Climate Change Vulnerability Transportation Assessment

Old Colony Planning Council

What does this presentation cover?

OCPC Climate Change Vulnerability Transportation Assessment Funded by the Old Colony Unified Planning Work Program

1. Study Purpose
2. What is Climate Change
3. Federal Response
4. State Response
5. OCPC and Local Response to Climate Change

OCPC Climate Change Vulnerability Transportation Assessment (Completion Date September 2021)

1. Study Purpose –
   - ❖ Identify the Impacts of Climate Change on the transportation system
   - ❖ Assess the vulnerability of the system
   - ❖ Develop strategies for management and mitigation
   - ❖ Coordinate with federal and state directives and initiatives

OCPC Climate Change Vulnerability Transportation Assessment (Completion Date September 2021)

1. Study Purpose

- Builds on previous OCPC and Local Study
  - OCPC Climate Change Roadway Drainage and Runoff Study 2011
  - OCPC Climate Change Transportation Impact Study 2010
  - Hazard Mitigation and Municipal Vulnerability Preparedness Plans (Local studies)

OCPC Climate Change Vulnerability Transportation Assessment (Completion Date September 2021)

1. Study Purpose

- Public outreach, stakeholder input and feedback (state , federal, local, watershed associations Jones River, Taunton River)
- Examining/identify the root causes of climate change
- Map potential negative impacts in the region compared to the existing transportation system
- Identify potential strategies to reduce climate change impacts

Weather and Climate

Weather – Short-term, day-to-day state of atmospheric changes variation in minutes to weeks

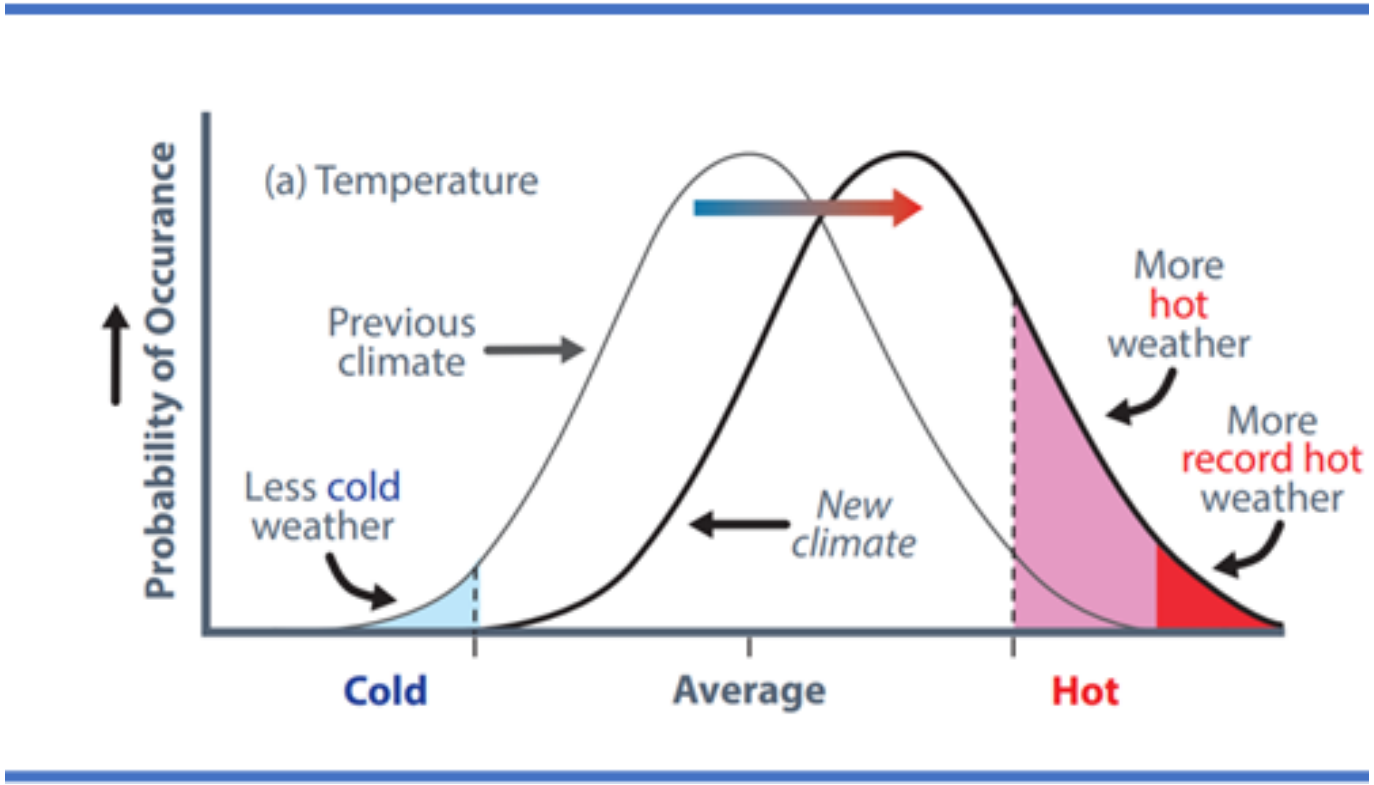
- Temperature, humidity, precipitation, cloudiness, visibility, and wind

Climate – Climate is the weather of a place averaged over a period of time, often 30 years

2. What is Climate Change?

2. What is Climate Change?

An increase in global temperatures and extreme weather events as a result of increased levels of **greenhouse gases and atmospheric pollution** (in particular, carbon pollution)



3. Federal Directives and Initiatives

EO 13653 (2013)

”Preparing the US for the Impacts of Climate Change”

“The federal government must build on progress and pursue new strategies to improve the Nation's preparedness and resilience.”

Agencies should promote:

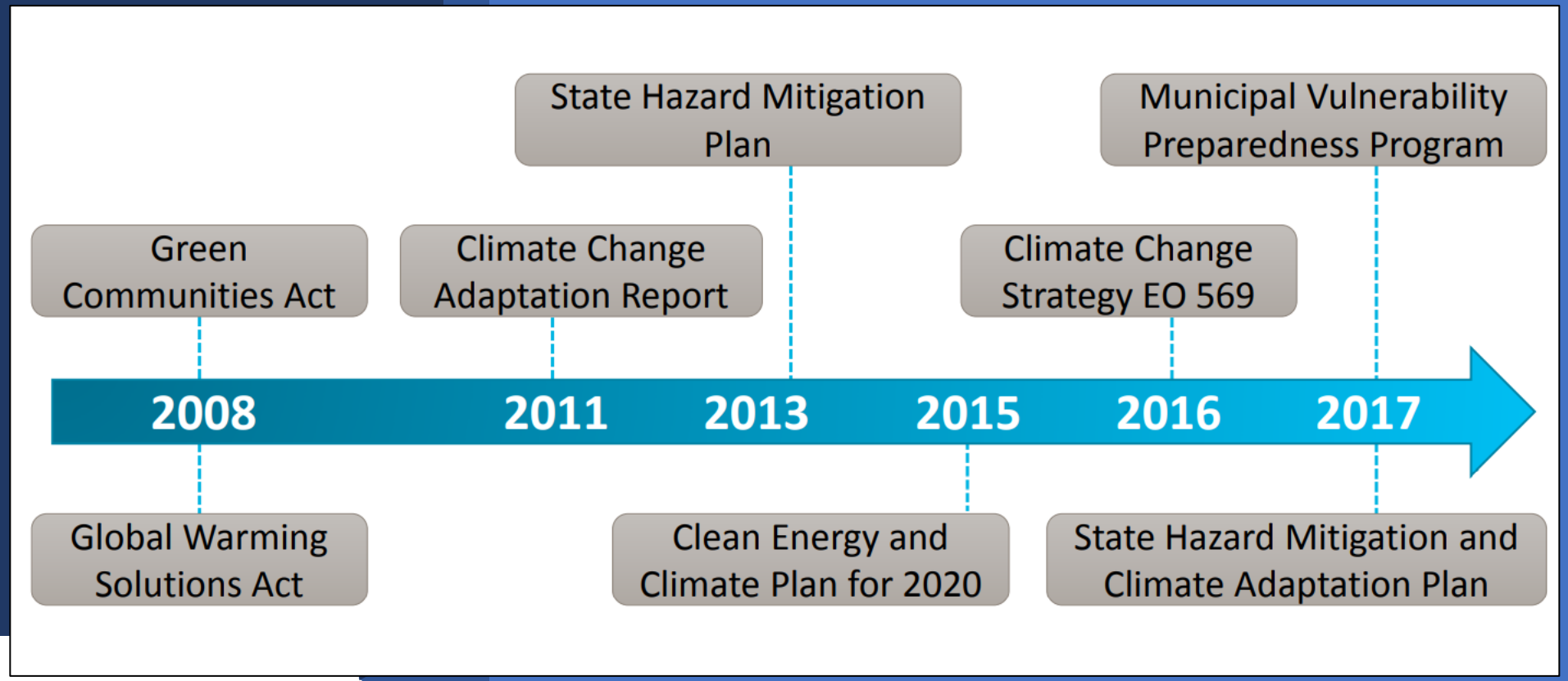
- Engaged and strong partnerships and information sharing at all levels of government
- Risk-informed decision making and the tools to facilitate it
- Adaptive learning, in which experiences serve as opportunities to inform and adjust future actions
- Support state and local governments in preparedness planning and resiliency

3. Federal Directives and Initiatives

FHWA - “Transportation Systems Management and Operations and Maintenance Programs (TSMO) need to adapt to Climate Change”

- Assess Vulnerability
- Document Existing Capabilities
- Collect and Integrate Data on Past Performance
  - Loss of alternative routes
  - Loss of situational awareness (due to power/communication)
  - Inability to evacuate/shelter-in-place.
  - Loss of service life (due to faster deterioration, etc.)
  - Increased safety risk
  - Loss of economic productivity
  - Reduced mobility

4. State Response to Climate Change



4. State Response to Climate Change

MASSACHUSETTS GLOBAL WARMING SOLUTIONS ACT (GWSA) – Enacted 2008

Requires the (EOEEA), in consultation with other state agencies and the public, to set economy-wide greenhouse gas (GHG) emission reduction goals

- Reduce between 10 percent and 25 percent below statewide 1990 GHG emission levels by 2020
- Reduce to at least 80 percent below statewide 1990 GHG emission levels by 2050.
- September 2016 Governor Baker signed EO 569 establishing statewide GHG emissions limits for 2030 and 2040 to promulgate regulations to ensure compliance with the 2020 emissions limit
- **Dec 2020 the Secretary of the EOEEA set GHG limit 45 % below the 1990 level for the year 2030**

4. State Response to Climate Change

Achieving GWSA Reduction Goals

- Establish regulations requiring reporting of GHG emissions by the Commonwealth's largest sources by January 1, 2009 providing data about the types and levels of GHG
- Establish 1990 as a baseline assessment of statewide GHG emissions used to measure goal progress (1990 is the base year of the Kyoto Protocol)
- Develop a projection of the statewide GHG emissions for 2020 (a "business as usual" scenario as if no government action is implemented for reductions)
- Establish target emission reductions for 2020, and a plan for achieving them. The GWSA requires that these must be established by January 1, 2011
- Analyze strategies via advisory committee and make recommendations for adapting to climate change, the committee reports to the Legislature by December 31, 2009
- EOEEA established two advisory committees to provide input on the implementation of the GWSA
  - The Climate Protection and Green Economy Advisory Committee to advise the Executive Office of Energy and Environmental Affairs on measures to reduce greenhouse gas emissions in accordance with the GWSA
  - The Climate Change Adaptation Advisory Committee to study and make recommendations on strategies for adapting to climate change

4. State Response to Climate Change

Achieving GWSA Reduction Goals

- Section 7(a) The secretary, in consultation with the executive office of administration and finance, may consider the use of market-based compliance mechanisms to address climate change concerns
- Section 7(c) The executive office and the department may work with the participating regional greenhouse gas initiative states and other interested states and Canadian Provinces to develop a plan to expand market-based compliance mechanisms such as the regional greenhouse gas initiative to other sources and sectors necessary or desirable to facilitate the achievement of the greenhouse gas emissions limits

4. State Response to Climate Change

The Transportation and Climate Initiative (TCI)

- Cap-and-trade" system, a cap is set on the total amount of carbon dioxide that can be released from vehicles using transportation fuels (lowered as time goes on).
- Transportation fuel suppliers must then buy allowances for every ton of carbon dioxide their fuel will produce, the total number of allowances is limited, based on the cap.
- An auction is held in which fuel suppliers can bid to buy allowances, the price of those allowances depends on the market allowances can be traded.
- States get money from the sale of the allowances and would be required to invest that money into projects that reduce carbon emissions from transportation.

4. State Response to Climate Change

The Transportation and Climate Initiative (TCI)

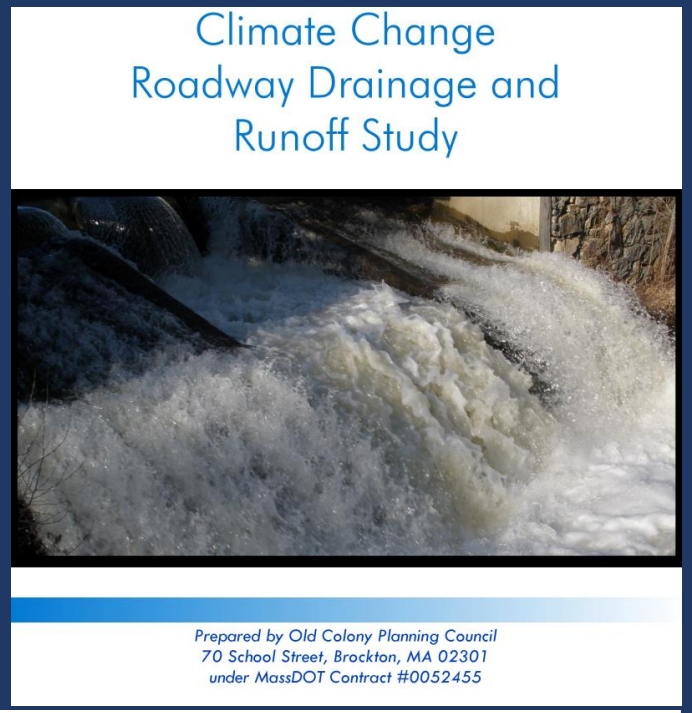
- Expected to incentivize development of fuel-efficient technologies and incentivize people to use less pollution emitting fuel and It will raise money for state investments in new technologies, such as electric buses
- Twelve northeast and mid-Atlantic states plus Washington, D.C., are involved in the discussions: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and Virginia
- MOU Memorandum of Understanding was signed in December of 2020 by Mass., Conn., RI, and the District of Columbia, a commitment for a minimum of 35 percent of each jurisdiction's proceeds, (est. $100 million each year), for communities underserved by the transportation system and overburdened by pollution will benefit equitably from clean transportation projects and programs.

