, 2020 for a kickoff meeting that set expectations for the upcoming update of the Plan, as well as reviewed the core tenets of the 2015 HMP Update Plan. Members of the LPC were familiar with each other as many serve on a similar committee, the Massachusetts Municipal Vulnerability Preparedness (MVP) Core Team, which is focused on similar goals with a more specific lens on climate hazards. See Chapter 7: Plan Adoption and Maintenance for further information on how this established Core Team will support the implementation of mitigation measures and keeping the Plan current going forward.

The LPC also met via video conference on November 17, 2020 to prepare an upcoming hazard identification and risk assessment (HIRA) workshop in December 2020. Additional information on the HIRA workshop can be found in Section 3.4, Workshops and Public Meetings, below. Prior to the November LPC meeting, members of the LPC also listened in to a video conference meeting with the Stakeholder Working Group on September 9, 2020. Additional information on the Stakeholder Working Group can be found in Section 3.3.1, Stakeholder Working Group, below.

On July 13, 2021, the LPC met along with the Stakeholder Working Group in a 90-min session focused on mitigation measures. Members of the LPC, particularly Everett Conservation Agent Tom Philbin who served as the project manager for the project, also met with the consultant team developing the Plan and other stakeholders throughout the project. Going forward the LPC will continue to serve in this role as defined in Chapter 7: Plan Adoption and Maintenance, to support hazard mitigation planning and the implementation of mitigation measures going forward.

3.3 STAKEHOLDER ENGAGEMENT

3.3.1 STAKEHOLDER WORKING GROUP

Stakeholders from throughout the community can provide important perspectives in addition to those of City staff and the public. Participants of the HMP Stakeholder Working Group include LPC members, as well as representatives from the

business community, school system, social system, and utilities. The composition of this working group is found in Table 3-2, Stakeholder Working Group Members. Stakeholder Working Group members are responsible for providing relevant information and data, reviewing the hazard assessment, evaluating goals and objectives for hazard mitigation, participating during stakeholder working group and public workshops and meetings, and reviewing and providing comments on the draft Plan.

Table 3-2: Stakeholder Working Group Members

Name	Organization
Kathleen O'Brien	Everett Community Growers
Nicole Bowden	Eversource
Tom Martin	Middlesex Gases
Daniel Cameron	National Grid
Patrick Herron	Mystic River Watershed Association (MyRWA)
Julie Wormser	Resilient Mystic Collaborative
Colin Kelly	Schnitzer Steel
Natalie Brown	Wynn Design & Development, Encore Boston Harbor
* Zoya Puri	Wynn Design & Development, Encore Boston Harbor

* Indicates an individual that is no longer serving in this role.

Note – Stakeholders representing Exelon Corp, the New England Produce Center, Exxon Mobil, the Davis Companies, and others were also part of the e-mail distribution of Plan materials and meeting presentation materials following along with this project.

The Stakeholder Working Group also helped to develop a comprehensive strategy to engage major stakeholders and the public in this process through identification of potential community outreach events and community groups and/or stakeholders to engage. Participants will be asked for assistance in distributing draft Plan materials (e.g., survey, public meeting announcements, draft Plan) to their relevant contact networks.

The Stakeholder Working Group met via video conference on September 9, 2020 for a kickoff meeting that set expectations for the upcoming update of the Plan, as well as introduced the members of the LPC and reviewed the core tenets of the 2015 HMP Update Plan. Members of the Stakeholder Working Group participated in the HIRA workshop in December 2020. Additional information on the HIRA workshop can be found in Section 3.4; Public Outreach, below.

On July 13, 2021, the Stakeholder Working Group along with the LPC attended a 90-min session focused on mitigation measures. Feedback from stakeholders crafted the mitigation measures proposed in Chapter 6: Mitigation Goals and Strategies. Going forward, members of the Stakeholder Working Group will be invited to continue to serve in an advisory role as defined in Chapter 7: Plan Adoption and Maintenance, to support hazard mitigation planning and the implementation of mitigation measures going forward.

3.3.2 REGIONAL STAKEHOLDERS

Additional stakeholders from throughout the region were invited to participate in the Stakeholder Working Group Meetings and to provide their valuable assessments throughout the project. The individuals listed in Table 3-3, Regional Stakeholders, participated in the development of the Plan either through sharing of information or direct participation in project meetings.

Table 3-3: Regional Stakeholders

Name	Organization
Erikk Hokenson	Massachusetts Office of Coastal Zone Management (CZM)
Emma DeSimone	Homeland Security Region 1 Program Manager/Boston Office of Emergency Management (OEM)
Joy Duperault	Massachusetts Department of Conservation & Recreation (DCR)
Carolyn Meklenburg	Massachusetts Executive Office of Energy & Environmental Affairs (EEA) MVP Program
Alex Train	City of Chelsea – Housing & Community Development
Ben Cares	City of Chelsea – Planning Department
Lou Mammolette	City of Chelsea – Department of Public Works

Name	Organization
Oliver Sellers-Garcia	City of Somerville – Office of Sustainability and Environment
Thomas Graney	City of Somerville – Department of Public Works
Hannah Lyons- Galante	Massachusetts Bay Transportation Authority (MBTA)

3.4 PROJECT MEETINGS AND PUBLIC OUTREACH

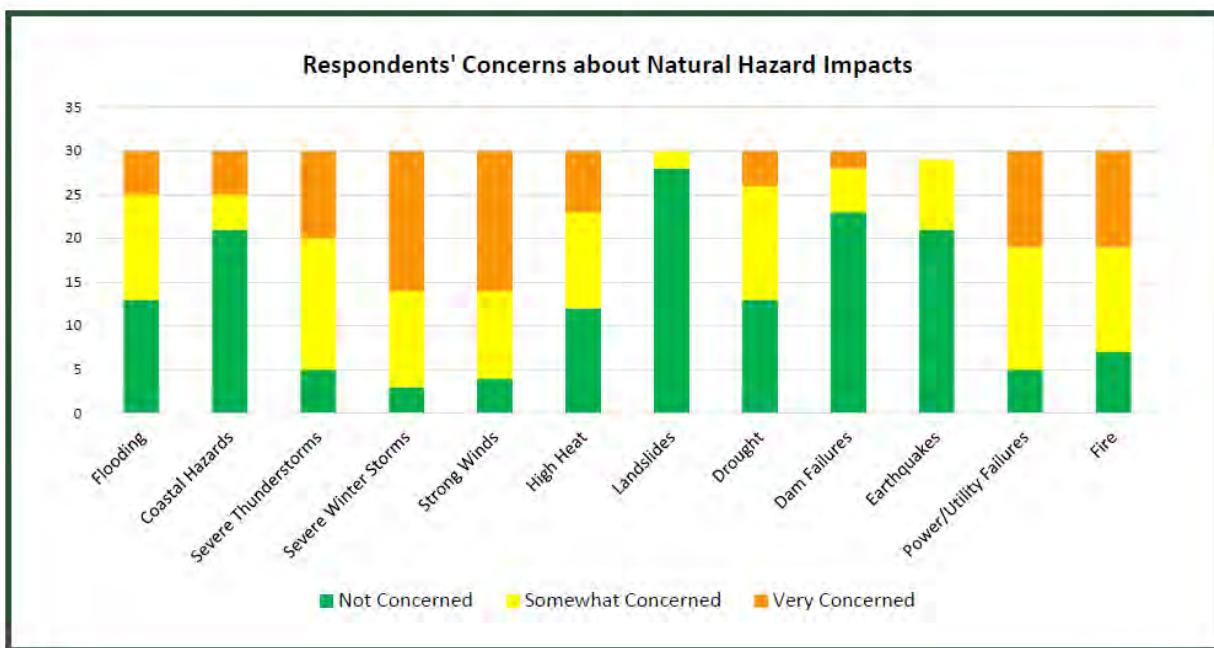
3.4.1 ONLINE PUBLIC SURVEY

The City of Everett prepared a community survey as an opportunity for the public to participate in the planning effort. Questions solicited information on topics such as hazard preparedness, experience with and concern about hazards, and prioritization of potential mitigation projects. The survey was posted on the City website, promoted on the City's social media accounts, and distributed by the LPC, Stakeholder Working Group, and other parties to their networks.:.

The City of Everett focused on reaching out to the community in their primary written and/or spoken language to gather feedback. A community survey was conducted in English, Portuguese, and Spanish and was open for different periods coordinated with other public engagements through the end of the planning process. The survey included opportunities for the public to both answer specific questions and provide broad feedback. A copy of the community survey along with response metrics is included in Appendix B.

General trends from the survey responses included a broad spectrum in the level of concern related to flooding and coastal hazards as shown in Figure 3-1: Community Survey Response Data – Concern about Natural Hazard Impacts. These results may indicate a disconnect associated with the fact that majority of residential areas are located outside of the current and projected flood hazard zones. The City of Everett intends to continue to expand public education related to flooding and coastal hazards in Everett to highlight linkages between transportation impacts, economic impacts, and other factors that can also impact residents related to flooding hazards in Everett's Industrial District.

Figure 3-1: Community Survey Response Data – Concern about Natural Hazard Impacts



Overall, survey respondents indicated a strong focus on winter storm events, thunderstorms, and significant wind events. Additional survey feedback focused on mitigation measures to address stormwater flooding at key areas of the city such as Air Force Road, enhanced communications from the City of Everett related to hazards and preparedness and continuing to invest in utility infrastructure resilience. The City of Everett intends to keep the survey open through the public comment period and subsequent agency review of the draft Plan to continue to collect feedback from the community.

3.4.2 PROJECT WORKSHOPS

Two workshops were conducted to support the development of the Plan. The first workshop took place on December 10, 2021 and was a two-and-a-half-hour session conducted via Microsoft Teams video conference platform. Attendees at the first workshop included the LPC plus a half dozen other city staff members and the Stakeholder Working Group. Participants attended three district presentations by the consultant team focused on an introduction to hazard mitigation planning, HIRA, and mitigation measures. Between each presentation segment, participants entered smaller breakout groups of approximately 6-8 individuals to discuss the topic and to use ArcGIS online mapping tool to directly assess risks and hazards in Everett. Feedback from participants indicated that use of the ArcGIS online mapping tool developed by the consultant team aided their evaluation of risks and hazards and was an engaging way to solicit meaningful feedback for the Plan.

The second workshop was conducted on July 8, 2021 and was a 90-minute session conducted via Microsoft Teams video conference platform. Attendees at the second workshop were staff members for a local nonprofit organization, Everett Community Growers (ECG). ECG focuses on urban agriculture and food security in Everett and operates community gardens and a farm stand for the benefit of the community. ECG staff members range from high school age to adult senior staff members and are involved in various roles to support the organization from farm field work to farm stand operations to organizational management. Participants attended three district short presentations by the consultant team focused on an introduction to hazard mitigation planning, HIRA, and mitigation measures. Between each presentation segment, participants entered smaller breakout groups of approximately 4-6 individuals to discuss the topic and to use ArcGIS online mapping tool to directly assess risks and hazards in Everett. Based upon the interests of the participants, the discussion focused on the impact of climate change on urban agriculture and the mitigation benefits of urban agriculture in addressing flooding and heat hazards.

3.4.3 PUBLIC MEETING

On July 13, 2021, the Everett Conservation Commission hosted a public meeting to support this project. This meeting was used to engage the community, communicate progress regarding the project timeline and draft Plan, facilitate discussion, solicit information, and receive input and feedback throughout the drafting of the Plan. The meeting was hosted virtually and was available to the entire community. The meeting was properly noticed, posted on the City website, and promoted on the City's social media accounts.

Chapter 4

RISK AND VULNERABILITY ASSESSMENT

CHAPTER 4: RISK ASSESSMENT

4.1 UPDATE PROCESS

The risk assessment analyzes the potential natural hazards that could occur within the City of Everett as well as the relationship between those hazards and current land uses, potential future development, and critical infrastructure. This section also includes a vulnerability assessment that estimates the potential damages that could result from certain large-scale natural hazard events.

Everett's risk assessment was updated using the most recently available hazard and land use data and through meetings with City staff, the Local Planning Committee (LPC), and the Stakeholder Working Group to identify changes in local hazard areas and development trends.

4.2 OVERVIEW OF HAZARDS AND IMPACTS

The natural hazards within this evaluation were based on those identified in the 2015 Everett HMP, the 2018 Massachusetts State Hazard Mitigation and Climate Adaptation Plan (SHMCAP)¹, and 2019 Everett Community Resilience Building Summary of Findings (resulting from a Municipal Vulnerability Preparedness (MVP) program planning grant).

The SHMCAP integrated the Commonwealth's traditional hazard mitigation plan, the 2013 Massachusetts State Hazard Mitigation Plan, with a climate change adaptation plan, 2011 Massachusetts Climate Change Adaptation Report. The resulting plan included an assessment of the Commonwealth's natural hazard and climate change vulnerabilities and accounted for projected changes in precipitation, temperature, sea level rise, and extreme weather events.

The MVP program² provides support for cities and towns in Massachusetts to begin the process of planning for climate change resiliency and implementing priority projects. The state awards communities with funding to complete vulnerability assessments and develop action-oriented resiliency plans. Communities who complete the MVP program become certified as an MVP community and are eligible for MVP Action Grant funding and other opportunities. The City of Everett participated in the planning phase of this program starting in 2018 and produced the *Everett Community Resilience Building Summary of*

¹ Massachusetts Integrated State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) - <https://www.mass.gov/service-details/massachusetts-integrated-state-hazard-mitigation-and-climate-adaptation-plan>

² Municipal Vulnerability Preparedness program - <https://www.mass.gov/municipal-vulnerability-preparedness-mvp-program>

Findings report³ in 2019. In addition to this work, Everett also completed a supplemental project related to urban heat island effect and produced the *Everett Urban Heat Island Supplement* report⁴ in 2019.

Table 4-1, Natural Hazard Risks Rationale, summarizes the rationale used to determine inclusion or exclusion of previously identified hazard risks within the current evaluation.

Table 4-1: Natural Hazard Risks Rationale

Natural Hazard	Included or Excluded from HMP Update	Rationale for Inclusion/Exclusion from HMP Update
Flooding	Included	Flooding, including riverine flooding, urban stormwater flooding, and coastal flooding, remains a significant concern for Everett. MVP Community Resilience Building Workshop participants identified inland and coastal flooding as priority hazards.
Coastal Hazards	Included	Coastal hazards, including wave damage, storm surge, and erosion along the Island End River and the tidal portion of the Mystic River, remain a significant concern that is increasing due to climate change.
Severe Thunderstorms	Included	Severe thunderstorms are of increasing concern due to climate change.
Severe Winter Storms	Included	Winter storms, including the 2015 HMP hazard “Nor’easters” and “Winter Storms”, remain a significant concern that is increasing due to climate change. MVP Community Resilience Building Workshop participants identified “Extreme Storms”, including severe winter storms, as a priority hazard.
Strong Winds	Included	Strong winds, including those resulting from 2015 HMP hazards “Hurricanes” and “Tornadoes,” remain a concern for Everett.
High Heat	Included	High heat, a subset of the 2015 HMP hazard “Extreme Temperatures,” remains a significant concern that is increasing due to climate change. MVP Community Resilience Building Workshop participants identified “Heat Wave” as a priority hazard.

³ Everett Community Resilience Building Summary of Findings <https://www.mass.gov/doc/everett-report/download>

⁴ Everett Urban Heat Island Supplement - [Microsoft Word - Everett Findings UHI Supplemental Report_FINAL.docx \(mass.gov\)](https://www.mass.gov/doc/everett-findings-uhi-supplemental-report_FINAL.docx)

Natural Hazard	Included or Excluded from HMP Update	Rationale for Inclusion/Exclusion from HMP Update
Landslides	Included	Landslides continue to be a concern for Everett due to the potential severity of impact.
Drought	Included	Drought continues to be a concern for Everett due to the potential severity of impact.
Dam Failure	Included	Dam failure continues to be a concern for Everett due to the potential severity of impact.
Earthquake	Included	Earthquake continues to be a concern for Everett due to the potential severity of impact.
Brush Fire	Excluded	Brush fire is not a likely occurrence in Everett due to its highly developed areas.

This assessment groups the identified natural hazards according to four primary climate change interactions, consistent with the categories used within the SHMCAP:

- **Changes in Precipitation:** Changes in the amount, frequency, and timing of precipitation—including both rainfall and snowfall—are occurring across the globe as temperatures rise and other climate patterns shift in response.
- **Sea Level Rise:** Climate change will drive rising sea levels, and rising seas will have wide-ranging impacts on communities, natural resources, and infrastructure along the Commonwealth's 1,519 tidal shoreline miles.
- **Rising Temperatures:** Average global temperatures have risen steadily in the last 50 years, and scientists warn that the trend will continue unless greenhouse gas emissions are significantly reduced. The 9 warmest years on record all occurred in the last 20 years (2017, 2016, 2015, 2014, 2013, 2010, 2009, 2005, and 1998), according to the U.S. National Oceanographic and Atmospheric Administration (NOAA)⁵.
- **Extreme Weather:** Climate change is expected to increase extreme weather events across the globe, as well as right here in Massachusetts. There is strong evidence that storms—from heavy downpours and blizzards to tropical cyclones and hurricanes—are becoming more intense and damaging and can lead to devastating impacts for residents across the state.

⁵ U.S. National Oceanographic and Atmospheric Administration (NOAA) - <https://www.noaa.gov/news/2020-was-earth-s-2nd-hottest-year-just-behind-2016>

Table 4-2, Climate Change Interactions and Associated Natural Hazards, provides a summary of the climate change interaction categories and the group of applicable natural hazards within this evaluation. The flooding hazard has been divided based on the predominant climate change interaction: riverine and urban flooding have been associated with “Changes in Precipitation,” and coastal flooding has been associated with “Sea Level Rise.” Consistent with the SHMCAP, dam failure and earthquake are not associated with a climate change interaction. Rather, dam failure is considered a technological and human-caused hazard and earthquake is considered a non-climate-influenced hazard.

While SHMCAP does not associate dam failure with a climate change interaction, the Mystic River watershed community is focused on the impacts of climate change on the DCR Amelia Earhart Dam infrastructure and its operations. As sea levels rise over the next fifty years, the Dam may experience flanking or overtopping during coastal storm events as shown in flood projections from the Massachusetts Coast – Flood Risk Model⁶. Flanking is related to storm surge bypassing the dam on the land sides in Somerville and Boston and causing coastal flooding inland and on properties located on/near the non-tidal section of the Mystic River.

Overtopping of the dam would occur when the elevation of storm surge extends the top elevation of the dam. An incident of overtopping would render the dam unable to control water elevations on either side of the dam allowing significant amounts of seawater into the Upper Mystic River and Malden River and likely leading to significant damage of dam equipment that would lead to a long recovery. Storm surge into the Upper Mystic River and Malden River would also lead to catastrophic regional flooding into the dozens of upstream communities that are tributary to the Mystic River. State agencies with local municipal support are currently working on interventions to improve the resilience of the dam, including the addition of more pumping infrastructure, protection of existing dam equipment, and land side projects to raise ground elevations in Somerville and Boston adjacent to the dam.

Table 4-2: Climate Change Interactions and Associated Natural Hazards

Climate Change Interaction	Natural Hazard
Changes in Precipitation	Flooding (riverine and urban flooding) Landslides Drought
Sea Level Rise	Flooding (coastal) Coastal Hazards
Rising Temperatures	High Heat
Extreme Weather	Severe Thunderstorms Severe Winter Storms Strong Winds

⁶ Fact Sheet on the Massachusetts Coast – Flood Risk Model -
https://www.mvcommission.org/sites/default/files/docs/MC-FRM_FAQ_Sheet_Final.pdf

Climate Change Interaction	Natural Hazard
Not Applicable – Technological and Human-Caused Hazard	Dam Failures
Not Applicable – Non-Climate-Influenced Hazard	Earthquake

The Plan uses the following definitions, consistent with the SHMCAP:

- **Climate change:** A change in the state of the climate that can be identified by statistical changes of its properties that persist for an extended period, whether due to natural variability or as a result of human activity.
- **Exposure:** The extent to which something is in direct contact with natural hazards or their related climate change impacts. Exposure is often determined by examining the number of people or assets that lie within a geographic area affected by a natural hazard, or by determining the magnitude of the climate change impact. For example, measurements of flood depth outside a building or number of heat waves experienced by a county are measurements of exposure.
- **Natural hazard:** Natural hazards are natural events that threaten lives, property, and other assets. Often, natural hazards can be predicted. They tend to occur repeatedly in the same geographical locations because they are related to weather patterns or physical characteristics of an area.
- **Risk:** The potential for an unwanted outcome resulting from a hazard event, as determined by its likelihood and associated consequences; and expressed, when possible, in dollar losses. Risk represents potential future losses, based on assessments of probability, severity, and vulnerability. In some instances, dollar losses are based on the actual demonstrated impact. In other cases, dollar losses are demonstrated through exposure analysis due to the inability to determine the extent to which a structure is impacted.
- **Severity/Extent:** The extent or magnitude of a hazard, as measured against an established indicator (e.g., Richter Scale, Saffir-Simpson Hurricane Scale, or Regional Snowfall Index).
- **Vulnerability:** The propensity or predisposition to be adversely affected; for example, as applied to building performance (functionality), damage, or the number of people injured. Vulnerability is a function of exposure, sensitivity, and adaptive capacity.

4.3 HAZARDS IMPACTED BY CHANGES IN PRECIPITATION

4.3.1 RIVERINE AND URBAN FLOODING

Riverine and urban flooding was the most prevalent serious natural hazard identified by City staff, the LPC, and the Stakeholder Working Group. The MVP Community Resilience Building workshop participants also indicated it was a natural hazard of particular concern. Riverine flooding occurs when the rate of precipitation and/or amount of stormwater runoff overwhelms the capacity of natural or structured drainage systems causing overflows; urban flooding occurs when precipitation causes the water table to rise and leads to flooding of low-lying areas such as streets and underpasses.

The City of Everett is bound by two major rivers – the Mystic River along the City's southern perimeter and the Malden River along the City's eastern perimeter. The Island End River is a tributary to the Mystic River and is located south of the Massachusetts Department of Conservation and Recreation (DCR) Amelia Earhart Dam.

Flooding is generally caused by hurricanes, nor'easters, severe rainstorms, and thunderstorms. As noted in the SHMCAP, secondary hazards for flooding include landslides following flood events when high flows oversaturate soils on steep slopes, causing them to fail. Climate change has the potential to exacerbate these issues over time as storms with increased precipitation rates become more frequent.

4.3.1.1 LOCATION

Many of Everett's urban flooding problems are associated with aging infrastructure and dense development patterns that involve significant areas of impervious surfaces which limit infiltration of precipitation and accelerate the velocity of stormwater runoff. Some areas within Everett that experience significant urban flooding issues include the Second Street corridor, which lacks stormwater infrastructure, Air Force Road, the Commercial Triangle section of Everett between Route 16 and the commuter rail tracks, and the area surrounding Glendale Park, which includes the site of the Everett Police Department.

In addition to these areas, critical infrastructure that is vulnerable to flooding due to their location in the FEMA flood zone are indicated in Table 4-14 and shown on Map 4-1. For sites related to coastal flooding, see Section 4.4.1.1. Related underlying infrastructural deficiencies are noted, where available, and have been updated to reflect current conditions.

4.3.1.2 EXTENT OF NATURAL HAZARD

DCR maintains a network of approximately 60 precipitation observation stations throughout Massachusetts. The station closest to Everett, the East Boston station “BOSNWS,” recorded an average of 44.3 inches of annual precipitation between 1990-2014.⁷ This is significantly more than the national precipitation average of 30.9 inches during the same timeframe.⁸

4.3.1.3 PREVIOUS OCCURRENCES OF HAZARD EVENTS

As city-specific data for previous urban flooding occurrences is not available, county-level flooding data was used as the best available. Middlesex County, which includes Everett, has had 14 FEMA flood-related declared disasters between 1954 and 2017, as shown in the SHMCAP.

Based on data from the National Centers for Environmental Information (NCEI) Storm Events Database, 83 historic flood events occurred in Middlesex County between April 1, 2014 and December 31, 2020. These events are compiled and are summarized in Table 4-3. Total damages for all floods since April 2014 totaled \$1.27 million.

Table 4-3: Middlesex County Flood Events April 1, 2014 through December 31, 2020

Date of Flood Event	Property Damage	Death/Injuries
7/27/2014	\$0	0/0
8/31/2014	\$0	0/0
10/22/2014	\$20,000	0/0
10/23/2014	\$0	0/0
12/9/2014	\$0	0/0
12/9/2014	\$5,000	0/0

⁷ DCR Office of Water Resources, Precipitation Database, retrieved June 23, 2021 from <https://www.mass.gov/info-details/water-data-tracking#precipitation-database->

⁸ NOAA National Centers for Environmental Information, State of the Climate: National Climate Report for Annual 2012, 2013, and 2014; NOAA National Centers for Environmental information, Climate at a Glance: National Time Series, published May 2021, retrieved on June 6, 2021 from <https://www.ncdc.noaa.gov/cag/>

Date of Flood Event	Property Damage	Death/Injuries
12/9/2014	\$30,000	0/0
12/9/2014	\$0	0/0
5/31/2015	\$0	0/0
5/31/2015	\$0	0/0
8/4/2015	\$0	0/0
8/15/2015	\$50,000	0/0
8/15/2015	\$75,000	0/0
9/30/2015	\$0	0/0
9/30/2015	\$0	0/0
9/30/2015	\$0	0/0
9/30/2015	\$0	0/0
9/30/2015	\$0	0/0
4/6/2017	\$0	0/0
6/27/2017	\$1,000	0/0
7/12/2017	\$1,000,000	0/0
7/12/2017	\$0	0/0
7/12/2017	\$0	0/0
7/12/2017	\$0	0/0
7/12/2017	\$0	0/0
7/12/2017	\$0	0/0
7/12/2017	\$0	0/0
7/18/2017	\$0	0/0
7/18/2017	\$0	0/0
7/18/2017	\$0	0/0

Date of Flood Event	Property Damage	Death/Injuries
8/2/2017	\$5,000	0/0
8/2/2017	\$0	0/0
10/25/2017	\$0	0/0
10/25/2017	\$0	0/0
10/30/2017	\$0	0/0
1/12/2018	\$0	0/0
1/13/2018	\$0	0/0
4/16/2018	\$0	0/0
4/16/2018	\$0	0/0
4/16/2018	\$0	0/0
4/16/2018	\$0	0/0
6/25/2018	\$0	0/0
6/25/2018	\$0	0/0
6/25/2018	\$0	0/0
6/25/2018	\$0	0/0
6/25/2018	\$0	0/0
6/25/2018	\$0	0/0
6/25/2018	\$15,000	0/0
8/8/2018	\$0	0/0
8/8/2018	\$5,000	0/0
8/8/2018	\$30,000	0/0
8/12/2018	\$5,000	0/0
8/12/2018	\$15,000	0/0

Date of Flood Event	Property Damage	Death/Injuries
8/12/2018	\$5,000	0/0
8/12/2018	\$0	0/0
8/12/2018	\$5,000	0/0
8/17/2018	\$0	0/0
10/29/2018	\$0	0/0
11/3/2018	\$0	0/0
11/10/2018	\$0	0/0
7/6/2019	\$0	0/0
7/6/2019	\$0	0/0
7/6/2019	\$0	0/0
8/7/2019	\$0	0/0
8/7/2019	\$300	0/0
8/7/2019	\$0	0/0
9/2/2019	\$0	0/0
9/2/2019	\$0	0/0
9/2/2019	\$0	0/0
9/2/2019	\$0	0/0
9/2/2019	\$0	0/0
9/2/2019	\$0	0/0
6/21/2020	\$0	0/0
6/21/2020	\$0	0/0
6/28/2020	\$0	0/0
6/28/2020	\$0	0/0
6/28/2020	\$5,000	0/0

Date of Flood Event	Property Damage	Death/Injuries
6/28/2020	\$0	0/0
7/23/2020	\$0	0/0
9/10/2020	\$3,000	0/0
9/10/2020	\$0	0/0
9/10/2020	\$0	0/0
TOTAL	\$1,274,300	0/0

4.3.1.4 PROBABILITY OF FUTURE EVENTS

Annual precipitation in Massachusetts is projected to increase by as much as 7.3 inches by the end of this century, according to the SHMCAP. Problems in the drainage system and aging infrastructure continue to increase the probability of urban flooding.

4.3.2 LANDSLIDES

According to the SHMCAP, “the term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on an over steepened slope is the primary reason for a landslide, there are other contributing factors.” Among the contributing factors are erosion by rivers, glaciers, or ocean waves create over steepened slopes; rock and soil slopes weakened through saturation by snowmelt or heavy rains; earthquakes create stresses that make weak slopes fail; and excess weight from accumulation of rain or snow, and stockpiling of rock or ore, from waste piles, or from man-made structures. Climate change has the potential to exacerbate these issues over time as storms with increased precipitation rates become more frequent.

Landslides can result from human activities that destabilize an area or can occur as a secondary impact from another natural hazard such as flooding. In addition to structural damage to buildings and the blockage of transportation corridors, landslides can lead to sedimentation of water bodies.

4.3.2.1 LOCATION

Landslides are a potential city-wide hazard in Everett. However, the City has limited vulnerability to landslides, and no critical facilities were identified with high vulnerability to landslides.

4.3.2.2 EXTENT OF NATURAL HAZARD

The entire city is classified as having a moderate risk for landslides. See Map 4-2.

4.3.2.3 PREVIOUS OCCURRENCES OF HAZARD EVENTS

There have been no documented landslides in Everett.

4.3.2.4 PROBABILITY OF FUTURE EVENTS

The LPC did not believe that landslides pose a significant risk to Everett and did not take actions regarding this hazard in the 2008 or 2015 Plans. There have been no comments from the community regarding landslides.

4.3.3 DROUGHT

As noted by the SHMCAP, “droughts can vary widely in duration, severity, and local impact. They may have widespread social and economic significance that requires the response of numerous parties, including water suppliers, firefighters, farmers, and residents. Droughts are often defined as periods of deficient precipitation. How this deficiency is experienced can depend on factors such as land use change, the existence of dams, and water supply withdrawals or diversions. For example, impervious surfaces associated with development can exacerbate the effects of drought due to decreased groundwater recharge.” Climate change has the potential to exacerbate these issues over time as rising temperatures and precipitation patterns become more variable and extreme.

4.3.3.1 LOCATION

In Everett, drought is a potential city-wide hazard. However, the impact of drought on Everett’s water supply is limited because the City receives its water supply from the Massachusetts Water Resources Authority (MWRA), which operates two large reservoirs in central Massachusetts, Wachusett and Quabbin Reservoirs. Because of the very large ratio of storage to annual demand, the MWRA water system is very well buffered from the impacts of drought in terms of its ability to supply water to its service population. Even the multi-year drought of record from 1962 to 1965 did not seriously impair the MWRA water system. The City of Everett has not had to impose emergency water restrictions. Were there to be a severe drought worse than the drought of record, water use restrictions could be implemented, which would mainly have an impact on nonessential outdoor water use for irrigation of public parks and playing fields and residential lawns.

4.3.3.2 EXTENT OF NATURAL HAZARD

Massachusetts generally receives enough precipitation under normal conditions to not be considered at a large risk for drought. DCR's precipitation observation station closest to Everett, the East Boston station "BOSNWS," recorded an average of 44.3 inches of annual precipitation between 1990-2014. This is significantly more than the national precipitation average of 30.9 inches during the same timeframe.

4.3.3.3 PREVIOUS OCCURRENCES OF HAZARD EVENTS

Everett does not collect data relative to drought events. Because drought is more of a regional natural hazard, this plan references state data as the best available data for drought. As noted in the SHMCAP, the Massachusetts has never received a Presidential Disaster Declaration for a drought-related disaster. However, Massachusetts has experienced extended periods of dry weather over the past 100 years and has recorded events dating back to 1879.

4.3.3.4 PROBABILITY OF FUTURE EVENTS

The Boston Harbor basin, which includes Everett, is expected to see a slight decrease to an increase in consecutive dry days throughout this century compared to the annual baseline of approximately 17 days per year from 1971 to 2001. Table 4-4, Projected Annual Consecutive Dry Days, indicates the projected number of consecutive dry days according to the "high" and "low" limits of the Northeast Climate Adaptation Science Center (NE CASC) data. In addition, the SHMCAP indicated that the average time between rain events is likely to remain fairly constant; however, individual drought events could still increase in frequency and severity.

Table 4-4: Projected Annual Consecutive Dry Days

	Observed Baseline 1971-2000 (Days)	Projected Change in 2030s (Days)	Projected Change in 2050s (Days)	Projected Change in 2070s (Days)	Projected Change in 2090s (Days)
Annual Consecutive Dry Days	17	0 to +1	0 to +2	-1 to +3	-1 to +4

Source: Resilient MA, Climate Change Clearinghouse for the Commonwealth, 2021.
<https://resilientma.org/>

4.4 HAZARDS IMPACTED BY SEA LEVEL RISE

4.4.1 COASTAL FLOODING

Coastal flooding is where wind and tide leads to flooding along tidal waterways such as the Island End River (IER) and the Lower Mystic River (south of the DCR Amelia Earhart Dam). The SHMCAP states coastal flooding is defined by the submersion of land along the ocean coast and other inland waters caused by the movement of seawater over and above normal present-day tide action.

These types of flooding are often combined as storm events lead to large amounts of draining stormwater, which can be blocked by elements of the built environment and can be backed up when drainage locations (ponds, streams, etc.) are at or above capacity. Sea level rise driven by climate change will exacerbate these issues over time.

4.4.1.1 LOCATION

The Island End River and a portion of the Mystic River south of the DCR Amelia Earhart Dam are tidally influenced and experience storm surge effects from Boston Harbor in major storm events. Relatively flat topographic elevations in Everett and neighboring Chelsea also present overland pathways for coastal/saltwater flooding to impact areas deeper into the community.

Many of the City's currently identified areas of flooding concern are directly linked to the filling of the Island End River in the early 1900s by the Eastern Gas and Coal Company, as well as subsequent filing for the construction of the New England Produce Center. The river was replaced by a ditch and culvert, which are partially located in adjoining Chelsea, and eventually drain into the Island End River in Chelsea near Williams Street. Several of the flooding areas of concern identified below are associated with the degraded Market Street culvert.

The area of Everett that experiences the most significant coastal flooding issues is the New England Produce Center and surrounding properties along the Island End River. During three coastal storm events in 2018 identified in Chapter 1: Introduction, significant flooding inundated this area filling roadways and parking areas, submerging the commuter and freight rail tracks, and limiting vehicle access and commerce associated with produce distribution. Flood projections from the MC-FRM, which incorporates sea level rise, show increasing risk of severe damage in this area, as well as other areas along the Lower Mystic River from storm surge during coastal storm events. Additionally, piped infrastructure that flows into the Market and

Beacham Street culverts and ultimately discharges at an outfall into the Island End River can become surcharged with seawater when that outfall is submerged during coastal storm events. This condition creates multiple pathways back into Everett's Industrial District and Commercial Triangle to spread the extent of coastal flood hazards. Locations such as Spring Street along the commuter rail tracks historically had tide gate infrastructure to limit this hazard. At this time, the majority of these upstream tide gates have fallen into disrepair due to age and lack of maintenance.

In addition to these areas, the critical infrastructure vulnerable to flooding due to their location in both the FEMA flood zone are indicated in Table 4-14 and shown on Map 4-1. For sites related to urban flooding, see Section 4.3.1.1.

4.4.1.2 EXTENT OF NATURAL HAZARD

Sea level rise is impacting the coastal areas of Everett. Table 4-5, NE CASC Relative Mean Sea Level Projections for Boston, MA Tide Station, shows relative (or local) mean sea level projections for the nearest tide station to Everett. The projections for the Boston tide station are based on four National Climate Assessment global scenarios with associated probabilistic model outputs from the Northeast Climate Adaptation Science Center (NE CASC). The values reflect the IPCC Representative Concentration Pathway (RCP) high emissions pathway (RCP 8.5).

Table 4-5: NE CASC Relative Mean Sea Level Projections for Boston, MA Tide Station

Scenario	2030	2040	2050	2060	2070	2080	2090	2100
Intermediate	0.7	1.0	1.4	1.8	2.3	2.8	3.4	4.0
Intermediate-High	0.8	1.2	1.7	2.3	2.9	3.6	4.3	5.0
High	1.2	1.7	2.4	3.2	4.2	5.2	6.4	7.6
Extreme (Maximum physically plausible)	1.4	2.2	3.1	4.2	5.4	6.8	8.4	10.2

Source: Resilient MA, Climate Change Clearinghouse for the Commonwealth, 2021.

<https://resilientma.org/>

4.4.1.3 PREVIOUS OCCURRENCES OF HAZARD EVENTS

Based on data from the National Centers for Environmental Information (NCEI) Storm Events Database, Middlesex County, including Everett, did not experience any documented county-wide coastal flooding events between April 1, 2014 and December 31, 2020. However,

localized coastal flooding incidents, most recently reported during the three storm events in 2018, and coastal flooding within Everett's Industrial District is occurring with increasing frequency from a combination of storm surge, rising sea levels influencing tidal flooding occurrences, and the interaction with urban and coastal flooding hazards.

Between 1921 and 2020, a relative sea level rise trend of 2.87 mm/year with a 95 percent confidence interval of +/- 0.15 mm/year (equivalent to 0.94 feet over a 100-year period) was observed in Boston.⁹

4.4.1.4 PROBABILITY OF FUTURE EVENTS

The frequency and severity of routine tidal flooding and storm-related flooding will increase due to the sea level rise effect of climate change. In addition, the frequency of severe storm events and resulting storm surge sufficient to cause coastal flooding is likely to increase due to climate change.

However, as noted within the SHMCAP, communities like Everett can plan infrastructure improvements in preparation for elevated water levels using best available flood projection data for time horizons from present day out to the end of the century.

4.4.2 COASTAL HAZARDS

Coastal hazards, including wave damage, storm surge, and erosion, remain a significant concern that is increasing due to climate change. Eroded coastlines have a lower capacity to buffer against the storm surge associated with hurricanes, nor'easters or other coastal storms, resulting in the greater vulnerability. Rising sea levels have led to increased rates of erosion along beaches and coastlines and the undermining of coastal bulkheads and estuarine river banks in Everett. Bulkheads and coastal banks in Everett protect the buildings from storm damage and their failure can lead to increased property damage.

4.4.2.1 LOCATION

The City experiences erosion and undercutting along its Mystic River banks when the Amelia Earhart dam is opened by DCR to increase storm water storage capacity by lowering the level of the Upper Mystic River. The areas potentially impacted along the Mystic River do not

⁹ National Oceanic and Atmospheric Administration (NOAA). 2018. Tides and Currents. Extreme Water Levels. Station 844390. Accessed July 15, 2021.

https://tidesandcurrents.noaa.gov/slrends/slrends_station.shtml?id=8443970

include populated residential areas, but rather industrial properties, some of which are abandoned or underutilized sites, but also include some currently active industrial operations.

4.4.2.2 EXTENT OF NATURAL HAZARD

As previously noted, sea level rise is impacting the coastal areas of Everett. The extent of damage from coastal flooding is influenced by variables such as elevated coastal landforms. Coastal banks, salt marshes, and other elevated coastal landforms can buffer increased tidal levels and storm surges.

4.4.2.3 PREVIOUS OCCURRENCES OF HAZARD EVENTS

The City does not keep records of specific coastal erosion events, but the process is an incremental one over the long term. FEMA has indicated in their latest rules that post hazard event reconstruction or repair funding for coastal protection structures will only be made available where the damage can be directly attributed to the storm event. Therefore, to receive this funding, the City must maintain records of maintenance and repair activities that demonstrate the status of each structure.

4.4.2.4 PROBABILITY OF FUTURE EVENTS

The frequency of severe storm events and resulting storm surge sufficient to cause wave damage, storm surge, and erosion is likely to increase due to climate change.

4.5 HAZARDS IMPACTED BY RISING TEMPERATURES

4.5.1 HIGH HEAT

There is no universal definition for extreme temperatures. The term is relative to the usual weather in the region based on climatic averages. High heat, for this climatic region, is usually defined as a period of 3 or more consecutive days above 90 °F, but more generally a prolonged period of excessively hot weather, which may be accompanied by high humidity.

4.5.1.1 LOCATION

High heat is a city-wide hazard which has had an impact on Everett's residents, especially on the more vulnerable populations such the elderly, school-aged children, and people with certain medical conditions, such as heart disease. However, even young and healthy individuals can succumb to heat if they participate in strenuous physical

activities during hot weather. Some behaviors also put people at greater risk: drinking alcohol; taking part in strenuous outdoor physical activities in hot weather; and taking medications that impair the body's ability to regulate its temperature or that inhibit perspiration.

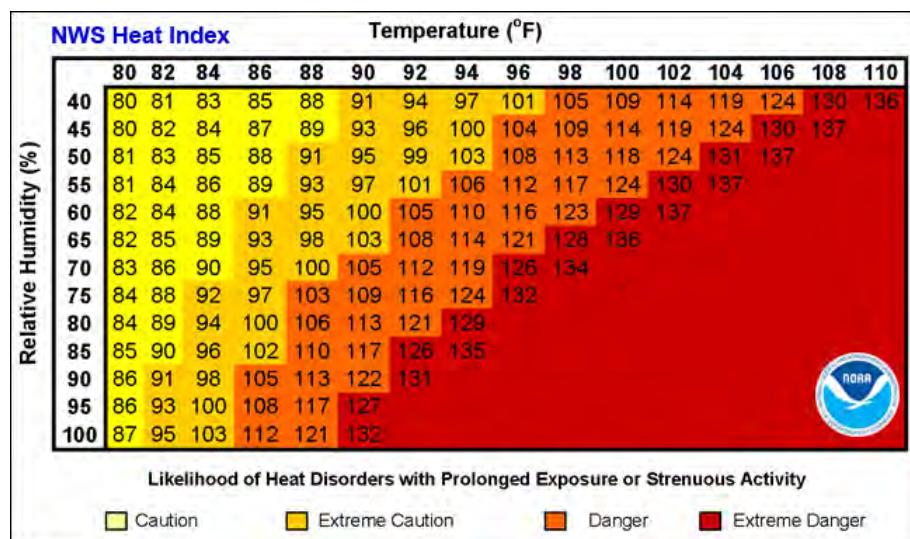
The urban heat island effect is when cities experience much warmer temperatures than suburbs and rural communities on hot days. Dense development patterns, large areas of industrial land use, heavy commercial trucking activity, limited tree canopy cover, and a high percentage of impervious land cover all contribute to the urban heat island effect throughout Everett.

The critical facilities vulnerable to flooding due to their location in areas mapped as historical experiencing urban heat island impacts such as localized higher ambient temperatures are indicated in Table 4-14 and shown on Map 4-3.

4.5.1.2 EXTENT OF NATURAL HAZARD

While a heat wave for Massachusetts is defined as three or more consecutive days above 90°F, another measure used for identifying extreme heat events is through a Heat Advisory from the NWS. These advisories are issued when the heat index (Figure 4-1) is forecast to exceed 100 degree Fahrenheit (F) for 2 or more hours; an excessive heat advisory is issued if forecast predicts the temperature to rise above 105 degree F.

Figure 4-1: National Weather Service (NWS) Heat Index



4.5.1.3 PREVIOUS OCCURRENCES OF HAZARD EVENTS

The City of Everett does not collect data on high heat occurrences. According to the SHMCAP, over the last two decades, an average of two high heat weather events have occurred in Massachusetts annually. There are an average of four to five heat waves annually in Massachusetts.

From 1979-2003, excessive heat exposure caused 8,015 deaths in the United States. During this period, more people in this country died from extreme heat than from hurricanes, lightning, tornados, floods, and earthquakes combined. The NCEI Storm Events Database record from July 6, 2010 indicates the temperature in eastern Massachusetts ranged from 100 to 106 degrees Fahrenheit. There were no reported deaths, injuries or property damage resulting from excessive heat.

4.5.1.4 PROBABILITY OF FUTURE EVENTS

Massachusetts is expected to see an increase in the number of high heat days in the coming years. The NE CASC data support the trends of an increased frequency of extreme hot weather events. Table 4-6 reflects the projected change in the number of days the Boston Harbor Basin, which includes Everett, will experience days above 90°F. The values reflect the IPCC Representative Concentration Pathway (RCP) high emissions pathway (RCP 8.5).

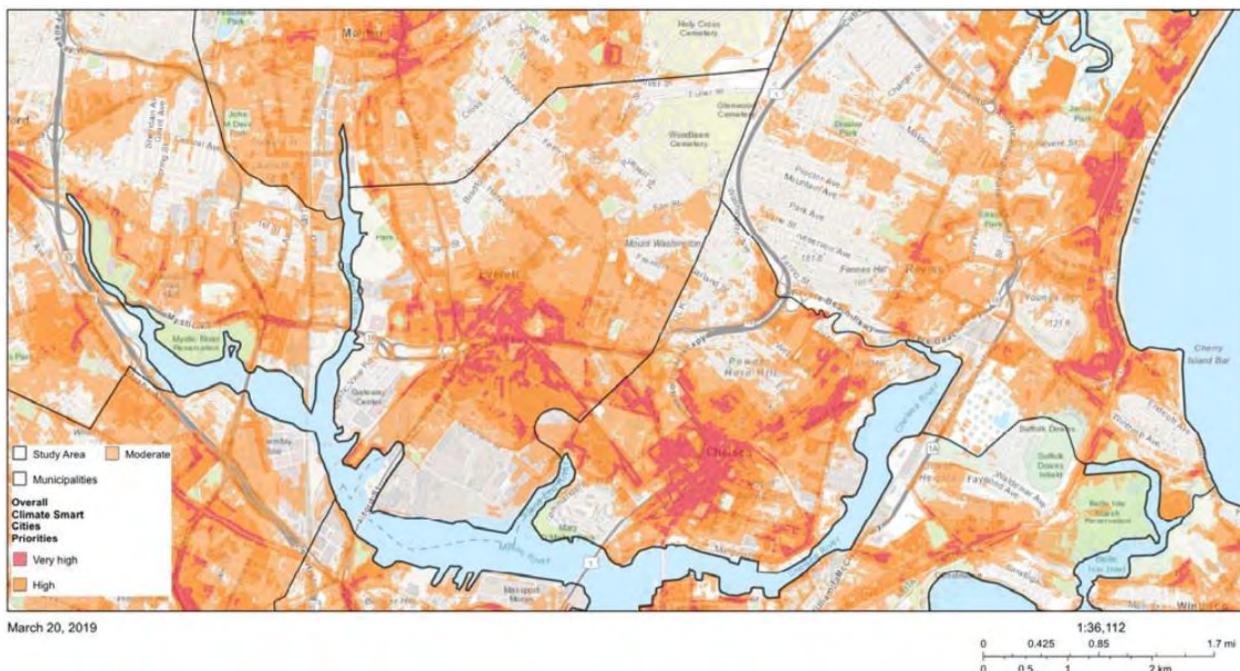
Table 4-6: Projected Change in Number of Days Above 90°F in the Boston Harbor Basin

Season	Baseline (Days)	2030s	2050s	2070s	2090s
Annual	7.85	+12.08	+24.46	+39.8	+53.83
Fall	0.31	+1.52	+2.81	+5.34	+8.58
Spring	0.50	+0.48	+0.9	+1.75	+3.14
Summer	7.04	+10.19	+19.67	+32.36	+42.21
Winter	0.00	0	0	0	0

Source: Resilient MA, Climate Change Clearinghouse for the Commonwealth, 2021. <https://resilientma.org/>

The Trust for Public Land's *Climate Smart Cities* report identifies several major corridors in Everett, as seen in Figure 4-2, as a "very high risk" of heat hazards and the remainder of the community as "moderate to high risk" of heat hazards.

Figure 4-2: Everett Climate Smart Cities Map



Source: Trust for Public Land, 2019 - <https://www.tpl.org/how-we-work/climate-smart-cities>

4.6 HAZARDS IMPACTED BY EXTREME WEATHER

4.6.1 SEVERE THUNDERSTORMS

A thunderstorm is a storm originating in a cumulonimbus cloud. Cumulonimbus clouds produce lightning. Frequently during thunderstorm events, gusty winds, and heavy rain sufficient to produce flooding are present. Less frequently, hail is present, which can become very large in size. Tornadoes can also be generated during these events. The National Weather Service defines a severe thunderstorm as a thunderstorm that produces one-inch hail or larger in diameter and/or winds equal or exceed 58 mph.

The city is vulnerable to both the wind and precipitation associated with thunderstorms. High winds can cause damage to structures, fallen trees, and downed power lines leading to power outages. Intense rainfall can overwhelm drainage systems causing localized flooding of rivers and streams as well as urban stormwater ponding and localized flooding.

As severe thunderstorms are wind- and precipitation-related hazards, climate change has the potential to exacerbate these issues over time as storms with increased severity and increased precipitation rates become more frequent.

4.6.1.1 LOCATION

The effect and impact from severe thunderstorms are experienced across both the city and the entire state.

4.6.1.2 EXTENT OF NATURAL HAZARD

Thunderstorms can lead to localized damage and represent a hazard risk for communities. Severe thunderstorms can form quickly, and, on average, they are only around 15 miles in diameter and last for about 30 minutes. They are typically more difficult to predict than continental and coastal storms.

4.6.1.3 PREVIOUS OCCURRENCES OF HAZARD EVENTS

Eastern Massachusetts is at risk of one to two severe thunderstorms per year. Everett experienced three severe thunderstorm events from 2005 to April 30, 2014 with no deaths or injuries.

Based on data from the NCEI Storm Events Database, 236 thunderstorm wind events occurred on 48 days in Middlesex County between April 1, 2014 and December 31, 2020. This includes six events on three days in Everett, causing an estimated \$35,500 in property damage. During the same time period, the Storm Events Database reflects two hail events in Everett. These storms are detailed in Table 4-7.

Table 4-7: Everett Hail and Thunderstorm Wind Events April 1, 2014 through December 31, 2020

Date of Event	Type of Event	Property Damage	Death/Injuries
7/7/2014	Thunderstorm Wind	\$5,000	0/0
7/7/2014	Thunderstorm Wind	\$5,000	0/0
7/7/2014	Thunderstorm Wind	\$5,000	0/0
8/7/2014	Hail	\$0	0/0

Date of Event	Type of Event	Property Damage	Death/Injuries
8/4/2015	Hail	\$0	0/0
7/23/2016	Thunderstorm Wind	\$15,000	0/0
7/23/2016	Thunderstorm Wind	\$5,000	0/0
8/7/2019	Thunderstorm Wind	\$500	0/0
TOTAL		\$35,500	0/0

4.6.1.4 PROBABILITY OF FUTURE EVENTS

The NE CASC data support the trend of a slightly increased frequency of extreme precipitation events, defined as days with more than two inches of precipitation. The SHMCAP notes that “based on these available projections for future rainfall events, the probability of future thunderstorm events is anticipated to increase.”

4.6.2 SEVERE WINTER STORMS

Severe winter storms include ice storms, nor'easters, heavy snow, blowing snow, and other extreme forms of winter precipitation. Winter storms are the most common and most familiar of the region's hazards that affect large geographic areas. An increased amount of severe winter storms is expected due to climate change.

Most blizzards and ice storms in the region cause more inconvenience than they do serious property damage, injuries, or deaths. However, periodically, a storm will occur which is a true disaster, and necessitates intense large-scale emergency response. Occasionally winter storms can also hinder the tidal exchange in tidally restricted watersheds and result in localized flooding within these areas. Ice build-up at gate structures can also damage tide gates and increase the hazard potential because of malfunctioning tide gates. Coastal storms also cause flooding because of tidal surges.

Because a major feature of winter storms is the tendency for higher tides with associated flooding, the same mitigation measures in place for flooding are all important for mitigating the impacts of winter storms. However, the rapid melting

of snow after major storms, combined with rainfall, is more of a common flooding threat.

The Everett Department of Public Works clears roads as requested by emergency service providers and carries on general snow removal operations, in conjunction with local snow removal contractors. The City continues to ban on-street parking at nights during snow storm events and during snow removal to ensure that streets can be plowed, and public safety vehicle access is maximized.

The city's overall vulnerability to winter storms is primarily related to restrictions to travel on roadways, temporary road closures, school closures, and potential restrictions on emergency vehicle access. A secondary vulnerability is power outages due to fallen trees and utility lines.

4.6.2.1 LOCATION

The entire city is at risk for winter storms. The elderly population is particularly susceptible due to their increased risk of injury and death from falls, overexertion, or hypothermia related to clearing snow or power failures. Also vulnerable are low income residents who may lack access to housing or housing with sufficient insulation or heating supply.

4.6.2.2 EXTENT OF NATURAL HAZARD

The average annual snowfall for most of the city is 36.1 to 48.0 inches. There is a small band in the northwestern part of the city where the average snowfall is 48.1 to 72.0 inches.

4.6.2.3 PREVIOUS OCCURRENCES OF HAZARD EVENTS

The City of Everett does not keep local records of winter storms. Data for Middlesex County, which includes Everett, is the best available data to help understand previous occurrences and impacts of winter storm events. The NCEI Storm Events Database includes 39 heavy snow events in Middlesex County between April 1, 2014 and December 31, 2020, as shown in Table 4-8.

Table 4-8: Middlesex County Heavy Snow Events April 1, 2014 through December 31, 2020

Date of Heavy Snow Event	Property Damage	Death/Injuries
11/26/2014	\$10,000	0/0
1/24/2015	\$0	0/0
1/24/2015	\$0	0/0
1/24/2015	\$0	0/0

Date of Heavy Snow Event	Property Damage	Death/Injuries
1/26/2015	\$0	0/0
1/26/2015	\$0	0/0
2/2/2015	\$0	0/0
2/2/2015	\$0	0/0
2/2/2015	\$0	0/0
2/8/2015	\$0	0/0
2/8/2015	\$0	0/0
2/8/2015	\$0	0/0
2/14/2015	\$0	0/0
2/14/2015	\$0	0/0
2/14/2015	\$0	0/0
2/5/2016	\$0	0/0
2/5/2016	\$70,000	0/0
2/5/2016	\$5,000	0/0
3/21/2016	\$0	0/0
4/4/2016	\$0	0/0
12/29/2016	\$0	0/0
3/14/2017	\$0	0/0
3/14/2017	\$0	0/0
3/14/2017	\$0	0/0
11/15/2018	\$0	0/0
11/15/2018	\$0	0/0
11/15/2018	\$0	0/0
12/1/2019	\$0	0/0
12/1/2019	\$1,500	0/0
12/1/2019	\$2,500	0/0
1/18/2020	\$0	0/0
1/18/2020	\$0	0/0
3/23/2020	\$0	0/0
10/30/2020	\$500	0/0
12/5/2020	\$0	0/0
12/5/2020	\$0	0/0
12/16/2020	\$0	0/0
12/16/2020	\$0	0/0
12/16/2020	\$0	0/0
TOTAL	\$89,500	0/0

4.6.2.4 PROBABILITY OF FUTURE EVENTS

A notable winter storm generally occurs at least once every winter, according to the SHMCAP. Nor'easters are the most frequently occurring natural hazard in the state, generally occurring on an annual basis with some years bringing up to four nor'easter events. Ice storms impact the Commonwealth on at least an annual basis.