4. State Response to Climate Change

MASSACHUSETTS GLOBAL WARMING SOLUTIONS ACT (GWSA)

- Updated legislation combined House and Senate bill (The Legislature will refile Senate Bill No. 2995, and the Governor work to improve the bill to reach agreement)
  - Senate Bill 2500 Interim 5 year targets with plans to achieve, regulations, public hearings, and certificates of compliance within 18 months of end of year
    - 2030: not less than 50% below 1990 level
    - 2040: not than 75% below 1990 level
  - House Bill 4933 -Plan updated every five years requirement for legislative recommendations
    - 2030: not less than 50% below 1990 level
    - 2040: not than 75% below 1990 level

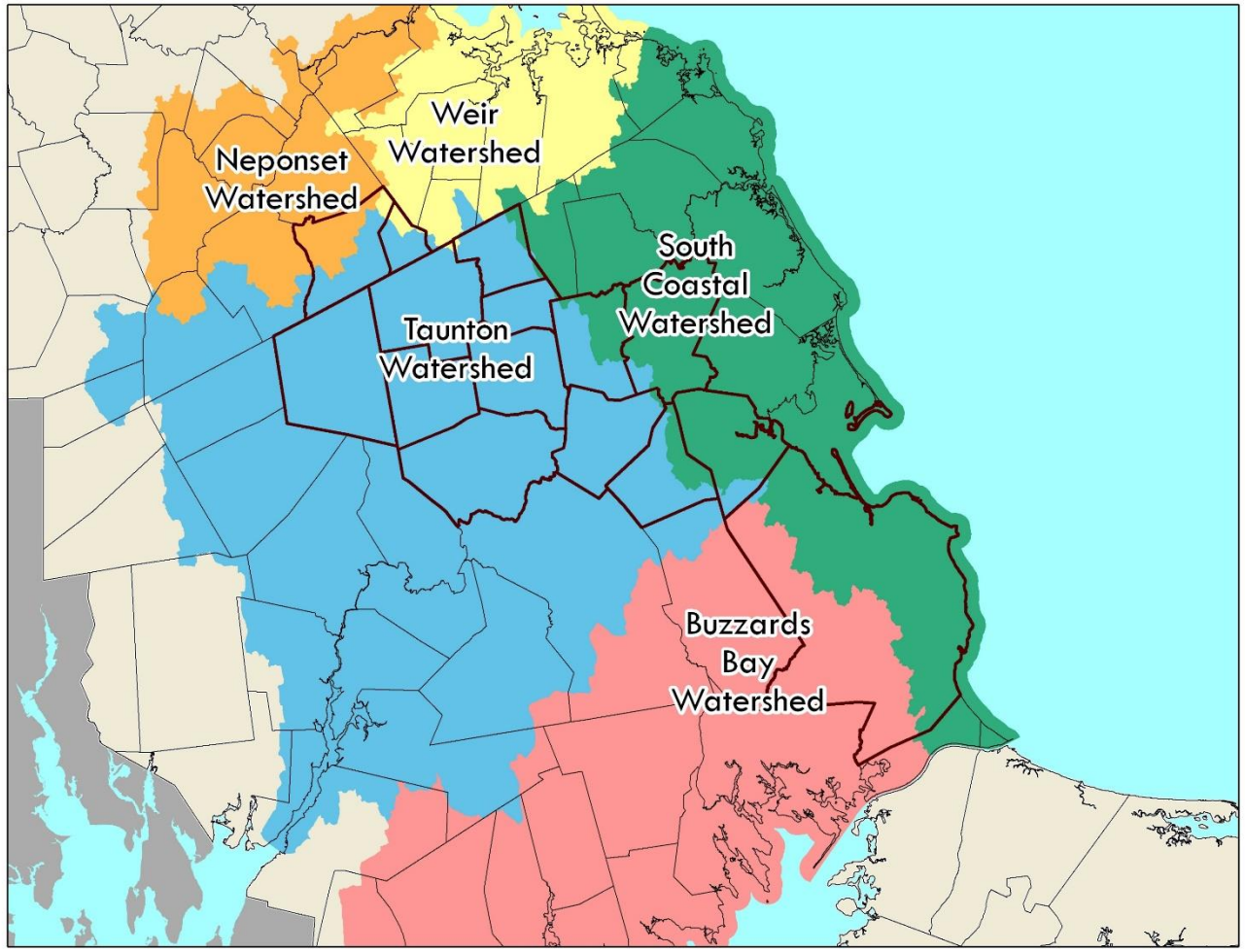
5. OCPC and Local Response



OCPC Climate Change Roadway Drainage and Runoff Study 2011

- Watersheds in the OCPC Region
- Impervious area in the region
- Storm water mapping for each community
- The affects of March 2010 storm event
- Regional drainage analysis and areas of concern
- Storm water regulation reviewed
- Strategies to mitigate storm water impacts
  - Low Impact Development (LID) practices

5. OCPC and Local Response
OCPC Climate Change Roadway Drainage and Runoff Study 2011



Watersheds in the OCPC region

The affects of storm event March 2010, Bridge Street top and Bridge Street today 2020 below, Bridgewater

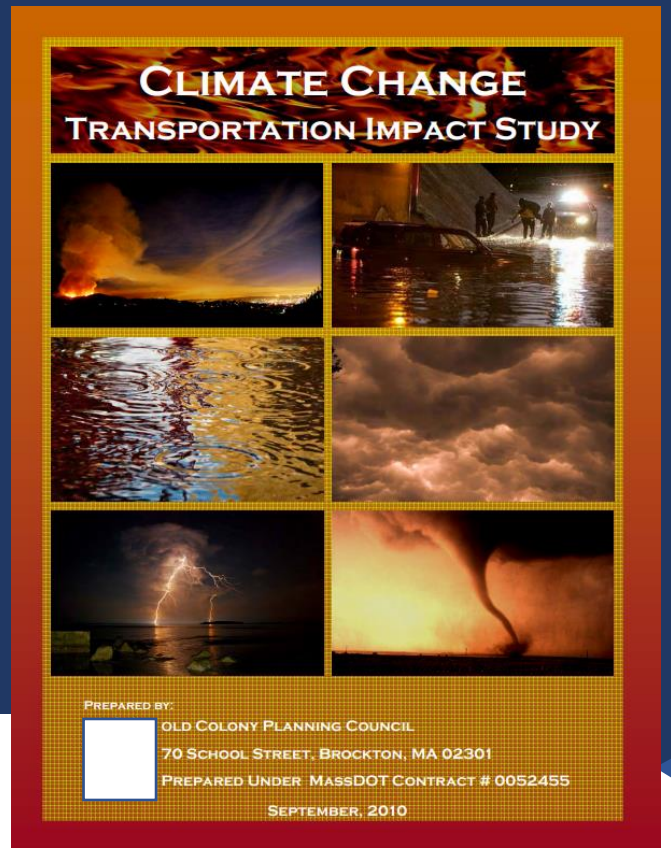
5. OCPC and Local Response
OCPC Climate Change Roadway Drainage and Runoff Study 2011

Salisbury Brook near Pleasant Street Brockton March 2010

Low Impact Development (LID)

"Traditional drainage uses large stormwater management systems to process stormwater, LID uses a diverse set of water controls designed to simulate the natural hydrologic cycle and reduce the total amount of runoff, distribute and discharge it to more locations, provide better natural pollution controls, and conceal the functionality with aesthetically pleasing design."