4.6.3 STRONG WINDS

Strong winds, including those resulting from hurricanes and tornadoes, remain a significant concern for Everett. Effects from high winds can include downed trees and/or power lines and damage to roofs, windows, and other structural components. High winds can cause scattered power outages. High winds are also a hazard for the boating, shipping, and aviation industry sectors. Climate change has the potential to exacerbate these issues over time warmer temperatures create energy for more intense storms and increased precipitation rates become more frequent.

A hurricane is a violent wind and rainstorm with wind speeds of 74-200 miles per hour. A hurricane is strongest as it travels over the ocean and is particularly destructive to coastal property as the storm hits the land. Hurricanes generally occur between June and November.

There have been no significant changes to address hurricane emergency response since 2005. The two major mitigation measures in place are adherence to the Massachusetts State Building Code and the City's Comprehensive Emergency Management Plan which addresses hurricane hazards although primarily from a response perspective.

A tornado is a violent windstorm characterized by a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground. They develop when cool air overrides a layer of warm air, causing the warm air to rise rapidly. Most vortices remain suspended in the atmosphere. Should they touch down, they become a force of destruction.

There have been no changes since the 2008 Natural Hazard Mitigation Plan to address tornadoes in Everett beyond maintaining emergency shelters in the event that they were needed. The City has adopted the Massachusetts State Building Code. The code's provisions are the most cost-effective mitigation measure against tornados given the extremely low probability of occurrence. The City does maintain American Red Cross certified emergency shelters if they were needed in case of evacuations due to tornadoes.

4.6.3.1 LOCATION

Eastern Massachusetts, including Everett, has been impacted to varying degrees by numerous hurricanes throughout its history. Given their typical characteristics and size, they have the potential to impact the entire city of Everett.

Given their unpredictable track, tornadoes are a potential city-wide hazard in Everett. Most structures pre-date current building codes and could be subject to significant damages. Evacuation may be required

on short notice. Sheltering and mass feeding efforts may be required along with debris clearance, search and rescue, and emergency fire and medical services.

4.6.3.2 EXTENT OF NATURAL HAZARD

Hurricanes range from 50 to 500 miles across. Hurricane intensity is measured according to the Saffir-Simpson scale, which categorizes hurricane intensity linearly based upon maximum sustained winds, barometric pressure, and storm surge potential. These are combined to estimate potential damage. Table 4-9 gives an overview of the wind speeds and range of damage caused by different hurricane categories.

Table 4-9: Saffir-Simpson Hurricane Wind Scale

Category	Sustained Winds Speed (mph)	Range of Damage
1	74-95	Very dangerous winds will produce some damage.
2	96-110	Extremely dangerous winds will cause extensive damage.
3	111-129	Devastating damage will occur.
4	130-156	Catastrophic damage will occur.
5	157 or higher	Catastrophic damage will occur.

Source: NOAA National Hurricane Center and Central Pacific Hurricane Center, <https://www.nhc.noaa.gov/aboutsshws.php>

Tornado damage severity is measured by the Fujita Tornado Scale, in which wind speed is not measured directly but rather estimated from the amount of damage. As of February 01, 2007, the National Weather Service began rating tornados using the Enhanced Fujita-scale (EF-scale), shown in Table 4-9, which allows surveyors to create more precise assessments of tornado severity.

Table 4-10: Enhanced Fujita (EF) Scale

EF Rating	3-Second Gust (mph)
0	65-85
1	86-110
2	111-135
3	136-165
4	166-200
5	Over 200

4.6.3.3 PREVIOUS OCCURRENCES OF HAZARD EVENTS

Major storm events, such as hurricanes and tornados have been an occasional, albeit not frequent, threat to Everett.

In 1944, a Category 1 hurricane tracked through northwestern Everett. A hurricane or storm track is the line that delineates the path of the eye of a hurricane or tropical storm. Typically, the entire city experiences the impacts of the wind and rain of hurricanes and tropical storms, regardless of the storm track.

Tornadoes are rare in eastern Massachusetts. Although no tornadoes have been recorded within the City of Everett, a tornado rated as F2 struck the neighboring cities of Chelsea and Revere on July 28, 2014.

4.6.3.4 PROBABILITY OF FUTURE EVENTS

Storms with strong winds are projected to occur with increased frequency and intensity. Hurricanes and tropical storms are generally limited to the months of July, August, September, and October, with a few storms arriving in May, June, or November. As noted in the U.S. Global Change Research Program's Fourth National Climate Assessment, tornado activity in the U.S. has become more variable, with a decrease in the number of days per year that tornadoes occur but an increase in the number of tornadoes on these days.

4.7 DAM FAILURE

Considered a technological and human-caused hazard, dam failure can arise from two types of situations. Dams can fail because of structural problems independent of any storm event. Dam failure can follow an earthquake by causing structural damage. Dams can fail structurally because of flooding arising from a storm or they can overspill due to flooding.

The DCR Amelia Earhart Dam separates the tidal and the non-tidal parts of the Mystic River. Constructed in 1966, is estimated to need \$5 million dollars in repairs, including repairs to the third pump and the possible installation of a fourth pump. The dam is currently able to pump 4,000 cubic feet per second of flow from the Mystic and Malden Rivers against high tide into Boston Harbor. The pump improvements would increase the rate that flood water can travel out of the cities and towns along the Mystic River.

4.7.1 LOCATION

The Amelia Earhart Dam is located on the Mystic River between the Cities of Everett and Somerville. It is owned and operated by the DCR, which also owns the Mystic Lakes Dam in Medford/Arlington, which is part of the Mystic Lakes system, located further upstream the Mystic River watershed.

4.7.2 EXTENT OF HAZARD

The dam provides an important tidal management resource on the Mystic River to control upstream flooding in the Mystic River watershed. In the event of a dam failure, the energy of the water stored behind even a small dam can cause loss of life and property damage if there are people or buildings downstream. The number of fatalities from a dam failure depends on the amount of warning provided to the population and the number of people in the area in the path of the dam's floodwaters. In the case of the Amelia Earhart Dam, if a dam failure occurred, the lower elevation areas of Everett along the Mystic River could be impacted by flooding. In Everett, these areas do not include populated residential areas and are mostly industrial properties, some of which are abandoned or underutilized sites, but also include some currently active operations and many of which are currently storing hazardous materials such as petroleum products, fuels, and other chemicals.

4.7.3 PREVIOUS OCCURRENCES OF HAZARD EVENTS

There has never been a dam failure in Everett.

4.7.4 PROBABILITY OF FUTURE EVENTS

Dam failure in general is infrequent but has the potential for severe impacts. However, projected sea level rise and greater storm intensity increase the probability that floodwaters could flank and/or overtopping the dam in its current condition.

4.8 EARTHQUAKE

An earthquake, a non-climate influenced hazard, is the vibration of the Earth's surface that follows a release of energy in the Earth's crust. These earthquakes often occur along fault boundaries. As a result, areas that lie along fault boundaries—such as California, Alaska, and Japan—experience earthquakes more often than areas located within the interior portions of these plates. New England, on the other hand, experiences intraplate earthquakes because it is located deep within the interior of the North American plate.

4.8.1 LOCATION

Earthquakes are a potential city-wide hazard in Everett. The City has many unreinforced, older masonry buildings which would be vulnerable in a severe earthquake.

4.8.2 EXTENT OF HAZARD

Seismologists use the Richter Scale to express the amount of seismic energy released by an earthquake (shown in Table 4-11), while the intensity of an

earthquake is measured by the Modified Mercalli Intensity (MMI) scale (shown in Figure 4-3). As the Richter Scale has a logarithmic basis, each whole number step corresponds to the release of about 31 times more energy than the preceding whole number.

Table 4-11: Richter Scale

Magnitude	Earthquake Effects
Less than 3.5	Usually not felt, but can be recorded by seismograph.
3.5-5.4	Often felt, but only causes minor damage.
5.5-6.0	Slight damage to buildings and other structures.
6.1-6.9	May cause a lot of damage in very populated areas.
7.0-7.9	Major earthquake. Serious damage.
8 or greater	Great earthquake. Can totally destroy communities near the epicenter.

Figure 4-3: Modified Mercalli Intensity Scale

Intensity	Shaking	Description/Damage
I	Not felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on upper floors of buildings.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken.
VIII	Severe	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

4.8.3 PREVIOUS OCCURRENCES OF HAZARD EVENTS

There have been no recorded earthquake epicenters within the City of Everett although residents may feel the tremors from one or more of the infrequent earthquakes recorded within the region.

4.8.4 PROBABILITY OF FUTURE EVENTS

Earthquakes cannot be predicted and may occur at any time. As stated in the SHMCAP, “because of the low frequency of earthquake occurrence and the

relatively low levels of ground shaking that are usually experienced, the entire Commonwealth can be expected to have a low to moderate risk to earthquake damage as compared to other areas of the country.”

4.9 LAND USE AND DEVELOPMENT TRENDS

4.9.1 EXISTING LAND USE

As previously noted, Everett has both densely developed residential neighborhoods, as well as an intensely used industrial area that includes a marine terminal associated with liquified natural gas (LNG), fuel storage facilities, and a materials processing facility. The residential neighborhood and commercial areas are in the upland hills while the industrial area is adjacent to the Mystic River and Island End River. Everett is a densely populated city with over 13,000 people per square mile and is also an Environmental Justice community. Except for the waterfront areas, there is little natural open space, with acres of cemeteries located in the northeast section of the city and smaller parks located throughout the city. The city's land use is shown on Map 4-4.

The most recent land use statistics available from the state are from aerial photography taken in 2016. Table 4-12 shows the acreage and percentage of land in 13 categories. If the residential categories are aggregated, residential uses make up 32.8% (722.6 acres) of the city's area. The most prevalent use is multi-family residential with 21.3% (469.5 acres) of the city's use.

Table 4-12: 2016 City of Everett Land Use

Land Use	Acres	Percentage of Total Area
Commercial	298.6	13.5%
Industrial	325.6	14.8%
Mixed use, other	7.4	0.3%
Mixed use, primarily commercial	0.1	0.0%
Mixed use, primarily residential	17.1	0.8%
Open land	85.7	3.9%
Residential - multi-family	469.5	21.3%
Residential - other	0.3	0.0%
Residential - single family	252.7	11.5%
Right-of-way	405.2	18.4%
Tax exempt	326.8	14.8%
Unknown	16.6	0.8%
Water	0.1	0.0%
TOTAL	2,205.6	100%

4.9.2 POTENTIAL FUTURE DEVELOPMENT

The following areas were identified from recent planning and permitting efforts as likely to be developed in the future, defined for the purposes of this plan as a ten-year time horizon. These areas are described below and shown on Map 4-5. Everett has permitted with focus on hazards.

- A. 114 Spring Street: 1 acre, 360+ residential units and 7,400 square feet of retail space, permitting stage
- B. Second & Vine Street: 6-story building, 320 residential units, 4,000 square feet retail space, permitting stage
- C. 1690 Revere Beach Parkway (Stop & Shop site): 5.6 acres in Everett, 800 residential units, 15,000 square feet retail space, permitting stage
- D. 85 Boston Street (Wood Waste site): 650 residential units, 9,000 square feet retail space, permitting stage
- E. 35-45 Garvey Street: Two 8-story buildings, 591 residential units, 7,400 square feet of retail space, permitting stage
- F. 110 Tremont: 2 buildings, 48 residential units, permitting stage
- G. 6 Norman Street: 5-story building, 66 residential units, permitting stage
- H. 65 Norman Street: 6-story building, 398 residential units, permitting stage

4.10 CRITICAL INFRASTRUCTURE IN HAZARD AREAS

Critical infrastructure includes facilities that are important for disaster response and evacuation (such as emergency operations centers, fire stations, water pump stations, etc.) and facilities where additional assistance might be needed during an emergency (such as nursing homes, elderly housing, and day care centers). These facilities are listed in Table 4-13 and are shown on Map 4-6. The critical facilities and their relationship to natural hazards are summarized in Table 4-13.

The purpose of mapping the natural hazards and critical infrastructure is to present an overview of hazards in the community and how they relate to critical infrastructure, to better understand which facilities may be vulnerable to particular natural hazards.

Table 4-13: Relationship of Critical Facilities to Natural Hazard Areas

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
Amelia Earhart Dam	Dam	N/A	Flooding	Yes	Yes
Children's Playhouse Day Care	Day Care	46 Bucknam St	Heat	No	No
Children's Playhouse Day Care	Day Care	92 Baldwin Avenue	Heat	No	No
Little Sprouts Family Day Care	Day Care	106 Glendale Street	Heat	No	No
First Steps Family Daycare	Day Care	12 Waverly Street	Heat	No	No
Christine's Family Day Care	Day Care	17 Clark Street	Heat and Flooding	No	Yes
K&D's Family Daycare	Day Care	189 Bradford Street	Heat	No	No
Patti-Cake Day Care Center	Day Care	195 Elm Street	Heat	No	No
ABC Daycare	Day Care	219 Main Street	Heat	No	No
Ms. Naoual's Neighborshcool	Day Care	26 Auburn Street	Heat	No	No
Zozo's Daycare	Day Care	297 Main Street	Heat	No	No
ABZ Early Childhood Development Center	Day Care	305 Main Street	Heat	No	No
Children's Playhouse Daycare	Day Care	46 Bucknam Street	Heat	No	No
Happy Heart Day Care	Day Care	5 Parker Street	Heat	No	No
Sweet Pea Family Day Care Center	Day Care	65 Malden Street	Heat	No	No
Sweet Angels Family Day Care	Day Care	68 Lexington Street	Heat	No	No
Family Day Care Program	Day Care	70 Everett Ave	Heat and Flooding	Yes	Yes

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
One Childhood Early Learning & Care	Day Care	8 Holyoke Street (Malden)	None	No	No
Red Apple Daycare	Day Care	91 Belmont Street	Heat	No	No
Everett Villa Co-Op	Elderly Housing	66 Main Street	Heat and Flooding	No	Yes
The Rehabilitation & Nursing Center At Everett	Elderly Housing	289 Elm St	Heat	No	No
St. Therese Parish Site - Senior Housing Development	Elderly Housing	795 Broadway	Heat	No	No
Pope John School Site - Senior Housing Development	Elderly Housing	888 Broadway	Heat	No	No
Sacro Plaza	Elderly Housing	142 School St	Heat	No	No
Park Plaza	Elderly Housing	30 Chelsea St	Heat	No	No
Glendale Towers	Elderly Housing	381 Ferry Street	Heat	No	No
Whittier Elderly Housing	Elderly Housing	393 Ferry St	Heat	No	No
Golden Age Circle	Elderly Housing	5 Golden Age Circle	Heat	No	No
Encore Boston Harbor – Casino Resort	Casino	1 Broadway	Flooding	Yes	Yes
AGP Gas	Oil / Gas	24 Vine Street	Heat	Yes	Yes
Middlesex Gasses & Technologies	Oil / Gas	292 2 nd Street	Heat	Yes	Yes
Exxon Mobil Corp	Oil / Gas	51 Robin St	Heat and Flooding	No	Yes
Exxon Corp	Oil / Gas	52 Beacham St	Heat and Flooding	Yes	Yes
Exxon Corp	Oil / Gas	75 Rover St	Flooding	No	Yes
Lineage Logistics	Food Distribution	60 Commercial Street	Flooding	Yes	Yes

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
New England Produce Center	Food Distribution	300 Beacham St	Heat and Flooding	Yes	Yes
Bay State Galvanizing	Hazardous Materials Storage	128 Spring Street	Heat	Yes	Yes
Duncan Galvanizing	Hazardous Materials Storage	69 Norman Street	Heat	Yes	Yes
Mbta Repair Facility	Hazardous Materials Storage	80 Broadway	Heat	Yes	Yes
Dampney Paint	Hazardous Materials Storage	85 Paris Street	Heat	Yes	Yes
Sprague Energy	Hazardous Materials Storage	43 Beacham St	Everett	Ma	Ma
Encore Boston Harbor Hotel & Casino	Hotel & Entertainment Use	1 Broadway	Flooding	Yes	Yes
Envision Hotel	Hotel	1834 Revere Beach Pkwy	Heat	Yes	Yes
Exelon (formerly Distrigas of Massachusetts LLC)	LNG Storage & Distribution	18 Rover Street	Flooding	No	Yes
Exelon (formerly Distrigas) Marine Terminal	LNG Marine Terminal	18 Rover St	Flooding	No	Yes
Exelon (formerly Distrigas of Massachusetts LLC)	LNG Storage & Distribution	101 Commercial St	Heat and Flooding	Yes	Yes
Exelon (formerly Distrigas of Massachusetts LLC)	LNG Storage & Distribution	61 Commercial St	Heat and Flooding	No	Yes
Everett City Hall	City Hall	484 Broadway	Heat	No	No
City of Everett	Municipal	100 Elm St	Heat	No	No
City of Everett	Municipal	105 Woodville St	Heat and Flooding	No	Yes

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
City of Everett	Municipal	110 Santilli Hwy	Heat and Flooding	Yes	Yes
City of Everett	Municipal	117 Edith St	Heat and Flooding	No	Yes
City of Everett	Municipal	121 Vine St	Heat	No	No
City of Everett	Municipal	133 Santilli Hwy	Heat and Flooding	Yes	Yes
City of Everett	Municipal	14 Baldwin Av	Heat and Flooding	No	Yes
City of Everett	Municipal	145 Florence St	Heat	No	No
City of Everett	Municipal	15 Broadway	Heat and Flooding	No	Yes
City of Everett	Municipal	15 Victoria St	Heat	No	No
City of Everett	Municipal	159 Bucknam St	Heat	No	No
City of Everett	Municipal	16 Devens St	Heat	No	No
City of Everett	Municipal	167-173 Veterans Av	Heat	No	No
City of Everett	Municipal	18 Thurman St	Heat	No	No
City of Everett	Municipal	1841 Revere Beach Pw	Heat and Flooding	Yes	Yes
City of Everett	Municipal	19 Norman St	Heat and Flooding	Yes	Yes
City of Everett	Municipal	192 Bow St	Heat and Flooding	Yes	Yes
City of Everett	Municipal	20 Nichols St	Heat	No	No
City of Everett	Municipal	21 Hoyt St	Heat	No	No
City of Everett	Municipal	22 Appleton St	Heat	No	No
City of Everett	Municipal	26-30 Veterans Av	Heat	No	No
City of Everett	Municipal	29 Mt Washington St	Heat	No	No

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
City of Everett	Municipal	3 Florence St	Heat and Flooding	Yes	Yes
City of Everett	Municipal	337 Broadway	Heat	No	No
City of Everett	Municipal	34 Cabot St	Heat and Flooding	No	Yes
City of Everett	Municipal	34 Dartmouth St	Heat	No	No
City of Everett	Municipal	36 Norwood St	Heat	No	No
City of Everett	Municipal	36 Thurman St	Heat	No	No
City of Everett	Municipal	37 Central Av	Heat	No	No
City of Everett	Municipal	370Broadway	Heat	No	No
City of Everett	Municipal	384 Broadway	Heat	No	No
City of Everett	Municipal	4 Fuller St	Heat	No	No
City of Everett	Municipal	410 Broadway	Heat	No	No
City of Everett	Municipal	45 Prospect St	Heat	No	No
City of Everett	Municipal	45Tufts Av	Heat	No	No
City of Everett	Municipal	48 Broadway	Heat	No	No
City of Everett	Municipal	5 Brook St	None	No	No
City of Everett	Municipal	54 Hancock St	Heat	No	No
City of Everett	Municipal	54 Thurman St	Heat	No	No
City of Everett	Municipal	548 Broadway	Heat	No	No
City of Everett	Municipal	55 Elm St	Heat	No	No
City of Everett	Municipal	587 Broadway	Heat	No	No
City of Everett	Municipal	6 Elm Wy	Heat	No	Yes
City of Everett	Municipal	60 Bow St	Heat	No	No
City of Everett	Municipal	62 Tremont St	Heat	Yes	Yes
City of Everett	Municipal	66 Swan St	Heat	No	No
City of Everett	Municipal	7 Air Force Rd	Heat	Yes	Yes
City of Everett	Municipal	70 Floyd St	Heat	No	No

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
City of Everett	Municipal	71 Elm St	Heat	No	No
City of Everett	Municipal	76 Glendale St	Heat	No	No
City of Everett	Municipal	781 Broadway	Heat	No	No
City of Everett	Municipal	9 Norwood St	Heat	No	No
Edward G Connolly Center	Municipal	90 Chelsea Street	Heat	No	No
City of Everett	Municipal	945 Broadway	Heat	No	No
City of Everett	Municipal	94-96 Gledhill Av	Heat	No	No
City of Everett	Municipal	96 Ferry St	Heat	No	No
Boys & Girls Club (Former High School)	Municipal	548 Broadway	Heat	No	No
School Administration	Municipal	121 Vine Street	Heat	No	No
Everett Stadium	Municipal	1993 Revere Beach Pkwy	Heat	Yes	Yes
Parlin Library	Municipal	410 Broadway	Heat	No	No
Recreation Center	Municipal	47 Elm St	Heat	No	No
Shute Library	Municipal	781 Broadway	Heat	No	No
Department Oof Public Works Facility	Municipal	19 Norman Street	Heat	Yes	Yes
Allied Veterans Memorial Rink and Pool	Park/Public Space	65 Elm St	Heat	No	No
U.S. Post office	Post office	11 Norwood St	Heat	No	No
Exxon Corp	Oil / Gas	42-148 Beacham Street	Heat	Yes	Yes
Mystic Generating Station	Power Generation	173 Alford St	Flooding	Yes	Yes
Constellation Mystic Power LLC	Power Generation	39 Rover St	Flooding	Yes	Yes
Mass Electric Substation	Power Generation	35 Thorndike St	Heat	No	No

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
Gateway Mall	Place of Assembly	1 Mystic View Road	Heat and Flooding	Yes	Yes
The Growing Church Boston	Place of Assembly	1691 Revere Beach Pkwy	Heat	Yes	Yes
Assembleia De Deus Manancial De Boston, Inc.	Place of Assembly	1886 Revere Beach Pkwy	Heat	Yes	Yes
Ministerio Dios Habla Hoy, Inc.	Place of Assembly	1886 Revere Beach Pkwy	Heat	Yes	Yes
Emmanuel Evangelical Church, Inc.	Place of Assembly	22 Park Terrace	Heat	Yes	Yes
Iglesia Cristiana Nuevo Renacer, Inc.	Place of Assembly	380 2 nd Street	Heat	Yes	Yes
Assembly of God Salvation by Grace	Place of Assembly	380 2 nd Street	Heat	Yes	Yes
American Muslim Center	Place of Assembly	82 Spring Street	Heat	Yes	Yes
Bethel Revival Center	Place of Assembly	49 Union St	Heat	No	No
Word of Life House of Worship	Place of Assembly	1 Kenilworth Street	Heat	No	No
Igreja Assembleia De Deus Agape, Inc.	Place of Assembly	10 Irving Street	Heat	No	No
Gurudwara Sikh Sangat Boston	Place of Assembly	10 Thorndike St	Heat	No	No
Missionary Church of The Haitian Community	Place of Assembly	100 Temple Street	None	No	No
Middlesex Haitian Church of Christ	Place of Assembly	11 Liberty St.	Heat	No	No
Iglesia De Dios Morada Del Altísimo, Inc.	Place of Assembly	11 Liberty St.	Heat	No	No

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
Assembleia De Deus Em Everett	Place of Assembly	11 Rich Street	Heat	No	No
Deus E Amor	Place of Assembly	120 A Chelsea Street	Heat	No	No
God Is Love Church	Place of Assembly	120 Chelsea Street	Heat	No	No
Iglesia Misionera J.E.L.F.D.S.	Place of Assembly	120 Chelsea Street	Heat	No	No
Iglesia Pentecostal Unida Hispana Inc.	Place of Assembly	13 Rear Chelsea St	Heat	No	No
Judah International Ministries	Place of Assembly	133-135 Hancock St.	Heat	No	No
Ministers' Wives International Inc.	Place of Assembly	133-135 Hancock St.	Heat	No	No
Cava Church	Place of Assembly	135 Hancock St.	Heat	No	No
Elm Street Baptist Church	Place of Assembly	14 Jackson Ave	Heat	No	No
Eglise De Jesus Christ De Massachusetts	Place of Assembly	14 Waters Avenue	Heat	No	No
Great Commission Baptist Church Inc.	Place of Assembly	146 Hancock Street	Heat	No	No
Ministries of The Great Commission.Inc	Place of Assembly	146 Hancock Street	Heat	No	No
Anglican Church of Nativity	Place of Assembly	151 Glendale Street	Heat	No	No
Igreja Assembleia De Deus Comademat, Inc.	Place of Assembly	16 Walnut St.	Heat	No	No
Maranata Christ Church	Place of Assembly	162 Vernal Street	Heat	No	No

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
The Growing Church Boston	Place of Assembly	1691 Revere Beach Parkway	Heat	Yes	Yes
Businessmen for Awakening Inc	Place of Assembly	1725 Revere Beach Pkwy	Heat	Yes	Yes
Assembleia De Deus Ministerio Getsemane	Place of Assembly	173 Chesnut St Apt 2	Heat	No	No
Assembleia De Deus Manancial De Boston, Inc.	Place of Assembly	1886 Revere Beach Parkway	Heat	Yes	Yes
Iglesia Apostoles Y Profetas, E.F. 2.20 Camino A Sion, Inc.	Place of Assembly	1886 Revere Beach Parway	Heat	Yes	Yes
Our Lady of Grace Parish	Place of Assembly	194 Nichols Street	Heat	No	No
St Theresa's Church	Place of Assembly	20 Gledhill Ave	Heat	No	No
Iglesia Evangelica Amigos La Union Del Santo Corp.	Place of Assembly	20 Tileston St.	Heat	No	No
We Got Next	Place of Assembly	206 Springvale Ave	Heat	No	No
Emmanuel Evangelical Church, Inc.	Place of Assembly	22 Park Terr.	Heat	Yes	Yes
Igreja Evangelica Avivamento Da Fe, Inc.	Place of Assembly	22 Timothy Ave.	Heat	Yes	Yes
Church of God of Mount Sinai In Union	Place of Assembly	23 Revere St.	Heat	No	No
Haitian Church of Christ	Place of Assembly	240 Main St.	Heat	No	No
Christ In Action International, Inc.	Place of Assembly	25 Webster St.	Heat	No	No

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
Send the Fire Ministries	Place of Assembly	25 Webster St.	Heat	No	No
Revival Church for The Nations	Place of Assembly	25 Webster Street	Heat	No	No
First Congregational Church Chelsea	Place of Assembly	26 County Rd	Heat	No	No
Greater Evangelism World Crusade, Inc.	Place of Assembly	29 Hancock St.	Heat	No	No
Congregation Tifereth Israel of Everett	Place of Assembly	34 Malden Street	Heat	No	No
Boston Province of The Sisters of Notre Dame De Namur, Inc.	Place of Assembly	351 Broadway	Heat	No	No
New Life Evangelical Assembly of God Church	Place of Assembly	355 Broadway	Heat	No	No
Siloam Baptist Church	Place of Assembly	365 Ferry St., #9	Heat	No	No
Glendale United Methodist Church	Place of Assembly	392 Ferry Street	Heat	No	No
Igreja Mundial Do Poder De Deus	Place of Assembly	396 Broadway	Heat	No	No
Fellowship Assembly of God	Place of Assembly	42 Church Street	Heat	No	No
Igreja Evangelica Assembleia De Deus Conservadora	Place of Assembly	422 Main St.	Heat	No	No
Peace Cathedral Ministries Ag	Place of Assembly	422 Main Street	Heat	No	No
Everett Haitian Community Center	Place of Assembly	427 A Broadway	Heat	No	No

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
Cambridge Seventh Day Adventist Church	Place of Assembly	43 Norwood Street	Heat	No	No
Centro Internacional De Teo	Place of Assembly	433 Broadway	Heat	No	No
Bride of Christ Tabernacle, Inc.	Place of Assembly	459 Broadway, Ste B1	Heat	No	No
Saint Anthony's Parish	Place of Assembly	46 Oakes Street	Heat	No	No
First United Parish of Everett	Place of Assembly	460 Broadway	Heat	No	No
Church of The Middle Path of Harmony	Place of Assembly	461 Broadway	Heat	No	No
Pi Ayiti	Place of Assembly	487 Broadway	Heat	No	No
Immaculate Conception Parish	Place of Assembly	489 Broadway	Heat	No	No
Maramatha Temple of Glory	Place of Assembly	4a 47 Arlington St.	Heat	No	No
Grace Food Pantry	Place of Assembly	50 Church Street	Heat	No	No
North Shore Evangelical Missionary Church	Place of Assembly	50 Church Street	Heat	No	No
Igreja Pentecostal Casa De Oracao Em Missoes Inc	Place of Assembly	500 Broadway	Heat	No	No
North Shore Rescue Mission	Place of Assembly	52 Church Street	Heat	No	No
Our Lady of Grace Pastor	Place of Assembly	59 Nichols Street	Heat	No	No
Igreja Evangelista International	Place of Assembly	6 Victoria Street	Heat	No	No

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
Iglesia De Dios Fuente Inagotable	Place of Assembly	63 Hancock Street	Heat	No	No
Centro Scalabriní	Place of Assembly	63 Oakes Street	Heat	No	No
Bible Tabernacle Church of Jesus Christ	Place of Assembly	631 Broadway	Heat	No	No
Immaculate Conception	Place of Assembly	66 Hancock Street #64	Heat	No	No
Grace Episcopal Church of Everett	Place of Assembly	67 Norwood Street	Heat	No	No
Evangelical Ministry - Hope and Life	Place of Assembly	68 Lexington Street	Heat	No	No
Life Changing Ministry	Place of Assembly	7 Chelsea Street	Heat	No	No
The Father's House Church Boston Ministry Inc.	Place of Assembly	7 Chelsea Street	Heat	No	No
Glendale Christian Lighthouse Church	Place of Assembly	701 Broadway	Heat	No	No
Rebirth Assembly of God Church, Inc.	Place of Assembly	74 Pearl St., #01	Heat	No	No
Covenant Christian Church Alliance, Inc., The	Place of Assembly	757 Broadway	Heat	No	No
Zion Baptist Church	Place of Assembly	757 Broadway	Heat	No	No
Upon This Rock Ministries, Inc.	Place of Assembly	757 Broadway	Heat	No	No
Outreach Community and Reform Center, the	Place of assembly	78 Main St	Heat	No	Yes
Outreach Chapel	Place of Assembly	90 Chelsea Street	Heat	No	No

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
L'eglise Baptiste Beraca De Boston	Place of Assembly	95 Main St.	Heat	No	No
Societa Maria Santissima Della Misericordia	Place of Assembly	97 Chestnut Street	Heat	No	No
Cristo Para Os Povos, Inc.	Place of Assembly	99 Irving St., 1st Floor	Heat	No	No
City of Everett Emergency Response Mobile Unit	Police Department	1 Broadway	Flooding	Yes	Yes
Everett Police Department	Police Department	45 Elm Street	Heat	No	No
Everett Fire Department	Fire Department	243 Ferry Street	Heat	No	No
Everett Fire Department	Fire Department	384 Broadway	Heat	No	No
Everett Fire Department	Fire Department	54 Hancock Street	Heat	No	No
Emergency Operations Ctr	Emergency Operations	43 Elm Street	Heat	No	No
The Rehabilitation and Nursing Center At Everett	Medical Facility	289 Elm Street	Heat	No	No
Teen Health Center at Everett High School	Medical Facility	100 Elm Street	Heat	No	No
Cambridge Health Alliance Everett Hospital	Medical Facility	103 Garland Street	Heat	No	No
MGH Everett Family Care	Medical Facility	19-21 Norwood Street	Heat	No	No
Anna May Powers Health Center	Medical Facility	20 Nichols Street	Heat	No	No
Everett Care Center	Medical Facility	391 Broadway, Suite 204	Heat	No	No
CHA Everett Hospital	Medical Facility	96 Garland St	Heat	No	No
CHA Everett - Nuclear Medicine	Medical Facility	103 Garland Street	Heat	No	No

Name	Facility Type	Address	Natural Hazard Area (Flooding or Heat)	Flooding Hazard Intensified by Climate Change	
				2030	2070
Madeline English School	School	105 Woodville Street	Heat	Yes	Yes
Adams School	School	78 Tileston Street	Heat	Yes	Yes
Everett High School	School	100 Elm St	Heat	No	No
Lafayette School	School	117 Edith St	Heat	No	Yes
George Keverian School	School	20 Nichols St	Heat	No	No
Webster School	School	30 Dartmouth St	Heat	No	No
Whittier School	School	337 Broadway	Heat	No	No
St. Anthony's School	School	54 Oakes St	Heat	No	No
Parlin School	School	587 Broadway	Heat	No	No
Pioneer Charter School	School	59 Summer St	Heat	No	No
Pope John High School	School	888 Broadway	Heat	No	No
The Community Family	Community Home	106 Wyllis Avenue	Heat	Yes	Yes
Boston Market Terminal	Regional Distribution Site	34 Market Street	Heat and Flooding	Yes	Yes

4.11 VULNERABILITY ASSESSMENT

The purpose of the vulnerability assessment is to estimate the extent of potential damages from natural hazards of varying types and intensities. A vulnerability assessment and estimation of damages was performed for earthquakes and flooding using HAZUS software.

4.11.1 INTRODUCTION TO HAZUS-MH

HAZUS- MH (multiple-hazards) is a computer program developed by FEMA to estimate losses due to a variety of natural hazards. The following overview of HAZUS-MH is taken from the FEMA website. For more information on the HAZUS-MH software, go to <https://www.fema.gov/flood-maps/products-tools/hazus>.

"Hazus is a nationally standardized risk modeling methodology. It is distributed as free GIS-based desktop software with a collection of inventory databases for every U.S. state and territory. Hazus identifies areas with high risk for natural hazards and estimates physical, economic, and social impacts of earthquakes, hurricanes, floods, and tsunamis. The Hazus Program, managed by FEMA's Natural Hazards Risk Assessment Program, partners with other federal agencies, research institutions, and regional planning authorities to ensure Hazus resources incorporate the latest scientific and technological approaches and meet the needs of the emergency management community.

Hazus is used for mitigation, recovery, preparedness, and response. Mitigation planners, GIS specialists, and emergency managers use Hazus to determine potential losses from disasters and to identify the most effective mitigation actions for minimizing those losses. Hazus supports the risk assessment requirement in the mitigation planning process. Response planners use Hazus to map potential impacts from catastrophic events and identify effective strategies for response and preparedness. Hazus is also used during real-time response efforts to estimate impacts from incoming storms or ongoing earthquake sequences.

Hazus can quantify and map risk information such as:

- Physical damage to residential and commercial buildings, schools, critical facilities and infrastructure.
- Economic loss, including lost jobs, business interruptions, and repair and reconstruction costs.
- Social impacts, including estimates of displaced households, shelter requirements, and populations exposed to floods, earthquakes, hurricanes and tsunamis.
- Cost-effectiveness of common mitigation strategies, such as elevating structures in a floodplain or retrofitting unreinforced masonry buildings."

There are three modules included with the HAZUS-MH software: hurricane wind, flooding, and earthquakes. There are also three levels at which HAZUS-MH can be run. Level 1 uses national baseline data and is the quickest way to begin the risk assessment process. The analysis that follows was completed using Level 1 data.

Level 1 relies upon default data on building types, utilities, transportation, etc. from national databases as well as census data. While the databases include a wealth of information on the City of Everett, it does not capture all relevant information. In fact, the HAZUS training manual notes that the default data is “subject to a great deal of uncertainty.”

However, for the purposes of this plan, the analysis is useful. This plan is attempting to only generally indicate the possible extent of damages due to certain types of natural disasters and to allow for a comparison between different types of disasters. Therefore, this analysis should be considered to be a starting point for understanding potential damages from the hazards. If interested, communities can build a more accurate database and further test disaster scenarios. It is expected that the City of Everett will advance this analysis as part of an upcoming Benefit-Cost Analysis (BCA) to support flood resilience projects at the Island End River.

4.11.2 ESTIMATED DAMAGES FROM EARTHQUAKES

The HAZUS earthquake module allows users to define an earthquake magnitude and model the potential damages caused by that earthquake as if its epicenter had been at the geographic center of the study area. For the purposes of this plan, an earthquake with a magnitude 5.3 was selected. Historically, major earthquakes are rare in New England, though a magnitude 5.3 event occurred in 1963. In summary, an earthquake of this magnitude would likely cause nearly \$1 billion dollars in damages, including damage to regional transportation infrastructure, municipal utility infrastructure, and community-wide facility damages. The full results of the analysis for Everett are summarized in Appendix C: Risk Assessment Materials.

4.11.3 ESTIMATED DAMAGES FROM FLOODING

While HAZUS outputs related to flooding are included in Appendix C: Risk Assessment Materials, the LPC decided ultimately not to limit estimated flood damages from HAZUS based upon the limited extent of the current FEMA 100-year floodplain while the latest Middlesex County flood maps are published (formerly anticipated in 2020). This flood map update will significantly extend the mapped floodplain in Everett to match the 2016 Suffolk County update that triggered significant expansion of the regulated floodplain in the City of Chelsea. Current flood mapping highlights the significant divide in the level of flood map accuracy at the Island End River where the portion of the New England Produce Center within Chelsea is mapped and the portion in Everett is not mapped despite

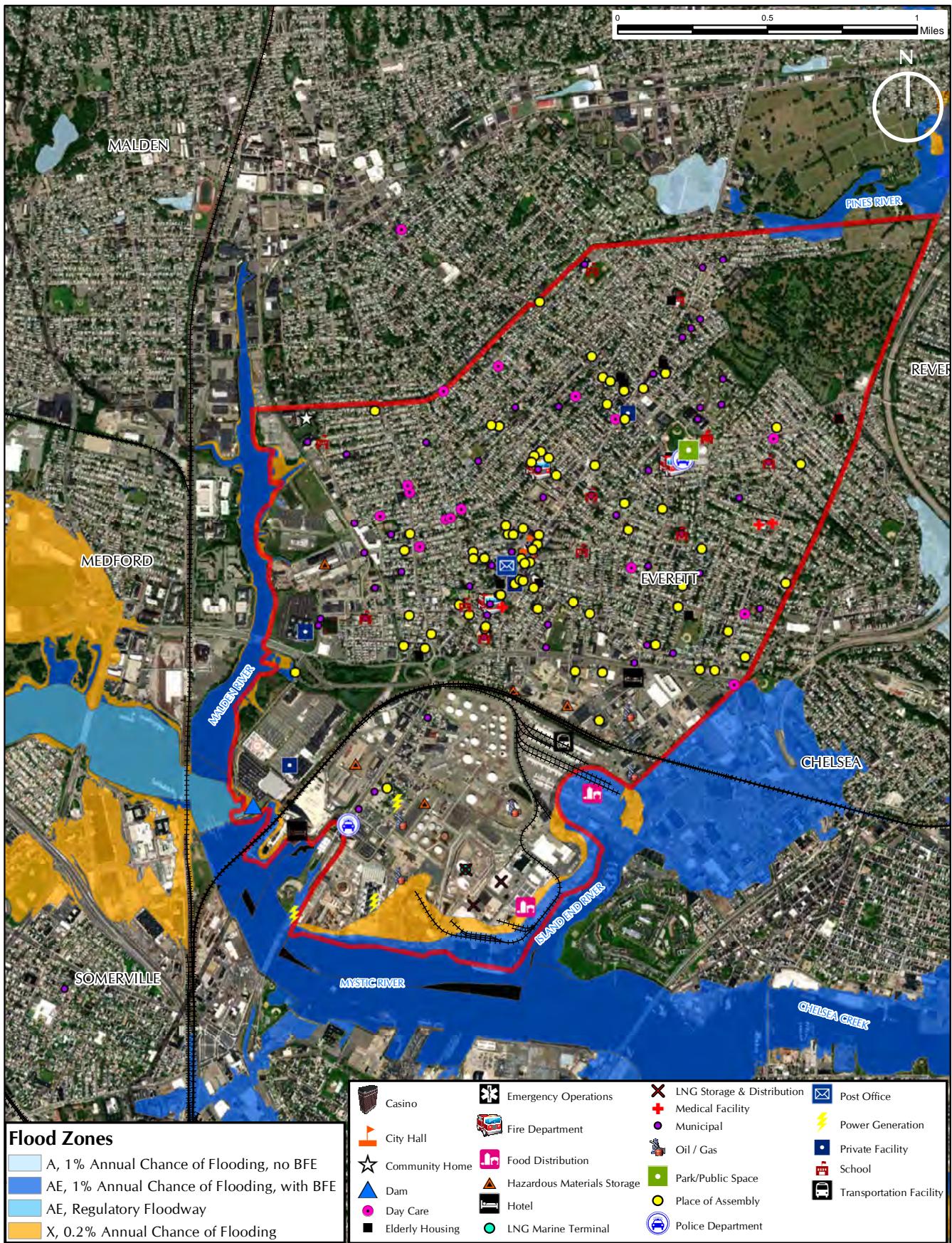
matching topographic elevations below the Suffolk County Base Flood Elevation (BFE) of Elevation 10.00 NAVD88.

Approximately 18.9% of the City's land area, and approximately 62 buildings worth an estimated \$429,952,200 were identified by the LPC as areas where flooding most frequently occurs based upon the anticipated 2020 mapped FEMA 100-year floodplain. Based upon FEMA guidance, the estimated losses in this area would range from 10% (\$42,995,220) and 50% (\$214,976,100) of total building value. Approximately 62.6% of the City's land area, and approximately 1,067 buildings worth an estimated \$972,165,000 were identified by the LPC as areas where flooding is projected to frequently occur in 2070 time-horizon based the Massachusetts Coastal – Flood Risk Model. Based upon FEMA guidance, the estimated losses in this area would range from 10% (\$97,165,000) and 50% (\$486,082,500) of total building value.

These estimated damages are limited to coastal flood impacts do not include inland urban flooding, which has not been accurately modeled in Everett to date. The City of Everett is currently engaging in stormwater modeling efforts for areas of the city that report inland flooding hazards and will update the Plan accordingly with estimate damages and associated mitigation measures as more information is available.

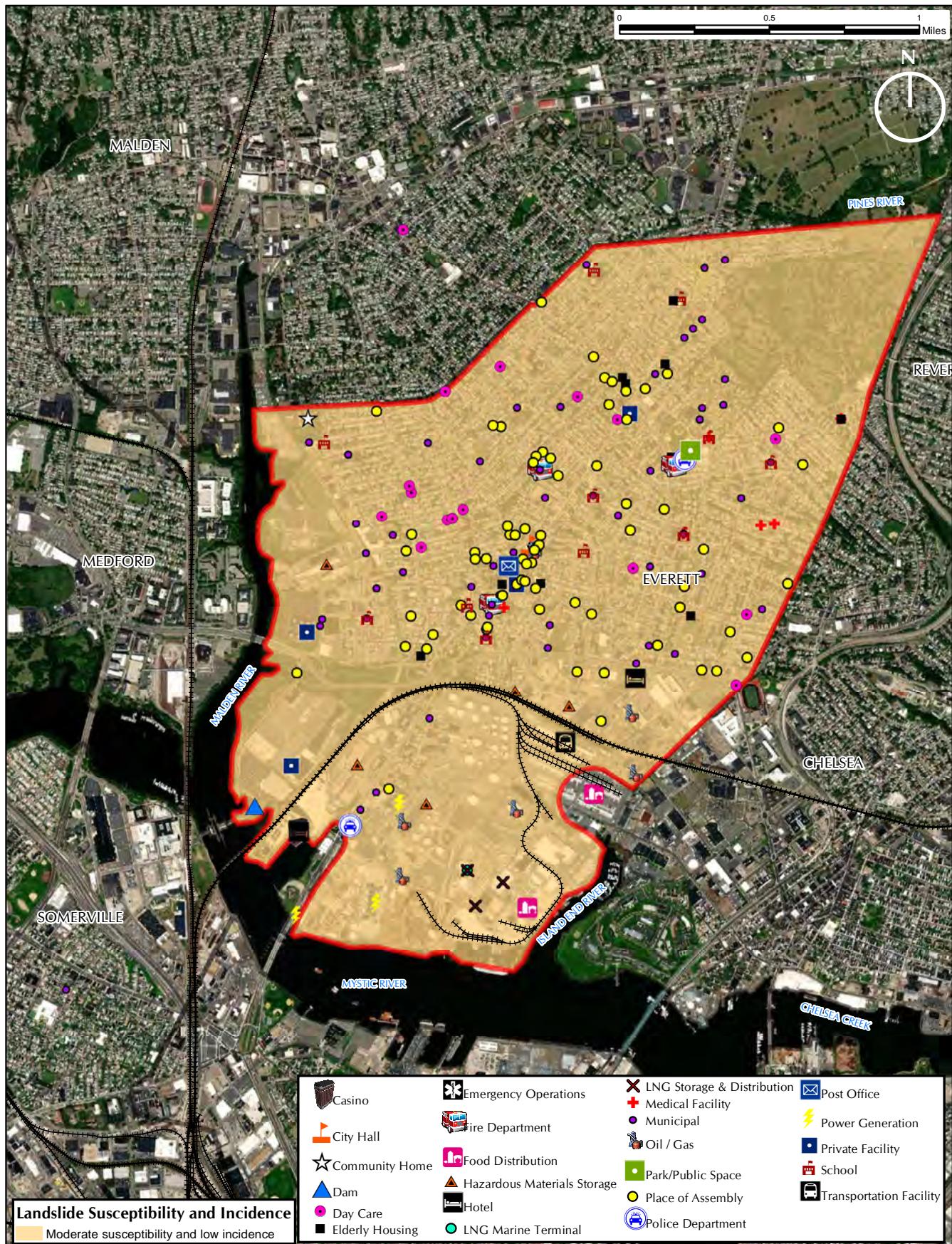
4.11.4 NATIONAL FLOOD INSURANCE PROGRAM (NFIP) INSURED STRUCTURES

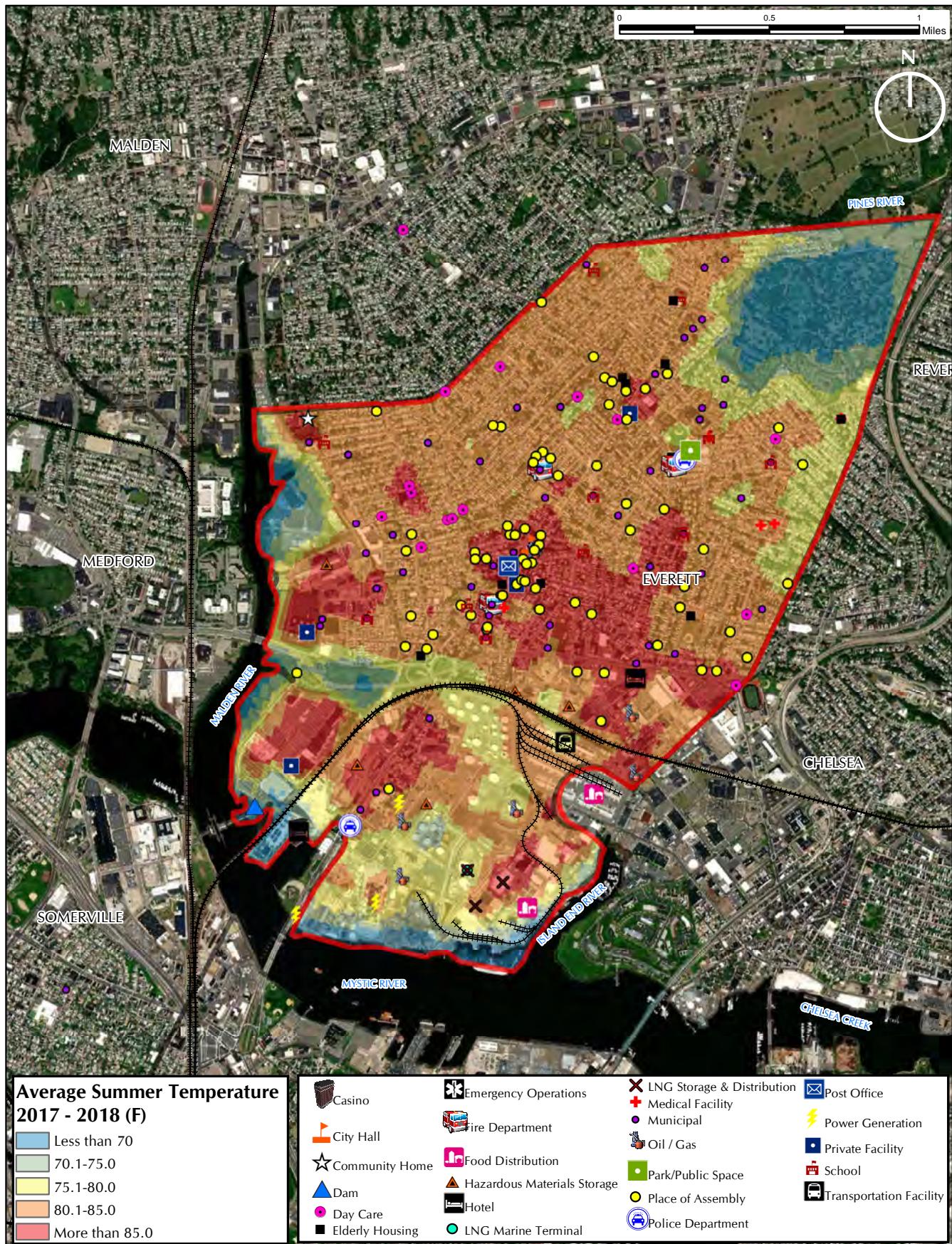
The Massachusetts NFIP Coordinator provided information regarding repetitive loss properties in Everett. A repetitive loss property is a property for which two or more NFIP losses of at least \$1,000 each have been paid within any 10-year rolling period since 1978. As of July 2, 2020, there were three repetitive loss properties in Everett. All three were residential properties, with two located in a Zone A flood hazard zone. There has been a total of 11 paid losses, with total losses of \$66,457, which is an increase of \$5,754 since the 2015 HMP Plan.