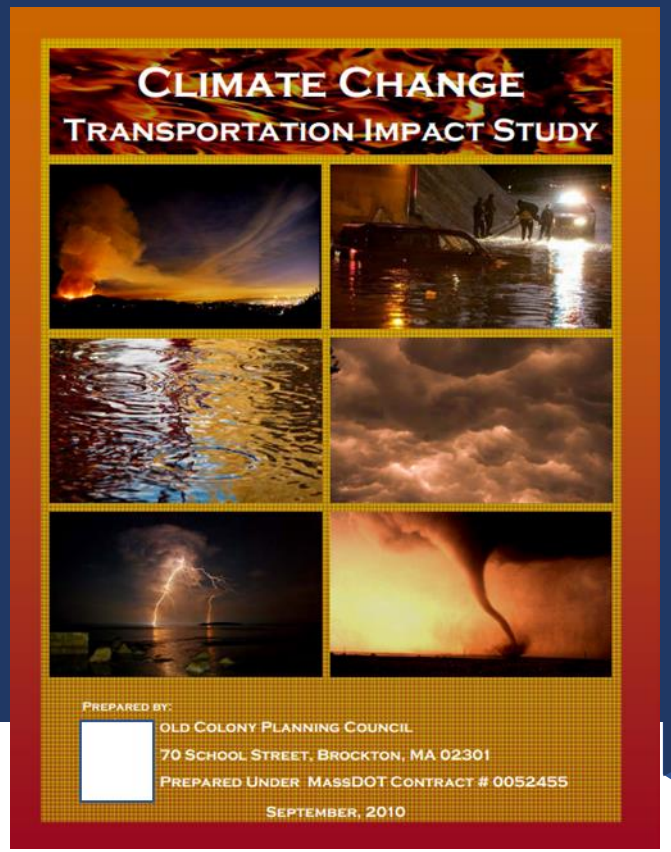
5. OCPC and Local Response OCPC Climate Change Transportation Impact Study 2010



Impacts

- Flooding
  - Taunton River, Bridgewater Titicut Street March 2010
  - Hollingsworth Pond, MBTA Passenger Rail Braintree, 2010
  - Norwood Airport flooded March 2010
  - March 2010, multiple roads in OCPC communities 15 inches in two weeks
  - Storm water and drainage
  - Dams
- Sea Level Rise
  - White Horse Beach, Plymouth
  - Coastal landowners and the tourism industry impacts
- Extreme Weather Impacts
- Air Quality and Health Impacts
  - Increase ground-level ozone causing air quality alerts
  - Health issues among the elderly and young children

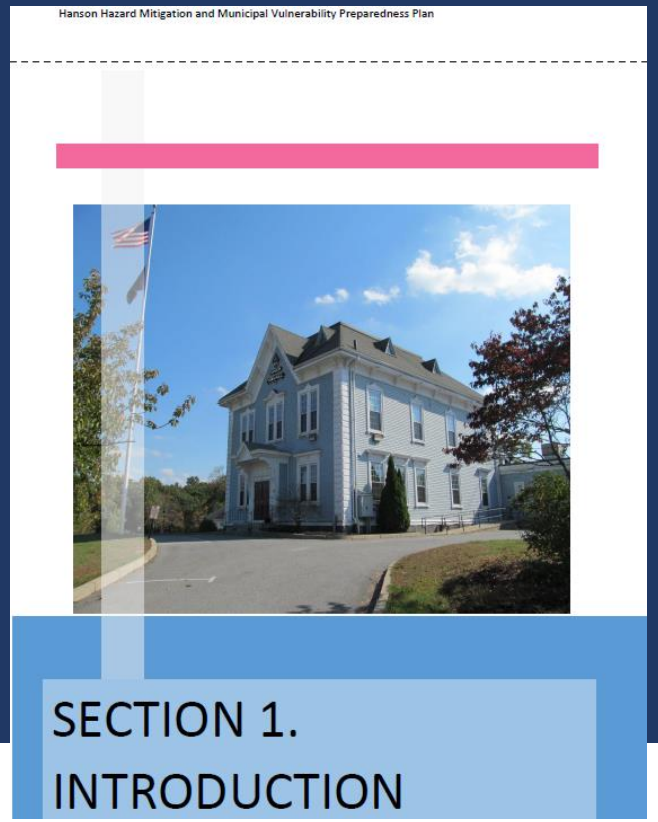
5. OCPC and Local Response
OCPC Climate Change Transportation Impact Study 2010



Recommended Improvements

- Improve local storm drainage by create drainage channels to detention ponds, clean trash/debris in swales on roads blocking water flow, increase safe flood storage by using potential multi-use retention basins
- Repair dams suitable for safe flood storage
- Reduce fallen tree risk with selective trimming and infill planting
- Continue creating / expanding fire breaks upwind of critical facilities
- Repairing/modifying seawalls for minimum erosion
- Local regulation - enforce current flood hazard zoning and adoption of storm water treatment and retention provisions
- Develop and/or update local stormwater and floodplain management plans.
- Integrate transit, bicycle, and pedestrian infrastructure into developments and promote Transit Oriented Development and Smart Growth principals (revise zoning promoting mixed-use/ integrated development)
- Use porous asphalt and LID to manage stormwater
- Consider track elevation for rail

5. OCPC and Local Response Municipal Vulnerability Preparedness



(Hanson Joint Plan: Hazard Mitigation and Municipal Vulnerability Preparedness Plan)

Massachusetts Municipal Vulnerability Preparedness grant program (MVP) provides funding for municipalities for the planning process for climate change resiliency, communities who complete the MVP program are certified and eligible for the MVP Action Grant funding

- Identify climate related hazards
- Understand how communities may be impacted by climate change
- Identify existing and future climate vulnerabilities and strengths
- Identify opportunities to take action to reduce risk and build resilience
- Implement priority actions identified through the planning process
- 15 of OCPC communities have completed or are in the process of completing an MVP plan, three have received an Action Grant

5. OCPC and Local Response Municipal Vulnerability Preparedness

	MVP Planning Grant	Local Hazard Mitigation Plan	MVP Action Grants
Abington+	✓ 2020 Comprehensive Environmental	No, and not with MVP; wants to do regional BRIC application (Liz Shea)	
Avon	In progress 2020 Weston & Sampson	In progress through MVP	
Bridgewater	✓ FY17/18	In progress OCPC	
Brockton	✓ FY17/18 OCPC involved	In progress; not with MVP. Funded by General Fund and awarded to STC.	2019: Integrated Water Infrastructure Vulnerability Assessment and Economic Development Plan for Climate Resiliency $312,615
Duxbury*	✓ FY17/18	✓ Completed 2018 MAPC	2019: Climate Change Flood Vulnerability Assessment/Adaptation Planning $131,712
East Bridgewater	In progress 2020 Vendor unknown	No, and not with MVP; wants to do regional BRIC application (John Haines)	
Easton+	✓ 2019	No, and not with MVP; wants to do regional BRIC application (Stephanie Danielson)	2020: Wetland Restoration- Removal of Abandoned Structures $177,620
Halifax	In progress 2020 $15,000 OCPC	In progress through MVP	
Hanover*+	Has not applied, but has expressed interest to State	No, and not part of OCPC Regional Plan; their HMP expires 2021	
Hanson	In progress FY19 $27,000 OCPC	In progress through MVP	
Kingston	✓ 2018 Horsley Witten Group	No, and not with MVP; Joanne checking with Mary Guiney	
Pembroke*	In progress 2020, extended 2021 Woodard & Curran	In progress through MVP	
Plymouth	✓ 2020 MAPC with OCPC support	In progress Horsley Witten Group	
Plympton	In progress 2020 Woods Hole	In progress through MVP	
Stoughton*+	In progress 2020 Vendor unknown	No, not part of MVP; wants to do regional BRIC application (Craig Horsfall)	
West Bridgewater	Has not applied, but has expressed interest to State	No, not part of MVP. Joanne checking with David Gagne.	
Whitman	In progress 2020 $? OCPC hopefully	In progress through MVP	