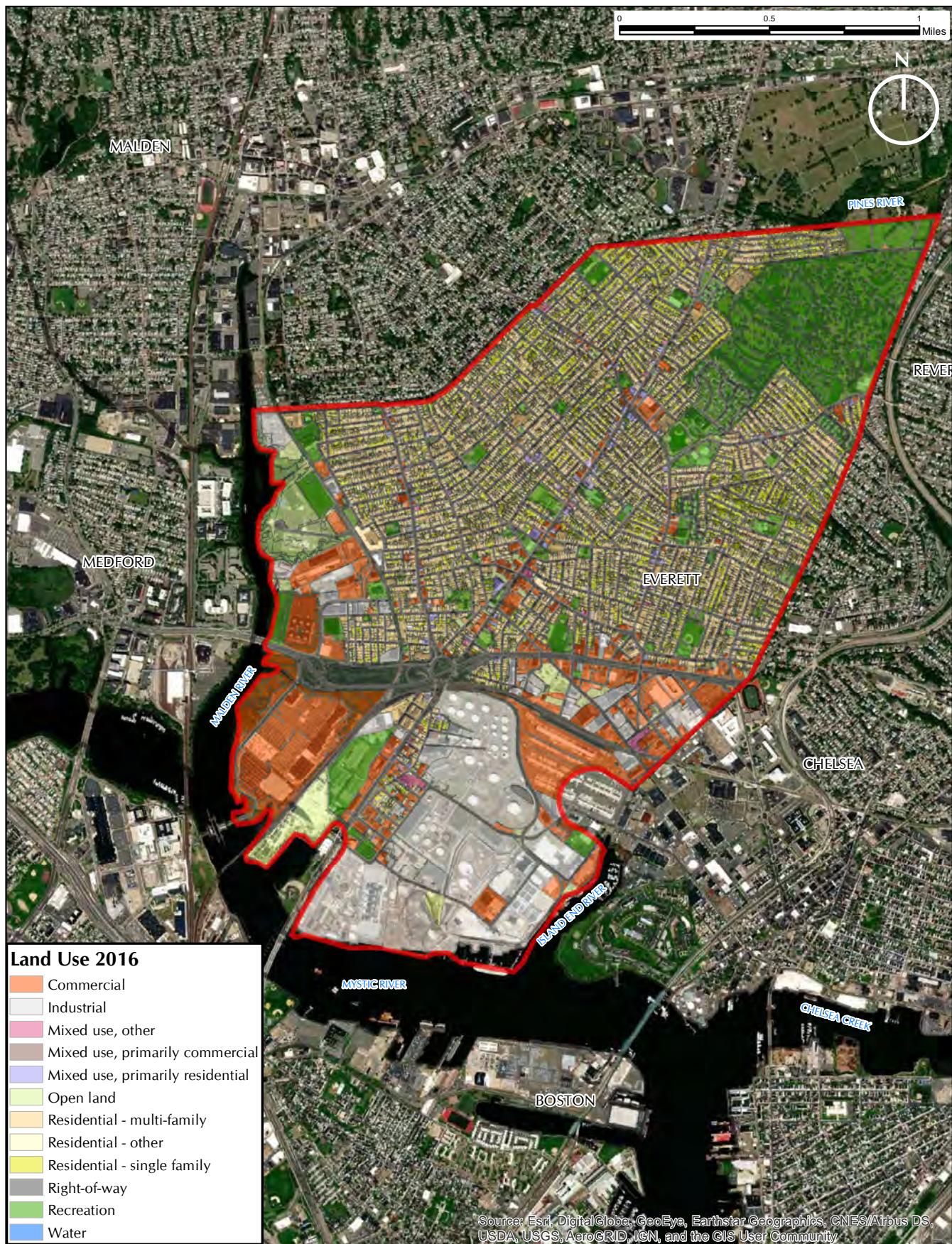


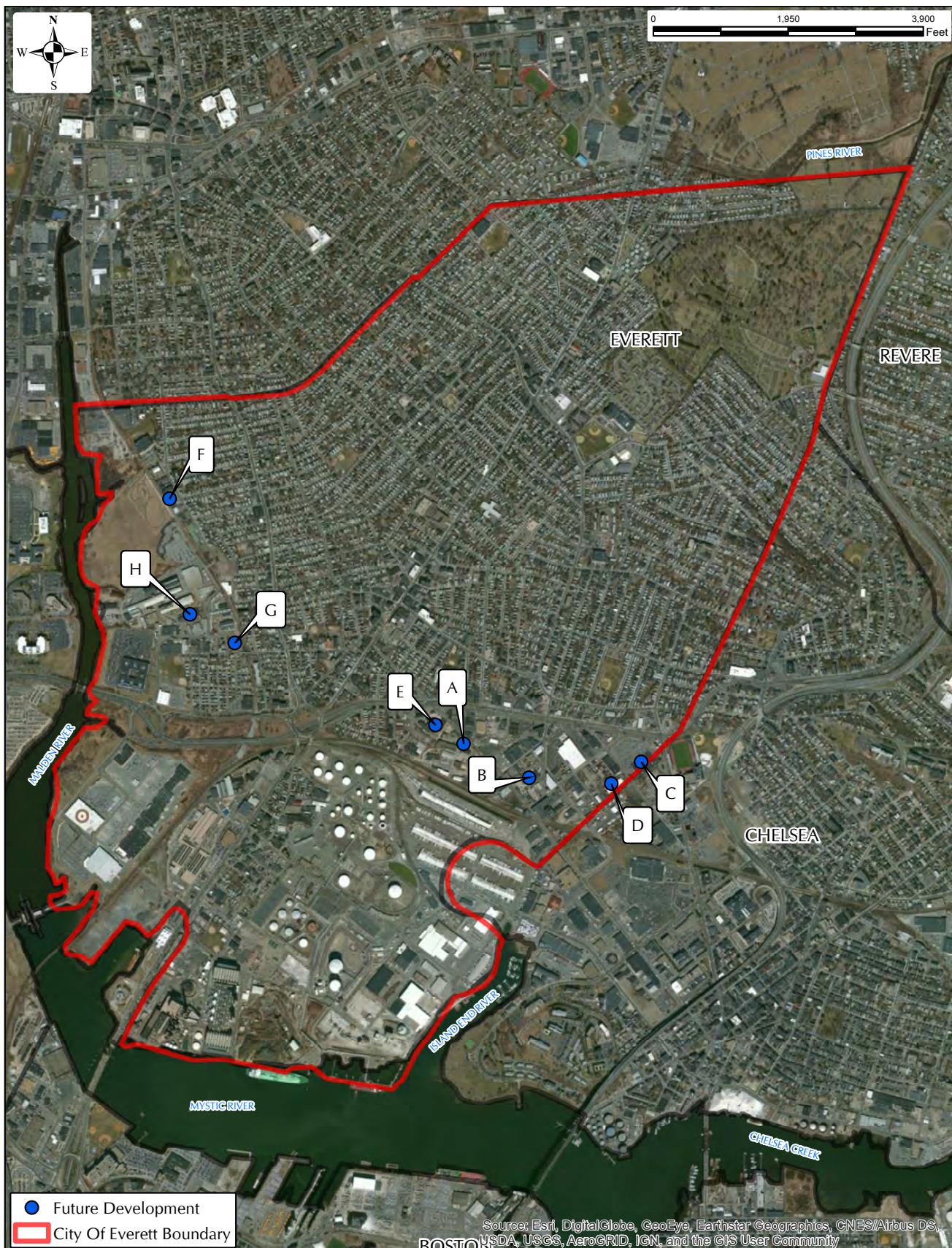
Everett, Massachusetts

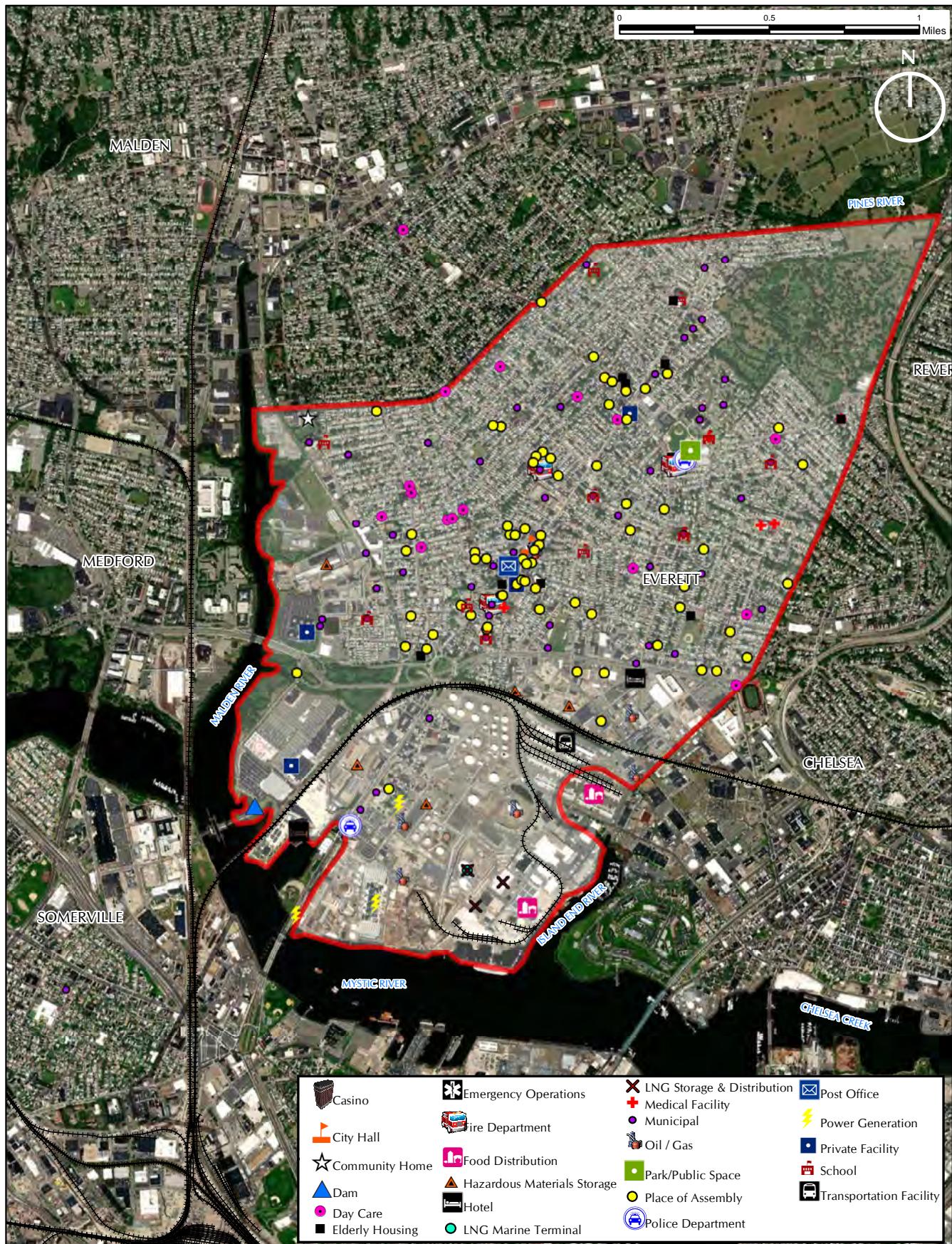
Map 4-1











Everett, Massachusetts

Map 4-6
Everett Critical Infrastructure
Source: City of Everett, 2018

Chapter 5

CAPABILITY ASSESSMENT

CHAPTER 5: CAPABILITY ASSESSMENT

5.1 INTRODUCTION

The Capability Assessment identifies the strengths and weaknesses of Everett's policies, programs, partnerships, and funding opportunities to mitigate the risks of natural hazards. It evaluates both current and future opportunities to improve capabilities as defined by the Federal Emergency Management Agency (FEMA):

1. Planning and regulatory capabilities based on the implementation of ordinances, policies, local laws and State statutes, and plans and programs that relate to guiding and managing growth and development.
2. Administrative and technical capabilities associated with the City's staff and their skills and their tools that can be used for mitigation planning and to implement specific mitigation actions.
3. Financial capabilities that include the resources the City has access to or is eligible to use to fund mitigation actions.
4. Education and outreach capabilities resulting from programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

5.2 PLANNING AND REGULATORY CAPABILITIES

Planning and regulatory capabilities include the local plans, codes, ordinances, policies, and programs that mitigate the impact of natural hazards. With input from the Local Planning Committee (LPC) and Stakeholder Working Group, the following table provides an inventory of the available resources that impact Everett's ability to mitigate risk. The relative effectiveness of each resources is ranked on a scale from "Most Effective" through "Somewhat Effective" to "Least Effective" in its potential ability to address potential hazards in Everett based upon its current form/structure/use. Additional notes on each resource, including ways to supplement or enhance the effectiveness of the resource, are included in Table 5-1, Planning and Regulatory Capabilities.

Table 5-1: Planning and Regulatory Capabilities

Name of Plan/Regulation	Last Updated	Description of the Plan/Regulation	Effectiveness to Address Potential Hazards	General Notes
Complete Streets Prioritization Plan	2016	Provides a framework to make transportation planning and infrastructure improvements within the City of Everett and its surrounding communities safer, more efficient, and more accessible.	Somewhat Effective (for Flooding and Heat Hazards)	Evaluates the main thoroughfares within the city, including evacuation routes, and seeks to organize/update these routes for multi-modal transportation. Inclusion of additional shade trees and green infrastructure along routes will help to mitigate heat and stormwater flooding hazards.
Everett Comprehensive Emergency Management Plan	2016	Addresses mitigation, preparedness, response, and recovery from natural and man-made emergencies.	Most Effective (for Multi-Hazards)	Strategic plan that coordinates the emergency response to natural and man-made emergencies. Updated regularly by Everett's emergency management professionals, including police, fire, communications, and other departments. Training of key personnel is associated with this plan.
Everett Community Resilience Building Summary of Findings	2019	Completed as part of the Massachusetts Municipal Vulnerability Preparedness (MVP) program to assess community vulnerabilities and create an action-oriented resilience plan.	Most Effective (for Multi-Hazards)	Comprehensive review of community vulnerabilities associated with current and projected hazards and prioritization of infrastructure projects and societal programs. Creation of this plan also included community outreach and public engagement.
Everett Community Resilience Building Urban Heat Island Effect Supplement	2019	As part of the MVP program, identifies sources and opportunities to address the City's urban heat island effect resulting from	Most Effective (for Heat Hazards)	Comprehensive review of community vulnerabilities associated with projected heat hazards and recommendations for infrastructure projects and societal programs to combat heat hazard. Creation of this

Name of Plan/Regulation	Last Updated	Description of the Plan/Regulation	Effectiveness to Address Potential Hazards	General Notes
		transportation, development patterns, etc.		plan also included community outreach and public engagement.
Everett for Everyone Five-Year Affordable Housing Plan	2018	Outlines actions to implement through 2023 to improve housing security in Everett.	Least Effective	Specific focus on creating and maintaining affordable housing units within Everett. Update of this plan could consider potential hazard impacts to housing units by overlaying hazard maps with updated potential sites for affordable housing units.
Everett Housing Production Plan	2015	Evaluates unmet housing needs and develops strategy to achieve housing production goals.	Least Effective	Specific focus on generation of new housing units within Everett. Update of this plan could consider potential hazard impacts to housing units by overlaying hazard maps with updated potential sites for housing units.
Everett Square Revitalization Plan	2018	Guides the intended economic revitalization of the Everett Square area.	Somewhat Effective (for Flooding and Heat Hazards)	Includes some planning related to needed infrastructure improvements including increased stormwater capacity in this watershed.
Everett Stormwater / Driveway Ordinance	2019	Regulates illicit connections and discharges to the storm drain system and controls construction site runoff.	Somewhat Effective (for Flooding and Heat Hazards)	Seeks to promote groundwater infiltration and limit stormwater runoff that may cause localized flooding.
Everett Stormwater Management Program	2019	Guides activities under the 2016 MS4 general permit.	Somewhat Effective (for Flood Hazards)	Focus on stormwater pollutant removal, however, recommendations of stormwater infrastructure projects will also address projected increased rainfall intensity.

Name of Plan/Regulation	Last Updated	Description of the Plan/Regulation	Effectiveness to Address Potential Hazards	General Notes
Lower Broadway District Urban Renewal Plan	2021	Guides intended economic revitalization of the 128-acre Lower Broadway District through land use and transportation planning.	Somewhat Effective (for Flooding and Heat Hazards)	Includes some planning related to needed infrastructure improvements including increased stormwater capacity in this watershed.
Open and Recreation Space Plan	2010	Assesses existing recreational facilities and evaluates future needs for passive and active recreation to serve users of all ages.	Somewhat Effective (for Flooding and Heat Hazards)	Prioritizes open space and green space within the city, particularly along riverways, which can mitigate heat and flooding hazards. Riverfront Vision Plan is currently being updated to enhance this planning effort.
Zoning Ordinance	2021	Contains provisions relevant to flood hazard mitigation.	Somewhat Effective (for Multi-Hazards)	Includes Flood Damage Prevention Ordinance (Chapter 9), which pertains to methods to reduce flood losses. Additionally, the City is currently working on an update to the floodplain overlay district to address projected 2070 floodplain and creation of a green standard ordinance to promote low-impact development and green infrastructure are underway.
Community Food Assessment & Plan	2018	Assesses the strengths and weaknesses of the City's food system and improve the food environment and health outcomes.	Somewhat Effective (for Flooding and Heat Hazards)	Promotes urban agriculture, which may mitigate heat and flooding hazards. Additionally, this plan identifies food insecurity, which may be exacerbated by hazards.

Some opportunities to expand planning and regulatory capabilities in the City of Everett include the following:

- Execute proposed ordinance updates and regulations updates/creation related to floodplain overlay district (to include projected 2070 floodplain area to encourage resilient development practices, including elevation/modification of critical infrastructure and new development or significant renovations, use of floodproofing strategies, and other techniques) and green standards (to promote use of low-impact development practices and nature-based solutions/green infrastructure throughout the community).
- Update *Everett Open and Recreation Space Plan* to incorporate hazard mitigation planning considerations in development/acquisition of new public open space, the renovation of existing open spaces, and the use of nature-based solutions/green infrastructure in all public open spaces. Continued partnership with the Mystic River Watershed Association (MyRWA) and neighboring communities could support these initiatives.
- Update community plans focused on housing to include hazard mitigation planning considerations.
- Partner with non-profit organizations, such as Everett Community Growers to promote continued implementation of the *Community Food Assessment & Plan*. Continued investment in community gardens and other urban agriculture opportunities have the potential to mitigate urban heat island and stormwater flooding issues in the City of Everett.

5.3 ADMINISTRATIVE AND TECHNICAL CAPABILITIES

Everett is governed by a Mayor and a City Council consisting of six ward councilors and five councilors-at-large. City departments, boards, and committees provide full-time and part-time employees, as well as volunteer appointments, that are critical to the implementation of Everett's risk reduction.

Everett additionally works closely with many state agencies and neighboring communities through collaborative regional partnerships. Organizations such as the Mystic River Watershed Association (MyRWA) are integral to this work.

With input from the LPC and Stakeholder Working Group, the following table provides an inventory of the available resources that impact Everett's ability to mitigate risk. Additional notes on each resource, including ways to supplement or enhance the effectiveness of the resource, are included in Table 5-2, Administrative and Technical Capabilities.

Table 5-2: Administrative and Technical Capabilities

Department/ Organization	Description	General Notes
<i>City of Everett</i>		
Department of Planning and Development	Current staff level at four professionals with expertise in land use planning, transportation planning, conservation, legal, and other sectors. The department also has one administrative support professional.	City of Everett is currently seeking to hire a new Planning Director to fill a vacancy in the staff.
Planning Board	The Planning Board is a five-member body whose duties include regulating the subdivision of land, reviewing, and making recommendations on zoning changes, creating, and updating the City's Master Plan, reviewing applications for Site Plan Review and some Special Permits. There are also two alternate members of the Board. The Planning Board is supported by one City land use planner.	Robust levels of development are proposed within the city and the Planning Board is actively reviewing half a dozen large projects, many of which are residential in nature. These residential developments are predominantly redevelopment of commercial/industrial sites into multi-family residential developments.
Conservation Commission	The Everett Conservation Commission is a five-member board, which oversees the protection of wetlands and other water bodies in the City. Through the Wetlands Protection Act (WPA), the Commission reviews permit applications for development and construction work within the buffer zone of the Mystic, Malden, Island End, and Pines Rivers.	The Commission's oversight of parcels along the major riverways of the Mystic, Malden, Island End, and Pines Rivers is key to protecting vulnerable floodplain areas and promoting good development practices that are resilient to current and future hazards.
Department of Public Works (DPW)	The DPW is responsible for a variety of City services including the collection, transportation and disposal of solid waste, snow removal, plowing and sanding, street sweeping, upkeep and repairs to sidewalks and streets, maintenance of parks and playground, city-wide tree maintenance and planting, anti-graffiti efforts, pavement marking maintenance, signage and traffic signalization,	Included as part of the DPW are: Engineering, Facilities Management, Fleet Maintenance, Municipal Infrastructure (which includes Glenwood Cemetery, Highway, and Parks), and Water Department.

Department/ Organization	Description	General Notes
	storm water system maintenance and drainage repairs, and the maintenance of Glenwood Cemetery.	The DPW Commission is a seven-member appointed board that oversees public works activities in the City.
Inspectional Services Department (ISD)	<p>The ISD is tasked with protecting the health, welfare, and safety of the residents and visitors of the City of Everett as mandated by Local Ordinances and State Law. ISD is mandated by local ordinances and state law to fulfill very specific rules and regulations regarding the safe construction of buildings, certifications of structures - residential and commercial, habitability of dwelling units, enforcement of state sanitary codes, testing of weighing devices, signage, and occupancy permits as well as enforcing the City of Everett Zoning Ordinances.</p> <p>Current staff level is at 20 total staff members, which is a mix of professionals with expertise in building construction, wiring, plumbing, code enforcement, and other sectors, as well as clerks and administrative support professionals.</p>	<p>The ISD includes the following divisions:</p> <ul style="list-style-type: none"> - The Division of Building Inspection and Maintenance is responsible for the enforcement of the state building code pertaining to buildings and other structures and for enforcement of related ordinances in the Revised Ordinances of the City of Everett, including, but not limited to the local zoning ordinance and Massachusetts State Building Code. - The Board of Appeals is responsible to hear and decide appeals in accordance with the law, applications for special permits upon which the Board is empowered to act, and decide on petitions for variances and appeals from decisions of the Code Enforcement Officers/ISD. - The Division of Code Enforcement is responsible for the enforcement of chapter 13A of the Revised Ordinances of the City of Everett; enforce all relevant ordinances; maintain a high quality of life for all Everett residents; working in conjunction with the Office of the City Solicitor, prosecute all infractions and violations of city ordinance; etc.

Department/ Organization	Description	General Notes
Health Department	Current staff level is an executive director and two registered nurses. The department also has one administrative support professional.	The Health Department provides quality inspection, community health, and disease prevention services, while promoting healthy lifestyles and the achievement of optimum health for the residents of Everett.
Everett Fire Department (EFD)	<p>The EFD is a professional fire department employing 103 career firefighters who are dedicated to serving the citizens of Everett.</p> <p>Located within Everett's 3.5 square miles are three fire stations housing three engine companies and two ladder companies which respond to over 5,000 calls per year.</p>	<p>EFD services include fire suppression, emergency medical, technical rescue, hazardous materials response, fire prevention, public education, and disaster preparedness activities.</p> <p>EFD protects a very diverse blue collar community and faces many unique challenges due to its dense population as well as the many energy related industries located here including a Liquefied Natural Gas Marine Terminal, a 1600 Megawatt Electric Generating Plant and a Petroleum Marine Terminal and Storage Facility.</p>
Grant Administration	Grant writing and administration is currently distributed between multiple city departments.	There is currently one primary staff member who is responsible for grant administration.
Everett Police Department (EPD)	<p>The EPD is a full-service, professional law enforcement agency providing coverage 24 hours a day, 365 days a year. Currently, there are 100 sworn police officers and 12 civilian support staff. In addition, there are 30 crossing guards and an Auxiliary department made up of 15 officers who volunteer their time at community events. The EPD makes use of college interns as well as participating in the summer jobs program.</p>	<p>The EPD has two K-9's, a Special Operations Unit, a Marine Unit, Underwater Search and Recovery teams, truck and traffic enforcement unit and a cadre of officers with extensive training and experience.</p> <p>EPD has upgraded its equipment to include new state of the art radios, pistols, patrol rifles, patrol vehicles and motorcycles. EPD officers have been trained and drilled in incident command and have been outfitted with protective equipment. EPD is in the</p>

Department/ Organization	Description	General Notes
		process of opening a state-of-the-art command center, which will allow public safety and city personnel to manage any critical incident.
Community Recreation Department	<p>Current staff level is one dedicated staff member who serves as the Director of Wellness. The department also consists of numerous part-time employees who teach recreation classes and provide human services activity support.</p> <p>In the City of Everett, the Recreation Department does not include Parks Department. City parks are maintained by the DPW Facilities division.</p>	The Community Recreation Department seeks to enrich the lives of the residents of Everett by providing welcoming recreation facilities and affordable, diverse recreation and human services activities for people of all ages. Programs provided by the Community Recreation department include, but are not limited to, arts and crafts, dance, sport-specific training, toddler playgroups, tumbling, and youth boxing.
<i>Regional Partnerships</i>		
City of Chelsea	The most significant collaborative partner of the City of Everett in addressing flooding and heat hazards. The two communities have pursued numerous grant funding opportunities and jointly worked on projects at/around the Island End River (IER) and the Market Street culvert.	Representatives of both cities meet on a biweekly basis along with their consultant teams to provide project updates, to strategize on funding opportunities, and to collaborate on upcoming ventures. The Cities of Chelsea and Everett are also currently formalizing a Memorandum of Understanding (MOU) to document roles/responsibilities for their collaborative work.
City of Malden	Both cities are currently invested in restoring the Malden River corridor. The City of Everett recently completed the Rivergreen Park project, which created a public kayak launch, river walk, and other park amenities. The City of Malden with support from MyRWA and the Friends of the Malden River are working to	Partnerships with MyRWA have been key for the City of Everett as they seek to improve riverways and invest in connected public open space along the Malden River in coordination with work by the City of Malden. Additionally, water quality projects supported by MyRWA have improved the watershed for both communities.

Department/ Organization	Description	General Notes
	connect to the river walk and improve parcels along the river.	
Resilient Mystic Collaborative (RMC) https://resilient.mysticriver.org	The RMC is a partnership among 21 neighboring communities in Greater Boston's Mystic River Watershed working to protect people and places from climate-intensified risks.	RMC facilitates two smaller committees: The Lower Mystic Regional Working Group and the Upper Mystic Regional Working Group. Details about the City of Everett's involvement in both working groups are provided below.
RMC - Lower Mystic Regional Working Group https://resilient.mysticriver.org/lower-mystic	A subset of the RMC that includes the Cities of Boston, Chelsea, Somerville, and others. This working group meets as a small committee group to focus on vulnerabilities within the Lower Mystic area.	RMC's Lower Mystic River team is currently focused on two key projects related to coastal storm flooding hazards; a regional flood resilience barrier at the IER and a critical infrastructure vulnerability assessment for the Lower Mystic River area.
RMC - Upper Mystic Regional Working Group https://resilient.mysticriver.org/upper-mystic-stormwater	A subset of the RMC that includes the Town of Arlington, City of Medford, City of Malden, and others. This working group meets as a small committee group to focus on vulnerabilities within the Upper Mystic area.	RMC's Upper Mystic River team is currently focused on a few key projects related to stormwater flooding hazards including the design and construction of stormwater wetlands in the Towns of Arlington & Lexington.
Mystic Region Emergency Management Planning Committee (REPC) http://mysticrepc.org/	Serves Chelsea, Everett, Lynnfield, Malden, Medford, Melrose, North Reading, Reading, Revere, Saugus, Stoneham, Wakefield, Winchester, Winthrop, and Woburn	The REPC provides coordination and training related to emergency management for member communities. Trainings range from anti-terrorism strategies to safe chemical storage measures to active shooter response trainings based upon federal agency guidance from the Department of Homeland Security, the Environmental Protection Agency (EPA), and other agencies. This committee also supports Everett in regional Tier II reporting requirements and associated emergency planning efforts related to Tier II reporting facilities/locations.

Department/ Organization	Description	General Notes
State Agencies		
Department of Conservation & Recreation (DCR)	DCR manages state parks and oversees more than 450,000 acres throughout Massachusetts. It protects, promotes, and enhances the state's natural, cultural, and recreational resources.	While DCR manages significant areas of public parkland along the waterfronts of neighboring Medford, Chelsea, Somerville, and other communities, most of the waterfront areas of Everett are privately owned. The most significant DCR asset impacting Everett is the Amelia Earhart Dam on the Mystic River. Continued investment is needed to ensure the resilience of this coastal asset that directly impacts flooding hazards within the City of Everett and many other communities. A current hazard mitigation project associated with the dam is a state investment in additional pumping infrastructure to allow for the regulation of the dam in advance of large storm events.
Massachusetts Water Resources Authority (MWRA)	MWRA is a Massachusetts public authority established by an act of the Legislature in 1984 to provide wholesale water and sewer services to 3.1 million people and more than 5,500 large industrial users in 61 metropolitan Boston communities.	Everett is served by water and sewer services from MWRA and is also home to MWRA piped infrastructure. Located on Route 99/Alford Street directly adjacent to the Everett Industrial District, but with a Boston, Massachusetts address, is MWRA's Sewerage Division Transport Department pumping facility and associated outfall.
Massachusetts Department of Transportation (MassDOT)	MassDOT is the Massachusetts entity responsible for transportation infrastructure such as roads and bridges, as well as some trains and buses. MassDOT provides maintenance of these assets, as well as supports programs and projects with cities and towns, public agencies, and private sector businesses to support the economic, quality of	MassDOT assets that are located within the City of Everett include Revere Beach Parkway/Route 16, a major thoroughfare that bisects the predominantly residential northern portion of Everett from the Everett Industrial District. Route 16 is a major evacuation route for the community and neighboring communities and is vulnerable to stormwater flooding hazards, as well as increasing risk of

Department/ Organization	Description	General Notes
	life, and environmental goals of the Commonwealth of Massachusetts.	storm surge from the tidal Lower Mystic River.
Massachusetts Bay Transportation Authority (MBTA)	The MBTA is the public agency responsible for operating most public transportation services in Greater Boston, Massachusetts.	The MBTA operates numerous buses through Everett, as well as supports commuter rail operations on the Newburyport/Rockport line from Boston up through Massachusetts North Shore. The MBTA's most significant asset in Everett is an approximately 15-acre fleet maintenance and repair facility at 84 Broadway.

Some opportunities to expand administrative and technical capabilities in the City of Everett include the following:

- Execute the MOU with the City of Chelsea to identify technical, administrative, financial, and operational responsibilities for IER flood resilience projects and other upcoming collaborative planning, design, and construction for multijurisdictional projects (MOU related to IER work is currently in draft form and undergoing administrative and legal review in both cities);
- Continue and expand where possible City staff engagement with RMC initiatives and REPC trainings;
- Coordinate with state agencies to understand and support their hazard mitigation and climate resilience planning and preparedness initiatives that impact critical infrastructure within the City of Everett; and
- Fill open staff positions within the Planning Department and DPW to facilitate ongoing and upcoming grant projects related to hazard mitigation and climate resilience planning and preparedness.

5.4 FINANCIAL CAPABILITIES

Everett has access to budgetary tools, grants, tax incentives, and other funding programs to mitigate natural hazards. As described in Table 5-2, Administrative and Technical Capabilities, above, grants are typically pursued by city departments such as the Planning Department, and regional partnerships such as the RMC. With input from the LPC and Stakeholder Working Group, the following table provides an inventory of the available resources that impact Everett's ability to mitigate risk. The relative effectiveness of each resource is ranked on a scale from "Most Effective" through "Somewhat Effective" to "Least Effective" in its potential ability to address potential hazards in Everett based upon its current form/structure/use. Additional notes on each resource, including ways to supplement or enhance the effectiveness of the resource, are included in Table 5-3, Financial Capabilities.

Table 5-3: Financial Capabilities

Financial Tool/Resource	Accessible for Hazard Mitigation (Yes/No)	Effectiveness for Hazard Risk Reduction in Everett
General funds	Yes	General funds are typically utilized to fund the staffing of planning initiatives and to provide project management for grant projects related to hazard mitigation and climate resilience.
Capital Improvement Program (CIP) funding	Yes	CIP funding supports projects such as road repairs, infrastructure repair/replacement/construction, other typical activities that can be linked to hazard mitigation.
Fees for water, sewer, gas, or electrical services	Yes	However, the majority of user paid fees are routed through utility providers and agencies or used in support of mandatory utility upgrades within the community such as sewerage inflow & infiltration (I&I) detection mitigation projects, MS4 compliance work, and other specific initiatives that may be linked to mitigation in some cases.
Stormwater utility fee	No	Not applicable.
Development impact fees	No	Not applicable.
MWRA interest-free loans	Yes	For use in water main replacements, which may be linked to mitigation in some cases.
HUD Community Development Block Grant (CDBG)	Yes	These funds may technically be used in coordination with hazard mitigation efforts.
State funding programs	Yes	The City of Everett has been very successful since 2016 in applying for and receiving state-funded grants related to hazard mitigation and climate resilience. Funding agencies and associated programs have included Massachusetts Executive Office of Energy & Environmental Affairs (EEA) through MVP program, Massachusetts Office of Coastal Zone Management (CZM) through Coastal Resilience (CR) and Coastal Pollutant Removal (CPR) grant programs, MassWorks, and other funding sources/programs.

Some opportunities to expand financial capabilities in the City of Everett include the following:

- Continued active collaboration with the City of Chelsea to attract significant funding required for the final design and construction of IER flood resilience projects, including flood resilience barriers, pumping stations, culvert repairs, tide gates, and other projects. Potential funding sources for this large-scale flood resilience infrastructure includes FEMA's Building Resilient Infrastructure and Communities (BRIC) grant program, as well as other federal and state funding opportunities related to infrastructure, hazard mitigation, and climate resilience.
- Continued pursuit of state funding opportunities through EEA MVP and CZM CR & CPR grant programs.
- Public-private partnerships to facilitate infrastructure projects that benefit economic development in Everett. Similar projects to recent redevelopment of Boston Market Terminal that included daylighting of a section of the failing Market Street culvert.
- Close collaborations with state agencies that maintain assets in Everett. Similar projects to recent MBTA culvert repair work at the commuter/freight rail tracks near the IER.

5.5 EDUCATION AND OUTREACH CAPABILITIES

Schools, nonprofits, public outreach campaigns, and trainings can help improve the public's awareness and preparedness for natural hazards, thereby reducing the likelihood of personal harm or loss of property.

Table 5-4: Education and Outreach Capabilities

Program/Organization	Description	General Notes
Online Alert Center	The City's Alert Center provides an overview of all alerts and emergencies in the City. Residents may opt-in to an instant notification system at http://www.cityofeverett.com/AlertCenter.aspx	Based upon the community survey, residents believe that this system is effective. Additional feedback from the survey indicated that communications could be broadened to include public education related to hazards and expanded resources for impending storm events or recovery periods.
Social Media	Everett is currently most active on Facebook and Instagram. The City has a Twitter account, although it has not been updated since July 2019.	Based upon the community survey, residents believe use of social media communications is effective. The planning process associated with the Plan utilized this tool to support community outreach.
Mystic River Watershed Association (MyRWA) https://mysticriver.org/	MyRWA was founded in 1972 with a mission to protect and restore the Mystic River, its tributaries and watershed lands for the benefit of present and future generations and to celebrate the value, importance, and great beauty of these natural resources. MyRWA uses science, advocacy, and education to ensure a vibrant, healthy, and resilient environment for all plants, animals and people that call the watershed home.	MyRWA continues to be a key partner for the City of Everett in its pursuit of improved public open space, enhancement of water quality, and addressing the impacts of climate change in the Mystic River watershed. MyRWA contributed to the update of this Plan, as well as numerous ongoing projects such as the IER flood resilience project. Additionally, MyRWA provides staff time to support grant funded projects, strategic planning support, and enhances public education and outreach to support the City's initiatives.
Everett Community Growers (ECG)	ECG was born out of a collaborative project of the Everett Community Health Partnership (ECHP) to create resident-led solutions to food access inequities in Everett. A two-year community organizing campaign guided by La Comunidad, Inc. led to the creation of Everett's first community garden, the Florence Street Community Garden, in 2012. Since then, ECG	ECG partnered with the Metropolitan Area Planning Council (MAPC) and the City of Everett on the Community Food Assessment and Plan, which includes policies for a more equitable food system. ECG is currently working with the City of Everett to create a

Program/Organization	Description	General Notes
	<p>has created the Tremont Street Community Garden (2015), Earthworks Garden (2018) & the Northern Strand Community Farm (2016). The Northern Stand Community Farm (NSCF) has always donated their produce to the Bread of Life Food Pantry in Malden. Last year in 2020, they opened their first farm stand and begun accepting HIP/SNAP/ P-EBT/ Card and Cash payments to make their produce more accessible to all.</p>	<p>Food Policy Council to implement those policy recommendations.</p>

Some opportunities to expand education and outreach capabilities in the City of Everett include the following:

- Continue to partner with non-profit organizations such as MyRWA and ECG to educate the public on hazard mitigation and climate resilience.
- Include non-profit organizations as a valued partner on mitigation projects to incorporate a strong public outreach and education component on all infrastructure projects. Use One Everett organization to include nonprofits that have not typically been involved in these types of projects to expand the community understanding and value of hazard mitigation and climate resilience planning and projects.
- Expand education and outreach capabilities to include Everett public school system and student organizations. Use the City of Chelsea's Equitable Climate Resiliency Framework and its all-ages approach to engagement by using high school students as key participants in climate resilience planning efforts through their high school science classes.

5.6 SUMMARY OF FINDINGS

The City of Everett is well-positioned for future grant funding opportunities related to hazard mitigation and climate resilience based upon its strong planning work completed to date, its collaboration with its regional partners, and its community outreach through nonprofit organizations. The City of Everett, along with its partner, the City of Chelsea, are currently engaged in Massachusetts Emergency Management Agency (MEMA) Technical Assistance program to prepare for an upcoming FEMA BRIC grant application to apply for financing for the IER Flood Resilience project. It will need to continue to build its municipal staff and focus on diverse opportunities for additional project funding to execute these largest hazard mitigation and climate resilience projects.

Chapter 6

MITIGATION GOALS AND STRATEGIES

CHAPTER 6: MITIGATION GOALS & STRATEGIES

6.1 INTRODUCTION

Hazard mitigation refers to “any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazardous conditions.” The mitigation goals and strategies set by the City of Everett through its 2015 Hazard Mitigation Plan are presented in this chapter along with updated goals and strategies to address current hazards and the projected impacts of climate change. Everett’s mitigation goals and strategies were updated based upon the results of the hazard identification and risk assessment presented in Chapter 4: Risk and Vulnerability Assessment.

6.2 EXISTING MITIGATION GOALS

The purpose of the *Everett Hazard Mitigation Plan 2021 Update* (the “2021 HMP Update” or “Plan”) is to provide the City of Everett with an assessment of the natural hazards it has experienced in the 2015-2021 period, as well as strategies to reduce or eliminate the loss of life and property damage resulting from likely future hazards, including those hazards exacerbated by the impacts of climate change. With a robust community engagement process and a comprehensive inventory of Everett’s existing mitigation tools, the 2021 HMP Update suggests improvements to the City’s planning, policy, and programs to reduce vulnerability and risk.

In the 2015 HMP Update Plan, the City of Everett identified the following nine mitigation goals for the community:

1. Prevent and reduce the loss of life, injury, and property damages resulting for all major natural hazards.
2. Identify and seek funding for measures to mitigate or eliminate each known significant flood hazard area.
3. Integrate hazard mitigation planning as an integral factor in all relevant municipal departments, committees, and boards.
 - Ensure that the Planning Department considers hazard mitigation in its review and permitting of new development.
 - Review zoning regulations to ensure that ordinance incorporates all reasonable hazard mitigation provisions.
 - Ensure that all relevant municipal departments have the resources to continue to enforce codes and regulations related to hazard mitigation.
4. Prevent and reduce the damage to public infrastructure resulting from all hazards

- Begin to assess the vulnerability of municipal buildings and infrastructure to damage from an earthquake.
 - Maintain existing mitigation infrastructure in good condition.
5. Encourage the business community, major institutions, and non-profits to work with the City to develop, review, and implement the hazard mitigation plan.
 6. Work with surrounding communities, state, regional, and federal agencies to ensure regional cooperation and solutions for hazards affecting multiple communities.
 - Continue to participate in the Mystic Region Regional Emergency Planning Committee (REPC).
 7. Ensure that future development meets federal, state, and local standards for preventing and reducing the impacts of natural hazards.
 8. Educate the public about natural hazards and mitigation measures that can be undertaken by property owners.
 - Provide information on hazard mitigation activities in languages most frequently spoken in Everett.
 9. Take maximum advantage of resources from FEMA and MEMA to educate City staff and the public about hazard mitigation.

6.3 UPDATED MITIGATION GOALS

Through discussions with the Local Planning Committee (LPC), the majority of the 2015 HMP Update goals were reconfirmed as ongoing goals of the community. Minor modifications were suggested to adapt specific text to current conditions as follows:

1. Prevent and reduce the loss of life, injury, and property damages resulting for all major natural hazards.
2. Identify and seek funding for measures to mitigate or eliminate each known significant flood hazard area.
3. Integrate hazard mitigation planning as an integral factor in all relevant municipal departments, committees, and boards.
 - Review zoning regulations to ensure that ordinance incorporates all reasonable hazard mitigation provisions.
 - Ensure that all relevant municipal departments have the resources to continue to enforce codes and regulations related to hazard mitigation.
4. Prevent and reduce the damage to public infrastructure resulting from all hazards, incorporating a particular focus on flooding and extreme heat hazards, which are likely to intensify due to climate change.
5. Encourage the business community, major institutions, and non-profits to work with the City to develop, review, and implement the hazard mitigation plan.

6. Work with surrounding communities, state, regional, and federal agencies to ensure regional cooperation and solutions for hazards affecting multiple communities.
 - Continue to partner with the City of Chelsea to focus on the significant coastal flood hazards occurring now and in the future at the Island End River.
7. Ensure that future development meets federal, state, and local standards for preventing and reducing the impacts of natural hazards.
8. Educate the public about natural hazards and mitigation measures that can be undertaken by property owners.
 - Provide information on hazard mitigation activities in languages most frequently spoken in Everett.
9. Take maximum advantage of resources from FEMA, MEMA, and other state agencies to fund large-scale hazard mitigation projects.

6.4 EXISITING MITIGATION PROJECTS & STRATEGIES

The 2015 Hazard Mitigation Plan Update included recommendations for several potential hazard mitigation strategies and projects for the City to pursue between 2015 and 2020 as shown in Table 6-1, Existing Mitigation Strategies.

Table 6-1: Existing Mitigation Strategies

Mitigation Strategy	Hazard(s) Addressed	Status	General Notes
Resolve ownership and legal issues of the Island End Culvert that will allow culvert cleaning and drainage ditch upgrade.	Flooding	Complete	Work is underway by the Cities of Chelsea and Everett, as well as private property owners, to repair/replace the culvert where appropriate. Segment of the culvert near Boston Market Terminal has recently been daylight along existing rail tracks. Upcoming projects will focus on flood resilience for this infrastructure including needed tidal and storm surge protections.
Install appropriate stormwater management measures (BMPs) at Springvale, Madison, and Elm Streets.	Flooding	Ongoing	Stormwater management projects are ongoing throughout the City, including in the Elm Street corridor, to alleviate urban flooding. Additionally, the City of Everett is investing in modeling stormwater flooding in key areas of the city to identify further mitigation measures.
Relieve the flooding at Elm Street due to infrastructure failure.	Flooding	Ongoing	Stormwater management projects are ongoing throughout the City, including in the Elm Street corridor, to alleviate urban flooding. Additionally, the City of Everett is investing in modeling stormwater flooding in key areas of the city to identify further mitigation measures.
Flooding of Tremont and Elton Street area: Dredging the creek streambed that drains this area remains a top priority, but is problematic due to contamination of the creek, land ownership, activity and use limitations.	Flooding	Complete	The City of Everett undertook significant restoration projects at both the North and South Creek, which outlet to the Malden River, to improve these channels by stabilizing the bank areas, adding vegetation to improve habitat, and restoring flow to alleviate upstream flooding impacts.
Complete the reconstruction of Lower Broadway: Flooding associated with the Island End culvert and failed infrastructure; replacing catch basins and installing new drain lines will help alleviate some of the flooding associated with the Island End culvert in this area.	Flooding	Complete	As part of the Encore Boston Harbor Resort development, Lower Broadway has been substantially rebuilt leading to more efficient roadway infrastructure and new utility infrastructure to address historic stormwater flooding issues in the Lower Broadway corridor. See above for further information on the status of work at the Market and Beacham Street culverts, which outlet to the Island End River.

Mitigation Strategy	Hazard(s) Addressed	Status	General Notes
Complete updating Chapter 9 of the Everett General Ordinances - Flood Damage Prevention.	Flooding	Ongoing	The City of Everett made minor revisions to Chapter 9 between 2015 and 2020 and is now undertaking a more significant revision to incorporate projected 2070 floodplain standards into the Ordinance to support community flood resilience goals.

The City of Everett takes a holistic approach to addressing hazard mitigation. By working across communities, City departments, and demographics, the City has begun a comprehensive effort to mitigate risk from urban and coastal flooding, high heat, severe storm events, and more.

Specifically, to address the current consistent threat of flooding near the Island End River (IER), the City of Everett and its regional partner, the City of Chelsea, have both independently and collaboratively pursued planning and infrastructure projects to improve the resilience of the IER area. Several projects in the Industrial District/Designated Port Area are already underway, including:

- DPA Industrial District Master Planning - The Everett Industrial District/ Designated Port Area is used primarily for wholesale produce, a deep-water petroleum and liquid natural gas port, and heavy construction and material recycling businesses. This master plan study will involve developing an understanding of current businesses and operations, uncovering new economic development strategies, and crafting a comprehensive implementation plan.
- Market Street Culvert Tide Gate at IER Outfall- Two corrugated metal culverts, one on Market Street and one on Beacham Street, were installed decades ago when the IER was filled in. As these culverts fail, the river is “self-daylighting”—breaking through the surface of the NEPC parking lots in unpredictable and dangerous ways. The culvert backs up with seawater and floods inland neighborhoods of Everett and Chelsea during storm events and astronomical high tides. The City of Everett is pursuing funding for a new tide gate to prevent this saltwater flooding into urban neighborhoods. This part of the project is essential for the rest of the coastal flood management strategy to work; otherwise water will pour in behind flood barriers via the stormwater system.
- Market Street Culvert Improvements - Constructed in 1965, Market Street culvert carries the old IER from an open drainage channel north of the Boston Market Terminal, across the site, and under Market Street to an outfall at the IER in Chelsea. Flooding has been a problem in the area for many years due to this culvert deteriorating and several sections of it collapsing. The Cities of Everett and Chelsea are partnering with a private landowner to replace the existing corrugated metal arch with a reinforced box culvert, and daylight a 400 linear-foot section of the river. The Market Street culvert repairs will improve its ability to manage intense precipitation events. The daylighted, landscaped portion of the channel will provide social benefits, including reducing summer heat and providing much-needed public open space.
- MBTA Culvert Repairs - The MBTA stormwater culvert northeast of Boston Market Terminal at 34 Market Street site was repaired in 2020 as part of activities in the City of Everett's proposed 20-Year Capital Improvement Recommended Plan. In 2021, the City of Everett will continue discussions with the MBTA about the

installation of additional relief drains underneath the MBTA tracks in the Spring Street area and removal of broken tide gate structures that cause stormwater to back up and increase surface flooding.

6.5 UPDATED MITIGATION STRATEGIES

The LPC and Stakeholder Working Group participants reviewed recent mitigation prioritizes identified in the *Community Resilience Building Summary of Findings* report prepared as part of the Municipal Vulnerability Preparedness (MVP) program in 2019.

The LPC further refined the list of mitigation strategies to include

- The Title of Mitigation Measure and Hazard addressed by the mitigation measure;
- A Description of the mitigation measure;
- Implementation Responsibility;
- Potential Partners;
- Time Frame for implementation of mitigation measure;
- Estimated Cost of implementing mitigation measure categorized as follows:
 - Very high (over \$10 million)
 - High (\$1 million - \$10 million)
 - Medium (\$100,000 - \$1 million)
 - Low (\$50,000 - \$100,000)
 - Very low (under \$50,000)
- Potential Funding Source or Supporting Agency (through Technical Assistance)

These designations reflect discussion and a consensus developed by the LPC with input from stakeholders but could change as conditions in the community change over time. The impact of climate change is likely to intensify natural hazards and may lead to a change in prioritization of the next five years. The LPC will continue to review and maintain this list of prioritized mitigation measures to adjust to changing conditions in Everett.

The information on potential funding sources shown in Table 6-2; Updated Mitigation Strategies, is preliminary and dependent on available funding per fiscal year. Many mitigation strategies will require multiple funding sources and identification of a potential funding source in Table 6-2 does not guarantee that a project will be eligible for or selected for funding. Upon adoption of this plan, the LPC is responsible for implementation should begin to explore the funding sources in more detail.

Table 6-2: Updated Mitigation Strategies

Title (Hazard(s) Addressed)	Description of Mitigation Measure(s)	Implementation Responsibility	Potential Partners	Time Frame	Estimated Cost	Potential Sources of Funding & Support
Highest Priority						
<i>Island End River Flood Resilience Project</i> (Flood Hazards)	Design, permit, and construct a large-scale flood resilience barrier and supporting utility infrastructure along the Island End River to promote district-scale flood protection for regional food distribution hub, roadway and rail transportation infrastructure, heavy industrial uses, residences within Chelsea, and businesses within Commercial Triangle area of Everett.	Cities of Everett and Chelsea Planning & Development and Department of Public Works/Engineering	State Agencies with Local Assets, Private Property Owners, and others	2021-2026	Very High	FEMA Building Resilient Infrastructure and Communities (BRIC) grant program, other state/federal grant programs and funding sources, public-private partnerships, etc.
High Priority						
<i>Secure Tier II Reporting Facilities that Store Hazardous Materials</i> (Multi-Hazard)	Improve collaboration of emergency planning with these property owners and improve awareness of hazardous material storage around Everett. Engage with federal and state agencies where appropriate to provide technical assistance to industrial users who store hazardous materials. Review of toxic discharge/release potential and potential exposure levels to people and the environment, particularly the Mystic River.	Fire Department	Other City of Everett Depts	2021-2026	Low	Massachusetts Office of Technical Assistance and Technology (OTA) within Mass EEA

Title (Hazard(s) Addressed)	Description of Mitigation Measure(s)	Implementation Responsibility	Potential Partners	Time Frame	Estimated Cost	Potential Sources of Funding & Support
<i>Market Street Culvert Repairs & Replacement</i> (Flood Hazard)	<p>Repair Market Street culvert failures</p> <p>Install tide gate to prevent coastal flooding/surcharge into N.E. Produce Center/etc.</p> <p>Address on-going maintenance.</p>	City of Chelsea	City of Everett	2021-2026	Very High	City of Chelsea, City of Everett, state/federal grant programs and funding sources, public-private partnerships, etc.
<i>Madeline English School also serves as City Emergency Dispensing Site</i> (Flood Hazard)	<p>Evaluate large-scale flood protection options for site, including potential options for relocation of this use.</p> <p>Consider ways to disperse emergency dispensing sites throughout the community to add resilience to climate hazards.</p>	Planning & Development	N/A	2021-On	Medium	FEMA, state/federal grant programs and funding sources, etc.
<i>Municipal Roadways – Paris Street/ Commercial Triangle Area</i> (Multi-Hazard)	<p>Use potential redevelopment in Commercial Triangle to redesign local roadways right-of-way with increased utility infrastructure capacity and other resilience measures.</p> <p>Identify flood storage opportunities in this district to address inland flooding risks.</p>	Department of Public Works/Engineering	Mass DOT (for Route 16 Revere Beach Parkway work)	2021-On	High	City of Everett, MassDOT, public-private partnerships, etc.

Title (Hazard(s) Addressed)	Description of Mitigation Measure(s)	Implementation Responsibility	Potential Partners	Time Frame	Estimated Cost	Potential Sources of Funding & Support
<i>Municipal Roadways – Spring Street/ Vine Street</i> (Multi-Hazard)	<p>Complete stormwater modeling with increased precipitation flows & intensity.</p> <p>Remove obsolete and aging tide gate infrastructure causing hydraulic restrictions.</p> <p>Upgrade utility infrastructure in these corridors and incorporate green infrastructure where feasible.</p> <p>Identify flood storage opportunities in this district to address inland flooding risks.</p>	Department of Public Works/Engineering	MBTA (for rail track work)	2021-On	High	City of Everett, MBTA, public-private partnerships, etc.
<i>DCR Amelia Earhart Dam</i> (Flood Hazard)	<p>Work with Resilient Mystic Collaborative to pursue needed resilience improvements at Dam by DCR to avoid flanking of dam in 2050-time horizon and overtopping of the dam in 2070-time horizon.</p> <p>Participate in the Lower Mystic Working Group to monitor progress on this critical infrastructure & continue education on climate hazards.</p>	DCR	RMC Cities and Towns	2021 - On	Very High	FEMA/ACOE/other federal/state grant programs and funding sources, RMC communities, etc.

Title (Hazard(s) Addressed)	Description of Mitigation Measure(s)	Implementation Responsibility	Potential Partners	Time Frame	Estimated Cost	Potential Sources of Funding & Support
Medium Priority						
<i>Municipal Bldgs. & Parks – Police Station & Glendale Park</i> (Flood Hazard)	<p>Decentralize stormwater management detention in this area to intercept stormwater in other parts of the watershed to minimize potential for flooding at police station and Glendale Park.</p> <p>Use Glendale Park and other municipal assets as public education opportunities and replace existing infrastructure with green infrastructure, such as pervious pavements, rain gardens, etc.</p>	Department of Public Works/Engineering	N/A	2021-2026	Medium	City of Everett, state MVP grant program, etc.
<i>Update Evacuation Routes</i> (Multi-Hazard)	<p>Consider resident access to transportation options during evacuations to understand community needs.</p> <p>Work with adjacent communities and state to understand how their local evacuation plans intersect with Everett's evacuation plans.</p> <p>Emergency response plan should be reviewed with projected flood maps to identify areas of the City, particularly Island End area/Commercial Triangle where access for emergency response may be limited.</p>	Fire Department	Other City of Everett Depts.	2021-2026	Low	City of Everett, federal/state emergency planning grant programs, etc.

Title (Hazard(s) Addressed)	Description of Mitigation Measure(s)	Implementation Responsibility	Potential Partners	Time Frame	Estimated Cost	Potential Sources of Funding & Support
	Decentralize municipal emergency response assets.					
<i>Heavily Utilized Arterial Roadways – Rte. 16/Rte. 99- (Flood Hazard)</i>	<p>Review coastal flood pathway data and identify areas where roadways should be elevated, or flood mitigation/stormwater projects are necessary.</p> <p>Work to address vulnerable state-owned roadway areas and right-of-ways..</p>	MassDOT	N/A	2021-ON	Very High	MassDOT, federal/state funding sources, etc.
<i>Utility Infrastructure - Energy (Extreme/Winter Storms)</i>	<p>Evaluate vulnerabilities of dry wire utilities, particularly overhead lines and exposed utility equipment.</p> <p>Maintain utility corridors and relocate overhead wires where feasible.</p>	Eversource/ National Grid/ Tele-comm Providers/etc.	N/A	2021-ON	Very High	Utility company, federal/state funding sources, etc.
<i>Alternative Transportation Options (Heat Hazards)</i>	<p>Develop protected cool corridors that encourage bicycling and walking by enhancing street trees, implementing green infrastructure, using permeable paving materials and other resilient strategies in areas such as Second Street.</p> <p>Incorporate cooling strategies into master plan for City bike network. Work with MyRWA on expansion of Mystic River greenway and connectivity to adjacent communities.</p>	Planning & Development	Mass DOT/ DCR/ MBTA/ etc.	2021 - ON	Medium	City of Everett, MassDOT, DCR, MBTA, federal/state grant programs and funding sources, etc.

Title (Hazard(s) Addressed)	Description of Mitigation Measure(s)	Implementation Responsibility	Potential Partners	Time Frame	Estimated Cost	Potential Sources of Funding & Support
<i>Emergency Management Resources</i> (Multi-Hazard)	<p>Work with new residential developments to discuss emergency preparedness and evacuation plan measures (particularly as new housing moves into Commercial Triangle)</p> <p>Utilize assets such as deep-water ports & hotels to support emergency response efforts as needed.</p> <p>Implement more climate hazard-specific emergency preparedness trainings for both municipal staff and residents. Increase awareness & use of Code Red system.</p>	Fire Department	Other City of Everett depts.	2021- 2026	Low	City of Everett federal/state emergency planning grant programs, etc.
<i>Communication</i> (Multi-Hazard)	<p>Enhance translation services training and awareness of languages/dialects used by Everett residents.</p> <p>Consider more translation seminars through the high school/school dept. to share language skills and broaden community outreach.</p>	Communications	Other City of Everett depts.	2021- 2026	Low	City of Everett federal/state emergency planning grant programs, etc.
<i>Update Zoning Ordinances & Regulations</i> (Multi-Hazard)	Update zoning ordinances & regulations to promote climate resilience.	Planning & Development	Other City of Everett depts.	2021- 2023	Low	City of Everett

Title (Hazard(s) Addressed)	Description of Mitigation Measure(s)	Implementation Responsibility	Potential Partners	Time Frame	Estimated Cost	Potential Sources of Funding & Support
	<p>Require/incentive green infrastructure (green roofs, rain gardens, etc.).</p> <p>Develop a climate checklist for permitting and update Floodplain Overlay District requirements.</p>					
<i>Public Education and Social Resilience</i> (Multi-Hazard)	<p>Work with community leaders to spread climate hazard and adaptation knowledge further into the community.</p> <p>Incorporate additional climate education opportunities into community events like Annual Spring Clean Up Event and others.</p>	Conservation	Other City of Everett depts.	2021-2026	Very Low	City of Everett, state grant funding programs (MVP Program)
<i>Outreach to Vulnerable Populations, including those who are Economically Stressed</i> (Multi-Hazard)	<p>Work with adjacent cities and towns to coordinate additional permanent housing shelters.</p> <p>Work with social service providers to understand the community needs and improve communications prior to hazard events.</p> <p>Educate Everett's strong faith-based community groups on hazards and community resources.</p>	Health	Other City of Everett depts.	2021-2026	Low	City of Everett, federal/state health, and human services funding sources.

Title (Hazard(s) Addressed)	Description of Mitigation Measure(s)	Implementation Responsibility	Potential Partners	Time Frame	Estimated Cost	Potential Sources of Funding & Support
<i>Update Open Space Plan (Multi-Hazard)</i>	<p>Identify ways to increase amount of open space, particularly pervious, vegetated open space in the City of Everett, including acquisition of property.</p> <p>Consider options for splash pads, public pools and misting stations to address heat hazards.</p>	Planning & Development	Other City of Everett depts.	2021-2023	Low	City of Everett, state community grant programs, etc.
<i>Urban Forestry (Multi-Hazard)</i>	<p>Prepare a community-wide assessment of municipal trees for health, location, quantity, etc.</p> <p>Develop comprehensive tree planting plan and strategy.</p> <p>Perform a community-wide analysis of opportunities for the use of green infrastructure throughout Everett. Consider use of living walls, parklets, tree pits, etc. Identify a maintenance program/partnership for green infrastructure and street trees.</p>	Conservation	Other City of Everett depts.	2021-2023	Low	City of Everett, state grant funding programs (MVP Program)
Lower Priority						
<i>Everett Armory/ Connelly Center (Extreme & Winter Storms and Heat Hazards)</i>	<p>Evaluate other shelter/cooling center options in Everett and regionally.</p> <p>Enhance options & programming at the Connelly Center to promote use by residents.</p>	Health	Other City of Everett depts.	2021-2026	Medium	City of Everett federal/state emergency planning grant programs, etc.

Chapter 7

PLAN ADOPTION AND MAINTENANCE

CHAPTER 7: PLAN ADOPTION & MAINTENANCE

7.1 PLAN ADOPTION

The Everett Hazard Mitigation Plan was adopted by the City Council on Month Date, Year. See Certificate of Adoption at the start of the Plan for documentation. The Plan was approved by the Federal Emergency Management Agency (FEMA) on Month Date, Year for a period of five years. The Plan is set to expire on Month Date, Year.

7.2 PLAN MAINTENANCE

While many of the mitigation measures from the City's previous Hazard Mitigation Plan have been implemented since that plan was adopted there has not been an ongoing local process to guide implementation of the plan. Additionally, there were no members of the previous Local Planning Committee (LPC) still serving in their roles in Everett at the time of this plan update. Over the next five years, it will be key to have an established process for the implementation of this plan update.

Fort Point Associates (a Tetra Tech Company) worked with the Everett LPC and Stakeholder Working Group to prepare this plan. After approval of the plan by FEMA, the City of Everett will combine this plan implementation with an existing Core Team established for the Massachusetts EEA MVP program, with the Conservation Agent designated as the coordinator. The Core Team meets at minimum quarterly to fulfill other grant program obligations that overlap the areas of interest in the hazard mitigation plan, including climate resilience, municipal preparedness, and public education centered around natural and climate-enhanced hazards. Core Team members will continue to participate in regional and state-based meetings/trainings to stay current with best practices for mitigating risk. These meetings/trainings may include those with the Massachusetts Emergency Management Agency (MEMA), the Regional Emergency Planning Committee, Resilient Mystic Collaborative, and others. Additional members could be added to the Core Team from businesses, non-profit organizations, and other entities.

The City will continue encourage public participation throughout the five-year implementation of this plan and in the review and update process. As updates and a review of the plan are conducted by the Core Team, these will be placed on the City's web site, a hard copy of the Plan and all updates will be available for viewing at Everett City Hall, and the Plan and all updates will be promoted on the City's social media accounts. Any public meetings associated with this work will be publicly noticed in accordance with local and state open meeting laws.

The City of Everett agrees to update and adopt this mitigation plan on a five-year basis. This update will include a comprehensive review and planning process like the one used

to develop the Plan. This process includes updating land use practices, collecting, and reviewing best available data, reviewing the capability assessment, engaging the public and relevant stakeholders, and updating the mitigation strategies. This process will occur according to the latest FEMA guidelines. The City of Everett will establish funding for the development of the plan update a year before the Plan expires in 2026. The Conservation Agent will serve as the Project Manager for the update process.

7.3 IMPLEMENTATION AND EVALUATION SCHEDULE

Plan Implementation Survey – The Conservation Agent will prepare and distribute a survey in year three of the Plan. The plan implementation survey will be distributed to all LPC members and other interested local stakeholders. The survey will poll the members on any changes or revisions to the plan that may be needed, progress and accomplishments for implementation, and any new hazards or risks as identified in the City of Everett.

This information will be used to prepare a report or addendum to the local hazard mitigation plan to evaluate its effectiveness in meeting the plan's goals and objectives and to identify areas that need to be updated in the next plan. The Core Team, led by the Conservation Agent, will have primary responsibility for tracking progress, evaluating, and updating the plan.

Prepare for the next Plan Update – FEMA's approval of this plan is valid for five years, by which time an updated plan must be approved by FEMA to maintain the town's approved plan status and its eligibility for FEMA hazard mitigation grants. Given the lead time needed to secure funding and conduct the planning process, the Core Team will begin to prepare for an update of the plan in year three. This will help the City avoid any lapse in its approved plan status and grant eligibility when the current Plan expires in 2026.

Prepare and Adopt an Updated Local Hazard Mitigation Plan – Once the resources have been secured to update the plan, the Core Team will hire a consultant team to lead the plan update. The Core Team will review the latest FEMA hazard mitigation plan guidelines for guidance in updating the mitigation plan. The Everett Hazard Mitigation Plan 2021 Update will be forwarded to MEMA for review and to FEMA for approval.

7.4 INTEGRATION OF PLAN WITH OTHER PLANNING EFFORTS

Upon approval of the Everett Hazard Mitigation Plan 2021 Update by FEMA, the Core Team will provide all interested parties and implementing departments with a copy of the Plan and will initiate a discussion regarding how the plan can be integrated into each department's ongoing efforts.

At a minimum, the plan will be reviewed and discussed with the following departments:

- Fire
- Police
- Public Works
- Planning
- Health
- Building
- Recreation

Other groups that will be coordinated with include representatives of local businesses, the Everett Chamber of Commerce, nonprofit organizations, and other stakeholders. The Plan will also be posted on the City's website and promoted on the City's social media accounts. The posting of the plan on the City website will include a mechanism for citizen feedback such as an e-mail address to send comments to the attention of the Conservation Agent.

The Hazard Mitigation Plan will be integrated into other city plans and policies as they are updated and renewed, including the Everett Open Space and Recreation Plan, the latest Comprehensive Emergency Management Plan (CEMP), upcoming housing plans, and other initiatives.

REFERENCES

REFERENCES

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Chapter 2: Community Profile

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Chapter 3: Planning Process

No references

Chapter 4: Risk and Vulnerability Assessment

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Chapter 5: Capability Assessment

No References

Chapter 6: Mitigation Goals and Strategies

No References

Chapter 7: Plan Adoption & Maintenance

No References

Appendix A

PLANNING PROCESS MATERIALS



Everett 2020 Hazard Mitigation Plan Update

LOCAL PLANNING COMMITTEE KICKOFF MEETING
AUGUST 27, 2020

Agenda

Introductions

- Fort Point Associates, Inc., a Tetra Tech Company
- Local Planning Committee Members

Background: 2015 HMP

- Overview and Identified Hazards
- Goals
- Potential Hazard Mitigation Actions and Initiatives

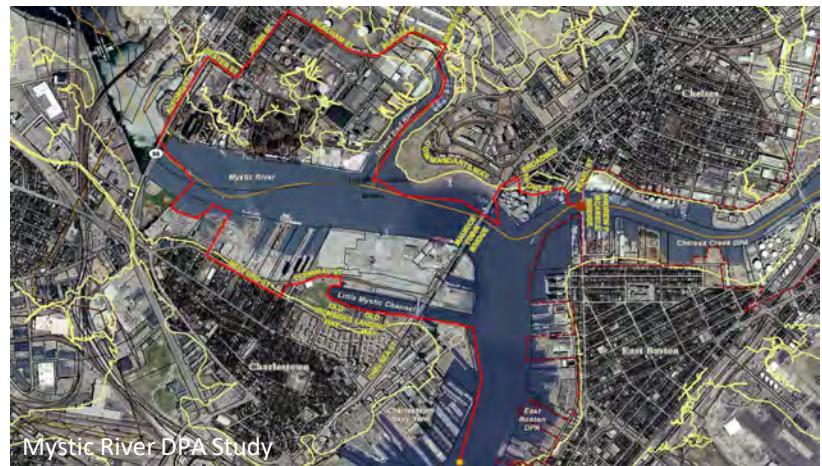
2020 HMP Update

- New Projects and Development
- Climate Resilience Planning 2015 - 2020
- Planning Process
- Engagement Strategy

Schedule



Clippership Wharf, East Boston



Mystic River DPA Study



Encore Boston Harbor, Everett



River's Edge Mixed-Use Project, Everett



Everett Central Waterfront MHP

Fort Point Associates, Inc. a Tetra Tech Company

A multi-disciplinary urban planning and environmental consulting firm with more than 35 years of experience in project planning, project management, and development approvals/environmental permitting.

Project Services and Areas of Expertise:

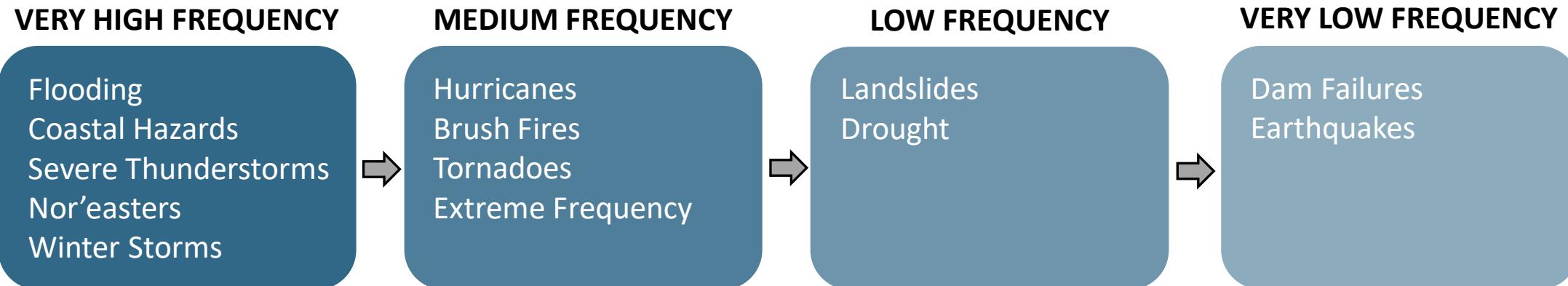
- Waterfront Development
- Land Use Planning and Analysis
- Master Planning
- Climate Resilience
- Municipal Harbor Plans and Designated Port Areas
- Local, State, and Federal Environmental Permitting

LPC Members Introduction

- Gregory St. Louis, *HMP Project Manager, Engineering*
- Tony Sousa, *Planning & Development*
- Tom Philbin, *Conservation*
- Patrick Johnston, *Everett Police, Marine Unit*
- Tony Carli, *Everett Fire Dept*
- Michael Imbornone, *Everett Fire Dept*
- Anthony O'Brien, *Everett Fire Dept*
- Joseph Gaff, *Everett Police, Parking/Traffic*
- Dennis Gooding, *Everett ISD*
- Deanna Deveney, *Communications*
- Sabrina Firicano, *Public Health*

2015 HMP Overview

- The 2000 Federal Disaster Mitigation Act requires all communities that wish to qualify for FEMA funding adopt a local multi-hazard mitigation plan to be updated in five-year intervals.
- Everett's first individual HMP was prepared by MAPC and filed in 2015.
- Building on public participation and stakeholder engagement, the plan identifies actions that can be taken to reduce the dangers to life and property from the following community-identified natural hazard events:



2015 HMP Goals

1. Prevent and reduce the loss of life, injury and property damages resulting from all major natural hazards.
2. Identify and seek funding for measures to mitigate or eliminate each known significant flood hazard area.
3. Integrate hazard mitigation planning as an integral factor in all relevant municipal departments, committees and boards.
4. Prevent and reduce the damage to public infrastructure resulting from all hazards.
5. Encourage the business community, major institutions and non-profits to work with the City to develop, review and implement the hazard mitigation plan.
6. Work with surrounding communities, state, regional and federal agencies to ensure regional cooperation and solutions for hazards affecting multiple communities.
7. Ensure that future development meets federal, state and local standards for preventing and reducing the impacts of natural hazards.
8. Educate the public about natural hazards and mitigation measures that can be undertaken by property-owners.
9. Take maximum advantage of resources from FEMA and MEMA to educate City staff and the public about hazard mitigation.

2015 Potential Hazard Mitigation Options

- Resolve ownership and legal issues of the Island End Culvert that will allow culvert cleaning and drainage ditch upgrade.
- Install appropriate stormwater management measures (BMPs) at Springvale, Madison and Elm Streets.
- Relieve the flooding at Elm Street due to infrastructure failure.
- Flooding of Tremont and Elton Street area: Dredging the creek streambed that drains this area remains a top priority, but is problematic due to contamination of the creek, land ownership, activity and use limitations.
- Complete the reconstruction of Lower Broadway: Flooding associated with the Island End culvert and failed infrastructure; replacing catch basins and installing new drain lines will help alleviate some of the flooding associated with the Island End culvert in this area.
- Complete updating Chapter 9 of the Everett General Ordinances - Flood Damage Prevention.



Hazard Mitigation Initiatives

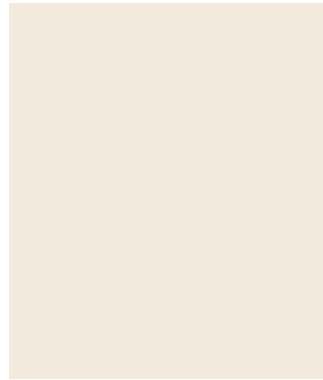
Island End River Project

- 2017 Chelsea MVP
- 2019 CZM Coastal Resilience Grant
- 2021 MVP Grant

Market Street Culvert / Tidegate

- MassWorks Grant
- MBTA Improvements
- Boston Market Terminal Redevelopment
- FEMA Disaster Relief Funding & Hazard Mitigation Grant Program





New Development Projects

Themes

- Infill of commercial and residential uses in industrial areas
- New residents and visitors to the City
- Robust economic development
- Increased impact on municipal services and infrastructure

Projects

- Encore Boston Harbor Resort & Casino
- Rivergreen Park
- Boston Market Terminal Redevelopment
- Market Forge
- Wood Waste of Boston

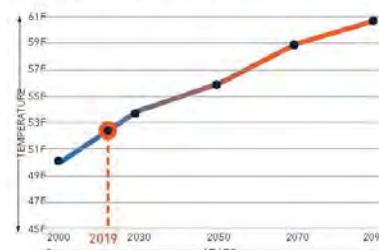
Climate Resilience Planning 2015-2020

Everett Municipal Vulnerability Preparedness Process

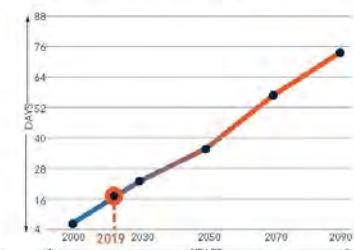
- In 2019, Everett applied for and received funding from the Massachusetts Executive Office of Energy and Environmental Affairs to identify climate-related hazards and community strengths and vulnerabilities
- The City is now an MVP-certified community, giving it access to ongoing grant opportunities
- The Urban Heat Island Supplement, developed with support from the Urban Land Institute, specifically evaluates the threat of high-risk heat areas
 - The study includes the Second Street corridor between Everett and Chelsea

EXTREME TEMPERATURES

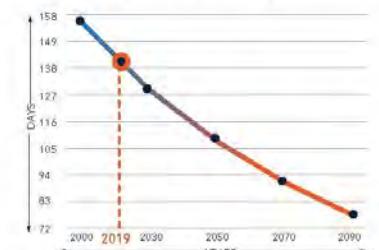
Average Temperatures



Days with Maximum Temperature over 90°F



Fewer Days Below Freezing

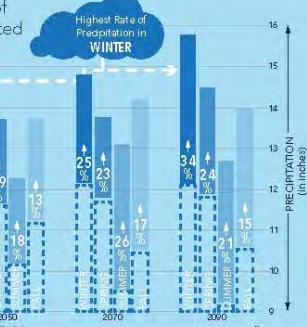


Climate change has already had observable effects on the environment. Rising temperatures, changes in precipitation patterns, droughts and heat waves, sea-level rise, and extreme storm events have **altered the distribution of risk and how resources are managed.**



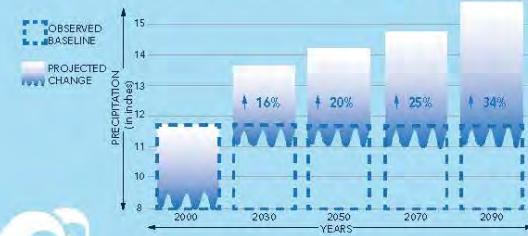
More Annual Precipitation and Inland Flooding

The Northeast United States has already experienced a larger increase in the intensity of rainfall events than any other region in the United States in the last fifty years, a trend that is expected to continue.



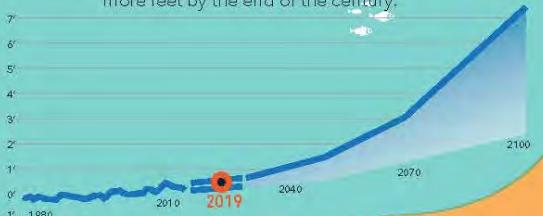
Extreme Snow And Ice Events

Total Annual Precipitation is expected to increase within the Boston Harbor Basin over the remainder of the century. Most of this increase is expected to occur during winter months where precipitation will fall as either rainfall or extreme snow or ice events.



Sea level Rise

Sea levels are rising as the oceans warm, ice melts and water expands. Sea levels have already risen about a foot and could rise several more feet by the end of the century.



Blizzards, Nor'Easters and Hurricanes

Storm events fueled by higher temperatures, increased evaporation, and atmospheric moisture leads to stormy weather of increased duration and intensity.



Drought Conditions

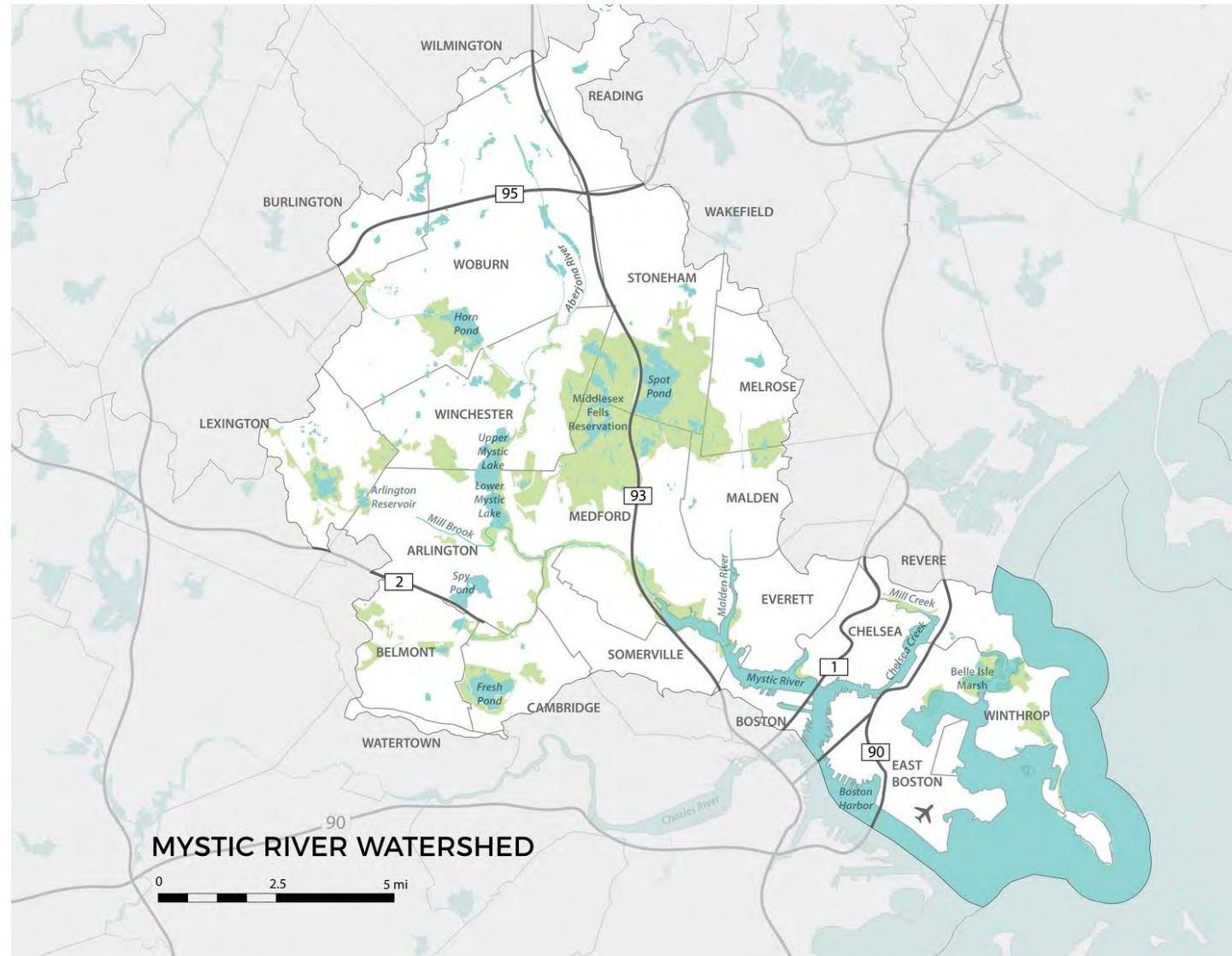
Due to the combined effects of higher temperatures, reduced groundwater recharge from extreme precipitation events, earlier snowmelt, summer and fall droughts may become more frequent.



Heatwaves

Extreme heat events are expected to become more frequent and intense. Socially vulnerable populations are particularly vulnerable to the dangers related to extreme temperature conditions.





Climate Resilience Planning 2015-2020

Regional Plans and Partnerships

- Mystic River Watershed Association
- Resilient Mystic Collaborative Lower Mystic Working Group
- Partnerships with Chelsea

Urban Renewal Plans

- Commercial Triangle
- Everett Square
- Lower Broadway

Mystic River
WATERSHED ASSOCIATION



2020 HMP Update Planning Process

- Re-evaluate risks identified in 2015 HMP
 - Flooding
 - Coastal Hazards
 - Severe Thunderstorms
 - Nor'easters
 - Winter Storms
 - Hurricanes
 - Brush Fires
 - Tornadoes
 - Extreme Frequency
 - Landslides
 - Drought
 - Dam Failures
 - Earthquakes
 - Integrate with ongoing regional climate resilience planning efforts
 - Work with Stakeholder Working Group to gather varied perspectives on hazard mitigation
 - Engage a diverse audience through innovative virtual events
- *What should a 2020 HMP look like?*

Engagement Goals and Strategy

- Create equitable and effective avenues for participation
- Address the changing landscape of in-person meetings through creative outreach efforts
 - Adhere to social distancing and public health guidelines
- Utilize and build upon existing virtual City communication channels
 - Social Media
 - Website
 - Listservs
- Gather input from diverse community and regional voices, including those that are not frequently represented
 - Council on Aging
 - Everett Public School System
 - Everett Community Growers



Schedule

LPC Meetings

- August 2020
- October 2020 – ½ Day Workshop
- November 2020
- February 2021

Additional Meetings (LPC Welcome but Not Required)

- September 2020 – Stakeholder Meeting
- October 2020 – Stakeholder Meeting
- October 2020 – Public Meeting 1
- December 2020 – Stakeholder Meeting
- January 2021 – Public Meeting 2

Completion in March 2021



Conclusion / Questions



Everett 2020 Hazard Mitigation Plan Update

STAKEHOLDER WORKING GROUP KICKOFF MEETING
SEPTEMBER 9, 2020

Agenda

Introductions

- Fort Point Associates, Inc., a Tetra Tech Company
- Stakeholder Working Group

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- Potential Hazard Mitigation Options and Initiatives

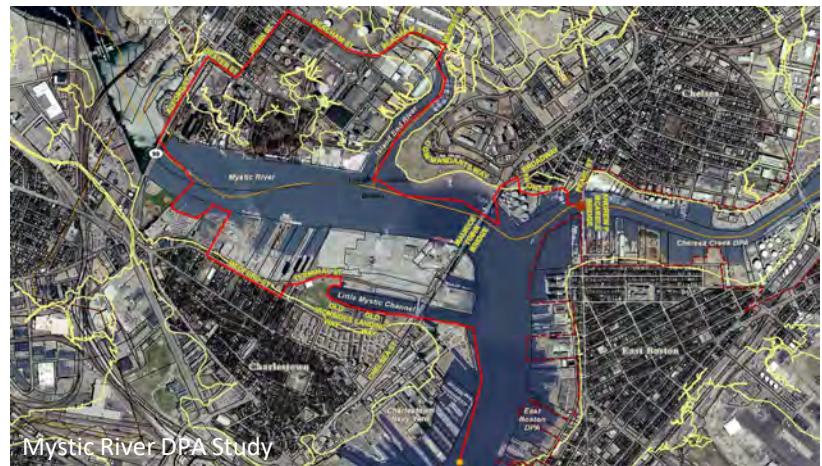
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- Municipal Harbor Plans and Designated Port Areas
- Local, State, and Federal Environmental Permitting

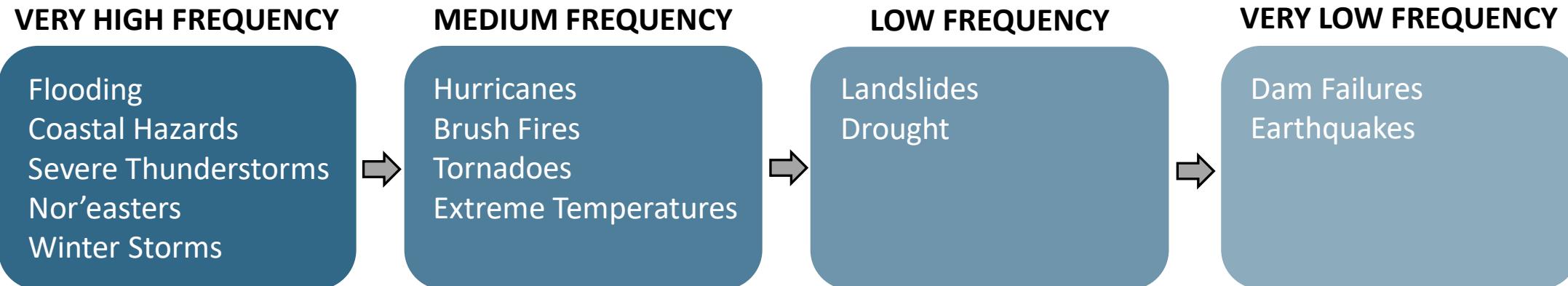
Stakeholder Working Group Introduction

- Private Businesses
- Nonprofits
- Residents
- Utility Providers
- State Agencies
- Regional Partners



2015 HMP Overview

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- Everett's first individual HMP was prepared by MAPC and filed in 2015.
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2015 Potential Hazard Mitigation Options

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- Complete updating Chapter 9 of the Everett General Ordinances - Flood Damage Prevention.



Hazard Mitigation Initiatives

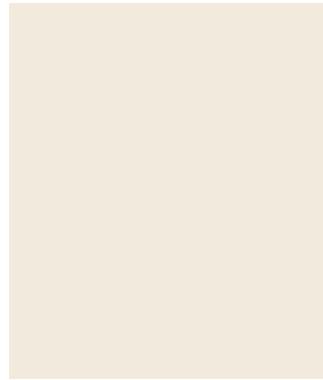
Island End River Project

- 2017 Chelsea MVP
- 2019 CZM Coastal Resilience Grant
- 2021 MVP Grant

Market Street Culvert / Tidegate

- MassWorks Grant
- MBTA Improvements
- Boston Market Terminal Redevelopment
- FEMA Disaster Relief Funding & Hazard Mitigation Grant Program





New Development Projects

Themes

- Infill of commercial and residential uses in industrial areas
- New residents and visitors to the City
- Robust economic development
- Increased impact on municipal services and infrastructure

Projects

- Encore Boston Harbor Resort & Casino
- Rivergreen Park
- Boston Market Terminal Redevelopment
- Market Forge
- Wood Waste of Boston

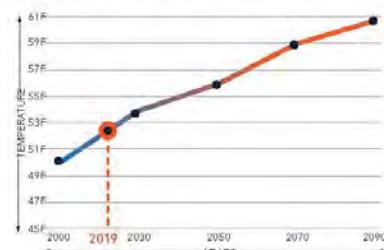
Climate Resilience Planning 2015-2020

Everett Municipal Vulnerability Preparedness Process

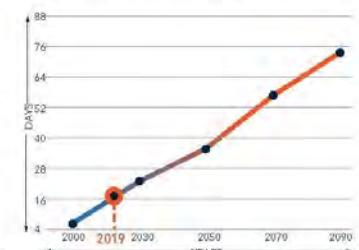
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 - The study includes the Second Street corridor between Everett and Chelsea

EXTREME TEMPERATURES

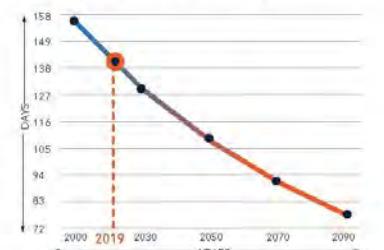
Average Temperatures



Days with Maximum Temperature over 90°F



Fewer Days Below Freezing

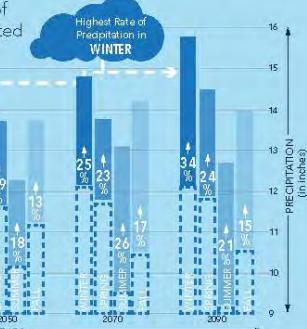


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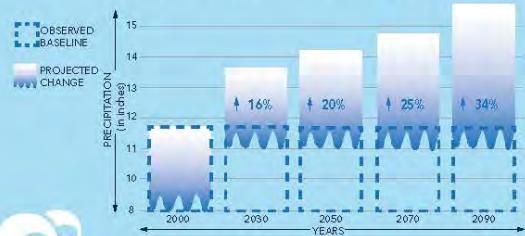
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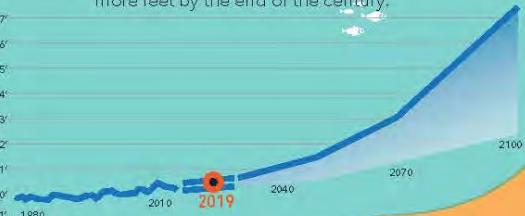
Blizzards, Nor'Easters and Hurricanes

Storm events fueled by higher temperatures, increased evaporation, and atmospheric moisture leads to stormy weather of increased duration and intensity.



Sea level Rise

Sea levels are rising as the oceans warm, ice melts and water expands. Sea levels have already risen about a foot and could rise several more feet by the end of the century.



Drought Conditions

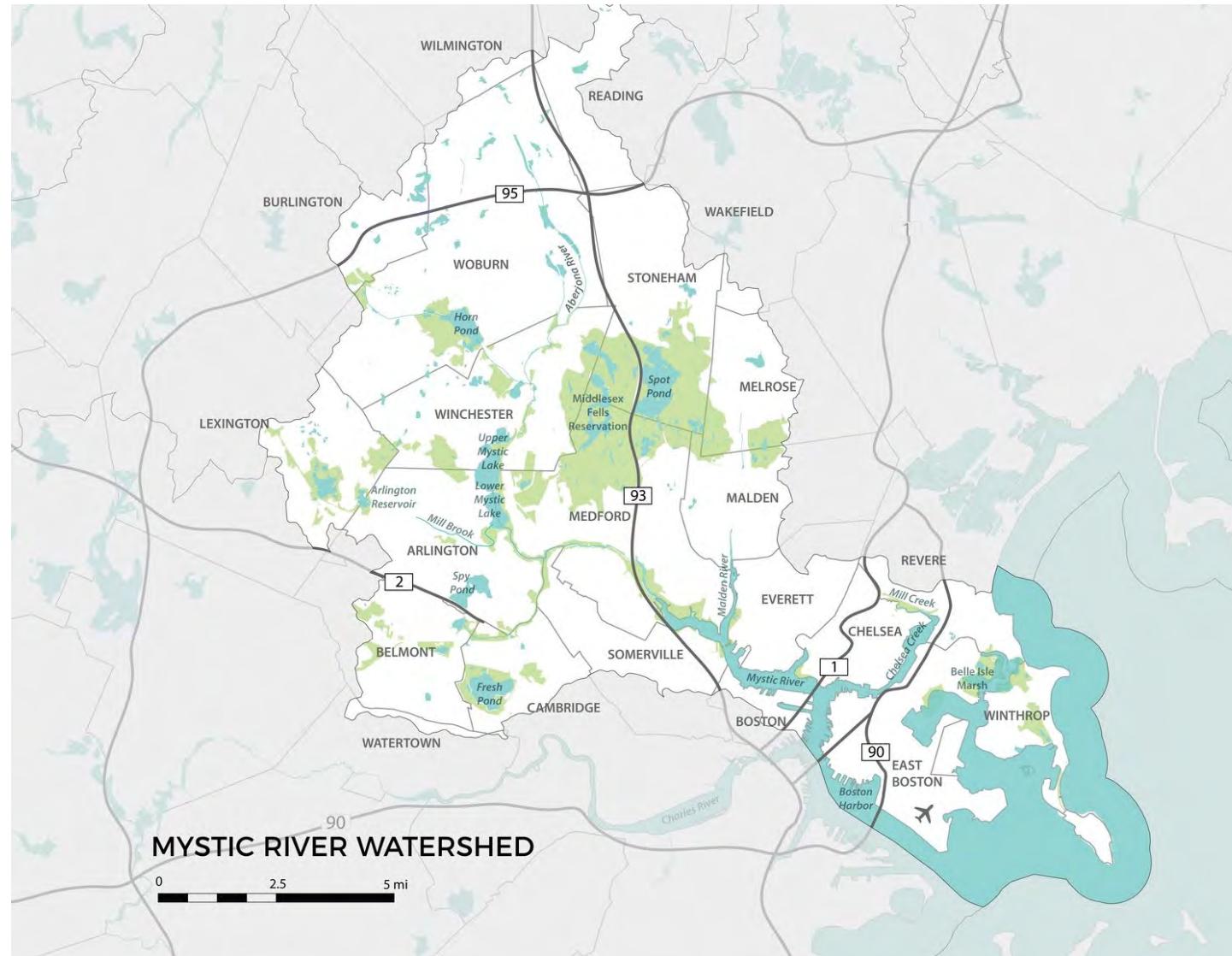
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Heatwaves

Extreme heat events are expected to become more frequent and intense. Socially vulnerable populations are particularly vulnerable to the dangers related to extreme temperature conditions.





Climate Resilience Planning 2015-2020

Regional Plans and Partnerships

- Mystic River Watershed Association
- Resilient Mystic Collaborative Lower Mystic Working Group

Urban Renewal Plans

- Commercial Triangle
- Everett Square
- Lower Broadway

Mystic River
WATERSHED ASSOCIATION



2020 HMP Update Planning Process

- Re-evaluate risks identified in 2015 HMP
 - Flooding
 - Coastal Hazards
 - Severe Thunderstorms
 - Nor'easters
 - Winter Storms
 - Hurricanes
 - Brush Fires
 - Tornadoes
 - Extreme Temperatures
 - Landslides
 - Drought
 - Dam Failures
 - Earthquakes
 - Integrate with ongoing regional climate resilience planning efforts
 - Include lessons learned from COVID-19 state of emergency
- *What should a 2020 HMP look like?*

Engagement Goals and Strategy

- Create equitable and effective avenues for participation
- Address the changing landscape of in-person meetings through creative outreach efforts
 - Adhere to social distancing and public health guidelines
- Utilize and build upon existing virtual City communication channels
 - Social Media
 - Website
 - Listservs
- Gather input from diverse community and regional voices, including those that are not frequently represented



Schedule

Local Planning Committee Meetings

- ~~August 2020~~
- Early October 2020
- October 2020 – $\frac{1}{2}$ Day Workshop
- February 2021

Additional Meetings

- ~~September 2020 – Stakeholder Meeting~~
- October 2020 – Public Meeting 1
- November 2020 – Stakeholder Meeting
- December 2020 – Stakeholder Meeting
- January 2021 – Public Meeting 2

Completion in March 2021



Conclusion / Questions



Everett 2020 Hazard Mitigation Plan Update

LOCAL PLANNING COMMITTEE MEETING
#2 AUGUST 27, 2020

Agenda

Overview of 2020 HMP Process

- Reintroductions
- Review of 2020 HMP Update
- Progress since August LPC Kickoff Meeting

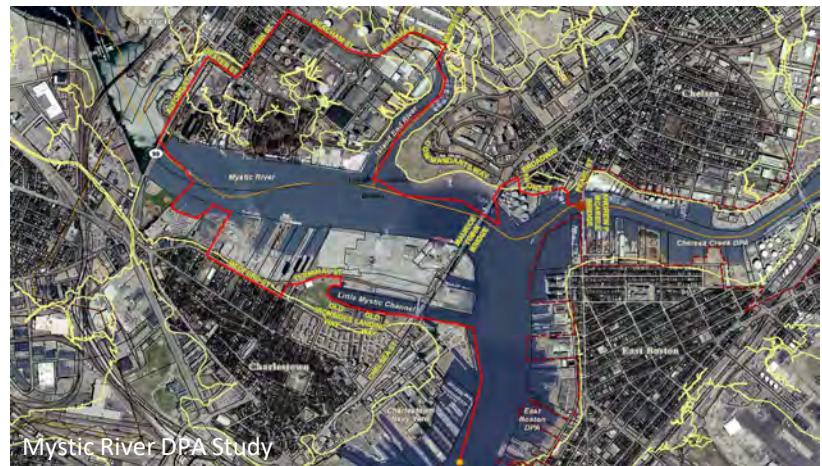
Progress

- Critical Infrastructure Inventory
- Capability Assessment
- Community Preparedness Survey

Schedule



Clippership Wharf, East Boston



Mystic River DPA Study



Encore Boston Harbor, Everett



River's Edge Mixed-Use Project, Everett



Everett Central Waterfront MHP

Fort Point Associates, Inc. a Tetra Tech Company

A multi-disciplinary urban planning and environmental consulting firm with more than 35 years of experience in project planning, project management, and development approvals/environmental permitting.

Project Services and Areas of Expertise:

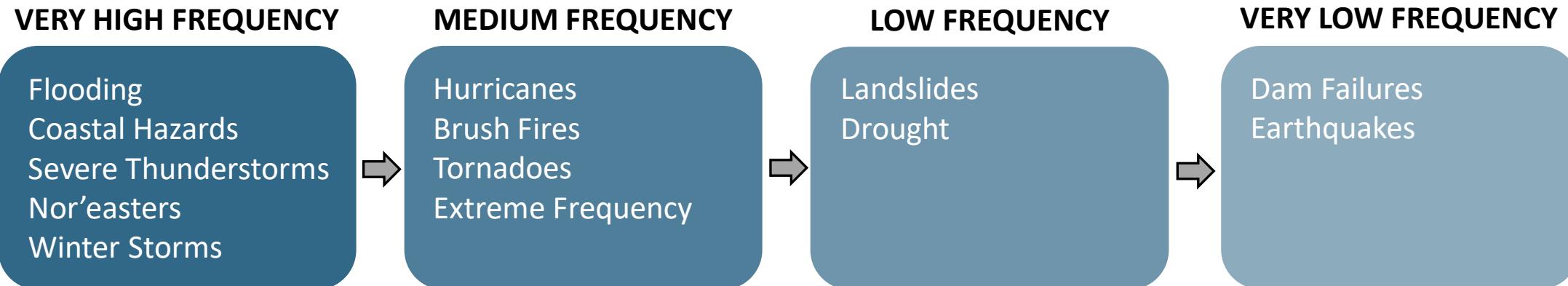
- Waterfront Development
- Land Use Planning and Analysis
- Master Planning
- Climate Resilience
- Municipal Harbor Plans and Designated Port Areas
- Local, State, and Federal Environmental Permitting

LPC Members Introduction

- Gregory St. Louis, *HMP Project Manager, Engineering*
- Tony Sousa, *Planning & Development*
- Tom Philbin, *Conservation*
- Patrick Johnston, *Everett Police, Marine Unit*
- Tony Carli, *Everett Fire Dept*
- Michael Imbornone, *Everett Fire Dept*
- Anthony O'Brien, *Everett Fire Dept*
- Joseph Gaff, *Everett Police, Parking/Traffic*
- Dennis Gooding, *Everett ISD*
- Deanna Deveney, *Communications*
- Sabrina Firicano, *Public Health*

2015 HMP Overview

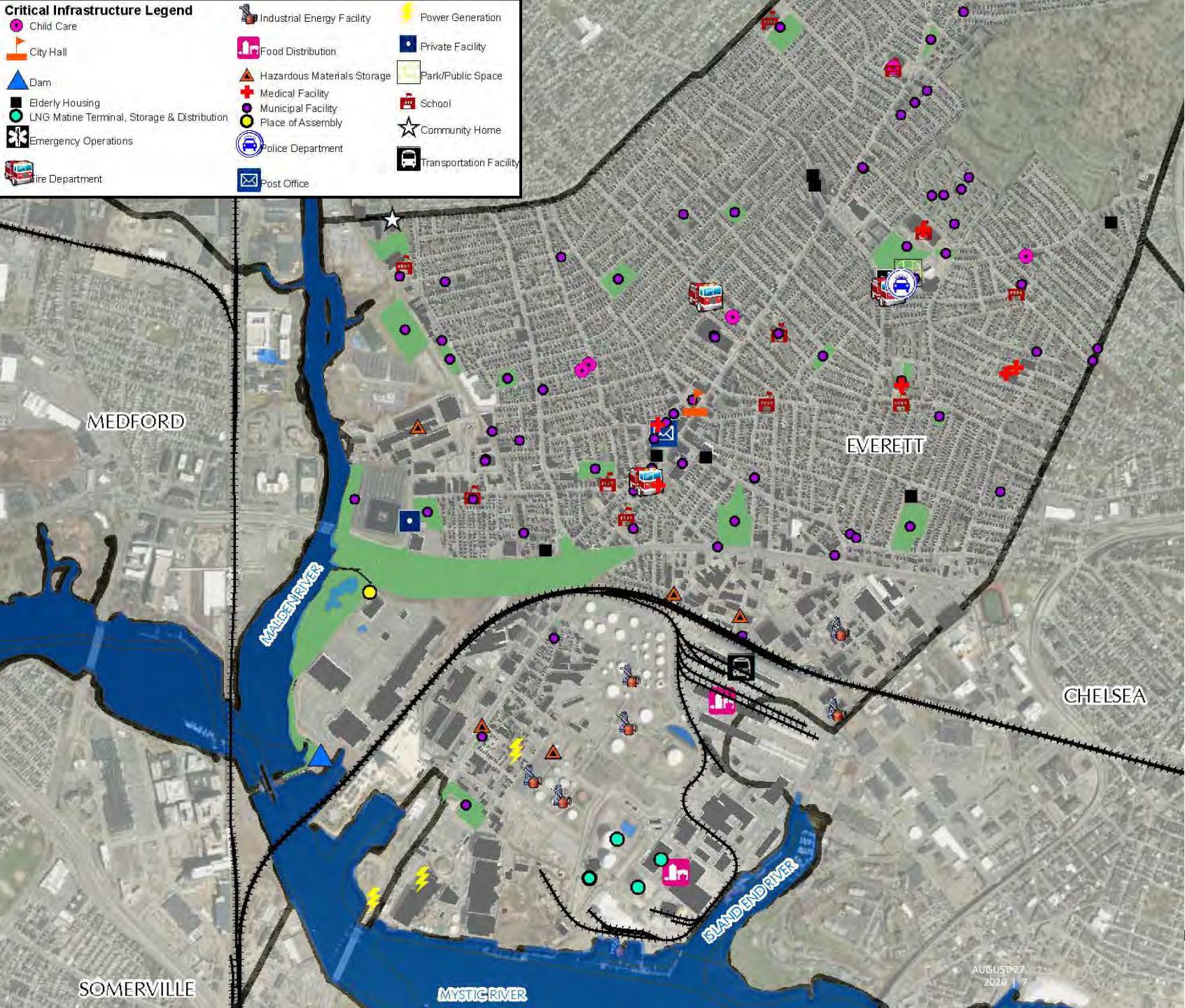
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2020 HMP Update Planning Process

- Re-evaluate risks identified in 2015 HMP
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 - Earthquakes
 - Integrate with ongoing regional climate resilience planning efforts
 - Work with Stakeholder Working Group to gather varied perspectives on hazard mitigation
 - Engage a diverse audience through innovative virtual events
- *What should a 2020 HMP look like?*

Critical Infrastructure



2015 Potential Hazard Mitigation Options

- Resolve ownership and legal issues of the Island End Culvert that will allow culvert cleaning and drainage ditch upgrade.
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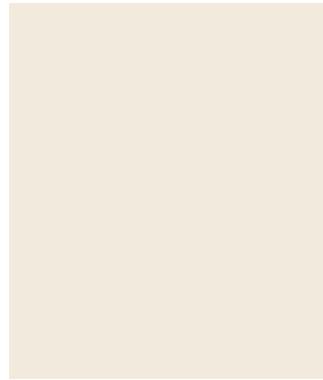
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Hazard Mitigation Initiatives



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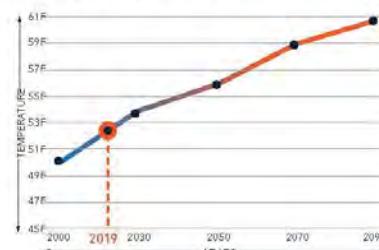
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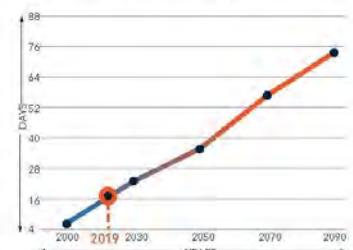
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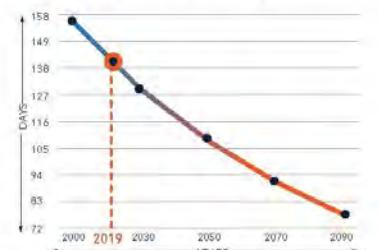
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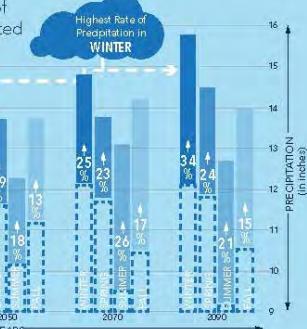


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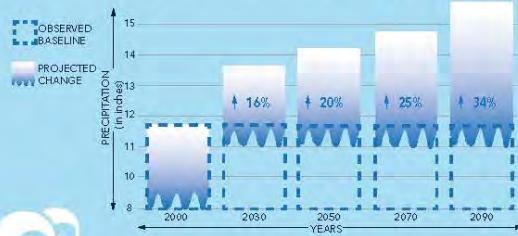
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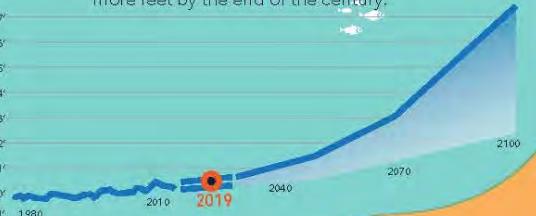
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 - Social Media
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 - Listservs
- Gather input from diverse community and regional voices, including those that are not frequently represented
 - Council on Aging
 - Everett Public School System
 - Everett Community Growers



Community Preparedness Survey

Objectives:

- 1
- 2
- 3
- 4
- 5

Schedule

LPC Meetings

- August 2020
- November 2020 – ½ Day Workshop
- December 2020
- February 2021

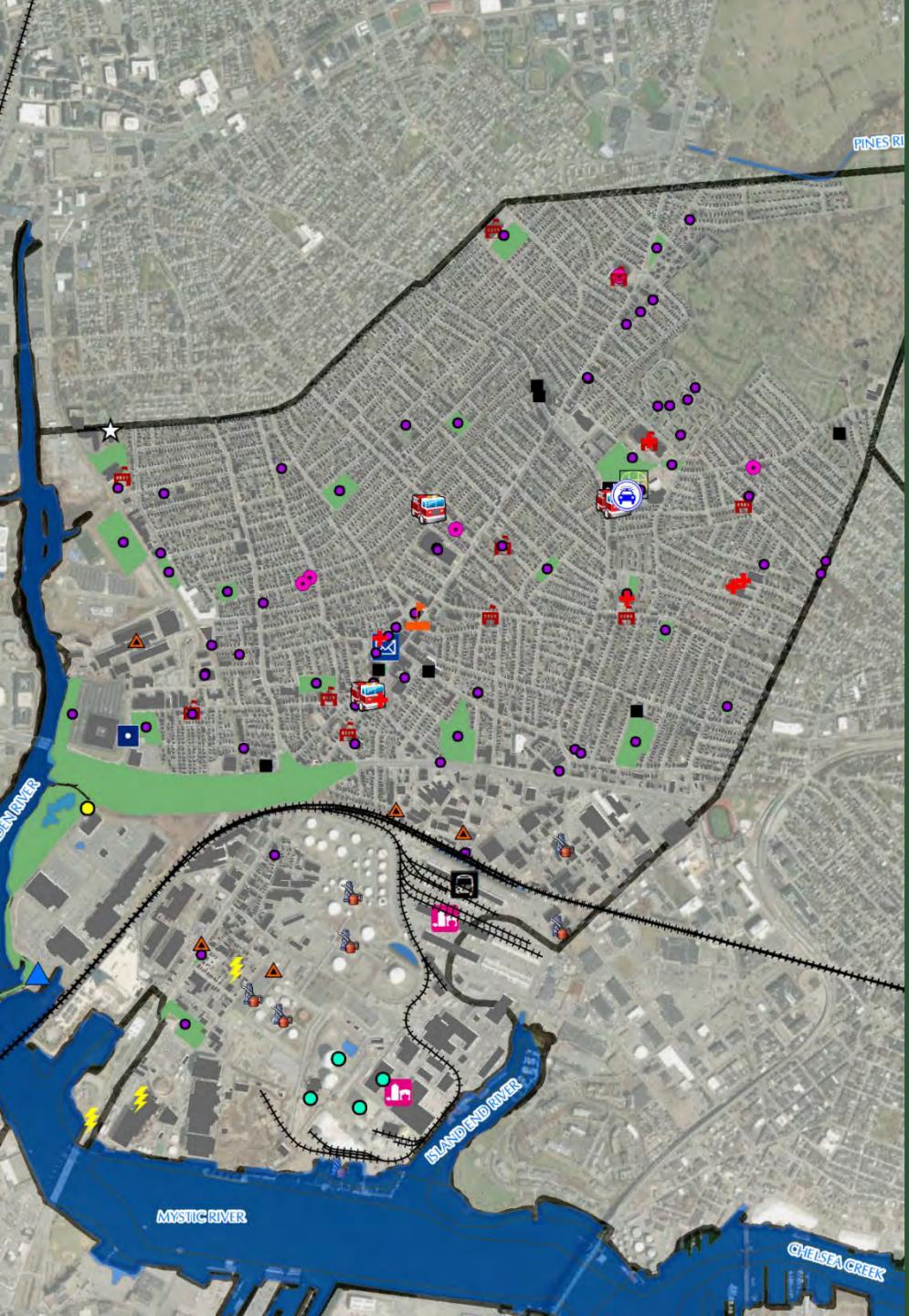
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Completion in March 2021



Conclusion / Questions



Everett 2021 Hazard Mitigation Plan Update

WORKSHOP PART I
JULY 8, 2021

Agenda

Introduction to Hazard Mitigation Planning

→ Collaborative Session 1: Introductions

Risks and Hazards

→ Collaborative Session 2: Risk and Hazard Mapping

Mitigation Measures Discussion

Next Steps



Meeting Format

- The Workshop is organized as a virtual charette: we will have three short presentations and two smaller collaborative sessions between each presentation.
- During the collaborative sessions, participants will be divided among two “rooms,” where a member of the project team will facilitate a live discussion.
- At the end of each session, participants will automatically be returned to the main meeting.
- Should you have any technical problems, you can always return to the link in the main meeting invitation.

Microsoft Teams Tips

Microsoft Teams is available as a desktop app, a smartphone app, and through your web browser. All formats will have the following controls available. Clicking on these symbols prompts the following actions:

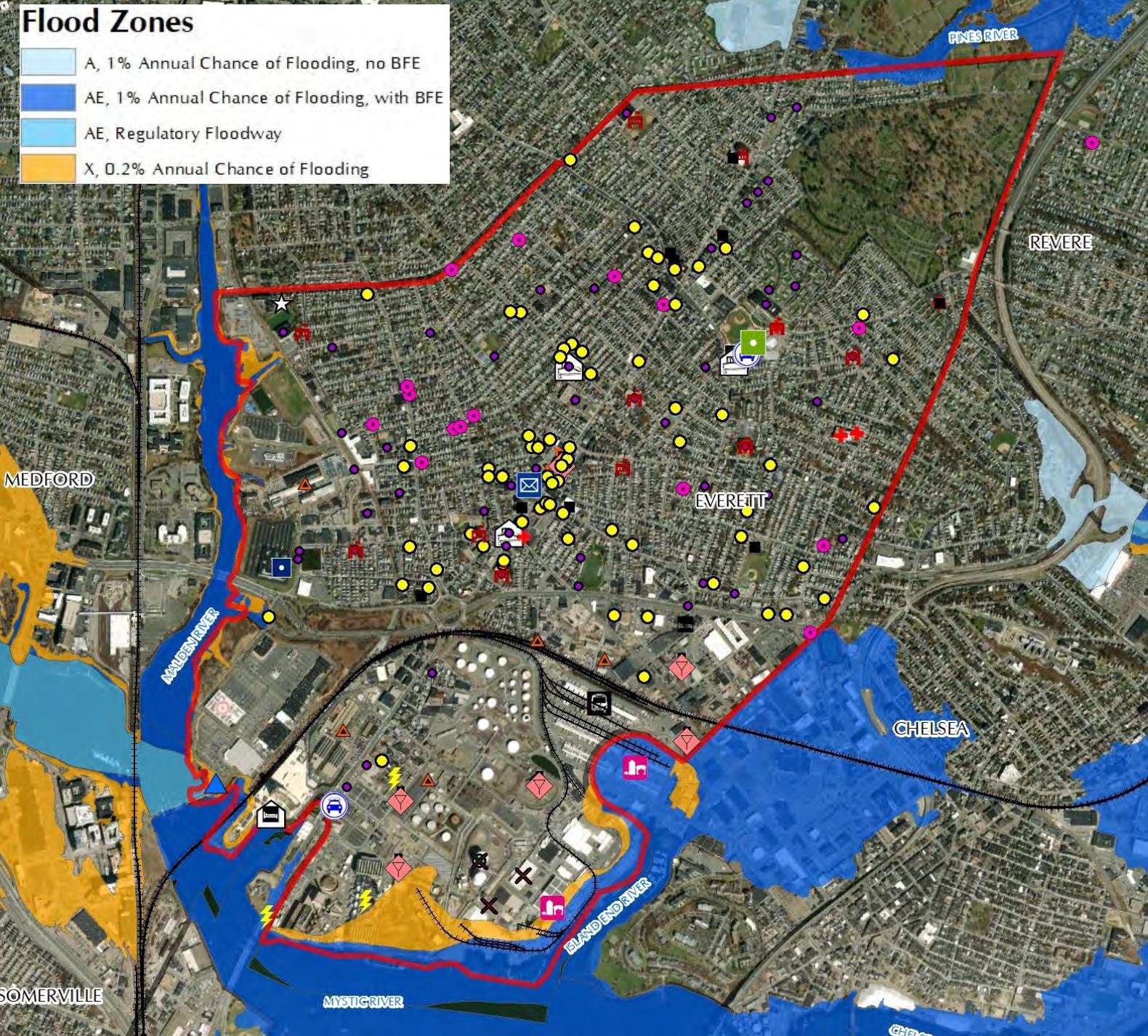


See Call Participants	Open Chat Box	Raise Hand	More Options	Turn Camera On/Off	Turn Mic On/Off	Share Screen (N/A)	Leave Meeting
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Etiquette: Participants will be muted during the presentations to avoid any background noise. The chat will be open to submit questions or comments. You may also “raise your hand” to be unmuted. We look forward to a lively and respectful discussion!