5. Local Response to Climate Change - Municipal Vulnerability Preparedness

September 2020

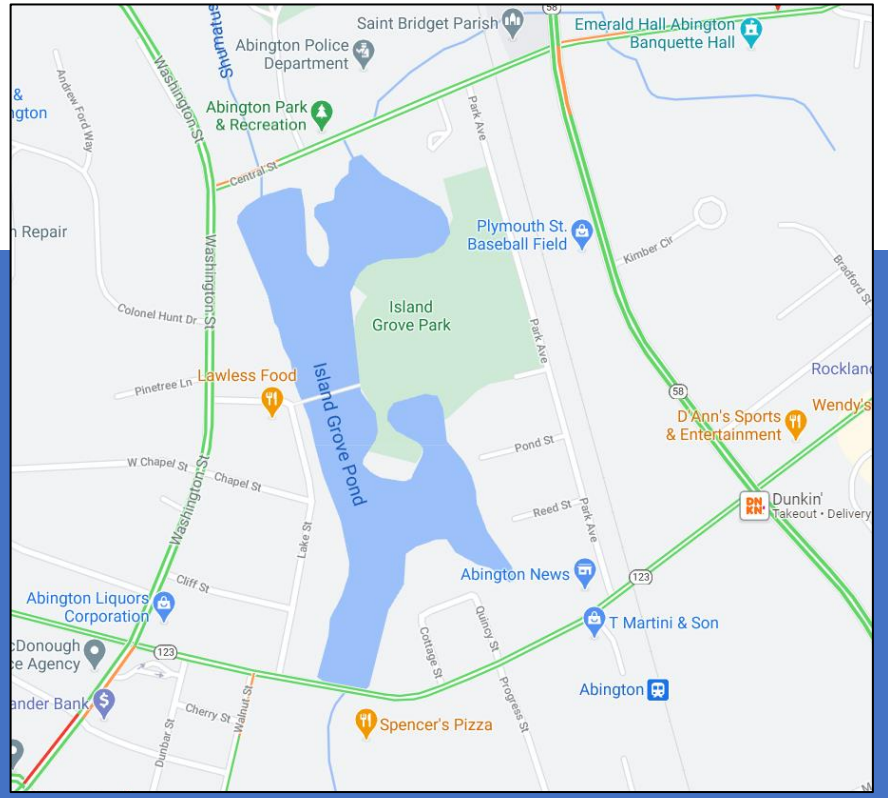
TOWN OF ABINGTON

COMMUNITY RESILIENCE BUILDING WORKSHOP
SUMMARY OF FINDINGS

Prepared for:

Town of Abington
500 Gliniewicz Way
Abington, MA 01940

Comprehensive Environmental Inc. • 41 Main Street, Bolton, MA 01740 • www.ceiengineers.com



ABINGTON Community Resilience Building Workshop Summary of Findings 2020

- ❖ Top Recommendations
  1. Repair Central Street Bridge - located at the inlet of the Shumatuscacant River to Island Grove Pond (significant hazard due to flooding and damage from high peak flows during strong storms)
  2. Repair Island Grove Pond Dam - located at the southern end of the pond at Centre Ave. (Rt. 123)

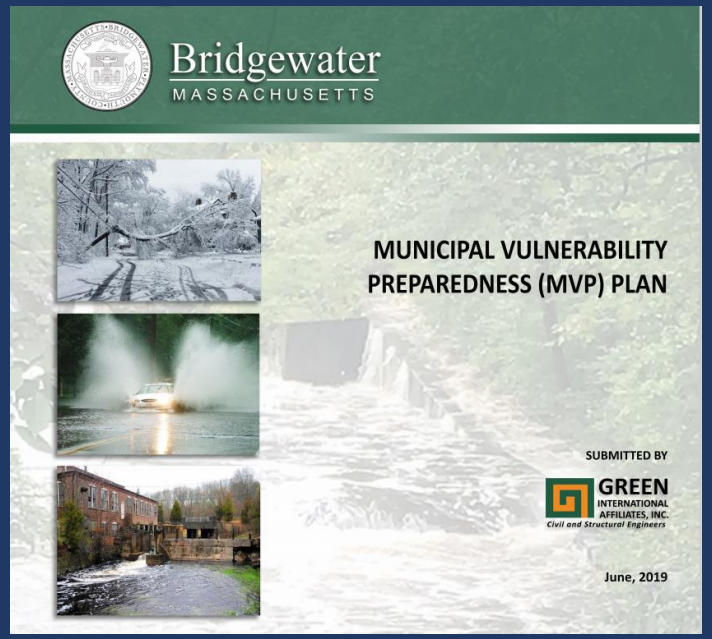
5. Local Response to Climate Change - Municipal Vulnerability Preparedness

AVON DRAFT Hazard Mitigation Plan and Municipal Vulnerability Preparedness Plan

❖Top Recommendations

1. Create a drainage map for the town to identify areas in need of new or additional drainage infrastructure
2. Extend culvert from West Trout Brook to the Avon Library lot to mitigate periodic flooding - High Priority
3. Enhance drainage in the Brentwood Avenue subdivision to alleviate flooding concerns – High Priority
4. Continue to clear brooks and streams throughout town to allow for the free flow of water and to mitigate the threat of flooding
5. Develop and implement a local flood mitigation dam management program
6. Clean and maintain the stormwater detention pond at the intersection of Bodwell Street and Murphy Drive
7. Upgrade the surface drainage infrastructure on Bodwell Street and Kiddie Drive

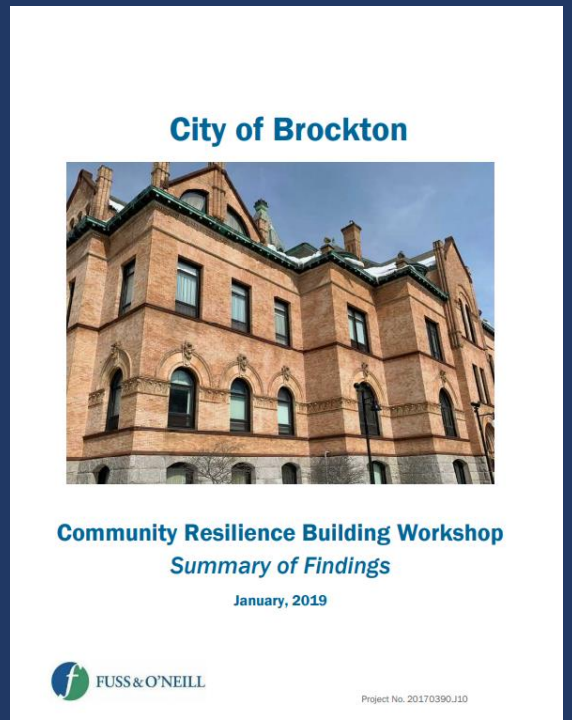
5. Local Response to Climate Change - Municipal Vulnerability Preparedness