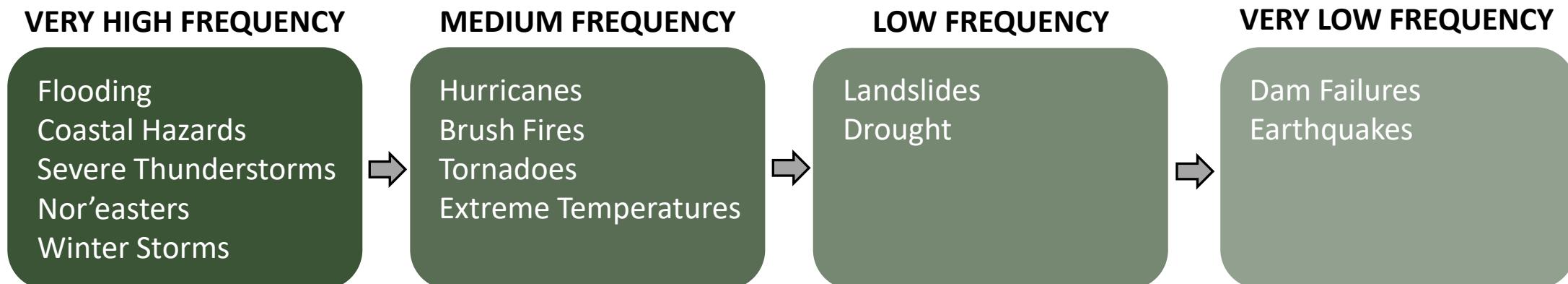
Why We're Here: FEMA HMP Requirements

- The 2000 Federal Disaster Mitigation Act requires communities that wish to qualify for FEMA funding adopt a local multi-hazard mitigation plan.
 - Plans must be updated in five-year intervals and involve a robust community engagement process.
- Hazard mitigation includes “any sustainable action that reduces or eliminates long-term risk to people and property from future disasters.”



Everett HMP History

- Everett first participated in hazard mitigation planning in 2004, when it and eight other Metro Boston communities filed the Metro Boston Multi Jurisdictional Hazard Mitigation Plan under the guidance of MAPC.
- The City's first individual HMP was prepared by MAPC and filed in 2015. It was approved by FEMA in October 2016.
- Building on public participation and stakeholder engagement, the 2015 HMP Update identified nine mitigation goals to reduce the dangers to life and property from the following community-identified natural hazard events:





2021 HMP Update Planning Process

- ✓ Convene Local Planning Committee (LPC) to provide guidance on the impacts of natural hazards and goals to address them
- ✓ Convene Stakeholder Working Group to gather varied perspectives on hazard mitigation
- ✓ Inventory critical infrastructure to develop a vulnerability assessment
- Assess community planning, regulatory, administrative, technical, financial, education, and outreach capabilities
- Engage a diverse audience to represent the community's current needs and values
- Re-evaluate risks and goals identified in 2015 HMP
- Integrate with ongoing regional climate resilience planning efforts



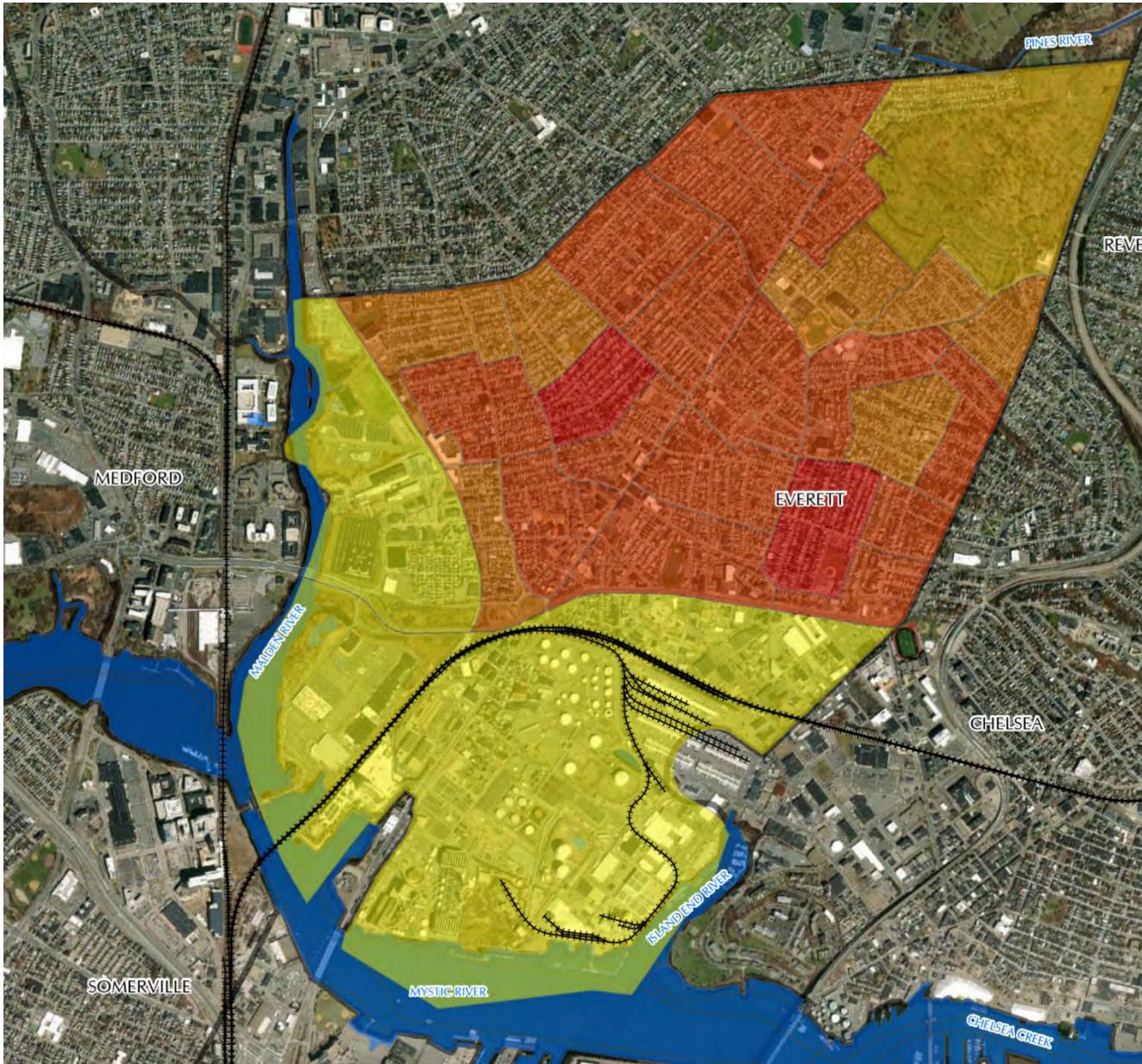
Community Context

Land Use

- Infill of commercial and residential uses in industrial areas along Mystic, Malden, and Island End Rivers
- Robust economic development
- New residents and visitors to the city
- Increased impact on municipal services and infrastructure

Land Use 2016

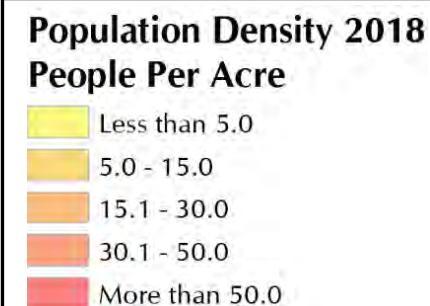
Commercial	Residential - multi-family
Industrial	Residential - other
Mixed use, other	Residential - single family
Mixed use, primarily commercial	Right-of-way
Mixed use, primarily residential	Recreation
Open land	Water



Community Context

Population Density

- Population corresponds with land use; primarily residential north of Revere Beach Parkway and Northern Strand Community Trail
- Least dense in heavily industrial/commercial areas along Mystic, Malden, and Island End Rivers
- Most dense toward center of city and Broadway “spine”



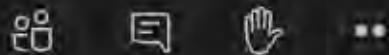
Risks and Hazards





Collaborative Session 1: Introductions

00:09



Join room

Leave



00:09



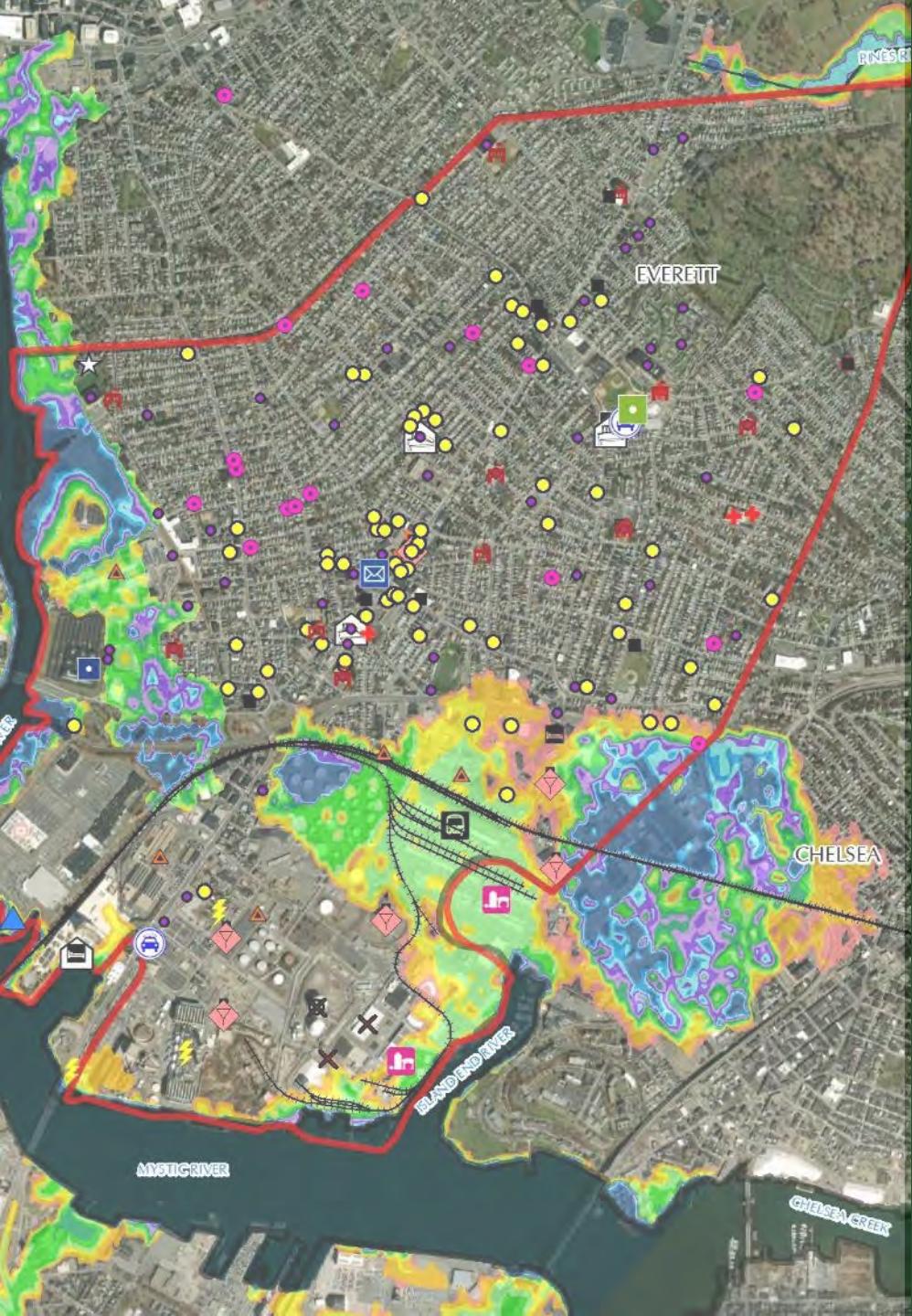
...



Return

Leave





Everett 2021 Hazard Mitigation Plan Update

WORKSHOP PART II
JULY 8, 2021

Agenda

Overview of 2020 HMP Update

→ Collaborative Session 1: Introductions

Risks and Hazards

→ Collaborative Session 2: Risk and Hazard Mapping

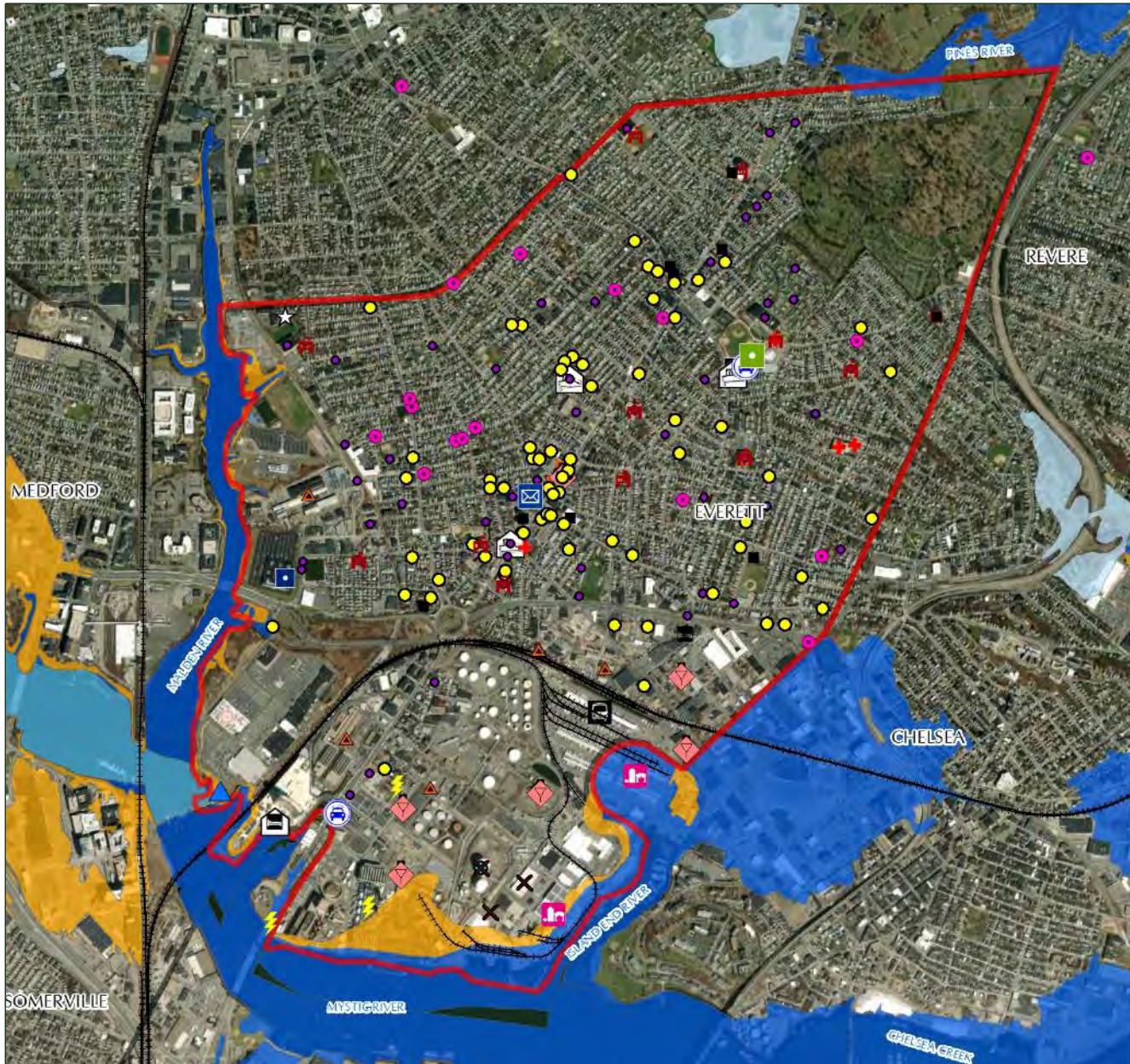
Mitigation Measures Discussion

Next Steps

Flooding

- Everett is subject to inland (riverine) flooding, urban (precipitation) flooding, and coastal (storm surge) flooding.
- Floods are caused by severe rainstorms, thunderstorms, nor'easters, and hurricanes.
- Undersized or lack of storm drainage and large expanses of impervious surfaces (building roofs, asphalt pavement for roadways or parking areas, etc.) exacerbate flooding impacts.





Current FEMA Flood Zones (2010)

- Middlesex county Flood Insurance Rate Maps (FIRMs) last updated in June 2010
- Suffolk County FIRM maps updated in 2016
- Areas of potentially high flood risk (such as the Island End River near the New England Produce Center) are currently mapped as hazards in Chelsea but are not mapped over the county line in Everett

Flood Zones

A	1% Annual Chance of Flooding, no BFE
AE	1% Annual Chance of Flooding, with BFE
AE	Regulatory Floodway
X	0.2% Annual Chance of Flooding

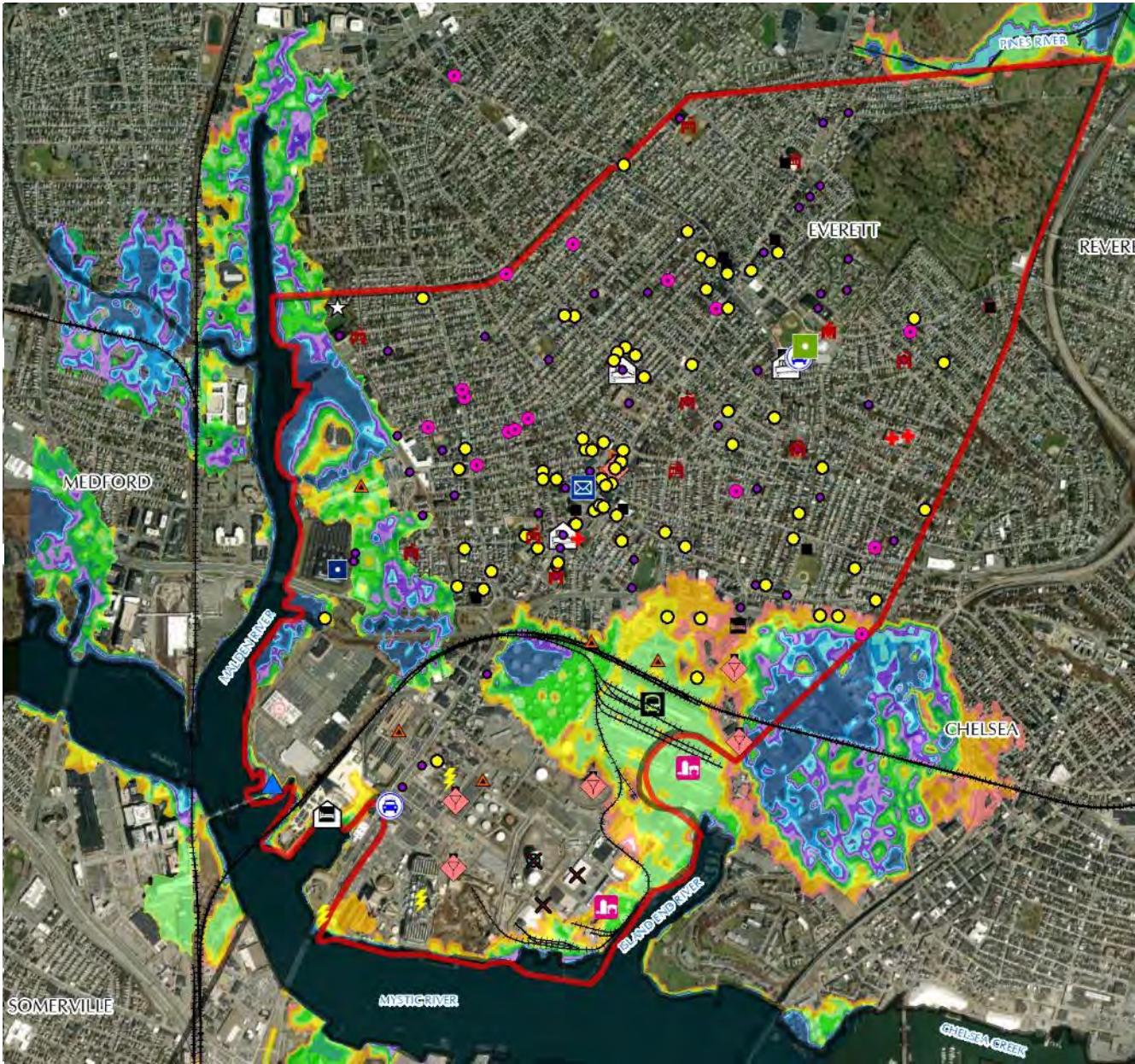


Draft FEMA Flood Zones (2020)

- Reflects emerging areas of vulnerability along Malden, Mystic, and Island End Rivers
- Flood pathways extend closer to city core

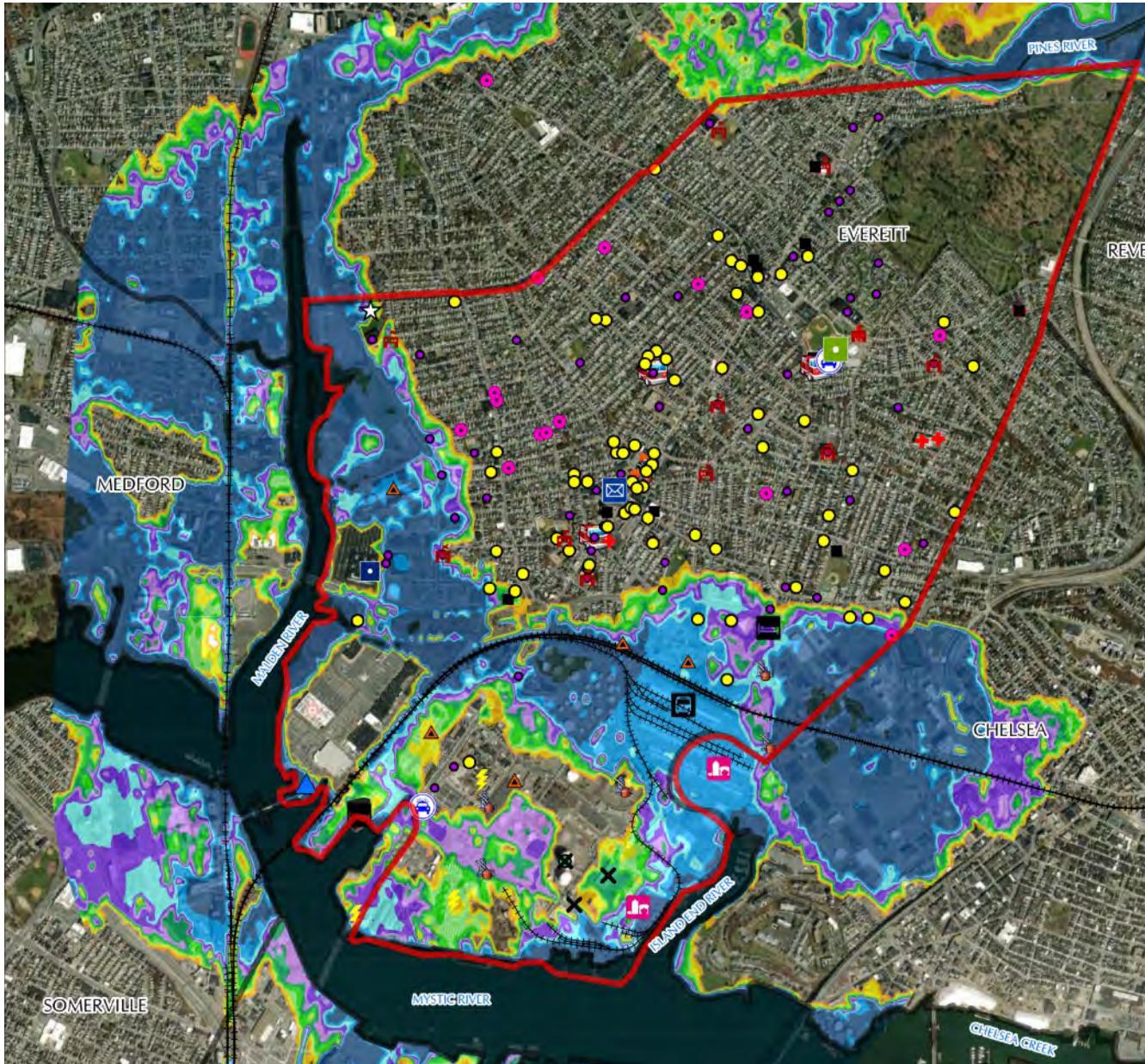
LEGEND

Proposed Study	Effective Study
Red Base Flood Elevations Shown On New Study Reaches Only	Basic Flood Boundary (BFB) (1% and 0.2% elevation in feet)
Structures	Cross Section Line
Profile Baseline	Coastal Transect Line
Watershed Boundary	Cities
ZONE A (Approximate Flooding)	States
ZONE AO (1% Shallow Flooding)	Annual Climate Hazard Boundary
ZONE AE (Detailed Flooding)	0.2% Annual Climate Hazard Boundary
ZONE AE with Floodway	Floodway Boundary
ZONE VE (1% Coastal Flooding)	0.2% and 0.1% Boundary
ZONE X (0.2% Flooding)	US Special Flood Hazard Area (SFHA)
	Flood Risk Area
	Boundary during SHFA, Areas and Islands by elevating SFHA of 100-year Site Flood Protection Flood Elevation or flood elevation
	Point of Moderate Water Action
	Flood at Moderate Water Action and coincident with Zone X Flood



2030 100-Year Storm

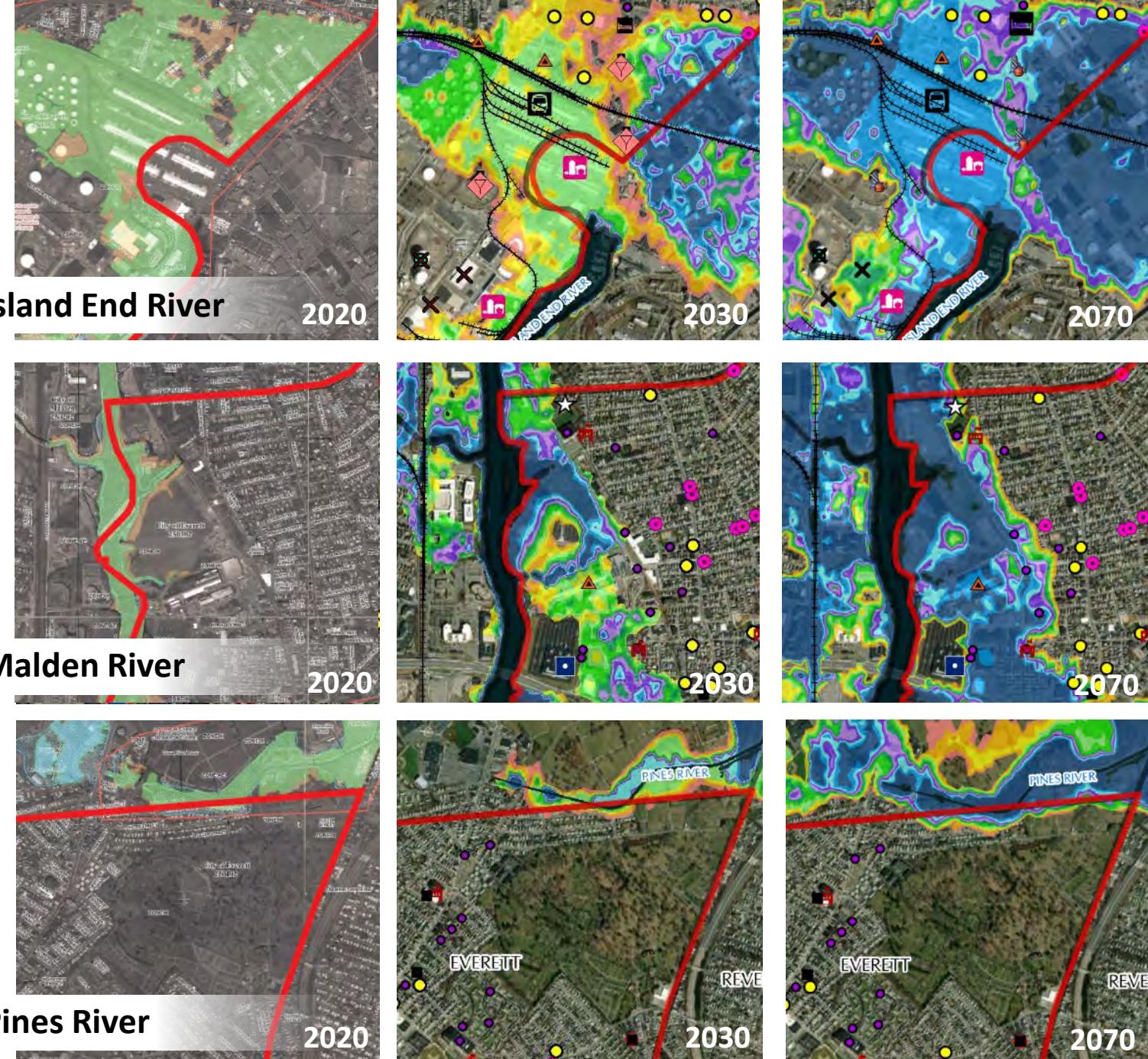
- Based on the Woods Hole MC-FRM model
- Follows many trends evident in the Draft 2020 FEMA Flood Zones FIRM (Malden River/Island End corridor flooding)
- Indicates increasing risk in Commercial Triangle and along the Malden River
- Illustrates regional flood concerns that cross city boundaries
- Highlights the importance of resilient development and regional partnerships



2070 100-Year Storm

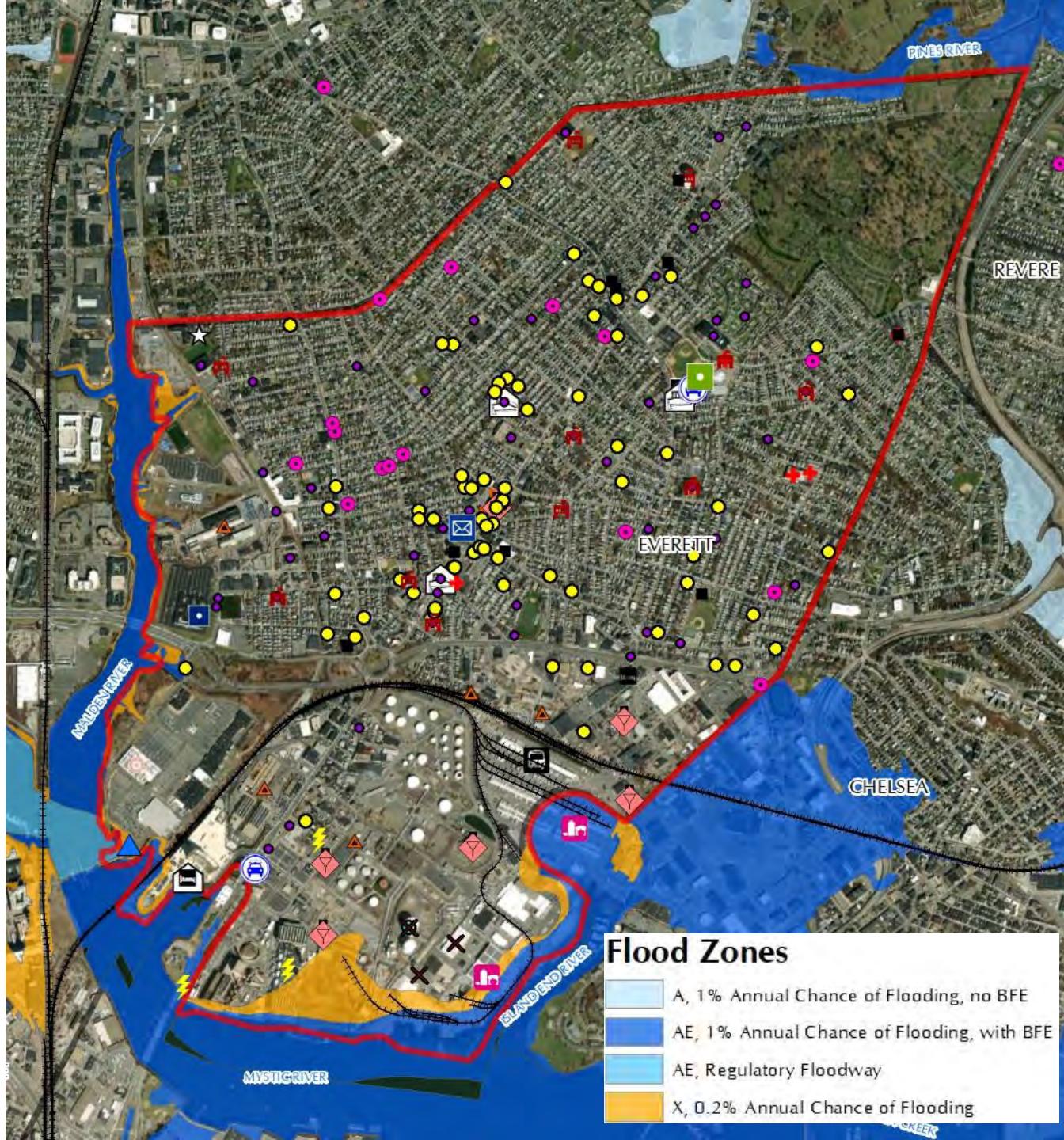
- Emphasizes growing extent and depth of flood risk
- Indicates the Island End River corridor is likely to extend beyond nuisance flooding of 1-2 feet and begin to cause structural damage and operational limitations
- Useful for redevelopment planning associated with the 30 – 50-year lifespan for building and infrastructure assets

Areas of Flood Risk 2020 - 2070



Community Risk Profile

- “Repetitive Loss” (RL) is defined by FEMA as:
a National Flood Insurance Program-insured structure that has had at least 2 paid flood losses of more than \$1,000 each in any 10-year period since 1978.
- In Everett, there have been 2 RL Buildings in the A and AE Zones, and 1 building in the X Zone.
- Losses total \$23,876.25.
- The quantity and value of these claims reflect the flood zones on the FIRMs to date, which cover only small portions of the Island End River area, the Malden River area, and the Mystic River DPA.

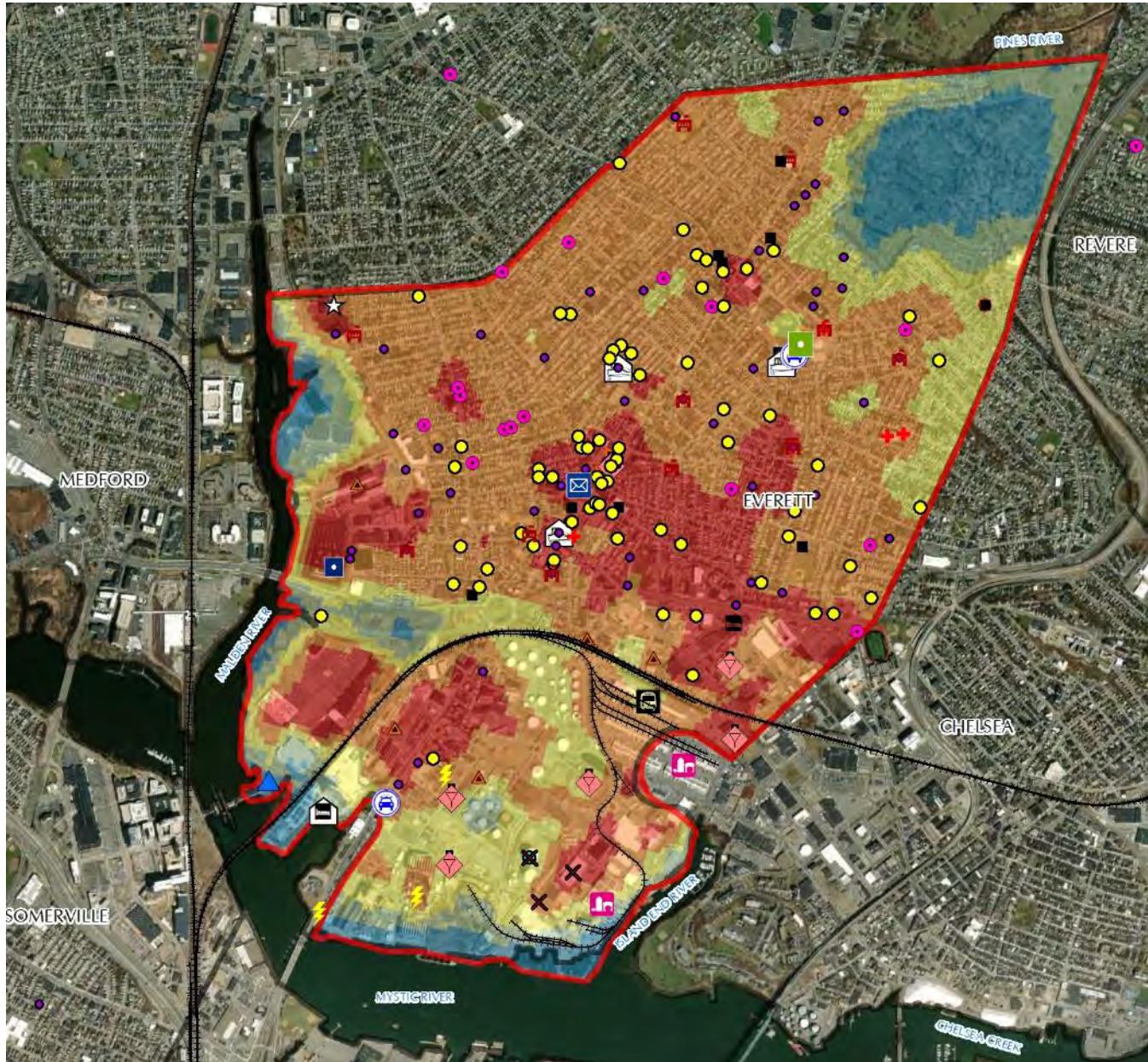


Heat

- In Massachusetts, the annual number of days over 90°F is expected to increase to 12 – 45 by 2050.
- Heat impacts in Everett come from:
 - Over 85% impervious cover.
 - Limited tree canopy and landscape vegetation.
 - Heavy trucking activity and idling vehicles from industrial uses.
 - Heat waste from HVAC and refrigeration.



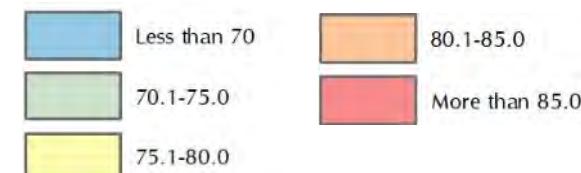
Photo: F. Chavez



Average Summer Temperature 2017 - 2018

- Illustrates intensifying heat in the most densely built areas
- Land cover and different sources of waste heat increase temperatures in different neighborhoods:
 - Industrial uses along Island End and Mystic Rivers
 - Construction equipment, machinery, and building exhaust in areas of high redevelopment
 - Traffic exhaust along major transportation corridors

Average Summer Temperature (F) (2017 – 2018)



Food Access

- The Everett Community Food Assessment & Plan was developed by Everett Community Growers in 2018 to develop an action plan and guide future food system efforts.
- Food insecurity rates in Everett are higher than across Massachusetts.
- Community gardens and urban farms are an effective neighborhood solution to address food insecurity and mitigate the impacts of heat and flooding.



Photo: Everett Community Growers



Collaborative Session 2: Risk and Hazard Mapping

00:09



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Return

Leave





Everett 2021 Hazard Mitigation Plan Update

WORKSHOP PART III
JULY 8, 2021

Agenda

Overview of 2020 HMP Update

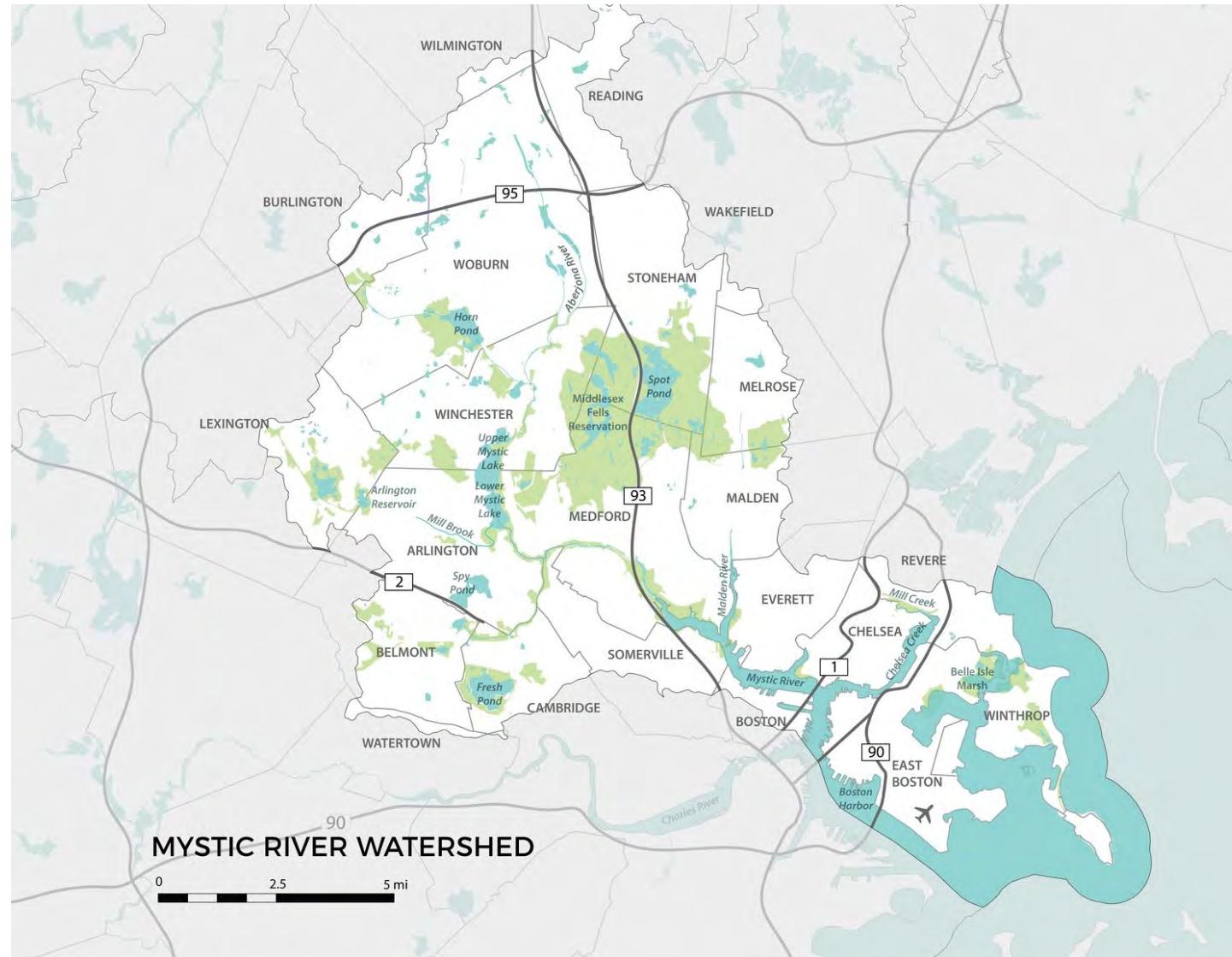
→ Collaborative Session 1: Introductions

Risks and Hazards

→ Collaborative Session 2: Risk and Hazard Mapping

Mitigation Measures Discussion

Next Steps



Planning Initiatives and Partnerships

Regional Plans and Partnerships

- Mystic River Watershed Association
- Resilient Mystic Collaborative Lower Mystic Working Group
- Partnerships with Chelsea

Urban Renewal Plans

- Commercial Triangle
- Everett Square
- Lower Broadway

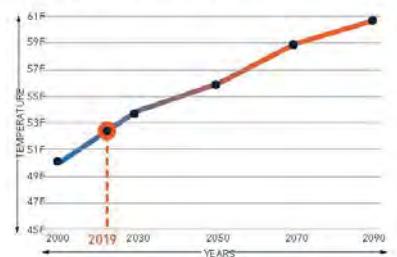


Accomplishments

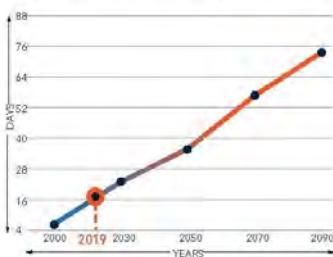
- Regional Collaborations
 - Island End River Flood Resilience (2017 – Present)
 - Lower Mystic Working Group Regional Infrastructure Vulnerability Assessment (2020 – Present)
- Municipal Vulnerability Preparedness (MVP) Process (2018 – 2019)
- MVP Urban Heat Island Supplement
- ULI Living with Heat Charette and Report (2019)

EXTREME TEMPERATURES

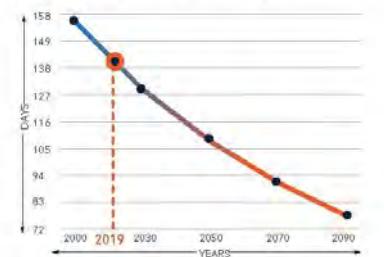
Average Temperatures



Days with Maximum Temperature over 90°F



Fewer Days Below Freezing

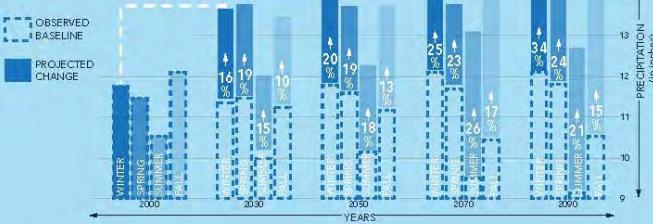


Climate change has already had observable effects on the environment. Rising temperatures, changes in precipitation patterns, droughts and heat waves, sea-level rise, and extreme storm events have **altered the distribution of risk and how resources are managed.**



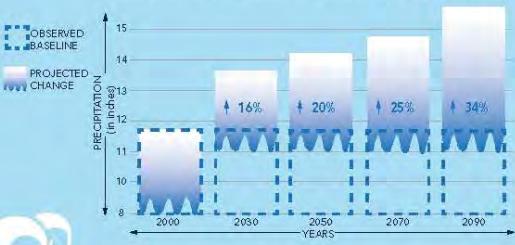
More Annual Precipitation and Inland Flooding

The Northeast United States has already experienced a larger increase in the intensity of rainfall events than any other region in the United States in the last fifty years, a trend that is expected to continue.



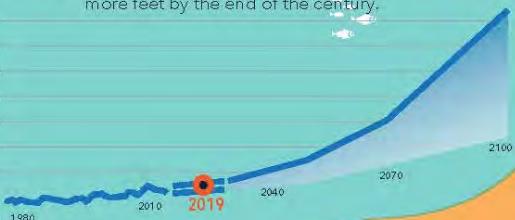
Extreme Snow And Ice Events

Total Annual Precipitation is expected to increase within the Boston Harbor Basin over the remainder of the century. Most of this increase is expected to occur during winter months where precipitation will fall as either rainfall or extreme snow or ice events.



Sea level Rise

Sea levels are rising as the oceans warm, ice melts and water expands. Sea levels have already risen about a foot and could rise several more feet by the end of the century.



Blizzards, Nor'Easters and Hurricanes

Storm events fueled by higher temperatures, increased evaporation, and atmospheric moisture leads to stormy weather of increased duration and intensity.



Drought Conditions

Due to the combined effects of higher temperatures, reduced groundwater recharge from extreme precipitation events, earlier snowmelt, summer and fall droughts may become more frequent.

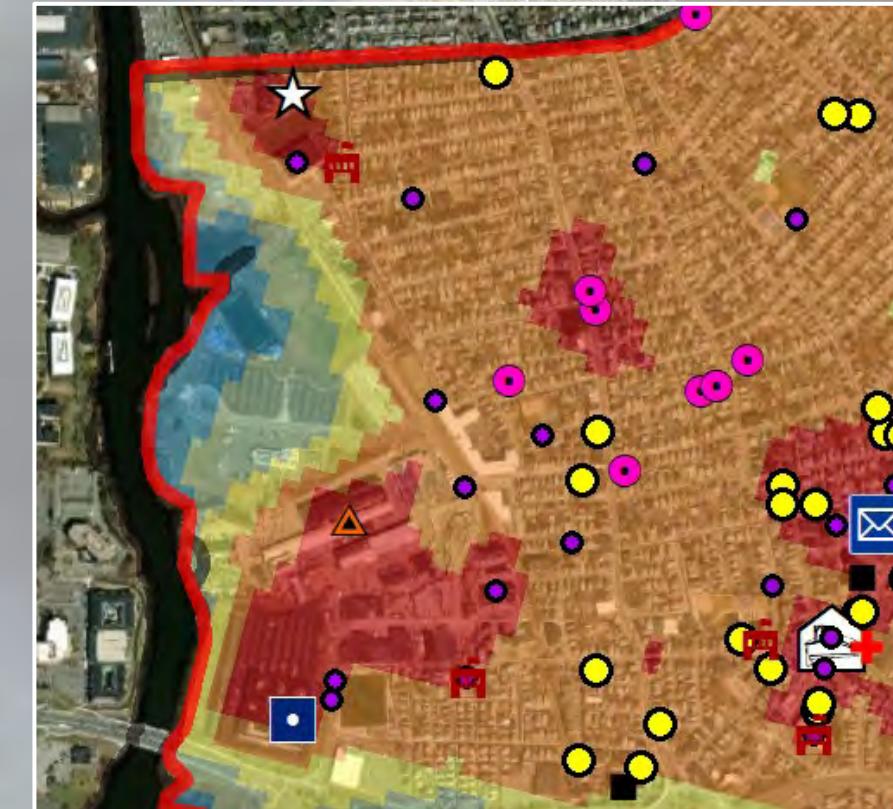
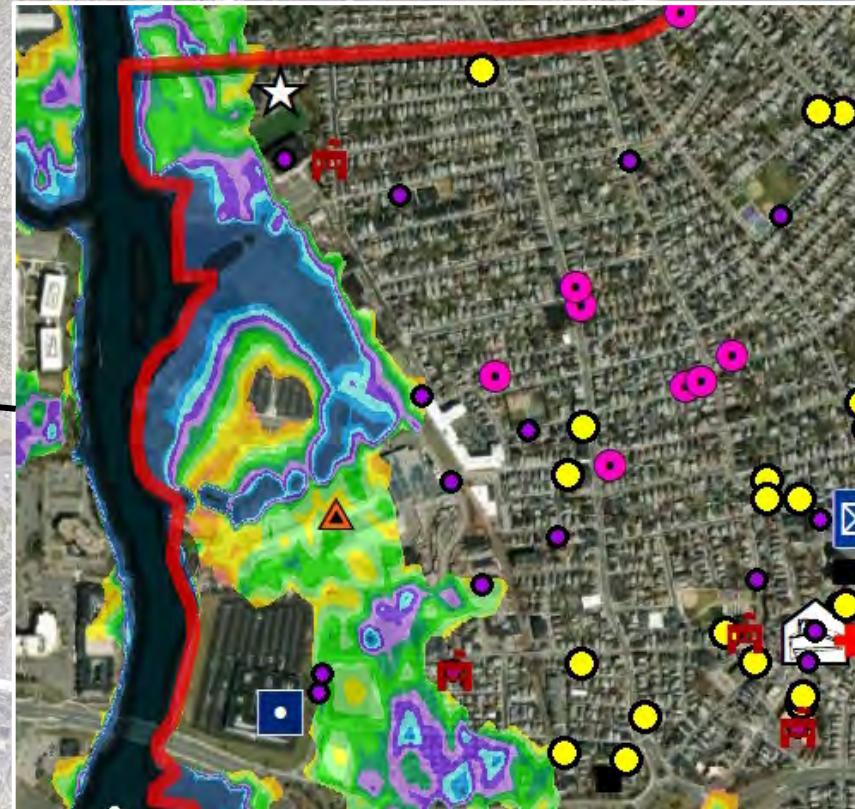
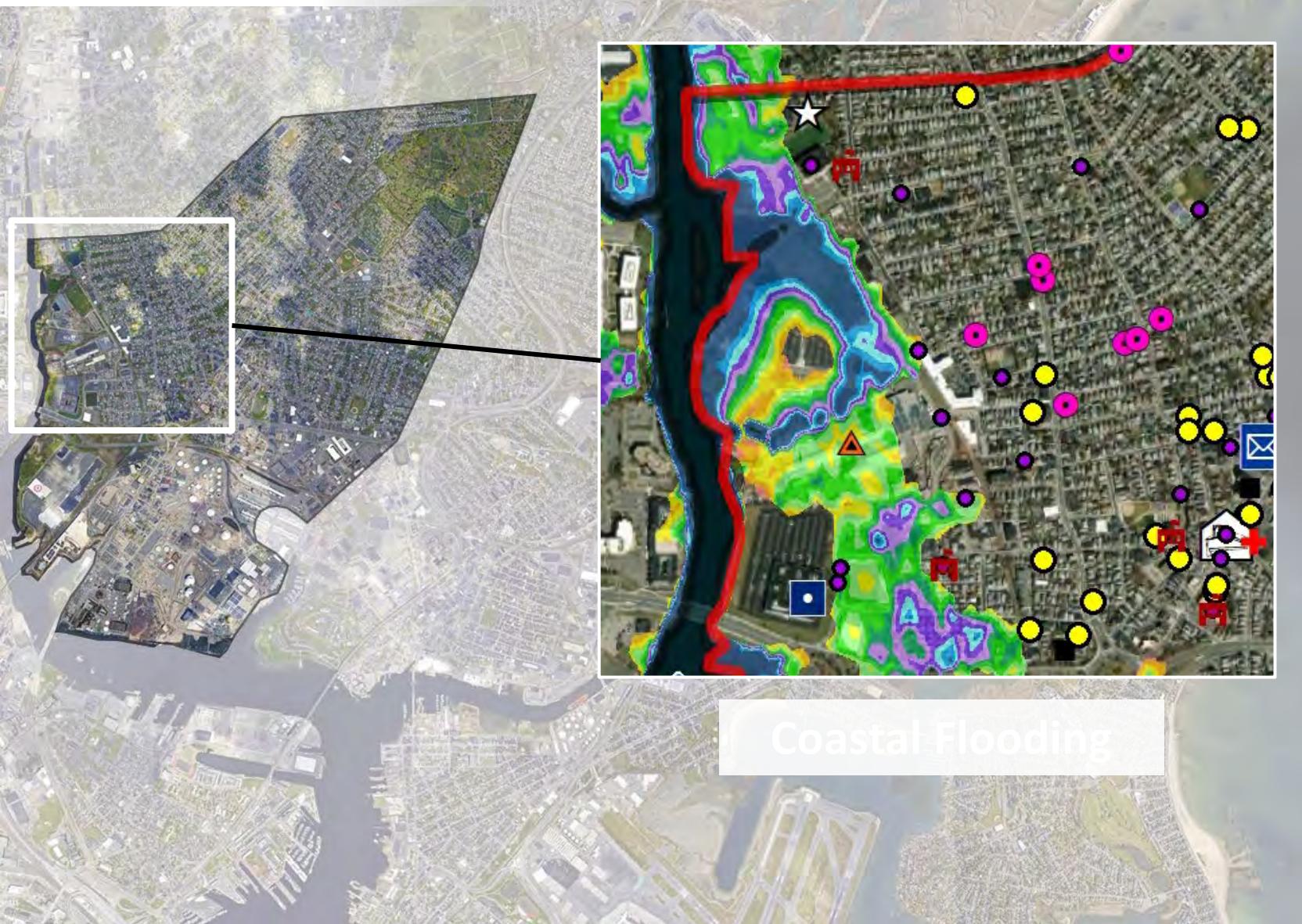


Heatwaves

Extreme heat events are expected to become more frequent and intense. Socially vulnerable populations are particularly vulnerable to the dangers related to extreme temperature conditions.



Malden River





Resilient Redevelopment

Ongoing Projects in Everett

- ✓ North Creek Channel Restoration
- ✓ Improved Landscaping and Tree Pits
- ✓ Outfalls Repair
- ✓ Public Education and Outreach
- ✓ Public Parks and Splashpads
- Floodplain Overlay District Ordinance
- South Creek Channel Restoration
- Green Standard Ordinance and Design Guide
 - Low Impact Development (LID)
 - Stormwater Storage
 - Pervious Pavers



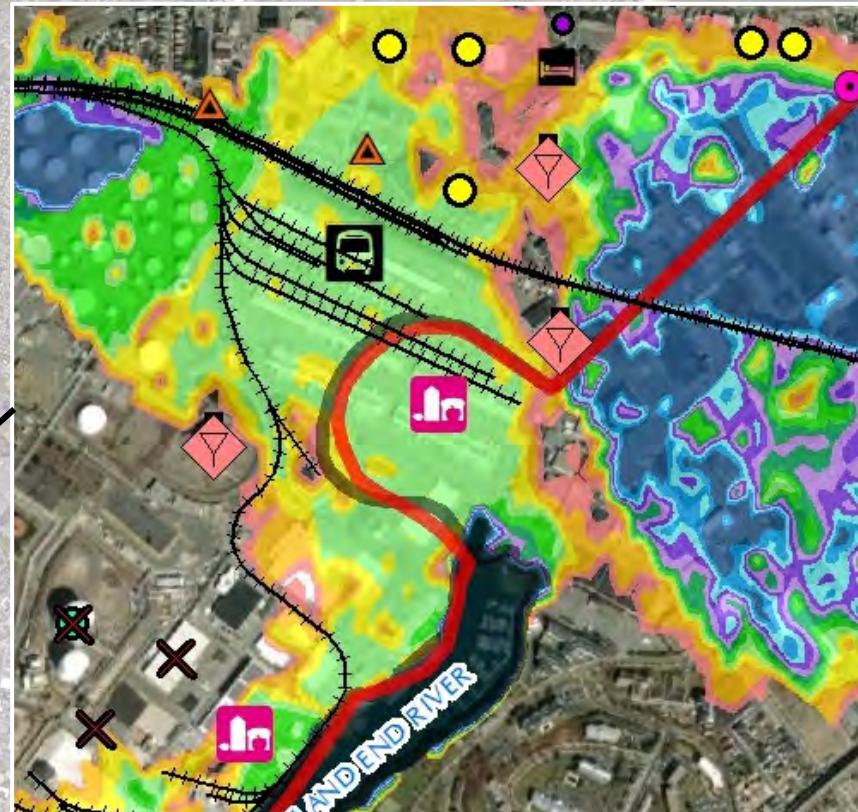


CBT Architects / One Architecture & Urbanism

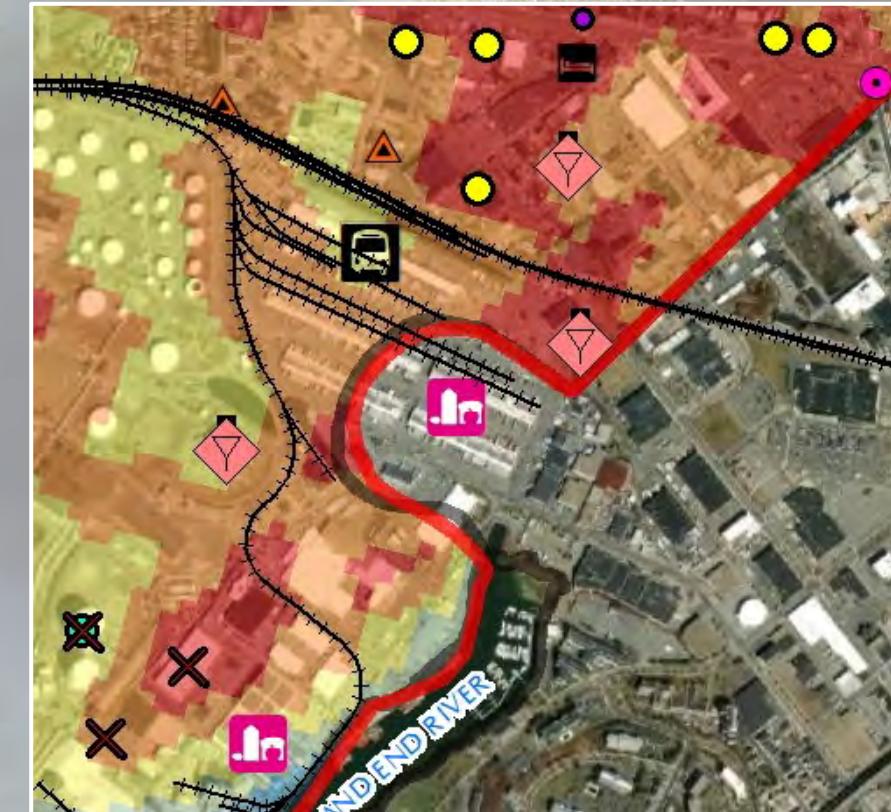
ULI Living with Heat Report

- Short-term Solutions:
 - Improve outdoor pedestrian/bus environment
 - Engage existing businesses to implement green practices
 - Create a new central spine
- Long-term Solutions:
 - Redevelop/expand Market Basket
 - Expand affordable housing and create elevated pedestrian platform over Second Street

Island End River



Coastal Flooding



Heat

Summary of Grant Activities

- 2016 to 2018** Municipal Vulnerability Preparedness (MVP) Planning grants
- Reports detailed vulnerability of IER corridor
 - Flood resilience barrier identified as top priority
- 2018 to 2019** Coastal Zone Management (CZM) grant
- Evaluated opportunities to mitigate flooding through natural and engineered solutions
- 2018** Resilient Mystic Collaborative (RMC) founded to facilitate cooperation on resiliency projects
- 2019 to 2021** Municipal Vulnerability Preparedness (MVP) Action grant
- Pursuing design measures on the Chelsea IER waterfront
- 2021** MVP Action grant – Application submitted early May
CZM Coastal Resilience grant – Application submitted late May
U.S. Congress Community Project Funding initiative (Rep. Ayanna Pressley) – Shortlisted
FEMA BRIC grant – Application upcoming, engaged in MEMA Technical Assistance Program

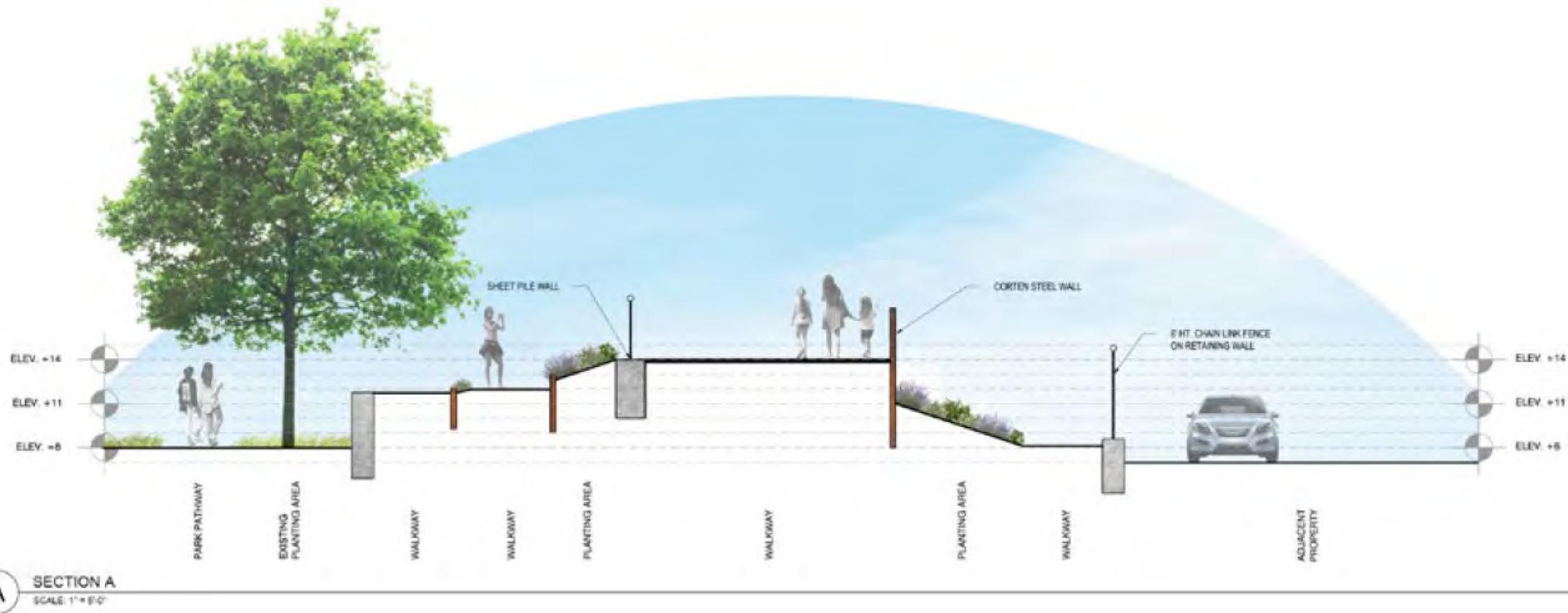
CHELSEA

Island End River Park and Wetland



CHELSEA

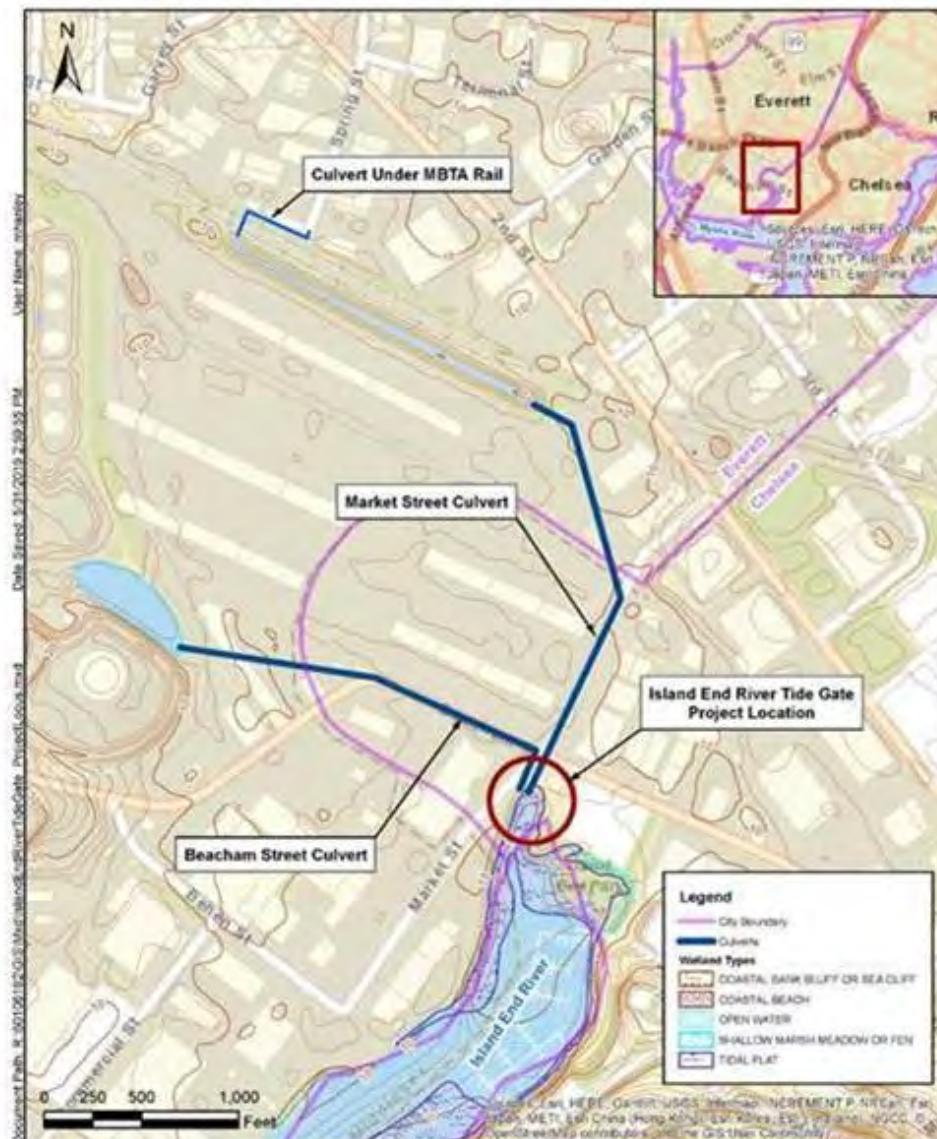
Island End River Park and Wetland



Additional Initiatives and Projects in the IER Corridor

- **DPA Industrial District Master Planning**
City of Everett & Utile
- **Hazard Mitigation Plan (HMP) Updates**
City of Everett & City of Chelsea
- **FEMA HMGP Grant Application for Culvert Tide Gates in the Market Street Area**
City of Everett & City of Chelsea
- **Market Street Culvert Replacement and Daylighting**
The Davis Companies, City of Everett & City of Chelsea
- **Mystic Infiltration Trench Siting and Design for Phosphorous Nutrient Management**
Mystic River Watershed Association & City of Everett
- **MBTA Culvert Replacement**
City of Everett & MBTA
- **Chelsea Market Street Culvert Limited Replacement**
City of Chelsea

Island End River Tide Gate Project Overview Map



Island End River Flood Resilience Project

Flood Barrier Alignment Options





Everett 2021 Hazard Mitigation Plan Update

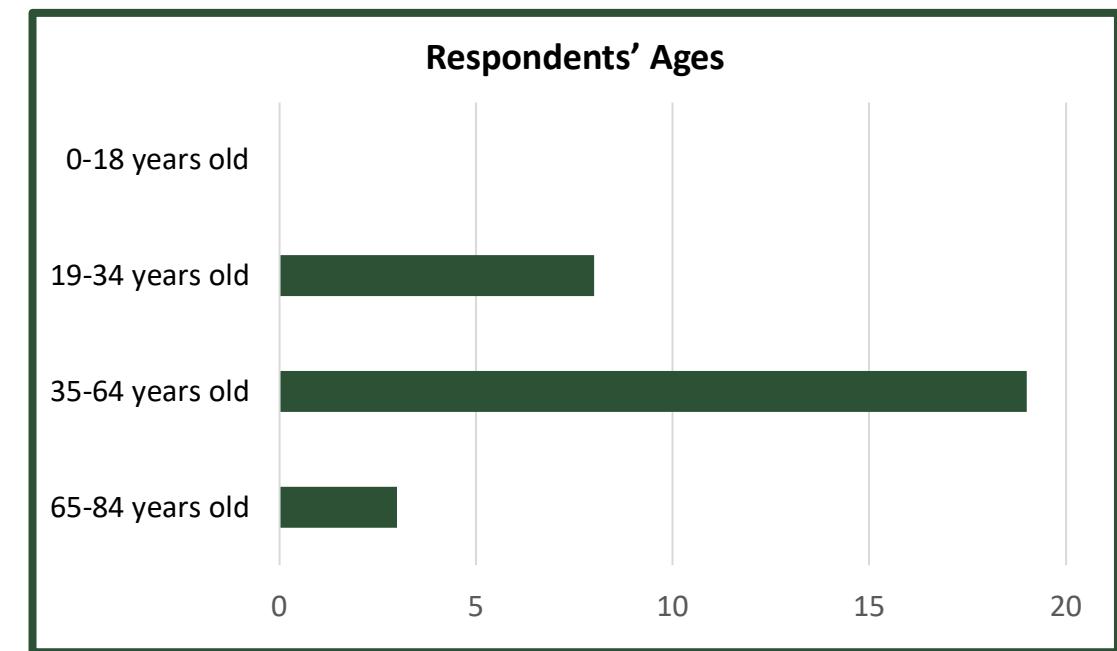
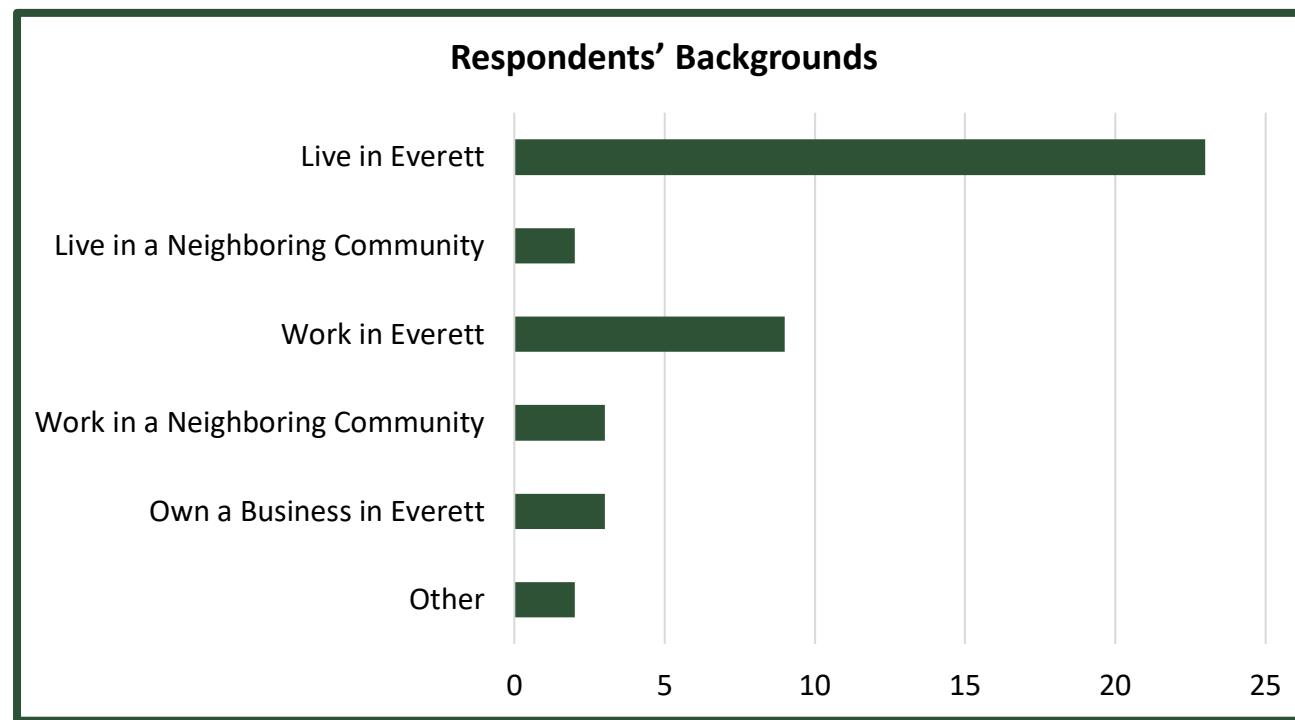
MITIGATION PLANNING MEETING
JULY 13, 2021

Agenda

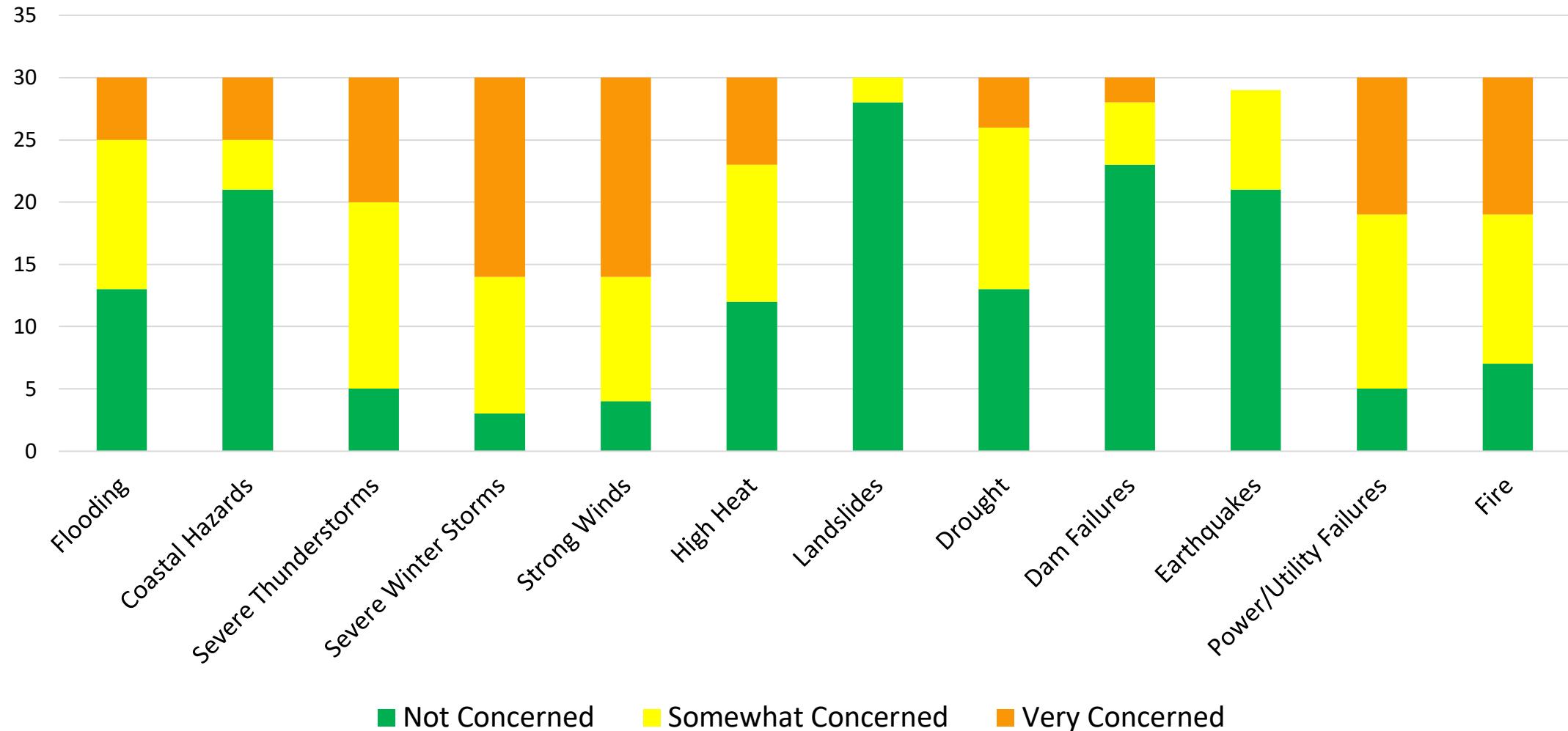
- 1) 2021 HMP Project Update
- 2) Current and Planned Mitigation Projects
- 3) Prioritizing Future Mitigation Projects
- 4) Next Steps

Everett Community Preparedness Survey

- 16-question survey conducted in Fall 2020 concerning hazard preparedness in Everett
- 33 respondents from in and around Everett



Respondents' Concerns about Natural Hazard Impacts



What has the City of Everett done well to prepare for natural hazards?

Excellent first responder teams in place

Streets get maintained so flooding isn't an issue.

Proactive communication

Phone calls with warnings

It is working on upgrading its drainage infrastructure

The snow removal is phenomenal.

How (or where) could the City of Everett improve its preparedness for natural hazards?

Better communication to the public

Upgrade utility services, address flooding

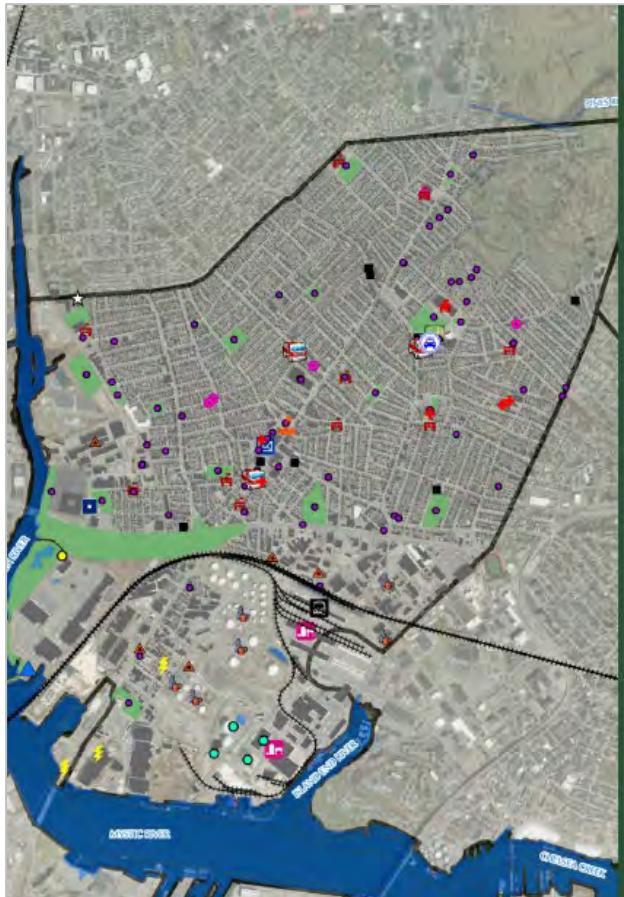
Air Force Road floods during heavy rain

Have a clear plan in place

Upgrade sewage lines to handle flood surges.

Increase awareness of protocols, increase and improve social programs and update infrastructure/public transportation

HMP Project Update



Everett 2021 Hazard Mitigation Plan Update

WORKSHOP PART I
JULY 8, 2021



Everett Community Growers

Summary of Grant Activities

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Ongoing Projects in Everett

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- ✓ Public Education and Outreach
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- Floodplain Overlay District Ordinance
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- Green Standard Ordinance and Design Guide
 - Low Impact Development (LID)
 - Stormwater Storage
 - Pervious Pavers



Why We're Here Today: Hazard Mitigation Projects

- The 2000 Federal Disaster Mitigation Act requires communities that wish to qualify for FEMA funding adopt a local multi-hazard mitigation plan.
 - Plans must be updated in five-year intervals and involve a robust community engagement process.
- Hazard mitigation includes “any sustainable action that reduces or eliminates long-term risk to people and property from future disasters.”



Risks and Hazards



Mitigation Strategies to Address Flooding

- Comprehensive planning and floodplain management
- Creation of regulations for development projects within current and future floodplains
- Use of building codes and development standards to promote flood-resilient construction
- Increased stormwater management through detention and infiltration
- Limit impervious surfaces and use porous pavement, rain gardens, and other methods to promote groundwater recharge
- Community participation in the NFIP
- Construction of neighborhood-scale drainage systems and flood control structures
- Protection of critical facilities and utility infrastructure



Credit: FEMA



Credit: FEMA

Mitigation Strategies for Coastal Hazards

- Strengthen state building code to mitigate storm damage
- Locate future critical facilities outside of areas susceptible to storm surge
- Provide additional freeboard for critical facilities and structures within high hazard areas
- Construct coastal flood resilience barriers
- Public education
- Enhance plantings in coastal resource areas
- Consider tide gates and backflow prevention devices to prevent storm surge from entering storm drain utilities



Encore Boston Harbor's "Living Shoreline"

Mitigation Strategies to Address Extreme Storms

- Retrofit existing buildings to promote storm readiness
- Install lightning protection devices and methods such as lightning rods and grounding on utility infrastructure
- Installing and maintaining surge protection on critical electronic equipment
- Burying power lines to provide uninterrupted power
- Vegetation management
- Public awareness and communications of upcoming storm events and preparedness measures
- Organize outreach to vulnerable populations before, during, and after storm events
- Establish community shelters for access to heating and cooling



Credit: FEMA



Credit: FEMA

Mitigation Strategies to Address Heat

- Improve outdoor pedestrian/bus environment by planting shade trees and constructing shade structures
- Encourage the installation of green roofs and walls and/or the use of reflective building and roofing products
- Limit the use of heat-absorbing impervious surfaces such as asphalt pavement and roofing materials
- Create cooling centers throughout the community
- Increase public awareness and public education of the dangers of heat hazards

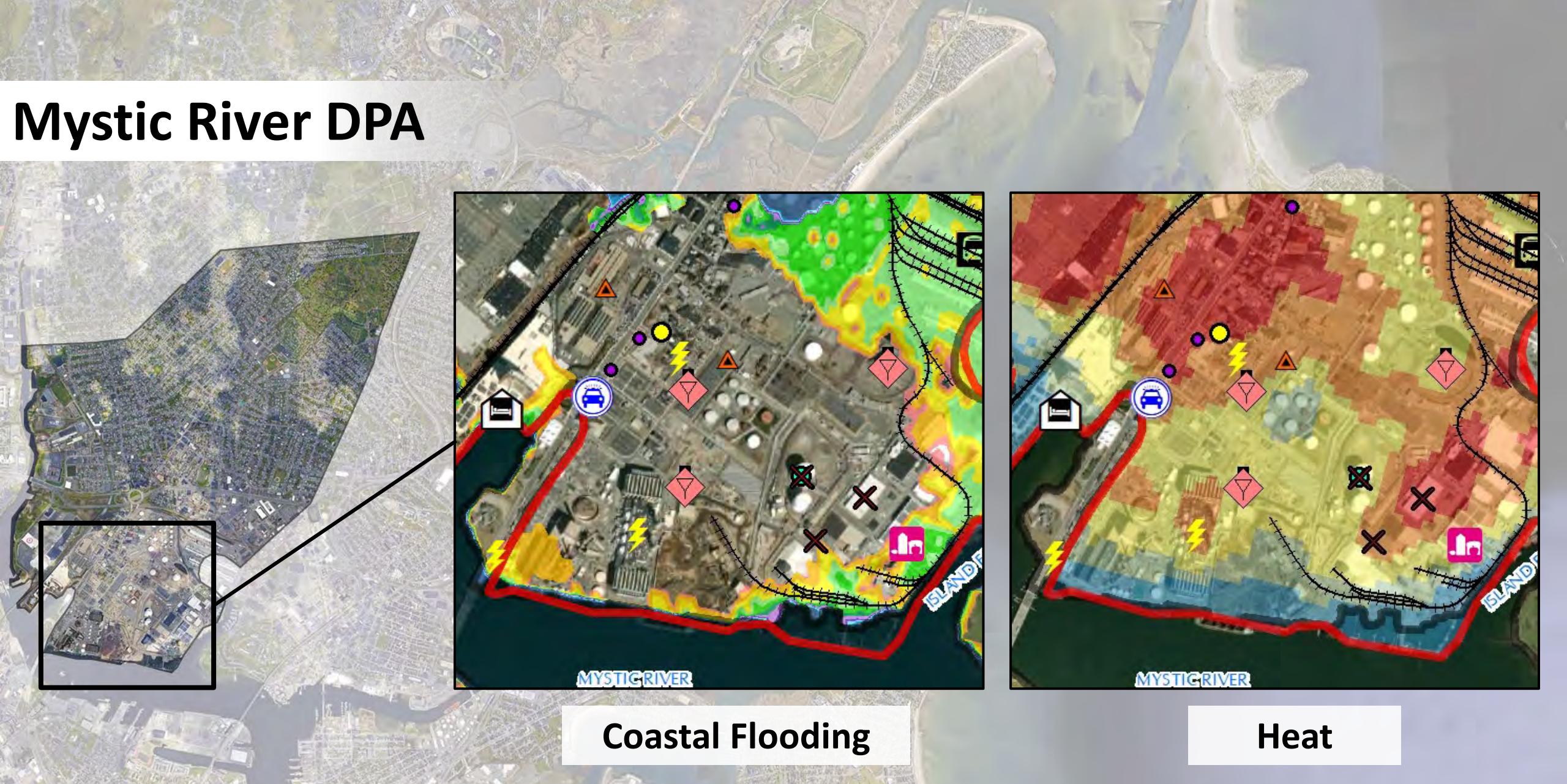


Urban Land Institute's "Living with Heat Report"



Rivergreen Park

Mystic River DPA

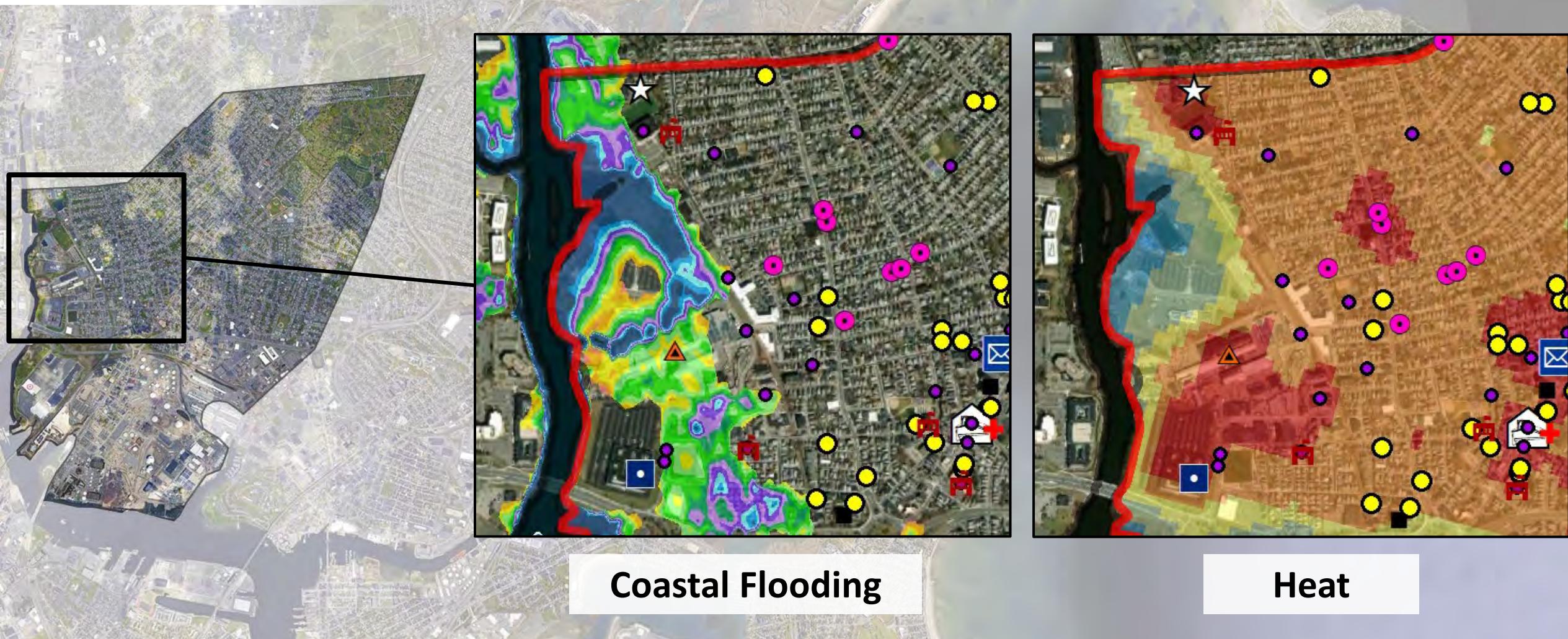


Coastal Flooding

Heat

Key infrastructure: Schnitzer Steel, Exelon LNG facility and other former Distrigas properties where petroleum products and fuels are stored, Ciment Quebec, Exxon Mobil, private rail tracks to industrial properties, Beacham Street

Malden River

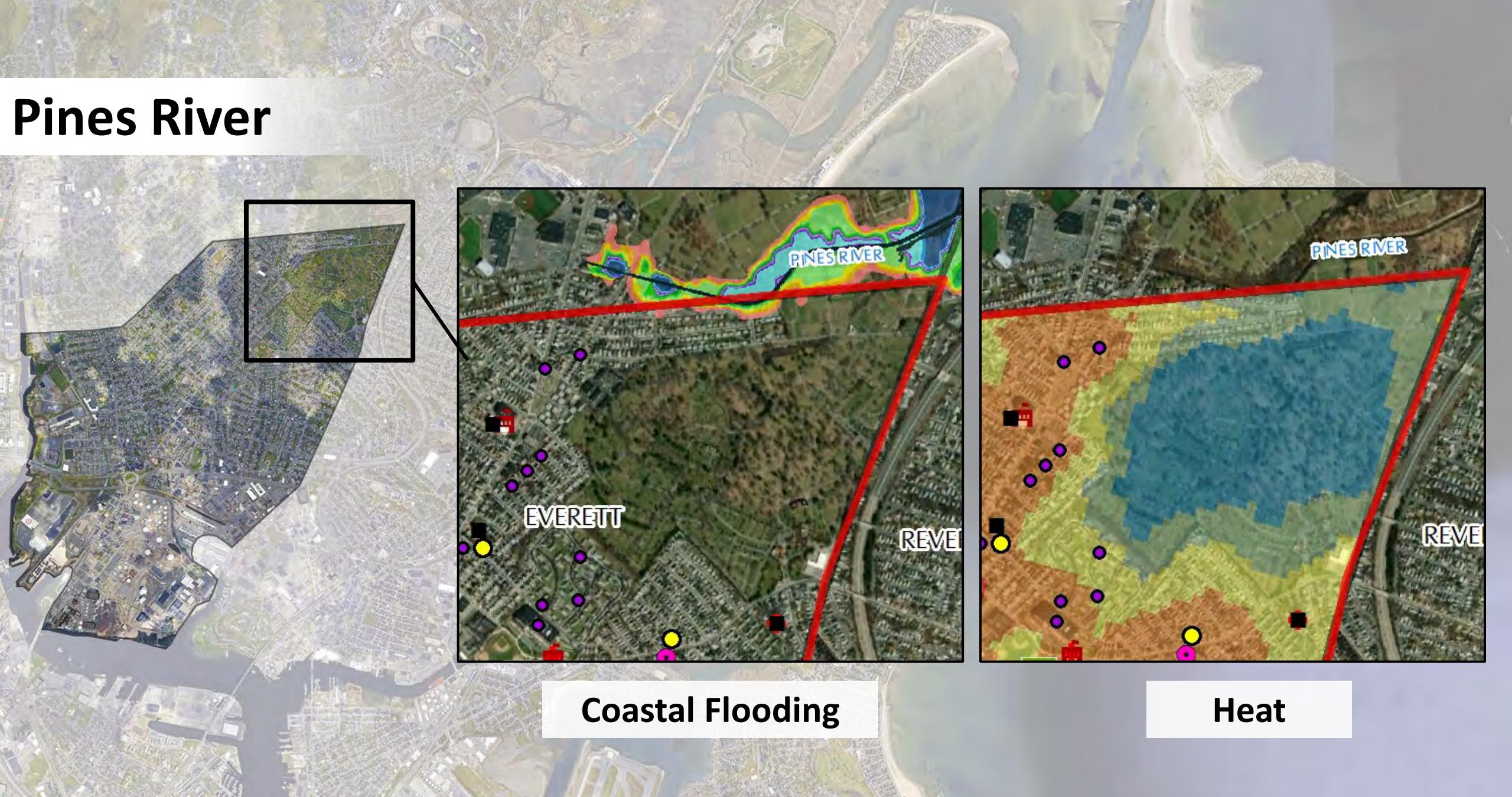


Coastal Flooding

Heat

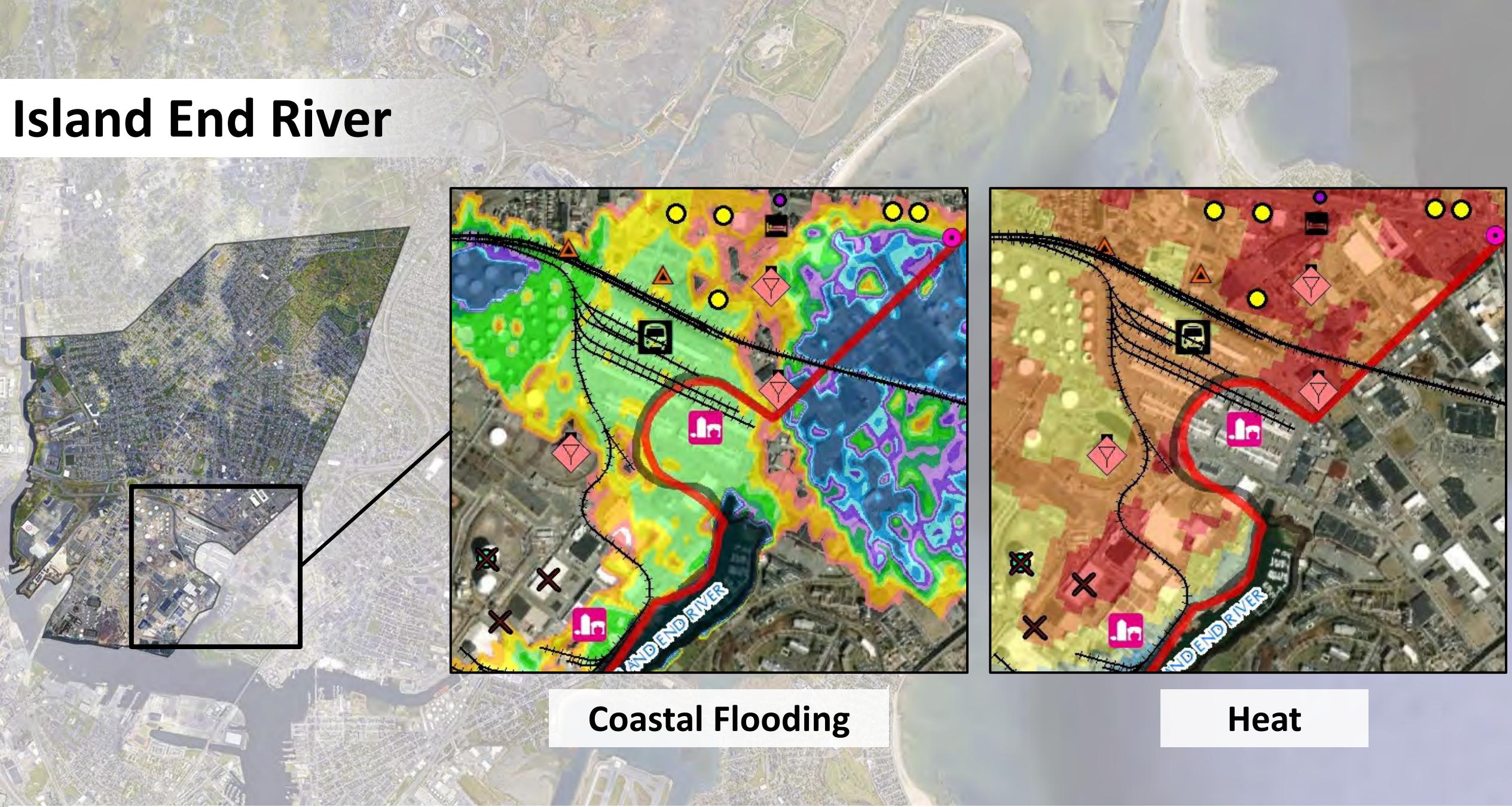
Key infrastructure: Madeline English School, Rivergreen Park, RiverGreen Technology Park, Revere Beach Parkway, former BNY Mellon building at 135 Santilli Highway

Pines River



Key infrastructure: single-family and multi-family residential properties, Glenwood Cemetery, Woodlawn Cemetery, Broadway

Island End River



Coastal Flooding

Heat

Key infrastructure: New England Produce Center, USPS facility, PW Marks, Amazon Fresh, and other food distribution facilities, SPS New England

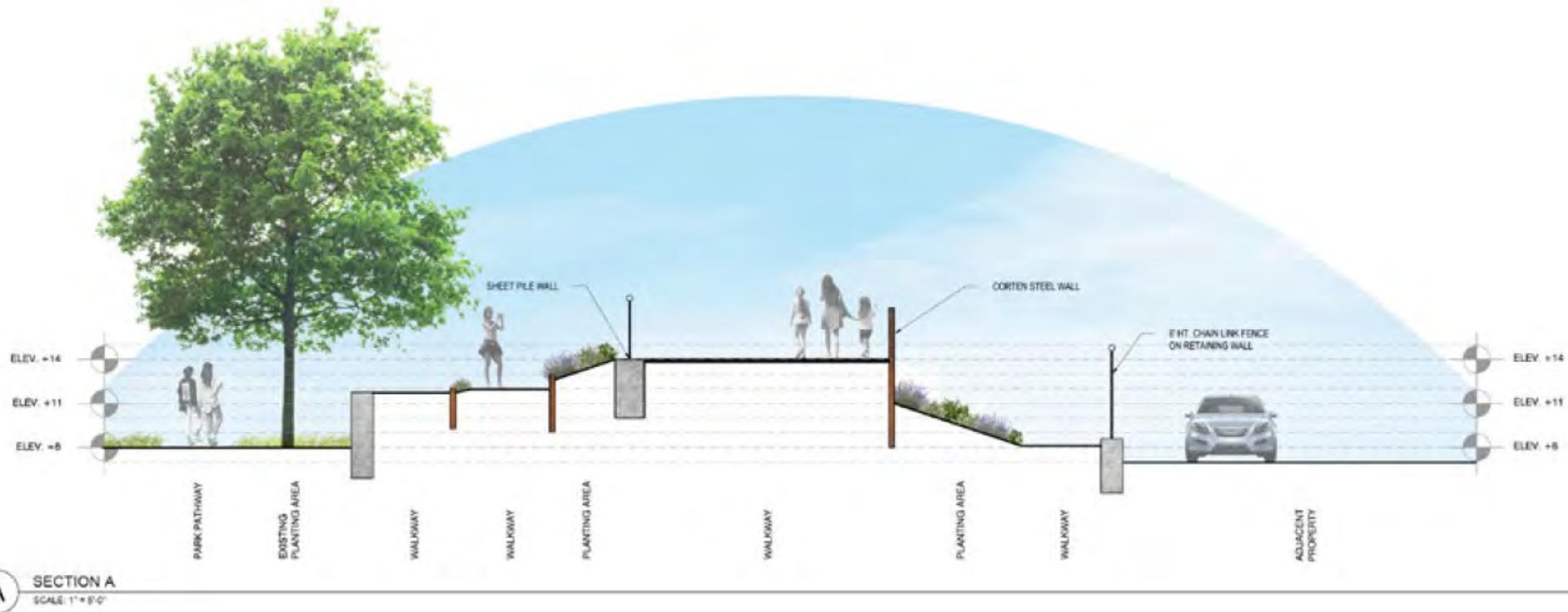
CHELSEA

Island End River Park and Wetland



CHELSEA

Island End River Park and Wetland



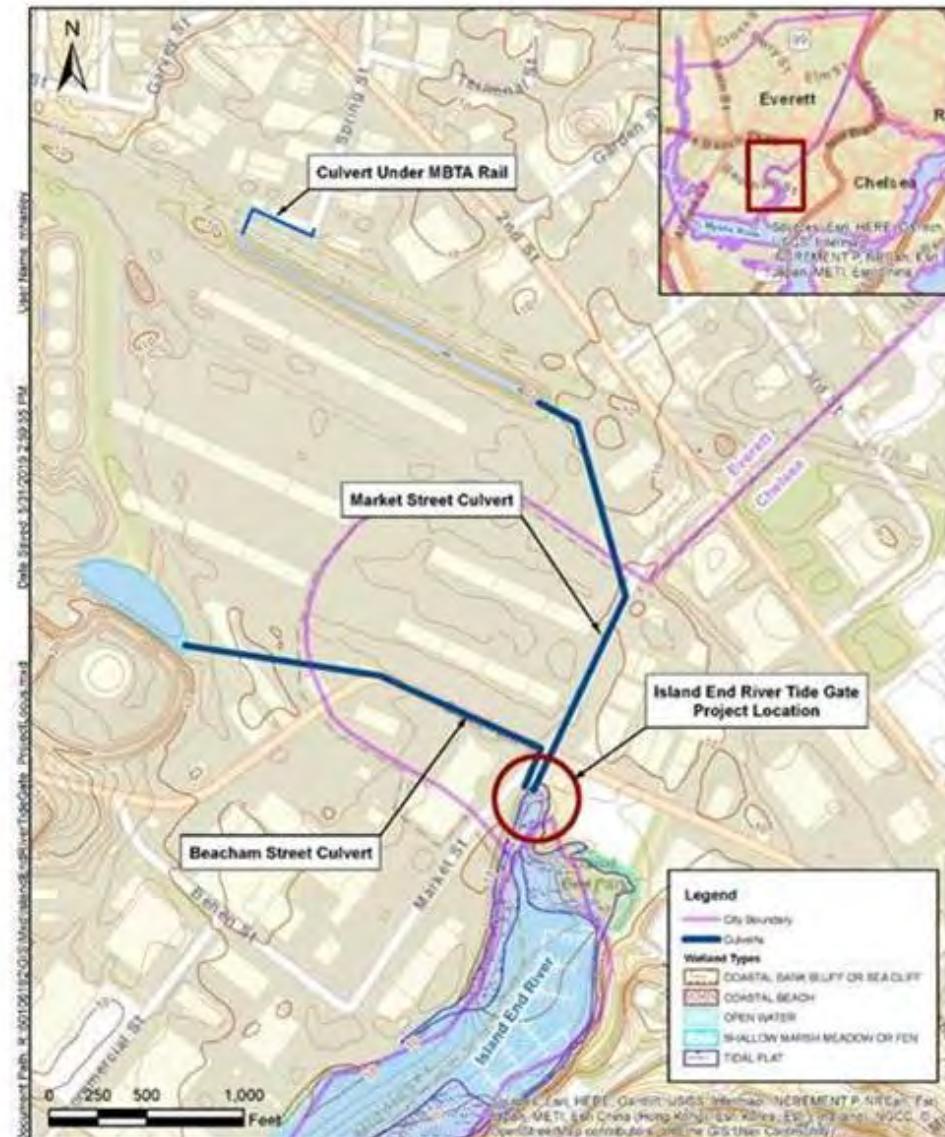
A

SECTION A
SCALE: 1" = 5'-0"

Additional Initiatives and Projects in the IER Corridor

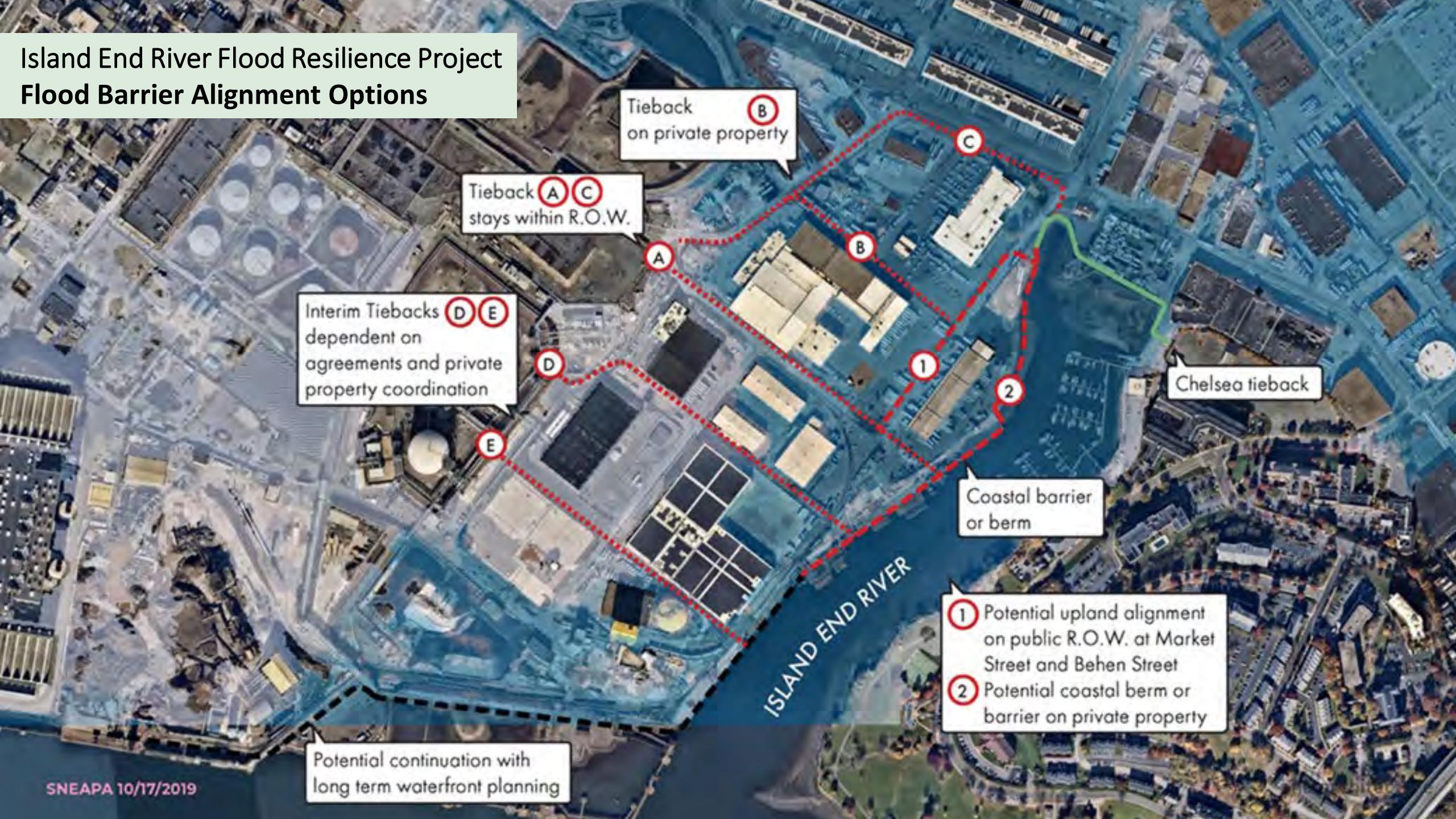
- **DPA Industrial District Master Planning**
City of Everett & Utile (with Fort Point Associates as sub-consultant)
- **Hazard Mitigation Plan (HMP) Updates**
City of Everett & City of Chelsea
- **Market Street Culvert Replacement and Daylighting**
The Davis Companies & City of Everett
- **Market Street Culvert and Outfall Improvements**
Including culvert pipe repair and replacement, evaluation of pump station(s), tide gates, and other flood resilience solutions
City of Chelsea
- **Mystic Infiltration Trench Siting and Design for Phosphorous Nutrient Management**
Mystic River Watershed Association & City of Everett
- **MBTA Culvert Replacement**
City of Everett & MBTA

Island End River Tide Gate Project Overview Map



Island End River Flood Resilience Project

Flood Barrier Alignment Options



Next Steps

Early July

- HMP workshop with Everett Community Growers on July 8
- Final 2021 HMP Update meeting with LPC and stakeholders on July 13