BRIDGEWATER Municipal Vulnerability Preparedness Plan

- Top Recommendations
  1. Obtain Effective hydraulic computer models from FEMA and develop Town-wide Hydrologic and Hydraulic (H&H) models based on UMass climate change (CC) projections for the 2050's and
  2. 2090'sDevelop a Culvert and Bridge Improvement Master Plan

5. Local Response to Climate Change - Municipal Vulnerability Preparedness

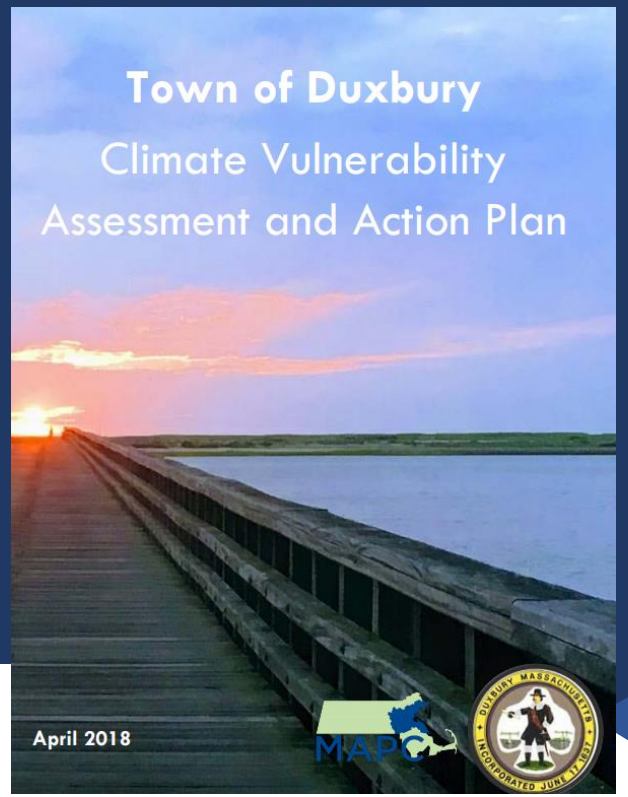


Salisbury Plain River regularly floods out Main St Route 28 at K-Mart Plaza (just north of W. Bridgewater line)

BROCKTON Community Resilience Building Workshop Summary of Findings

1. Develop an integrated all-waters approach to increase flood resiliency City-wide
2. Study of the City's dams how they work together effectively for flood storage or where dam removals may be warranted
3. There is a need for a systematic, detailed inventory that catalogs the size and condition of culverts and bridges City-wide

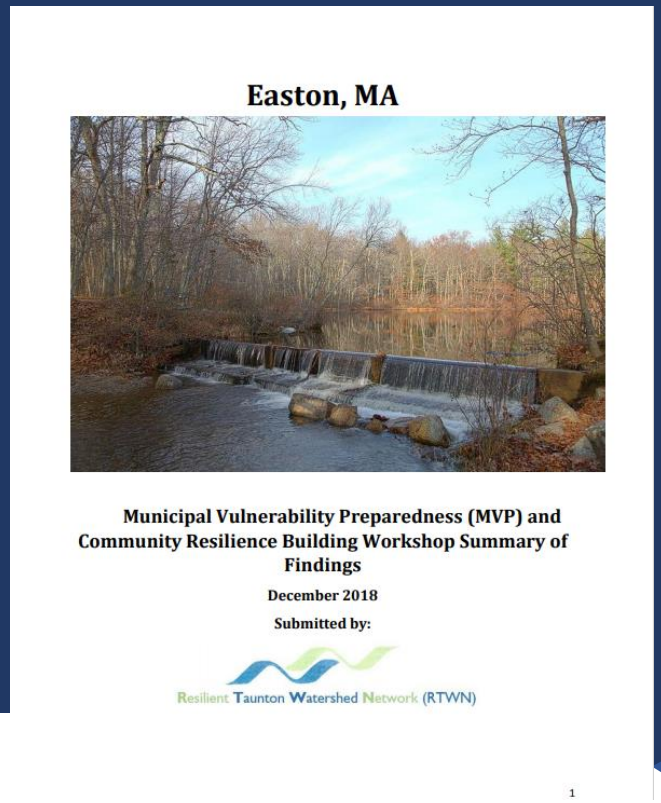
5. Local Response to Climate Change - Municipal Vulnerability Preparedness



DUXBURY Climate Vulnerability Assessment and Action Plan

The Town has hired a consultant through an MVP implementation grant (to be completed in the spring 2021) for determining the coast line sea level rise impacts to roads, bridges, culverts in 10 year, 50 year horizon. Coordinated with MassDOT.

5. Local Response to Climate Change - Municipal Vulnerability Preparedness


Easton, MA

Municipal Vulnerability Preparedness (MVP) and Community Resilience Building Workshop Summary of Findings

December 2018

Submitted by:

Resilient Taunton Watershed Network (RTWN)

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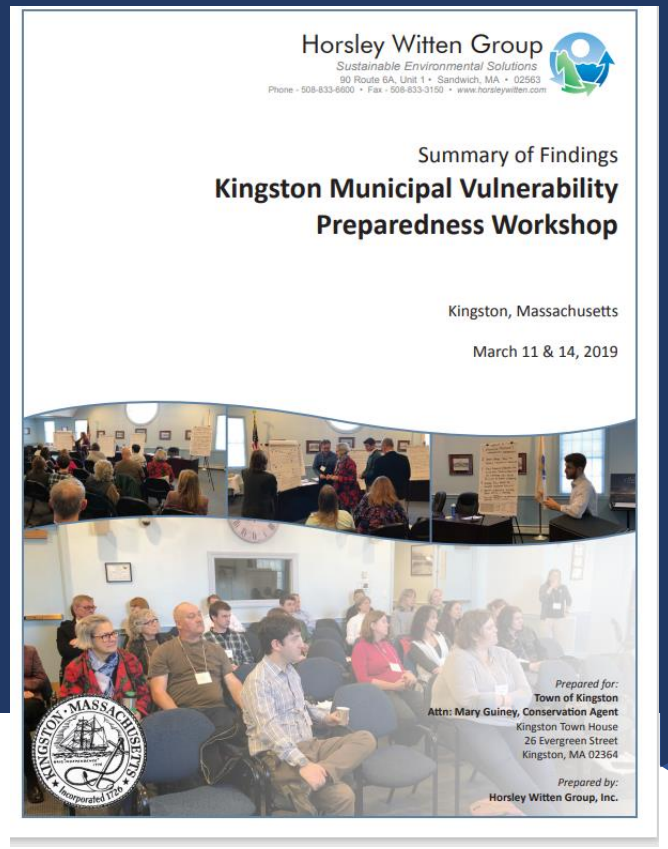
EASTON MVP Community Resilience Building Workshop Summary

Culverts and localized flooding areas of concern included:

- Sawmill Pond Rd at Bay Rd around #486, Prospect Road around #80 and #33
- Culvert under Route 138 near the mobile home park
- Bay Rd near #224 has a confluence of three culverts
- Purchase Street at the “Dog Leg” near Easton Country Club

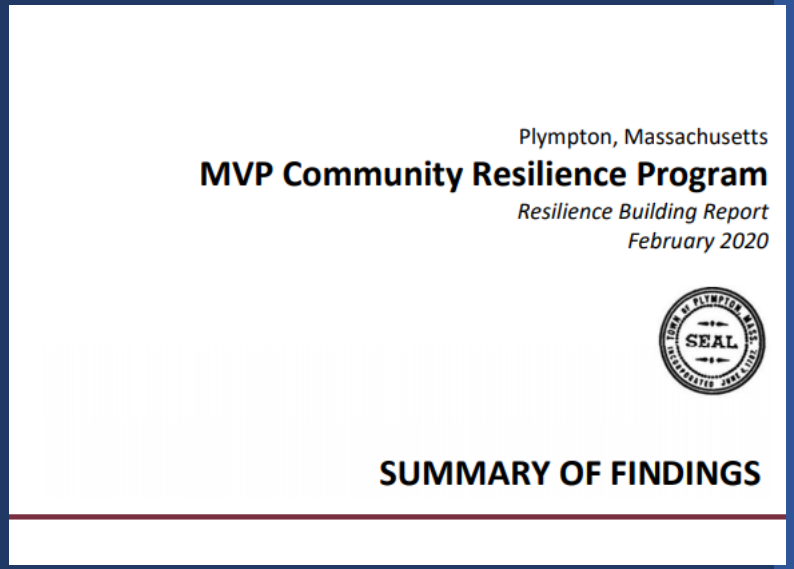
5. Local Response to Climate Change - Municipal Vulnerability Preparedness



KINGSTON Municipal Vulnerability Preparedness Workshop

- Several culverts in town, including ones at Lake Street and Tussock Brook are in the planning process of being removed or retrofitted to improve flow and reduce flooding
- The town has installed Vortechs® stormwater treatment at several outfalls combining swirl concentration and flow controls into a shallow treatment unit that traps and retains trash, debris, sediment and hydrocarbons from stormwater runoff

5. Local Response to Climate Change - Municipal Vulnerability Preparedness


Plympton, Massachusetts

MVP Community Resilience Program

Resilience Building Report

February 2020

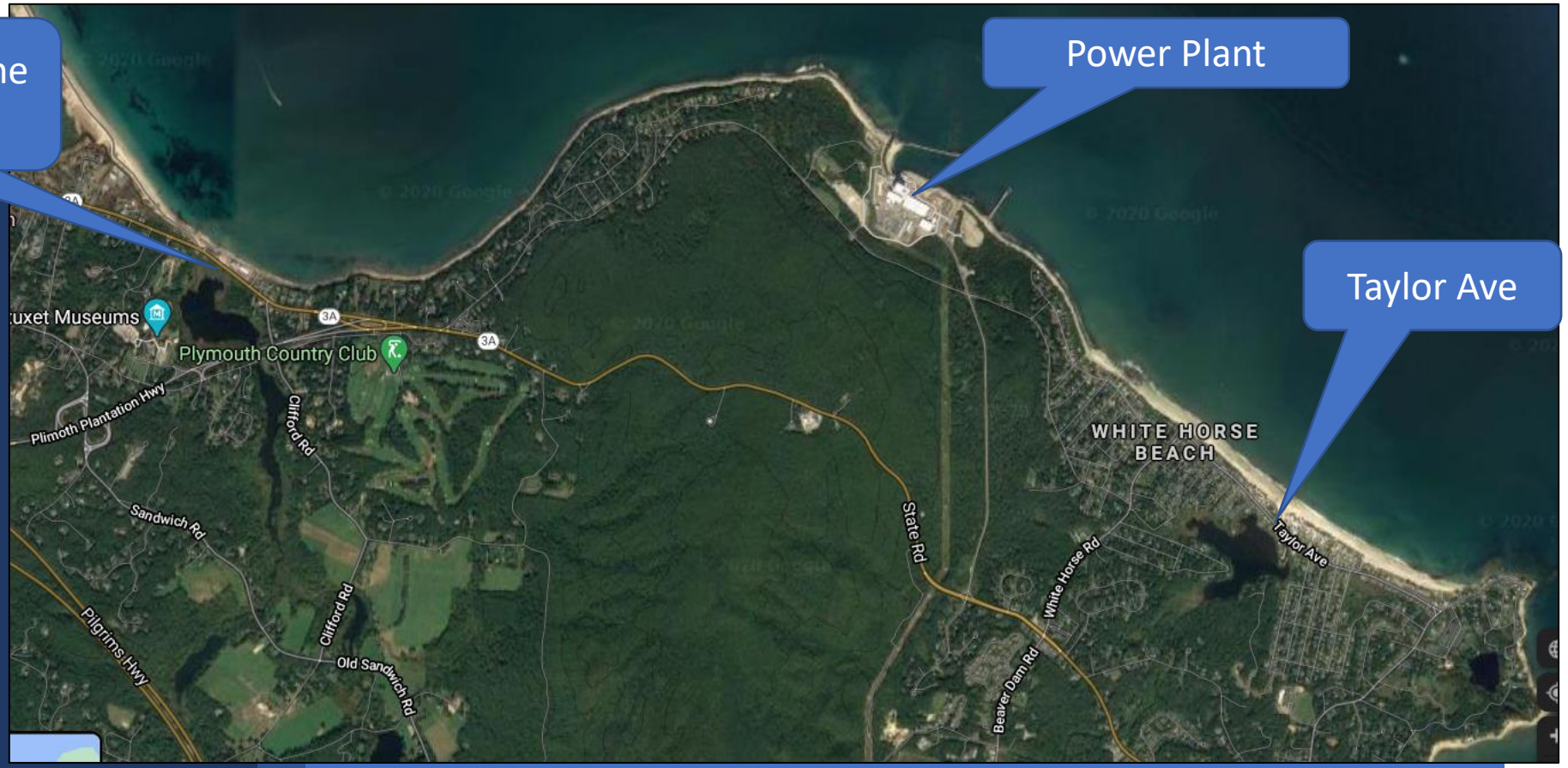
SEAL

SUMMARY OF FINDINGS

PLYMPTON MVP Community Resilience Program

- Inventory of Town-owned culverts; Replace, repair & update culverts; Asses/Identify places for new culverts, Conduct bridge & culvert condition assessment; develop repair and maintenance program
- Conduct dam condition assessment on Town-owned Dams; develop dam repair & maintenance program; Identify potential Easements around Rivers; Develop
- State and Major Roads: Continued maintenance; follow pavement management plan; purchase