Mid July

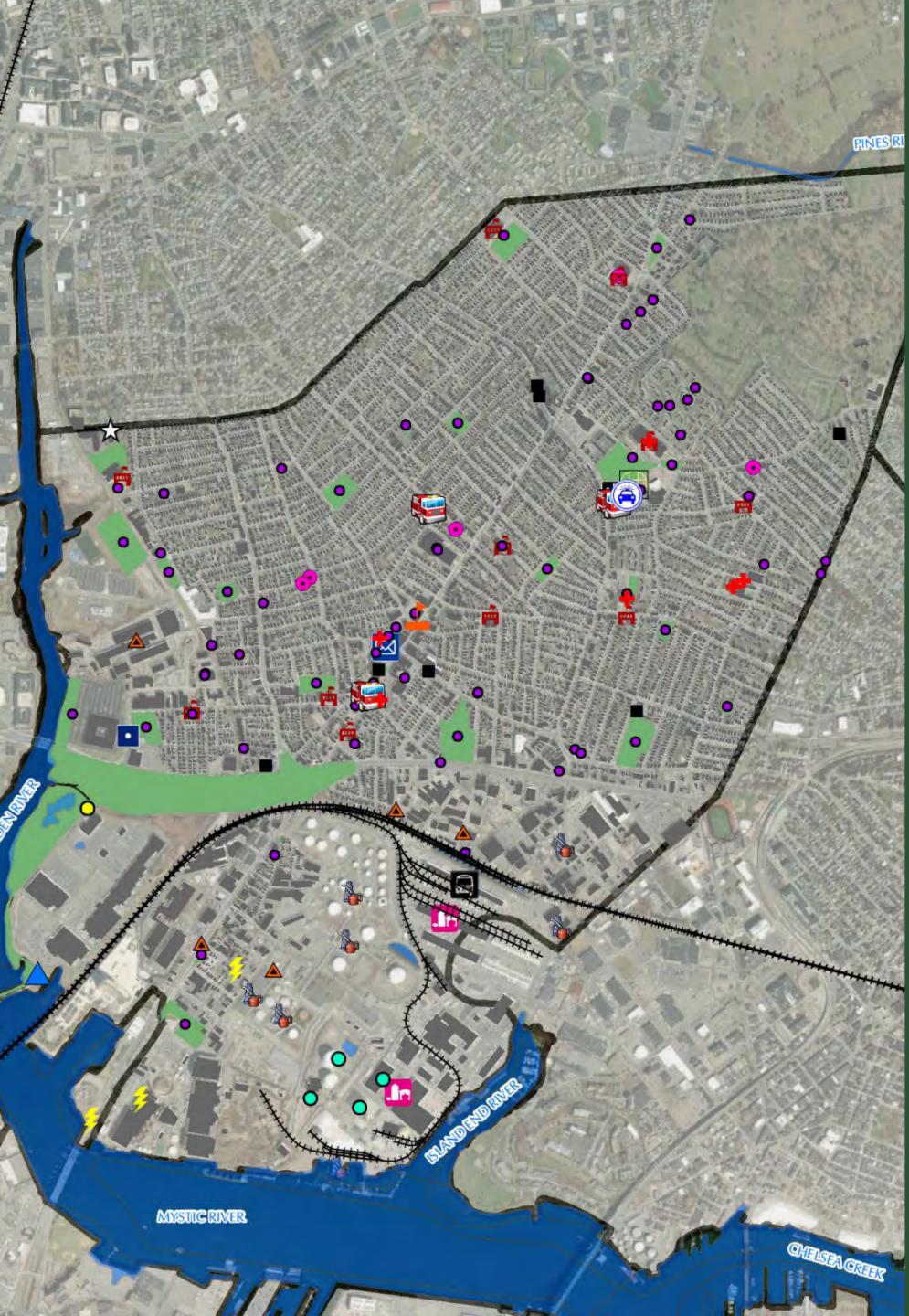
- Attend Conservation Commission hearing to present HMP update on July 15
- Release a draft copy of HMP Report during week of July 19-23
 - Draft report posted to City of Everett website
 - Two-week public comment period

August

- Submit HMP to MEMA

Fall 2021

- Present to Everett Chamber of Commerce on ongoing and upcoming hazard mitigation projects at the Island End River
- MEMA anticipated to recommend final review of HMP by FEMA



Everett 2021 Hazard Mitigation Plan Update

PUBLIC MEETING – CONSERVATION COMMISSION
JULY 15, 2021

Agenda

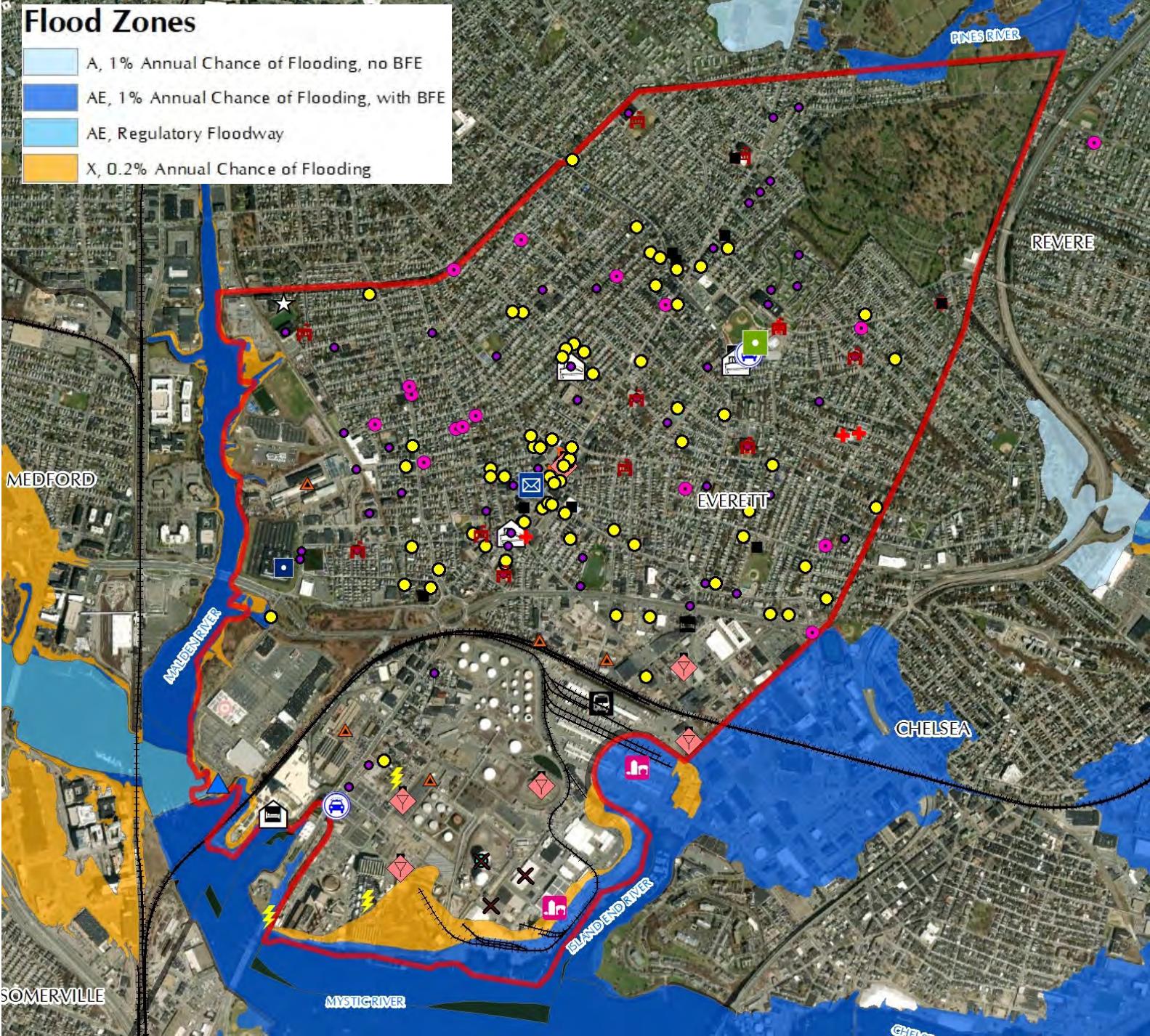
Overview of 2021 HMP Update

Risks and Hazards

Next Steps

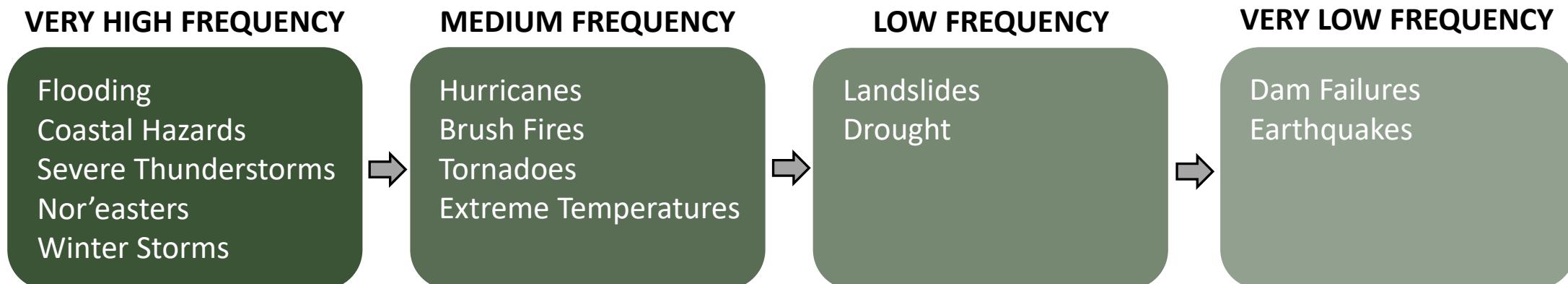
Why We're Here: FEMA HMP Requirements

- The 2000 Federal Disaster Mitigation Act requires communities that wish to qualify for FEMA funding adopt a local multi-hazard mitigation plan.
 - Plans must be updated in five-year intervals and involve a robust community engagement process.
- Hazard mitigation includes “any sustainable action that reduces or eliminates long-term risk to people and property from future disasters.”



Everett HMP History

- Everett first participated in hazard mitigation planning in 2004, when it and eight other Metro Boston communities filed the Metro Boston Multi Jurisdictional Hazard Mitigation Plan under the guidance of MAPC.
- The City's first individual HMP was prepared by MAPC and filed in 2015. It was approved by FEMA in October 2016.
- Building on public participation and stakeholder engagement, the 2015 HMP Update identified nine mitigation goals to reduce the dangers to life and property from the following community-identified natural hazard events:



Risks and Hazards





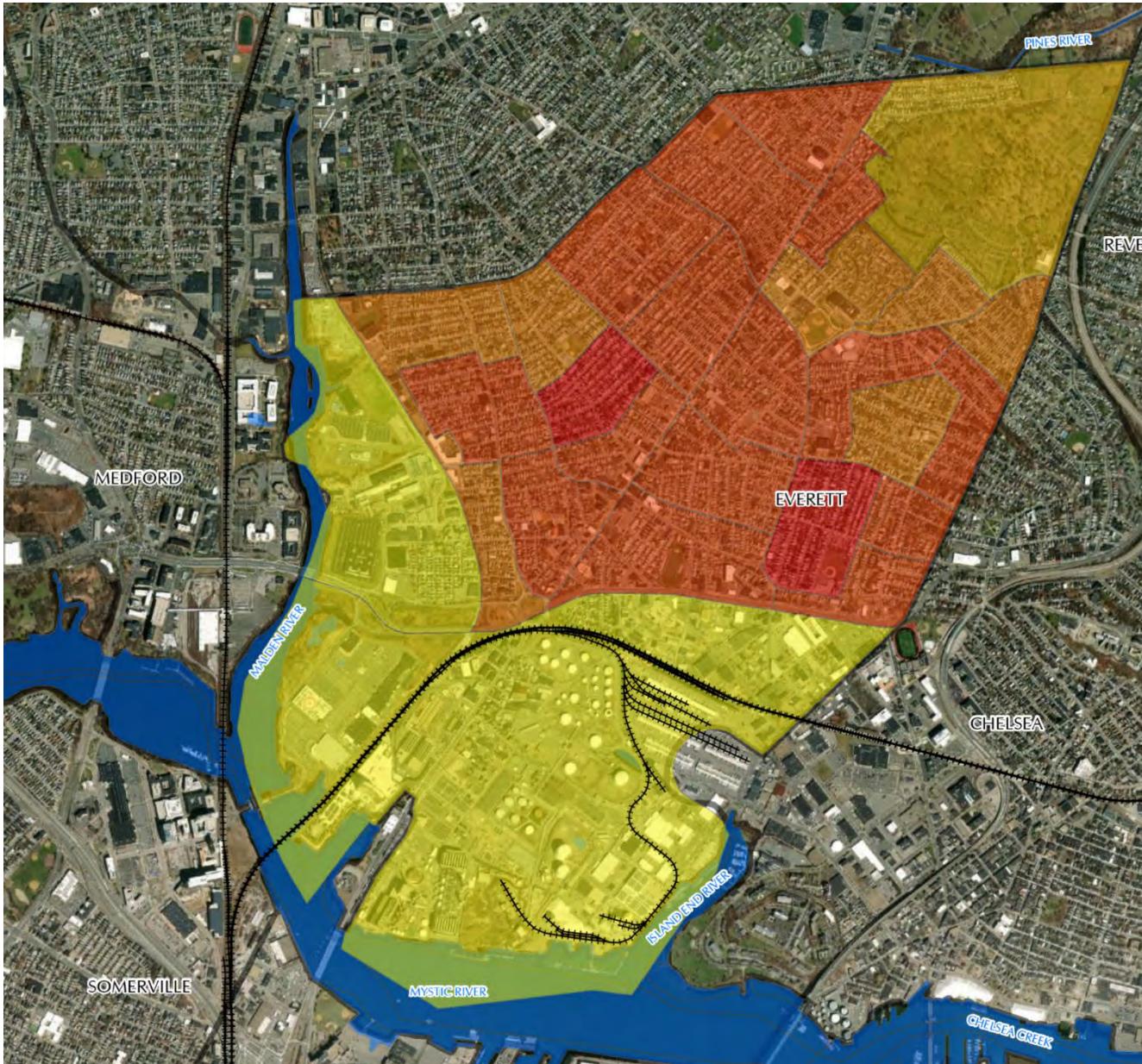
Community Context

Land Use

- Infill of commercial and residential uses in industrial areas along Mystic, Malden, and Island End Rivers
- Robust economic development
- New residents and visitors to the city
- Increased impact on municipal services and infrastructure

Land Use 2016

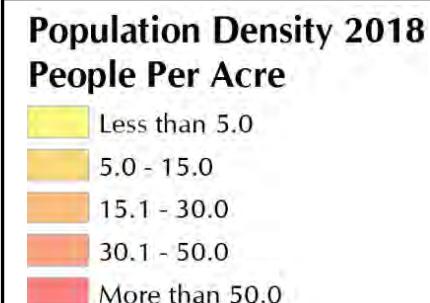
Commercial	Residential - multi-family
Industrial	Residential - other
Mixed use, other	Residential - single family
Mixed use, primarily commercial	Right-of-way
Mixed use, primarily residential	Recreation
Open land	Water



Community Context

Population Density

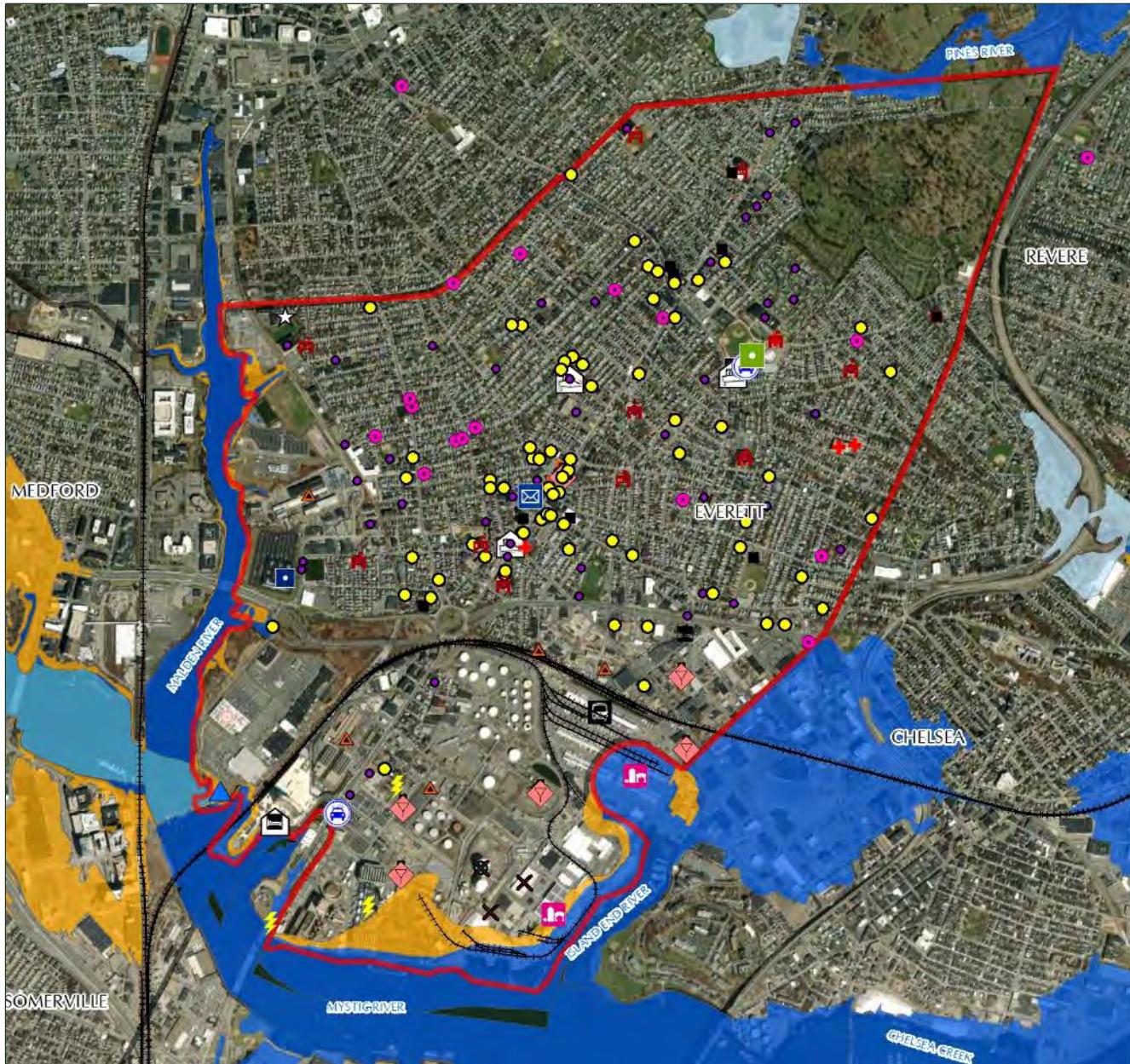
- Population corresponds with land use; primarily residential north of Revere Beach Parkway and Northern Strand Community Trail
- Least dense in heavily industrial/commercial areas along Mystic, Malden, and Island End Rivers
- Most dense toward center of city and Broadway “spine”



Flooding

- Everett is subject to inland (riverine) flooding, urban (precipitation) flooding, and coastal (storm surge) flooding.
- Floods are caused by severe rainstorms, thunderstorms, nor'easters, and hurricanes.
- Undersized or lack of storm drainage and large expanses of impervious surfaces (building roofs, asphalt pavement for roadways or parking areas, etc.) exacerbate flooding impacts.





Current FEMA Flood Zones (2010)

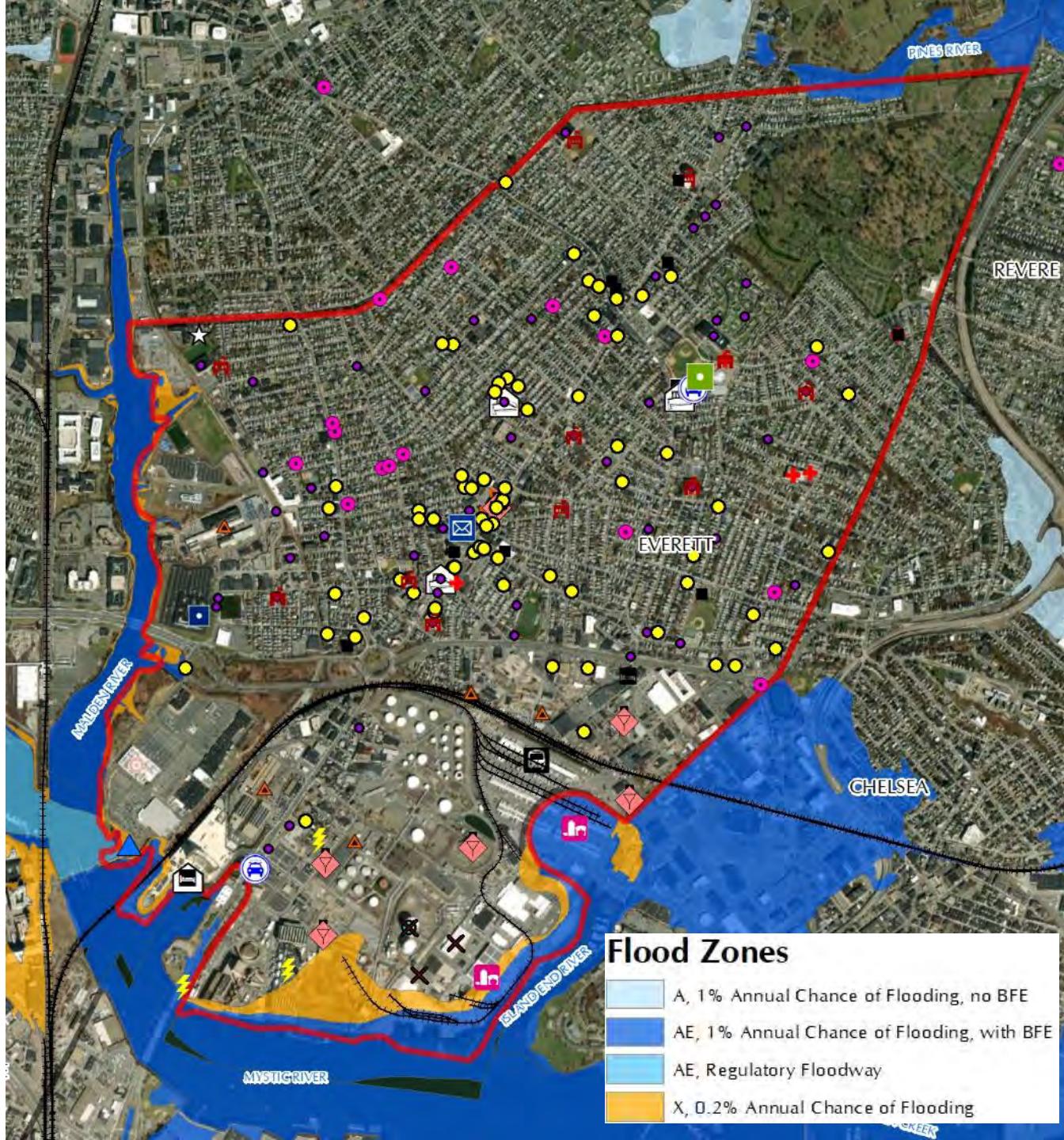
- Middlesex county Flood Insurance Rate Maps (FIRMs) last updated in June 2010
- Suffolk County FIRM maps updated in 2016
- Areas of potentially high flood risk (such as the Island End River near the New England Produce Center) are currently mapped as hazards in Chelsea but are not mapped over the county line in Everett

Flood Zones

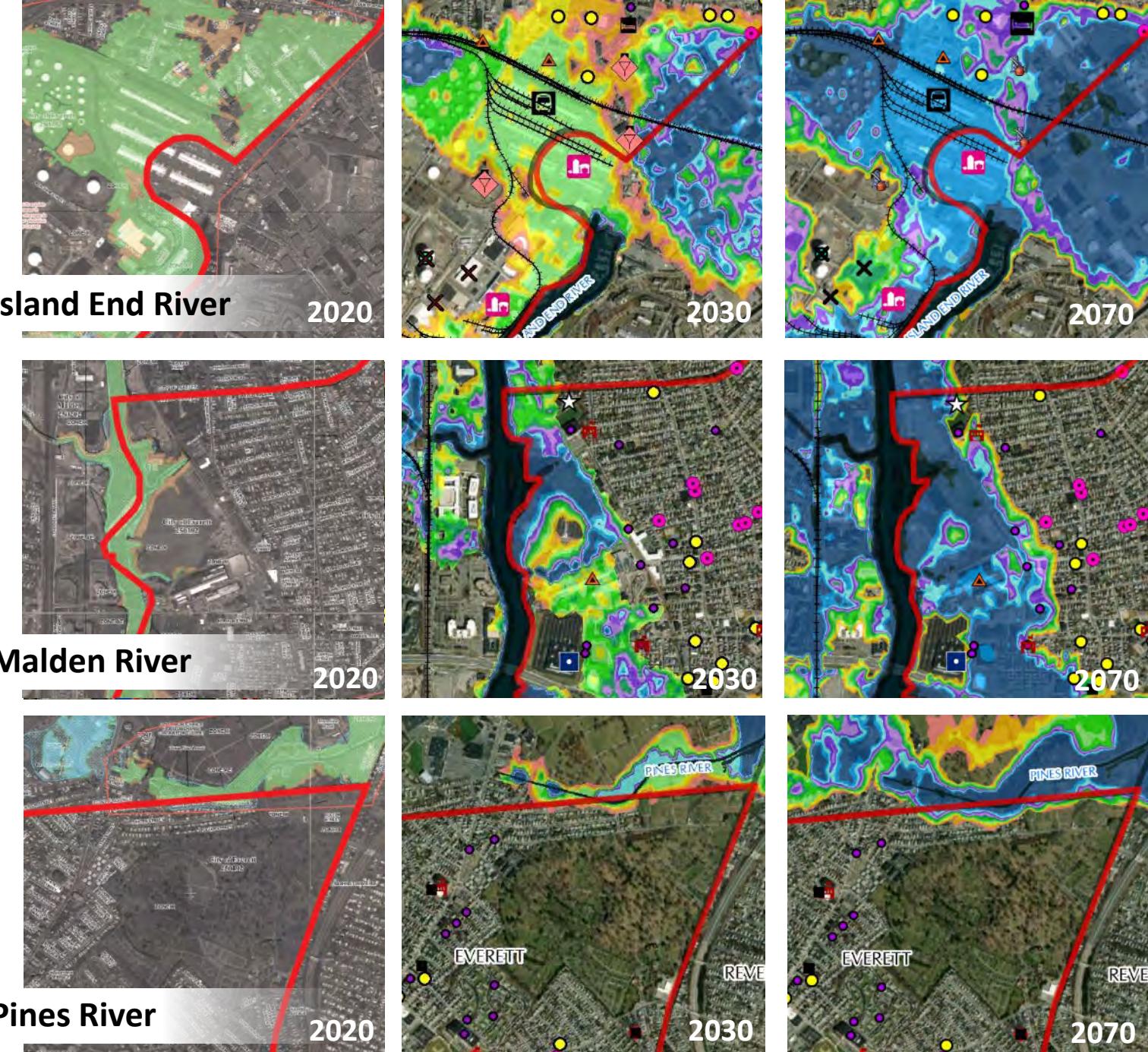
A	1% Annual Chance of Flooding, no BFE
AE	1% Annual Chance of Flooding, with BFE
AE	Regulatory Floodway
X	0.2% Annual Chance of Flooding

Community Risk Profile

- “Repetitive Loss” (RL) is defined by FEMA as:
a National Flood Insurance Program-insured structure that has had at least 2 paid flood losses of more than \$1,000 each in any 10-year period since 1978.
- In Everett, there have been 2 RL Buildings in the A and AE Zones, and 1 building in the X Zone.
- Losses total \$23,876.25.
- The quantity and value of these claims reflect the flood zones on the FIRMs to date, which cover only small portions of the Island End River area, the Malden River area, and the Mystic River DPA.



Areas of Flood Risk 2020 - 2070

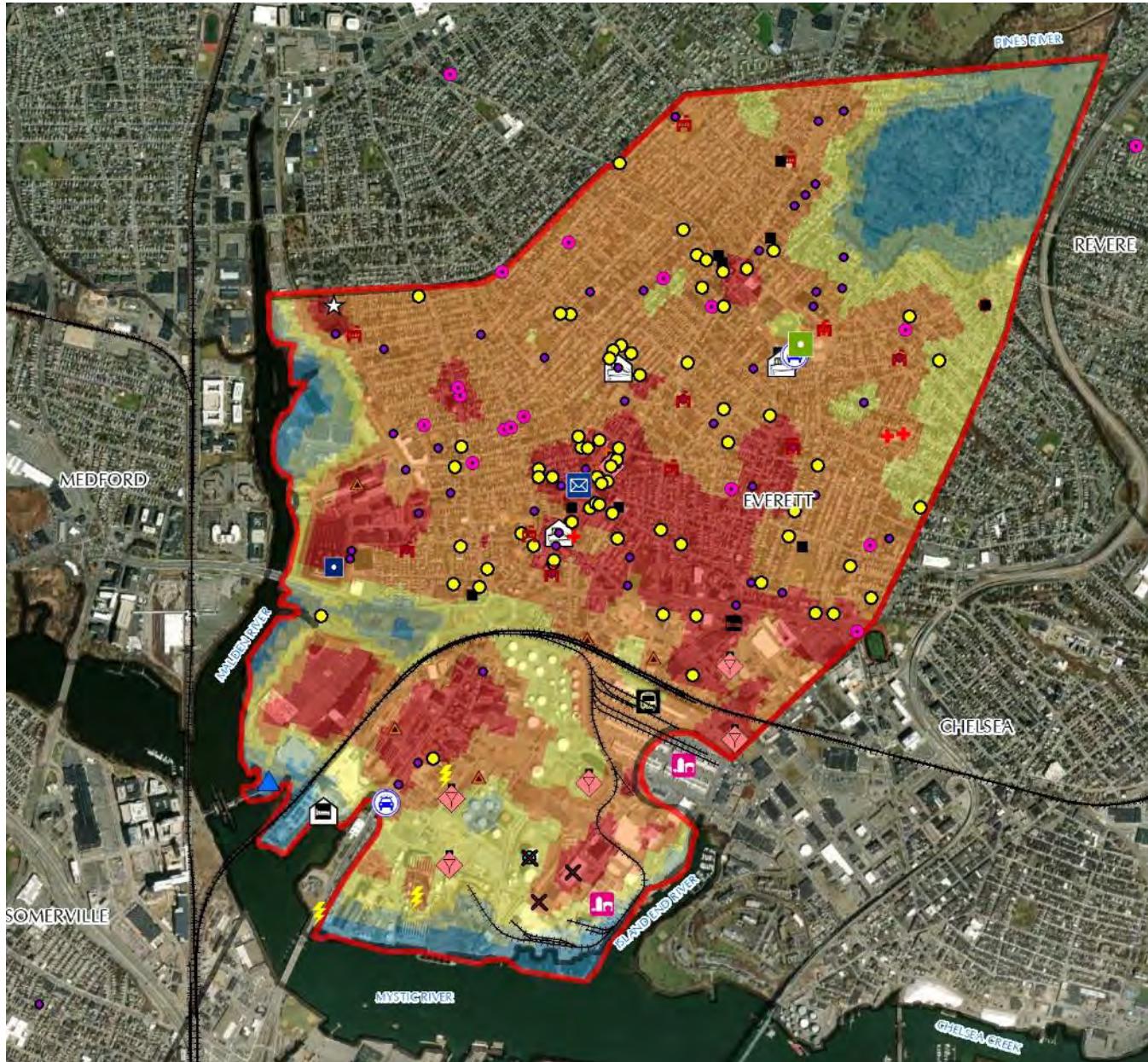


Heat

- In Massachusetts, the annual number of days over 90°F is expected to increase to 12 – 45 by 2050.
- Heat impacts in Everett come from:
 - Over 85% impervious cover.
 - Limited tree canopy and landscape vegetation.
 - Heavy trucking activity and idling vehicles from industrial uses.
 - Heat waste from HVAC and refrigeration.



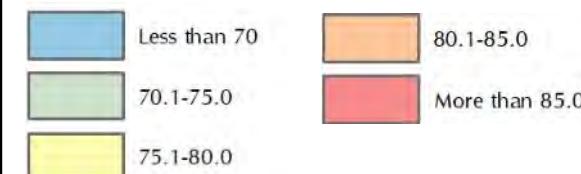
Photo: F. Chavez



Average Summer Temperature 2017 - 2018

- Illustrates intensifying heat in the most densely built areas
- Land cover and different sources of waste heat increase temperatures in different neighborhoods:
 - Industrial uses along Island End and Mystic Rivers
 - Construction equipment, machinery, and building exhaust in areas of high redevelopment
 - Traffic exhaust along major transportation corridors

Average Summer Temperature (F) (2017 – 2018)





The City of Everett is updating its **Hazard Mitigation Plan (HMP)**.

The primary purpose of the HMP is to help the City and the community better prepare for natural disasters.

Please consider taking 5-10 minutes to complete this survey.
All responses are anonymous.

Scan QR code to visit the survey website!

English:



Spanish:



Portuguese:



<https://www.surveymonkey.com/r/EverettHMP>

<https://www.surveymonkey.com/r/EverettHMP-esp>

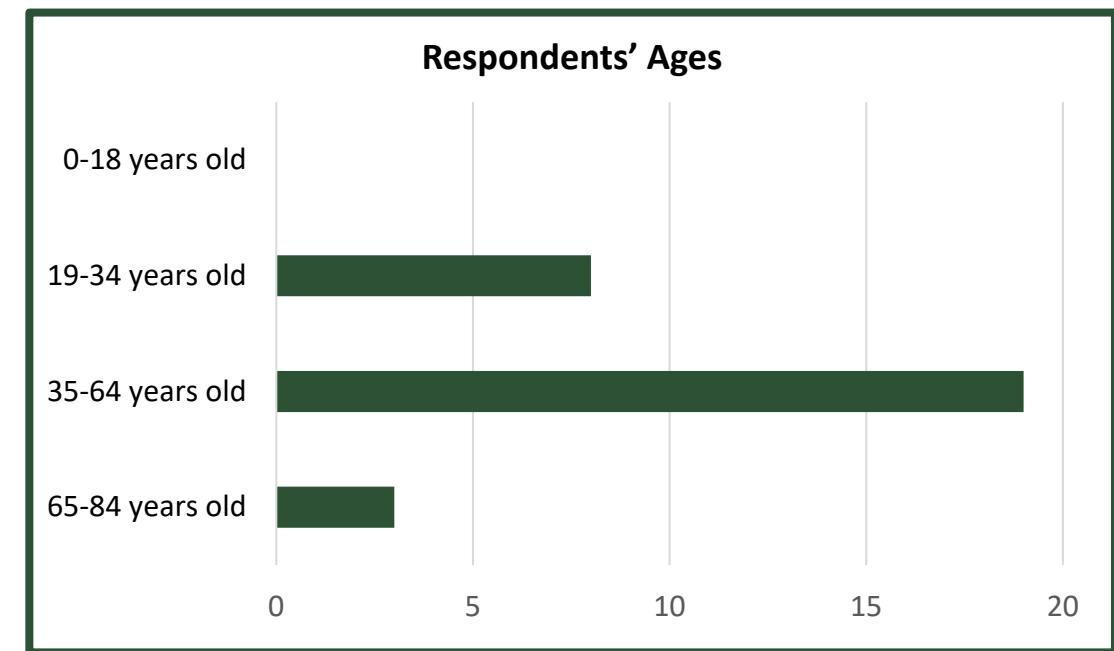
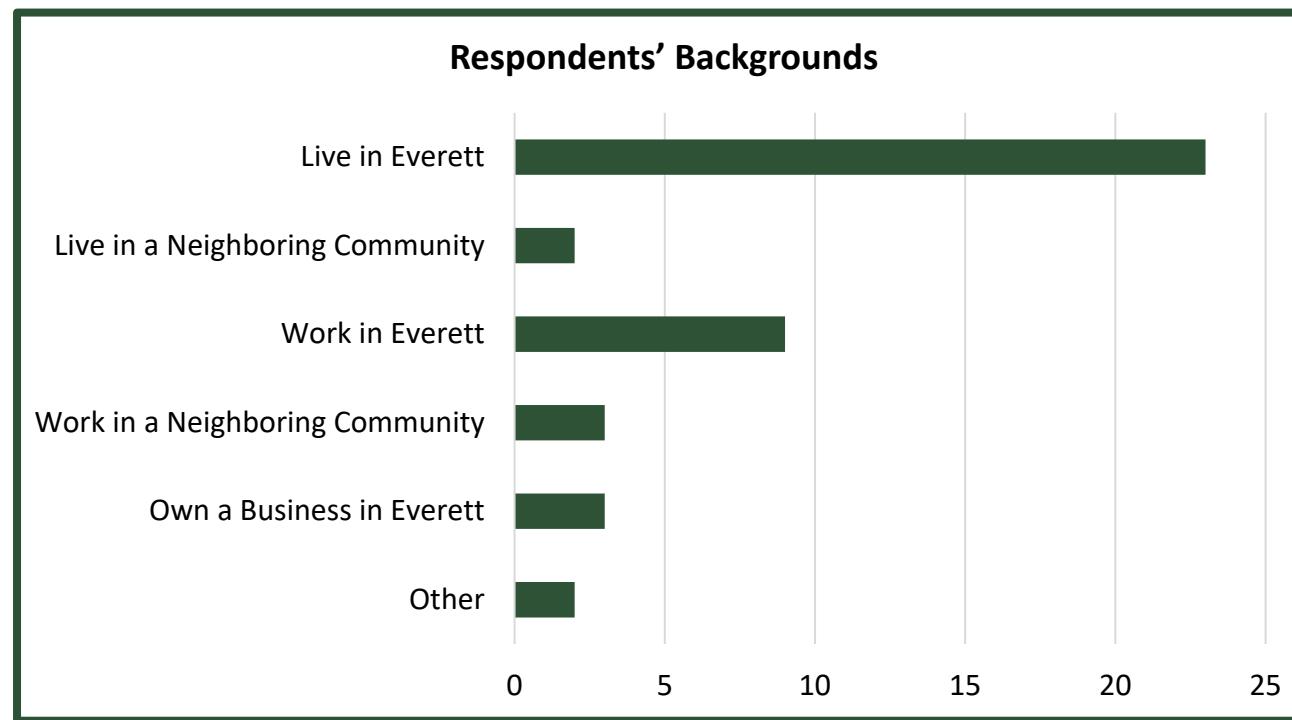
<https://www.surveymonkey.com/r/EverettHMP-ptbr>

Community Preparedness Survey

- Objectives
 - Understand how natural hazards have impacted community members
 - Reach a diverse group of people from different backgrounds
- Shared via:
 - City of Everett social media
 - Email to LPC and Stakeholder Working Group
 - Distribution from Stakeholders to networks

Everett Community Preparedness Survey

- 16-question survey conducted in Fall 2020 concerning hazard preparedness in Everett
- 33 respondents from in and around Everett



What has the City of Everett done well to prepare for natural hazards?

Excellent first responder teams in place

Streets get maintained so flooding isn't an issue.

Proactive communication

Phone calls with warnings

It is working on upgrading its drainage infrastructure

The snow removal is phenomenal.

How (or where) could the City of Everett improve its preparedness for natural hazards?

Better communication to the public

Upgrade utility services, address flooding

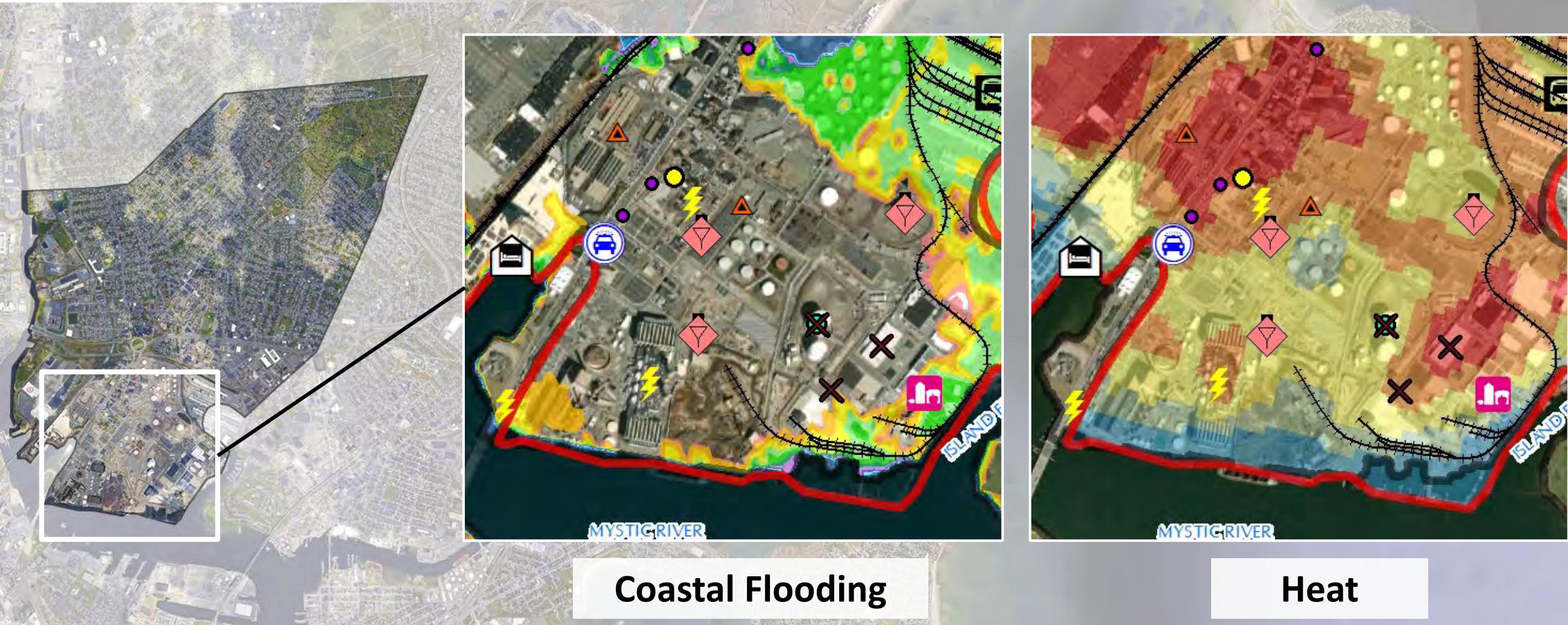
Air Force Road floods during heavy rain

Have a clear plan in place

Upgrade sewage lines to handle flood surges.

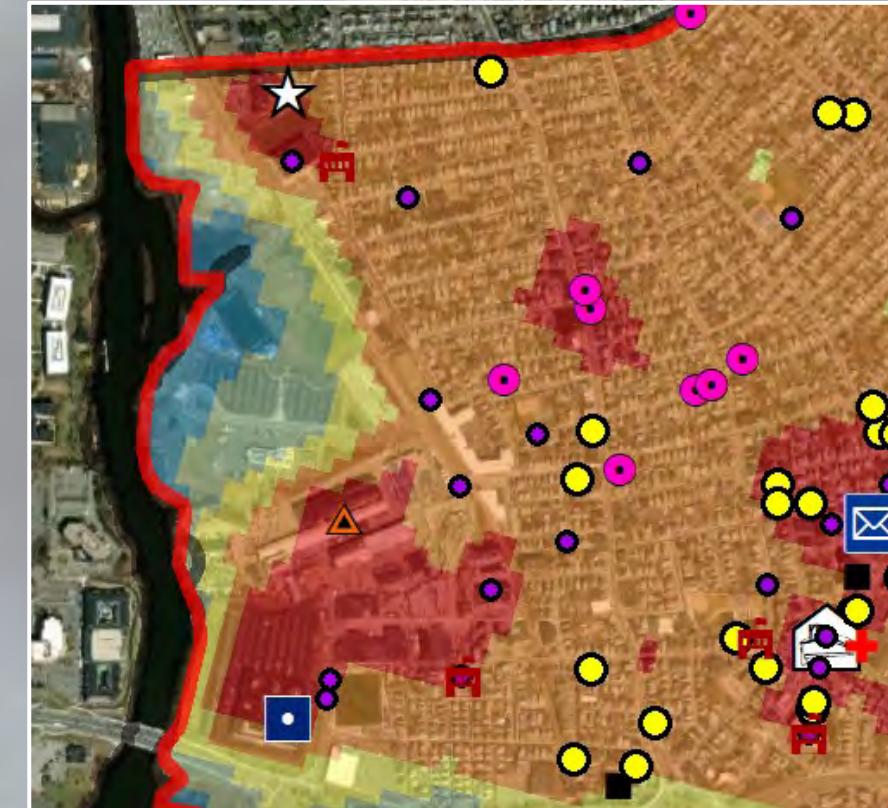
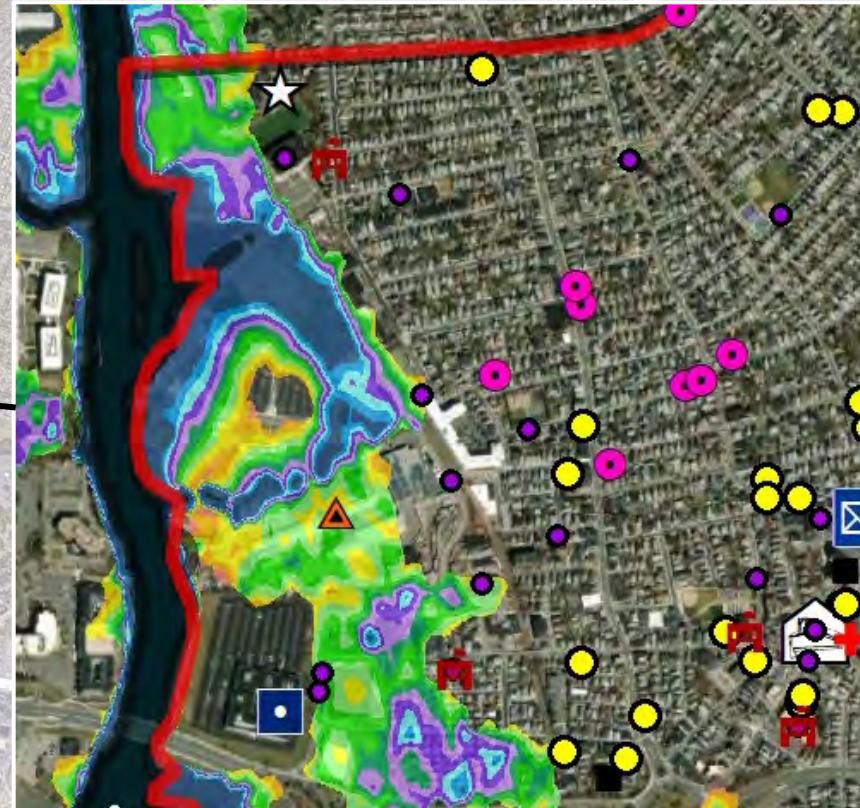
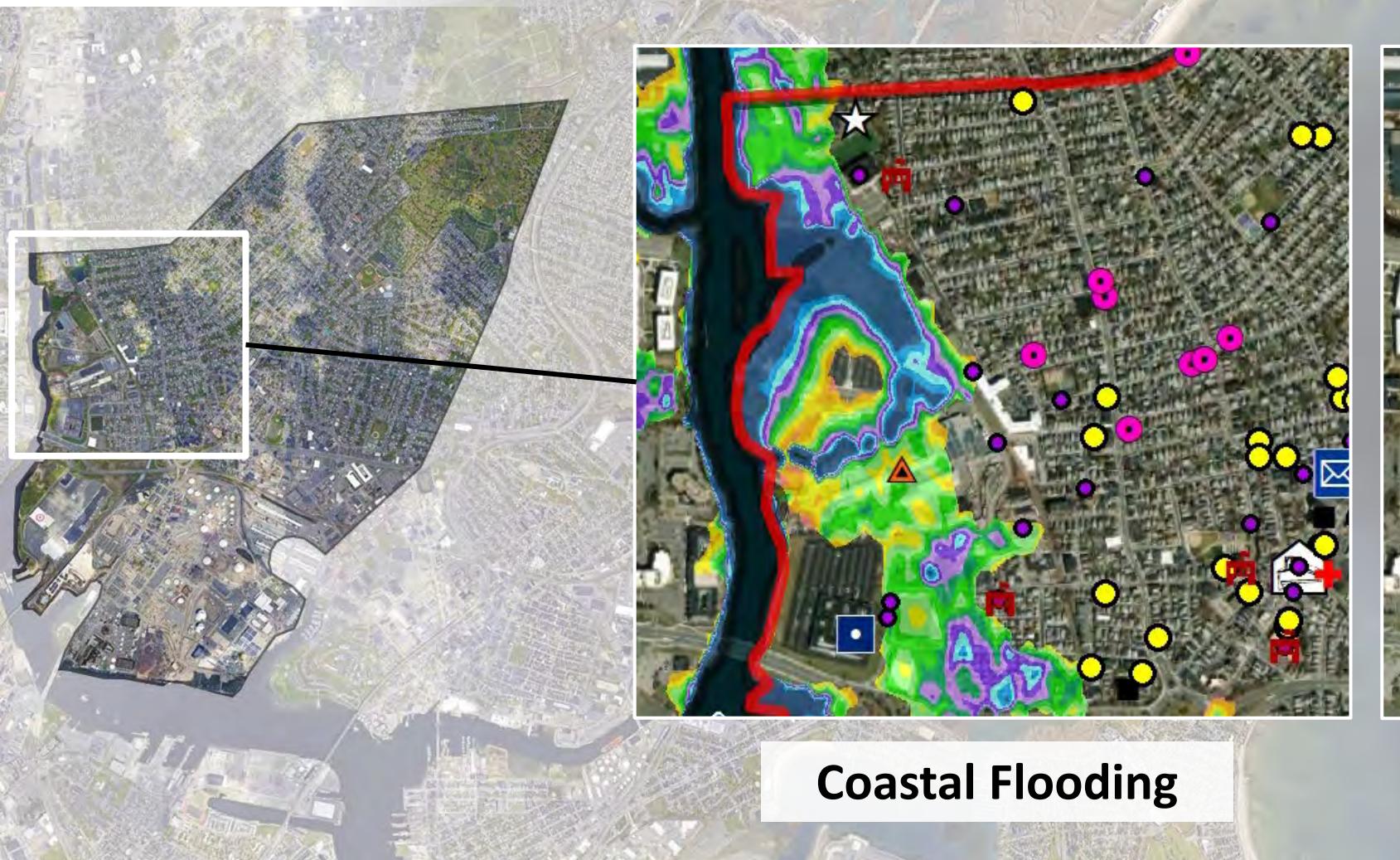
Increase awareness of protocols, increase and improve social programs and update infrastructure/public transportation

Mystic River DPA



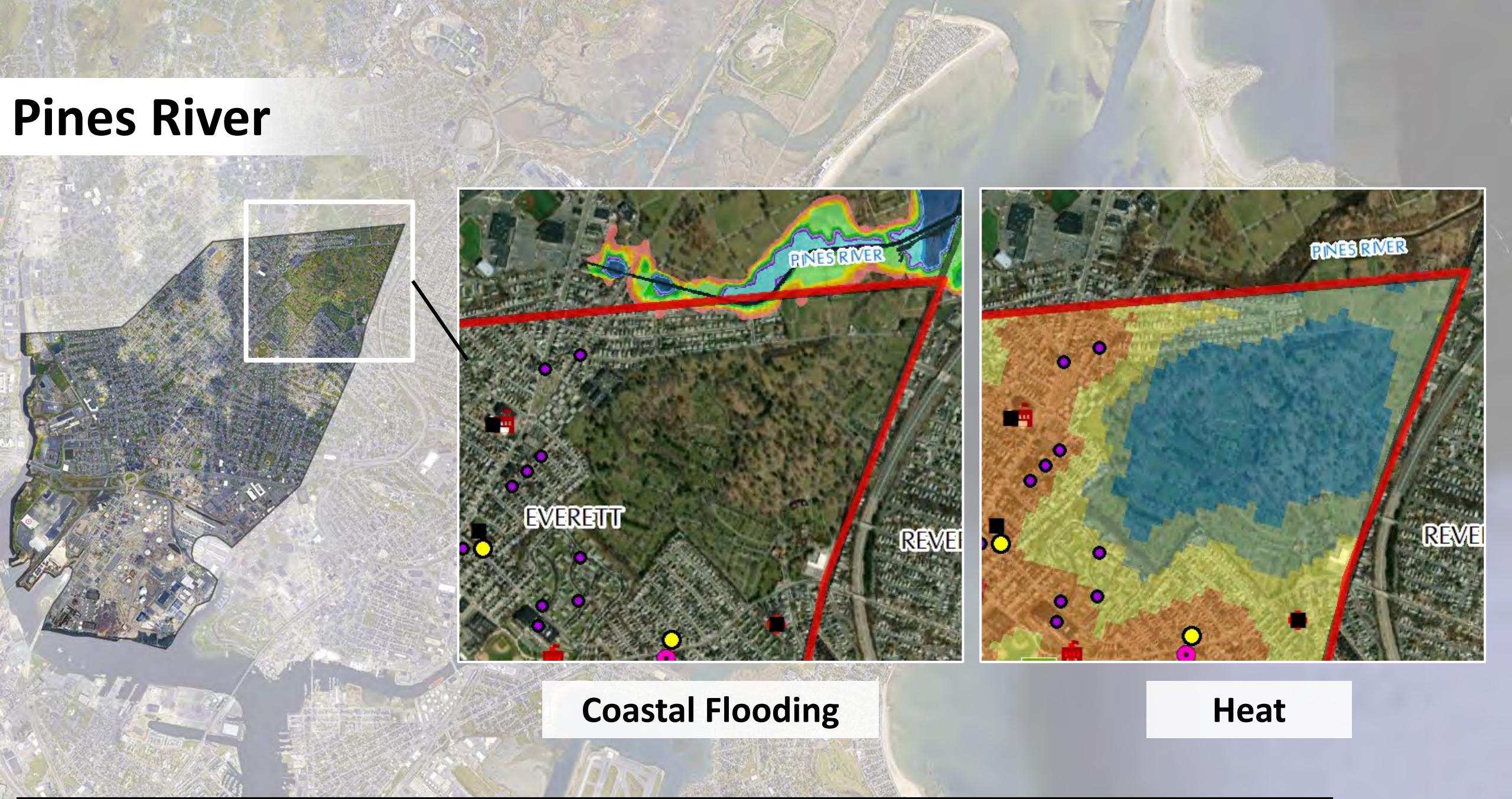
Key infrastructure: Schnitzer Steel, Exelon LNG facility and other former Distrigas properties where petroleum products and fuels are stored, Ciment Quebec, Exxon Mobil, private rail tracks to industrial properties, Beacham Street

Malden River



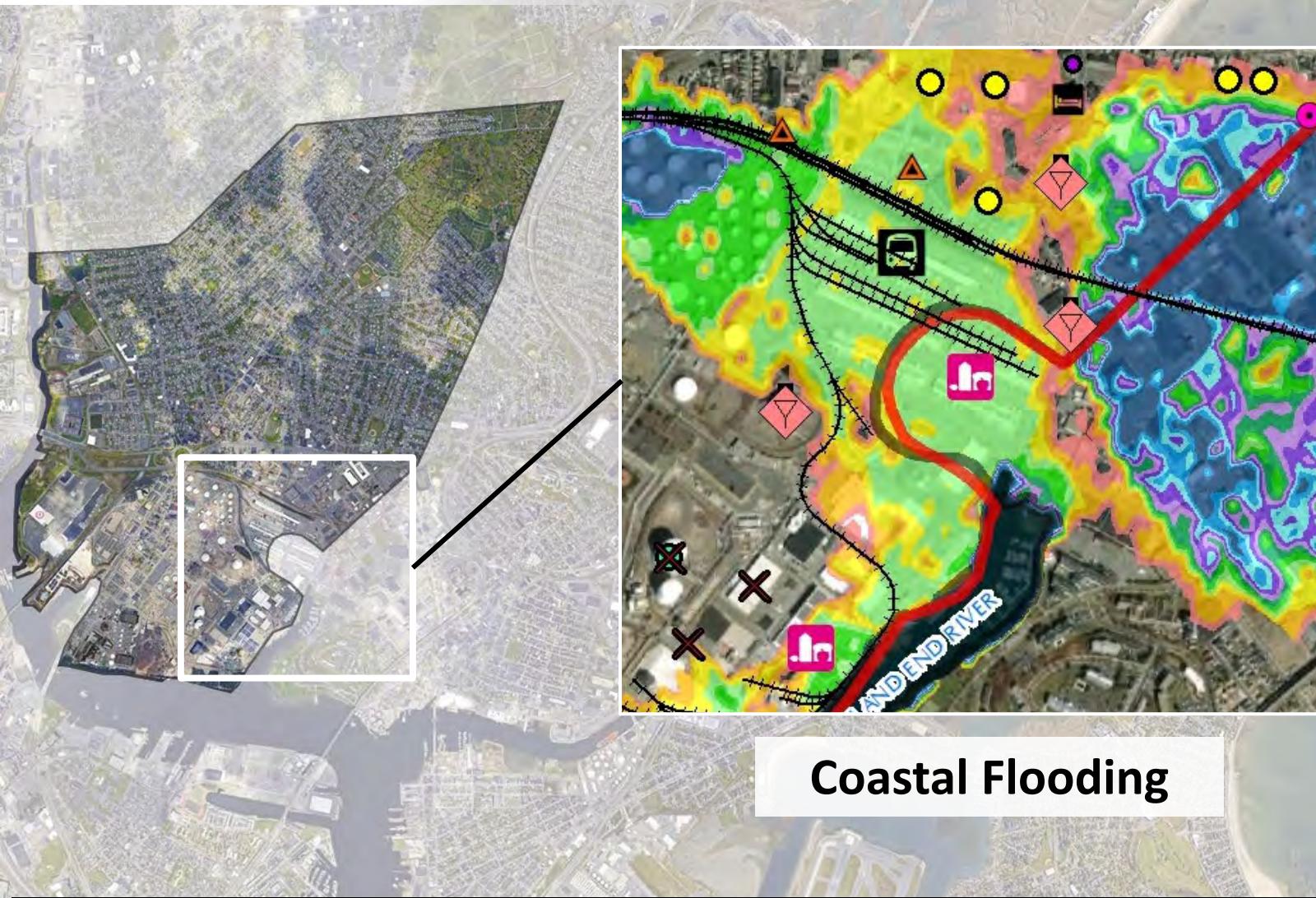
Key infrastructure: Madeline English School, Rivergreen Park, RiverGreen Technology Park, Revere Beach Parkway, former BNY Mellon building at 135 Santilli Highway

Pines River

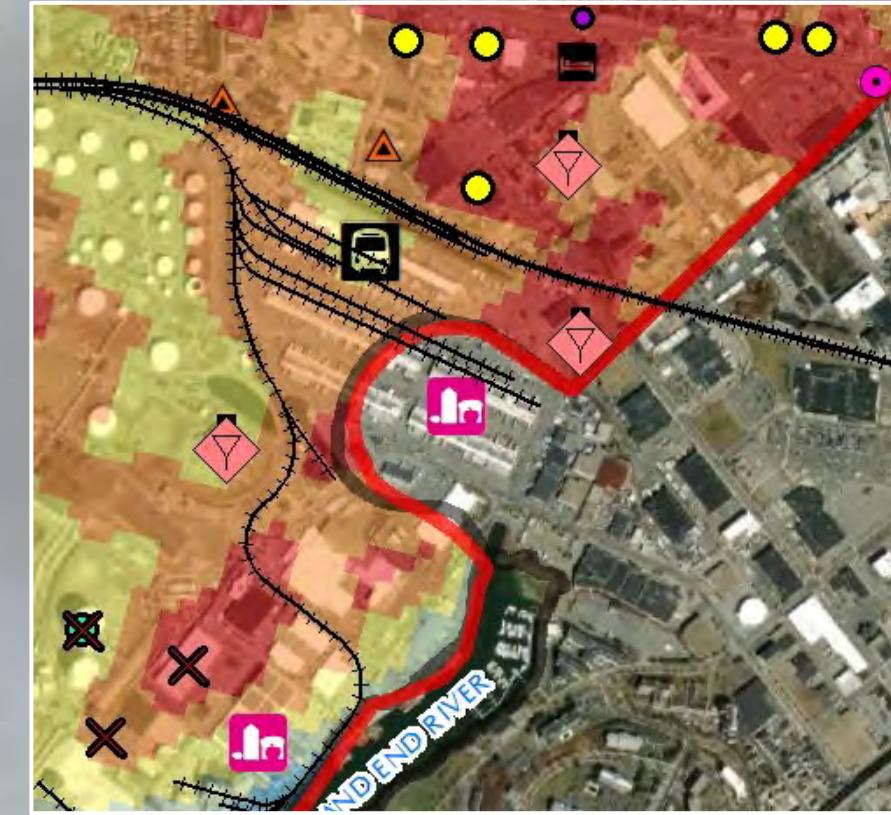


Key infrastructure: single-family and multi-family residential properties, Glenwood Cemetery, Woodlawn Cemetery, Broadway

Island End River

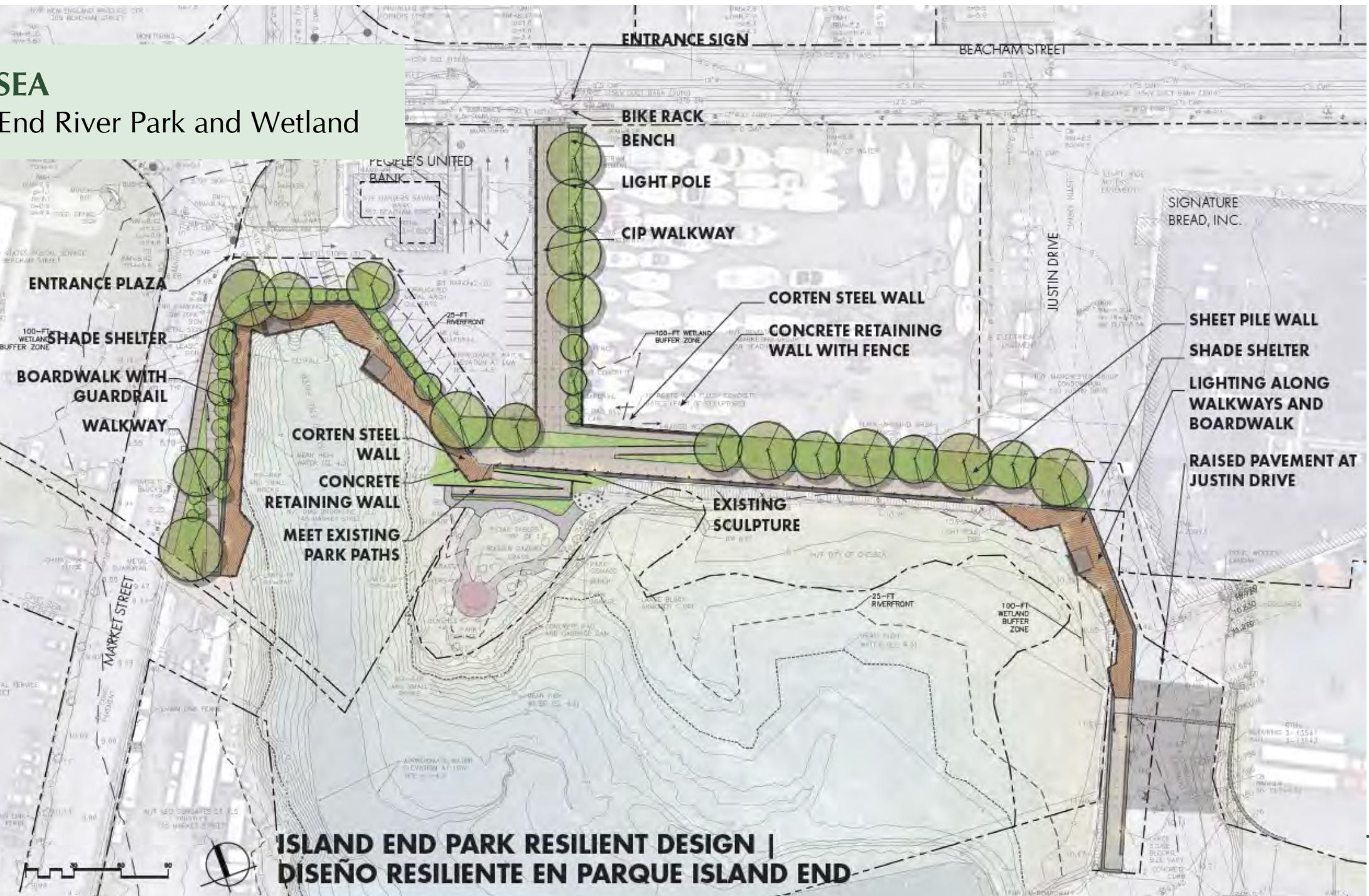


Coastal Flooding



Heat

Key infrastructure: New England Produce Center, USPS facility, PW Marks, Amazon Fresh, and other food distribution facilities, SPS New England

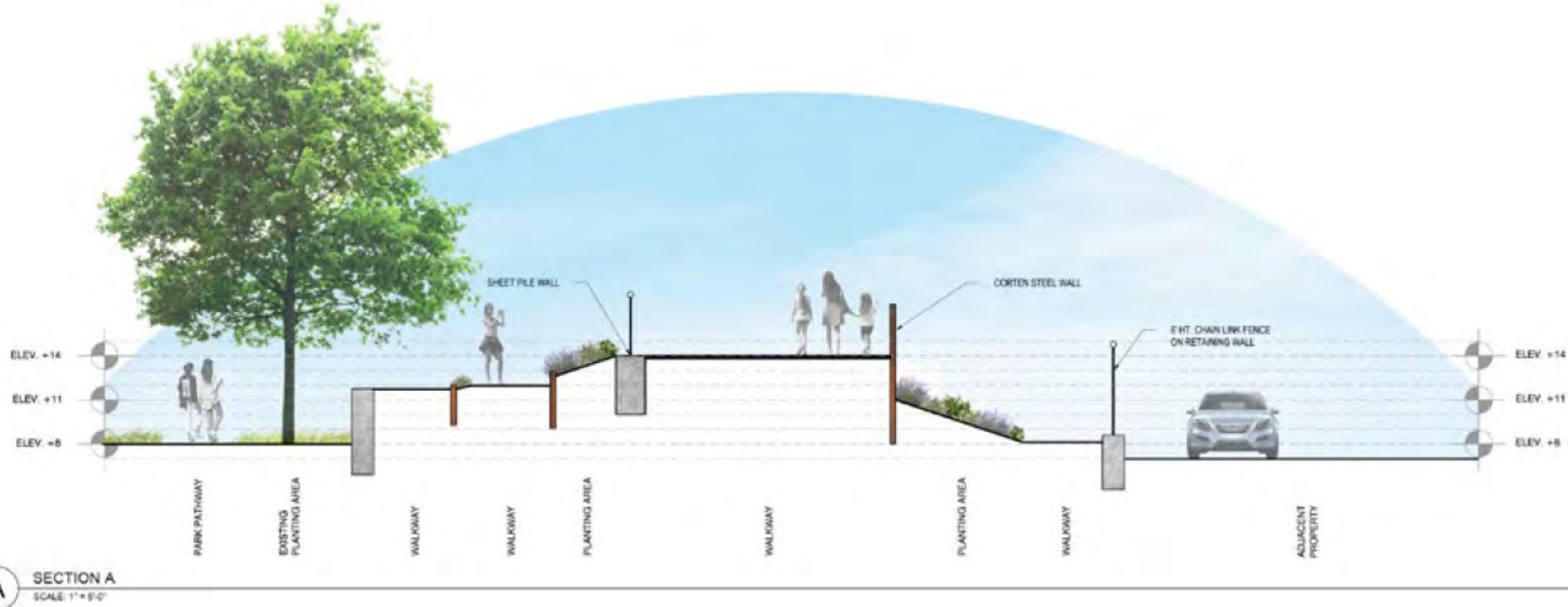


CHELSEA

Island End River Park and Wetland

CHELSEA

Island End River Park and Wetland



A

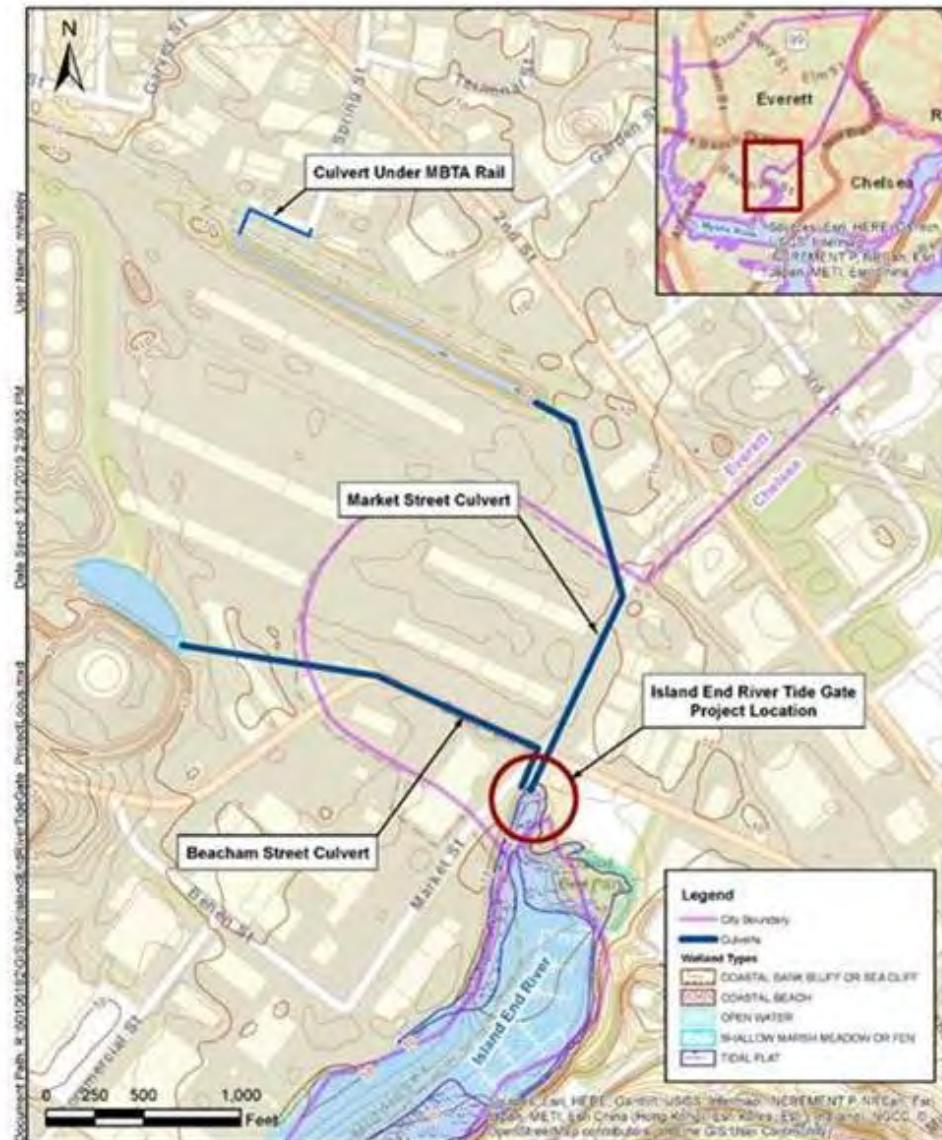
SECTION A
SCALE: 1" = 5'-0"



Additional Initiatives and Projects in the IER Corridor

- **DPA Industrial District Master Planning**
City of Everett & Utile (with Fort Point Associates as sub-consultant)
- **Hazard Mitigation Plan (HMP) Updates**
City of Everett & City of Chelsea
- **Market Street Culvert Replacement and Daylighting**
The Davis Companies & City of Everett
- **Market Street Culvert and Outfall Improvements**
Including culvert pipe repair and replacement, evaluation of pump station(s), tide gates, and other flood resilience solutions
City of Chelsea
- **Mystic Infiltration Trench Siting and Design for Phosphorous Nutrient Management**
Mystic River Watershed Association & City of Everett
- **MBTA Culvert Replacement**
City of Everett & MBTA

Island End River Tide Gate
Project Overview Map



Island End River Flood Resilience Project

Flood Barrier Alignment Options



Next Steps

Early July

- HMP workshop with Everett Community Growers on July 8
- Final 2021 HMP Update meeting with LPC and stakeholders on July 13

Mid July

- Attend Conservation Commission hearing to present HMP update on July 15
- Release a draft copy of HMP Report during week of July 19-23
 - Draft report posted to City of Everett website
 - Two-week public comment period

August

- Submit HMP to MEMA

Fall 2021

- Present to Everett Chamber of Commerce on ongoing and upcoming hazard mitigation projects at the Island End River
- MEMA anticipated to recommend final review of HMP by FEMA

Appendix B

EVERETT COMMUNITY SURVEY INFORMATION

Appendix C

RISK ASSESSMENT SUPPORTING MATERIALS

Hazus-MH: Earthquake Global Risk Report

Region Name	City
Earthquake Scenario:	Earthquake
Print Date:	June 10, 2021

Disclaimer:

This version of Hazus utilizes 2010 Census Data.

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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Appendix A: County Listing for the Region

Appendix B: Regional Population and Building Value Data

General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Massachusetts

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 3.54 square miles and contains 8 census tracts. There are over 15 thousand households in the region which has a total population of 41,667 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 9 thousand buildings in the region with a total building replacement value (excluding contents) of 4,405 (millions of dollars). Approximately 89.00 % of the buildings (and 71.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 675 and 955 (millions of dollars) , respectively.

Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 9 thousand buildings in the region which have an aggregate total replacement value of 4,405 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 72% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 1 hospitals in the region with a total bed capacity of beds. There are 14 schools, 3 fire stations, 1 police stations and 2 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 22 hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 1,630.00 (millions of dollars). This inventory includes over 38.53 miles of highways, 8 bridges, 226.18 miles of pipes.

Table 1: Transportation System Lifeline Inventory

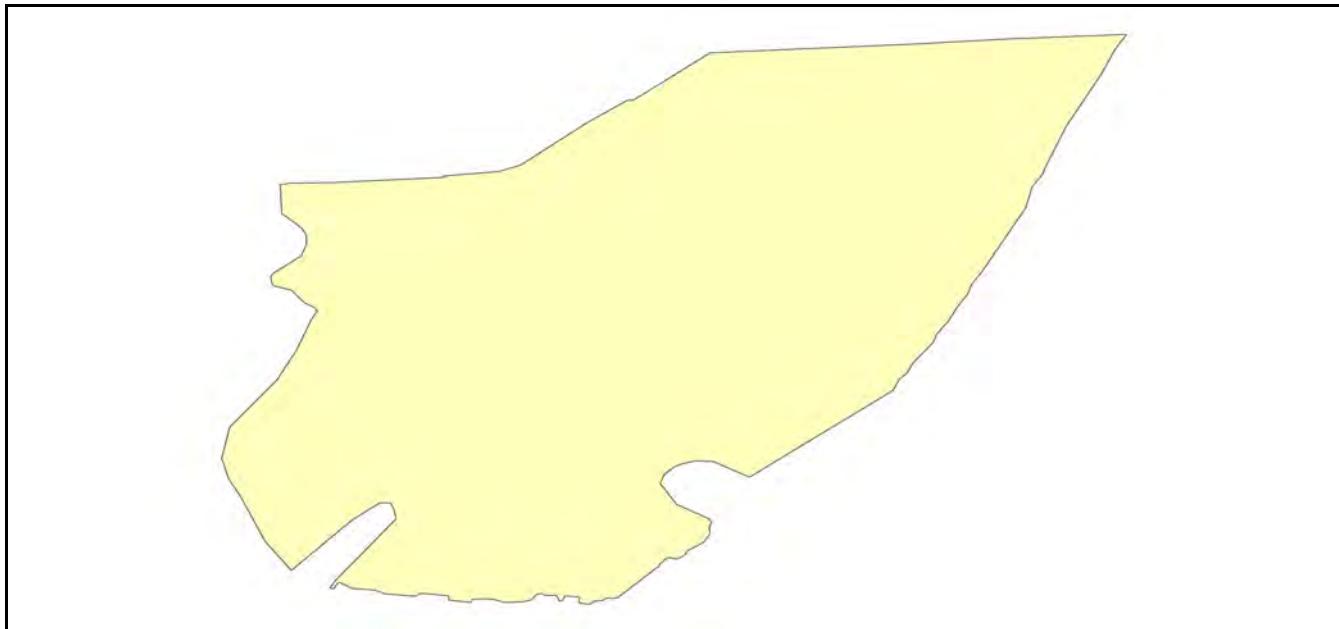
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	8	48.8894
	Segments	100	439.2049
	Tunnels	0	0.0000
	Subtotal		488.0943
Railways	Bridges	1	5.3607
	Facilities	0	0.0000
	Segments	84	70.1961
	Tunnels	0	0.0000
	Subtotal		75.5568
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	14	54.0671
	Tunnels	0	0.0000
	Subtotal		54.0671
Bus	Facilities	0	0.0000
	Subtotal		0.0000
Ferry	Facilities	0	0.0000
	Subtotal		0.0000
Port	Facilities	17	57.5955
	Subtotal		57.5955
Airport	Facilities	0	0.0000
	Runways	0	0.0000
	Subtotal		0.0000
Total			675.30

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	4.4192
	Facilities	0	0.0000
	Pipelines	0	0.0000
	Subtotal		4.4192
Waste Water	Distribution Lines	NA	2.6515
	Facilities	0	0.0000
	Pipelines	0	0.0000
	Subtotal		2.6515
Natural Gas	Distribution Lines	NA	1.7677
	Facilities	0	0.0000
	Pipelines	4	8.3619
	Subtotal		10.1296
Oil Systems	Facilities	1	0.1160
	Pipelines	0	0.0000
	Subtotal		0.1160
Electrical Power	Facilities	1	938.1249
	Subtotal		938.1249
Communication	Facilities	0	0.0000
	Subtotal		0.0000
	Total		955.40

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	Earthquake
Type of Earthquake	Historical
Fault Name	NA
Historical Epicenter ID #	999
Probabilistic Return Period	NA
Longitude of Epicenter	-188.28
Latitude of Epicenter	52.98
Earthquake Magnitude	5.30
Depth (km)	10.00
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	Central & East US (CEUS 2008)



Hazus-MH: Flood Global Risk Report

Region Name: City

Flood Scenario: EverettHMP Flood

Print Date: Friday, June 11, 2021

Disclaimer:

This version of Hazus utilizes 2010 Census Data.

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.



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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Massachusetts

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is approximately 4 square miles and contains 562 census blocks. The region contains over 16 thousand households and has a total population of 41,667 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B.

There are an estimated 9,357 buildings in the region with a total building replacement value (excluding contents) of 4,406 million dollars. Approximately 88.61% of the buildings (and 71.49% of the building value) are associated with residential housing.



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Building Inventory

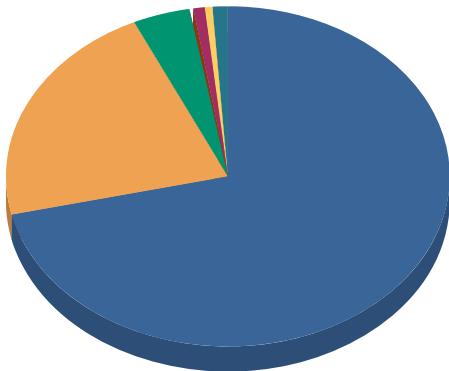
General Building Stock

Hazus estimates that there are 9,357 buildings in the region which have an aggregate total replacement value of 4,406 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure (\$1000)	Percent of Total
Residential	3,149,575	71.5%
Commercial	946,196	21.5%
Industrial	193,172	4.4%
Agricultural	4,431	0.1%
Religion	39,538	0.9%
Government	20,811	0.5%
Education	51,948	1.2%
Total	4,405,671	100%

**Building Exposure by Occupancy Type for the Study Region
(\$1000's)**



Residential	\$3,149,575
Commercial	\$946,196
Industrial	\$193,172
Agricultural	\$4,431
Religion	\$39,538
Government	\$20,811
Education	\$51,948
Total:	\$4,405,671

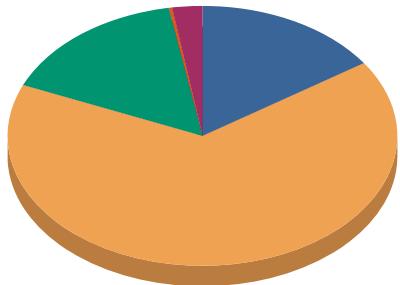


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Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure (\$1000)	Percent of Total
Residential	18,273	15.6%
Commercial	77,205	65.8%
Industrial	18,609	15.9%
Agricultural	228	0.2%
Religion	2,932	2.5%
Government	0	0.0%
Education	0	0.0%
Total	117,247	100%

Building Exposure by Occupancy Type for the Scenario (\$1000's)



Residential	\$18,273
Commercial	\$77,205
Industrial	\$18,609
Agricultural	\$228
Religion	\$2,932
Government	\$0
Education	\$0
Total:	\$117,247

Essential Facility Inventory

For essential facilities, there are 1 hospitals in the region with a total bed capacity of no beds. There are 14 schools, 3 fire stations, 1 police station and 2 emergency operation centers.



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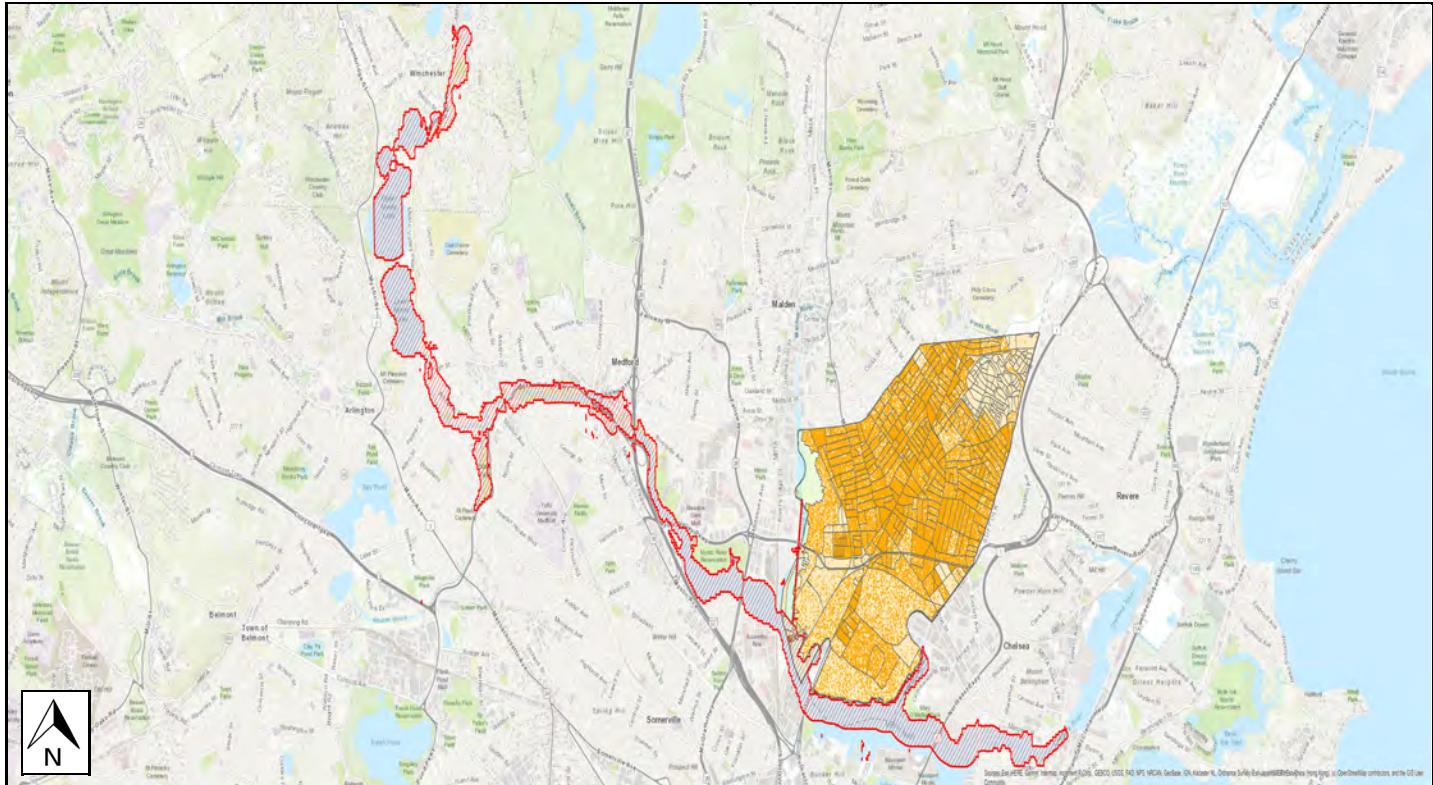
Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	City
Scenario Name:	EverettHMP Flood
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure

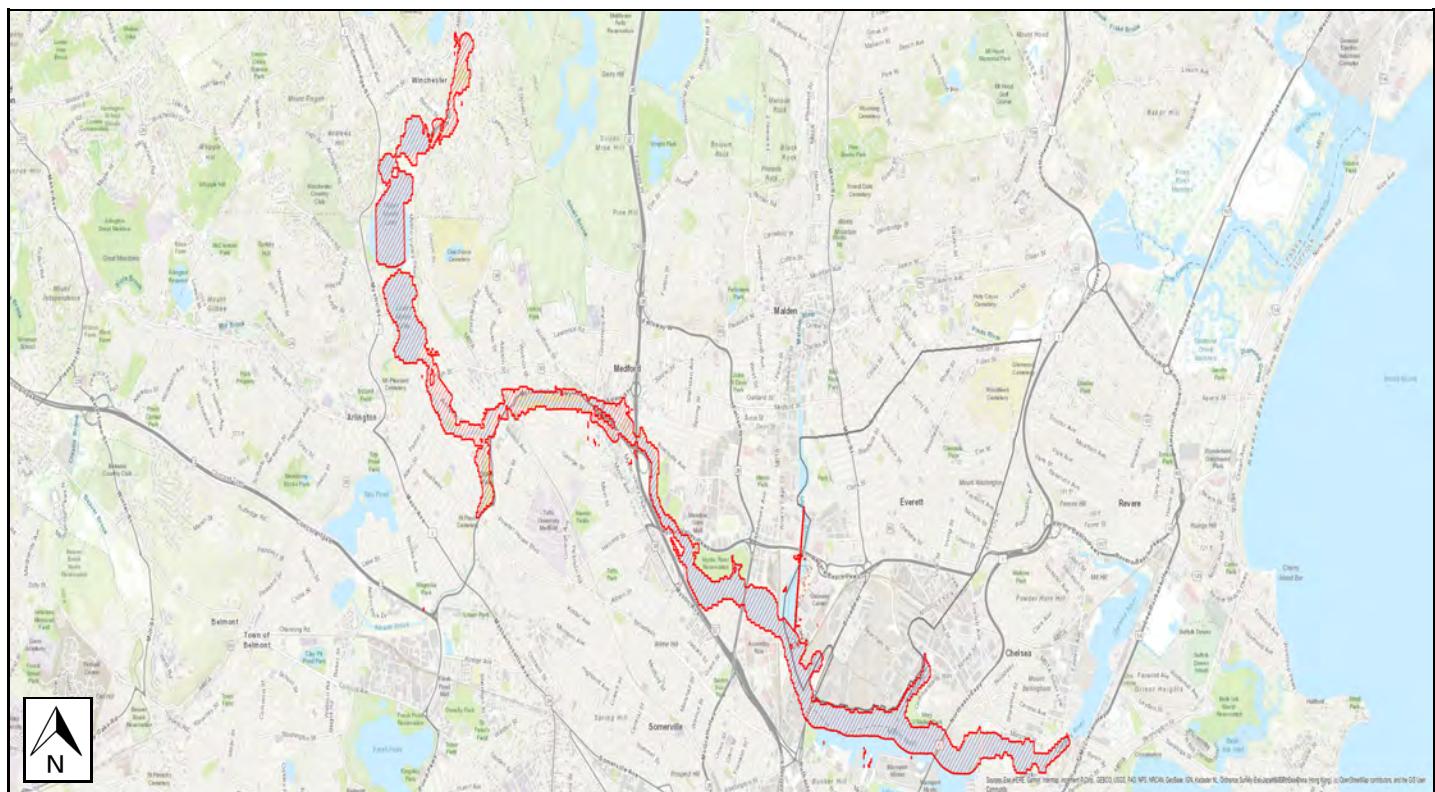
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Building Damage

General Building Stock Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0% of the total number of buildings in the scenario. There are an estimated 0 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = \$300K) Overview Map



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Table 3: Expected Building Damage by Occupancy

Occupancy	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)										
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	0	0	0	0	0	0	0	0	0	0	0	0
Total	0											

Counts By Damage Level

Damage Level 1-10	0
Damage Level 11-20	0
Damage Level 21-30	0
Damage Level 31-40	0
Damage Level 41-50	0
Damage Level >50	0
Total:	0



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Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)										
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	0	0	0	0	0	0	0	0	0	0	0	0
Steel	0	0	0	0	0	0	0	0	0	0	0	0
Wood	0	0	0	0	0	0	0	0	0	0	0	0



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Essential Facility Damage

Before the flood analyzed in this scenario, the region had 0 hospital beds available for use. On the day of the scenario flood event, the model estimates that 0 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	2	0	0	0
Fire Stations	3	0	0	0
Hospitals	1	0	0	0
Police Stations	1	0	0	0
Schools	14	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.



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Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

Analysis has not been performed for this Scenario.



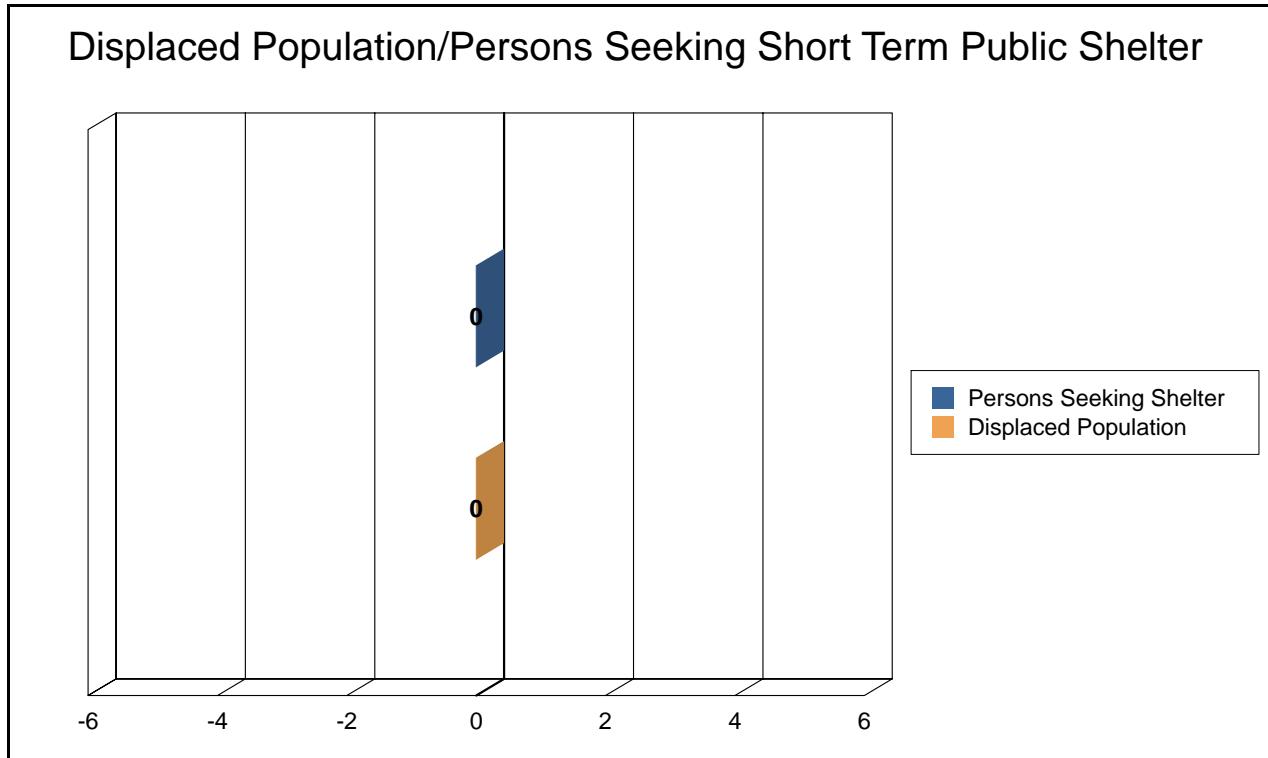
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Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 0 households (or 0 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 0 people (out of a total population of 41,667) will seek temporary shelter in public shelters.

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Economic Loss

The total economic loss estimated for the flood is 0.52 million dollars, which represents 0.45 % of the total replacement value of the scenario buildings.

Building-Related Losses

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 0.31 million dollars. 40% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 0.00% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.



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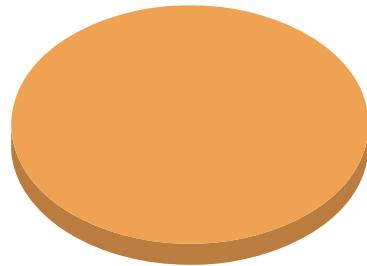


Table 6: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Building Loss</u>						
	Building	0.00	0.06	0.00	0.00	0.06
	Content	0.00	0.24	0.00	0.00	0.24
	Inventory	0.00	0.01	0.00	0.00	0.01
	Subtotal	0.00	0.31	0.00	0.00	0.31
<u>Business Interruption</u>						
	Income	0.00	0.05	0.00	0.00	0.05
	Relocation	0.00	0.04	0.00	0.00	0.04
	Rental Income	0.00	0.03	0.00	0.00	0.03
	Wage	0.00	0.09	0.00	0.00	0.09
	Subtotal	0.00	0.21	0.00	0.00	0.21
<u>ALL</u>	Total	0.00	0.52	0.00	0.00	0.52

Losses by Occupancy Types (\$M)



Residential	\$0
Commercial	\$1
Industrial	\$0
Other	\$0
Total:	\$1



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Appendix A: County Listing for the Region

Massachusetts

- Middlesex



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Appendix B: Regional Population and Building Value Data

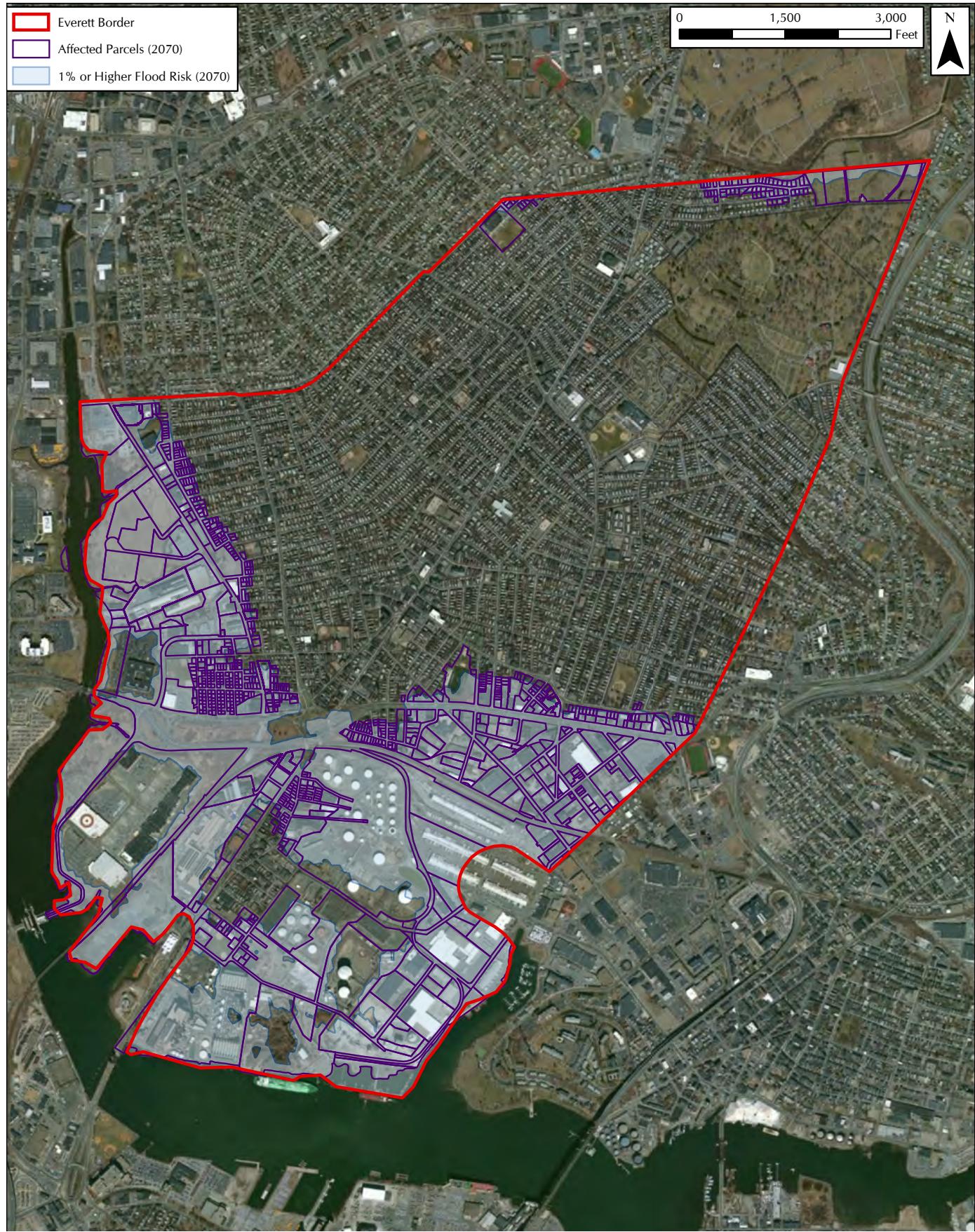
	Building Value (thousands of dollars)			
	Population	Residential	Non-Residential	Total
Massachusetts				
Middlesex	41,667	3,149,575	1,256,096	4,405,671
Total	41,667	3,149,575	1,256,096	4,405,671
Total Study Region	41,667	3,149,575	1,256,096	4,405,671

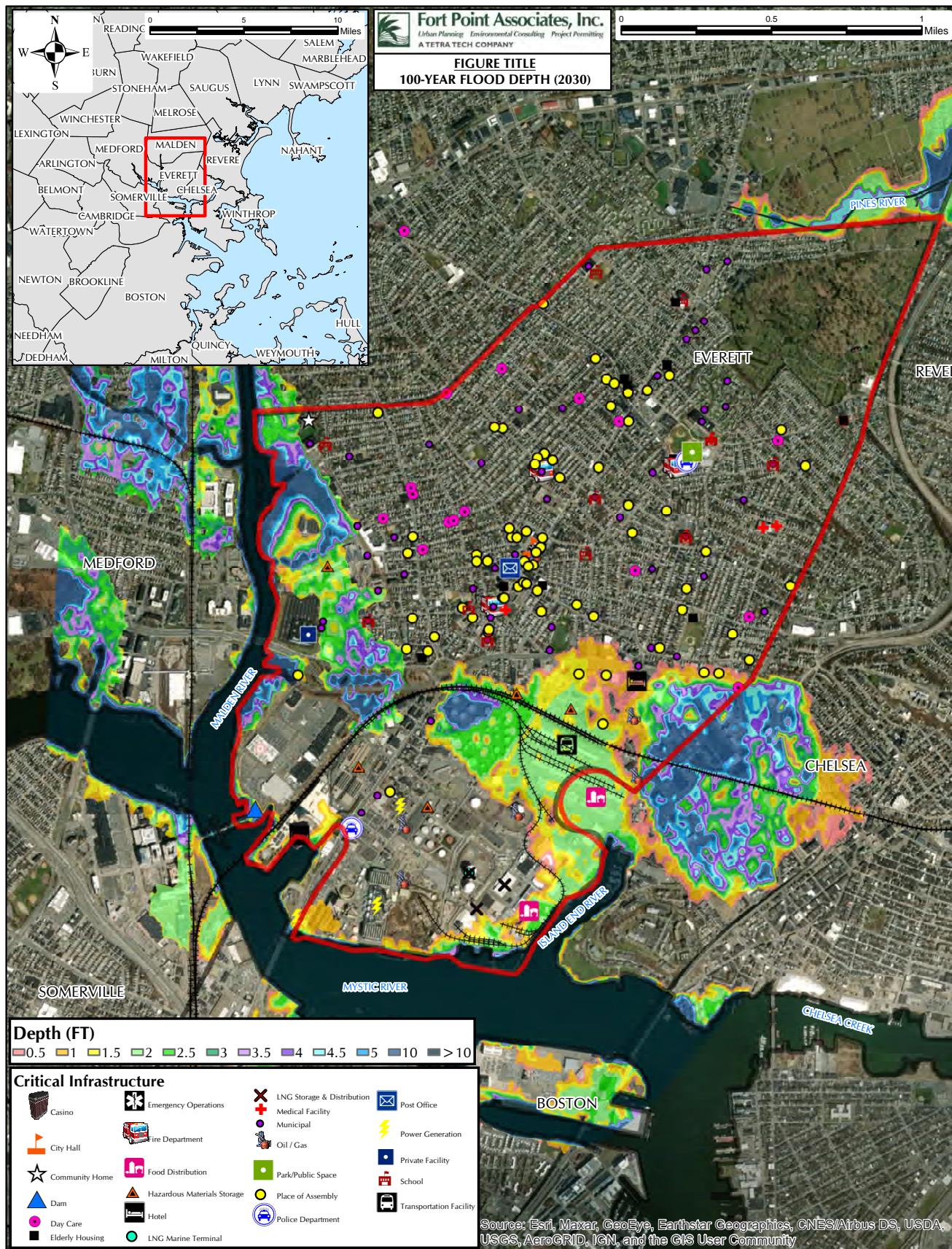


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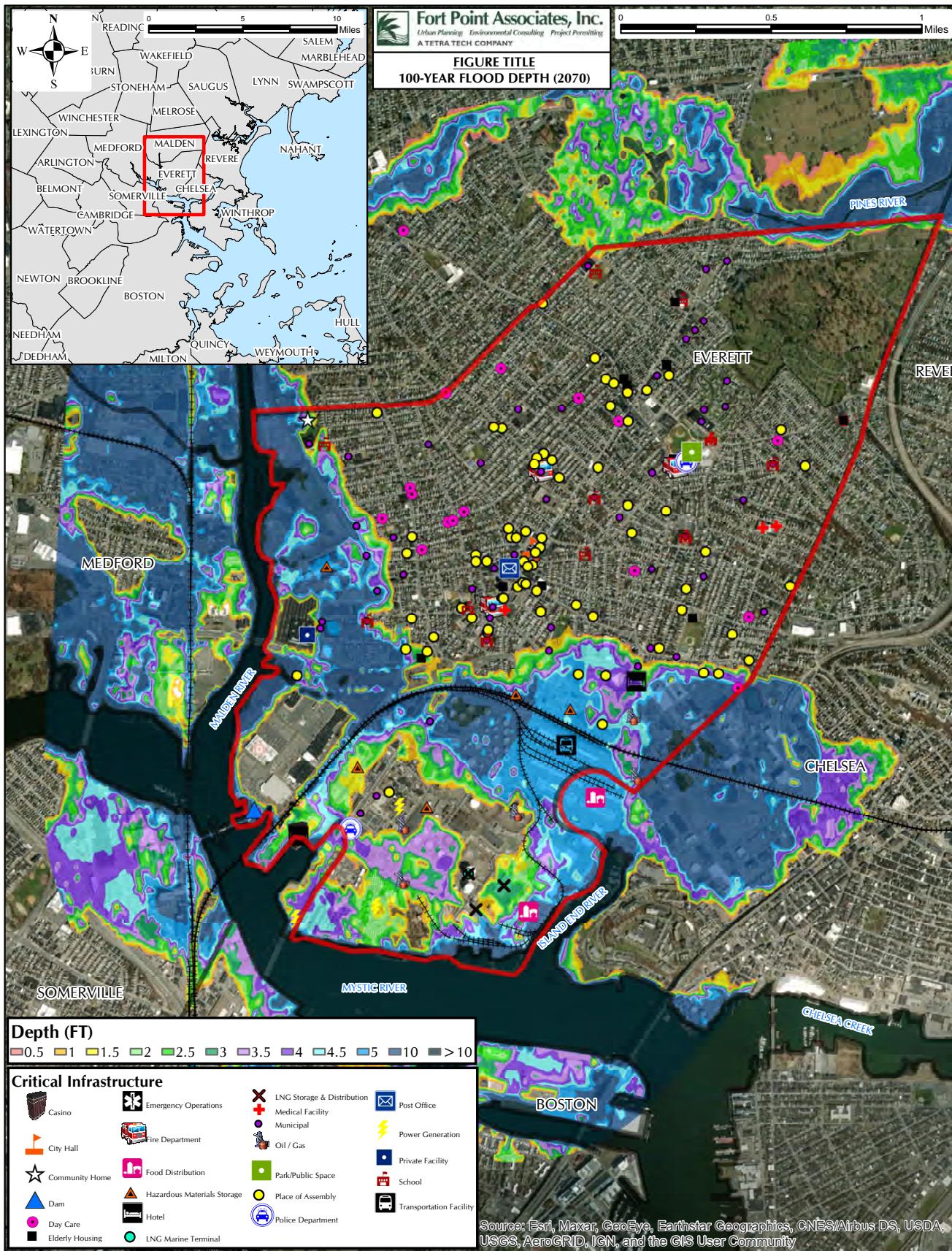
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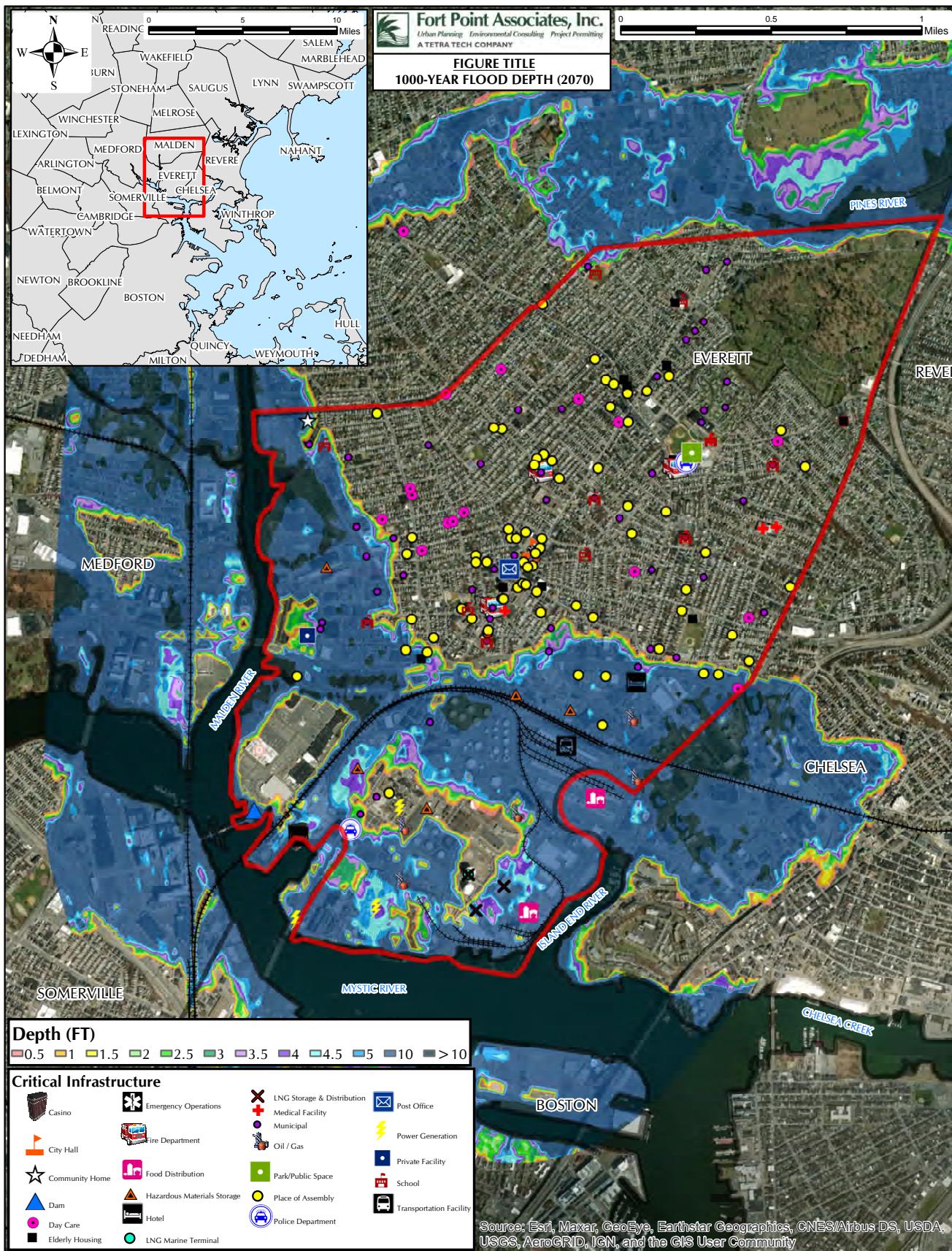




*Bosma, K., E. Douglas, P. Kirshen, K. McArthur, S. Miller, and C. Watson, MassDOT Report: Climate Change and Extreme Weather Vulnerability Assessments and Adaptation Options for the State of Massachusetts, 2019 (in publication).



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