5. Local Response to Climate Change - Municipal Vulnerability Preparedness

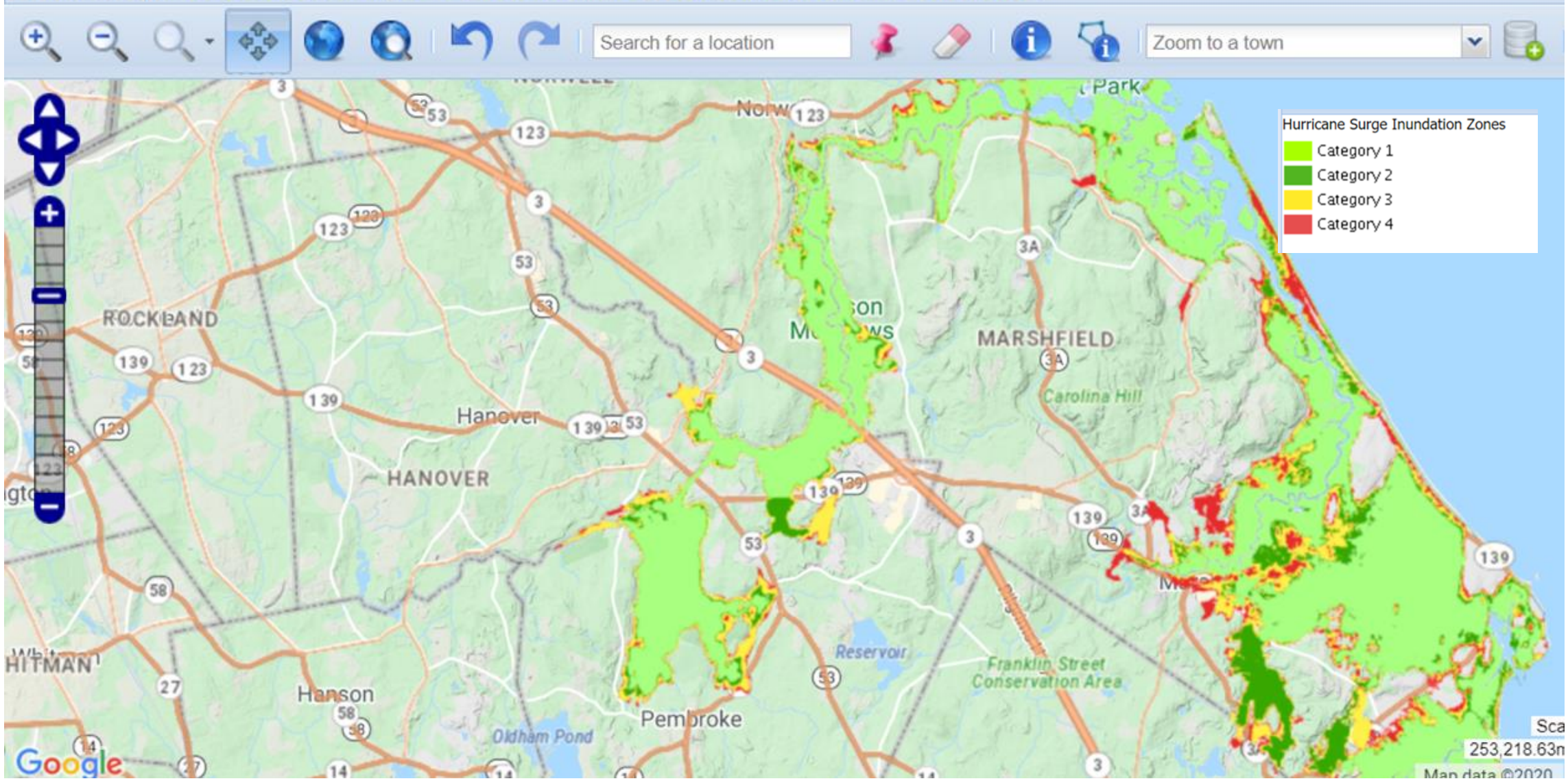


PLYMOUTH Municipal Vulnerability Preparedness Plan

- Coastal Sea Level Rise

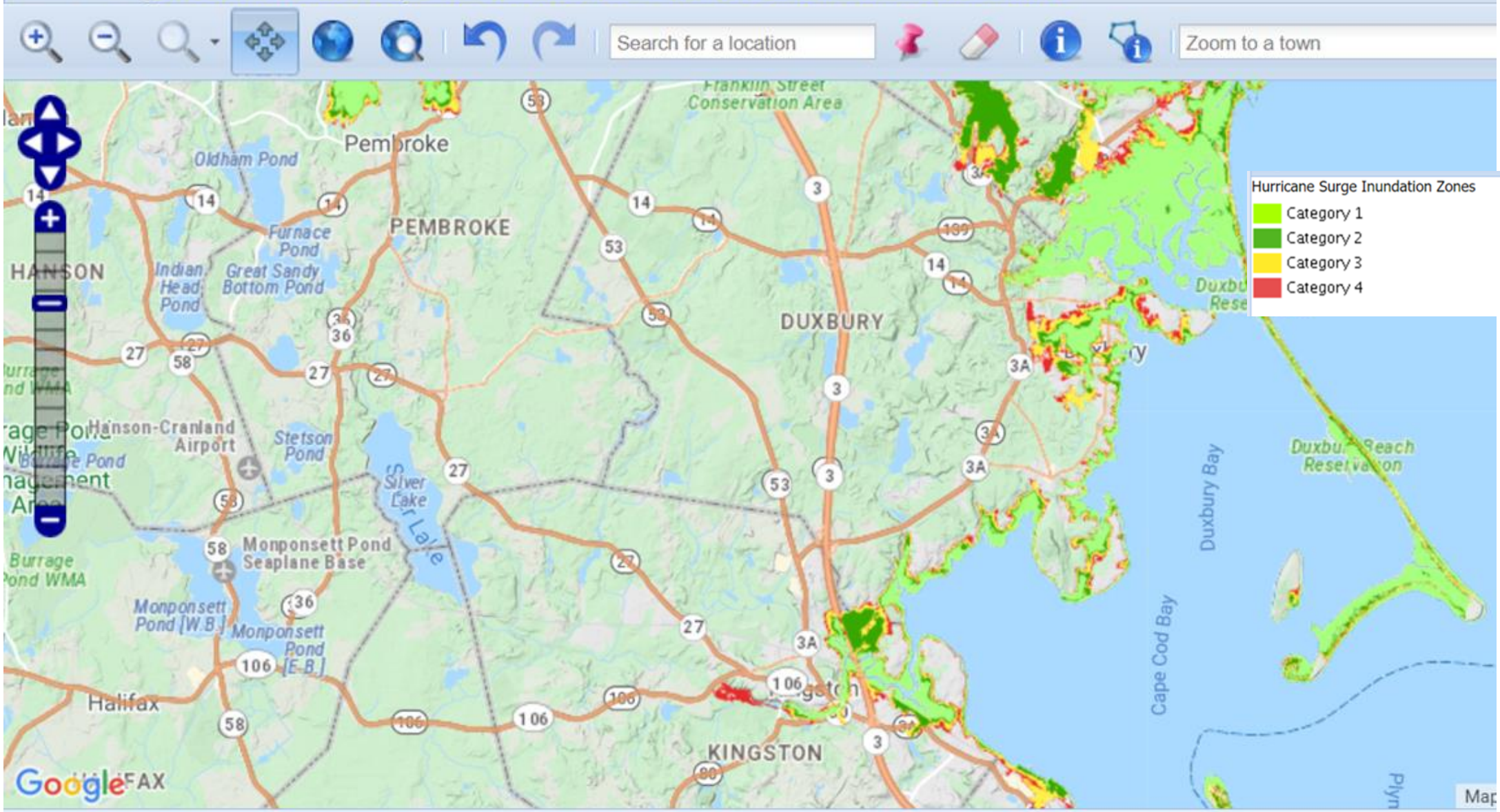
Climate Change Vulnerability Map

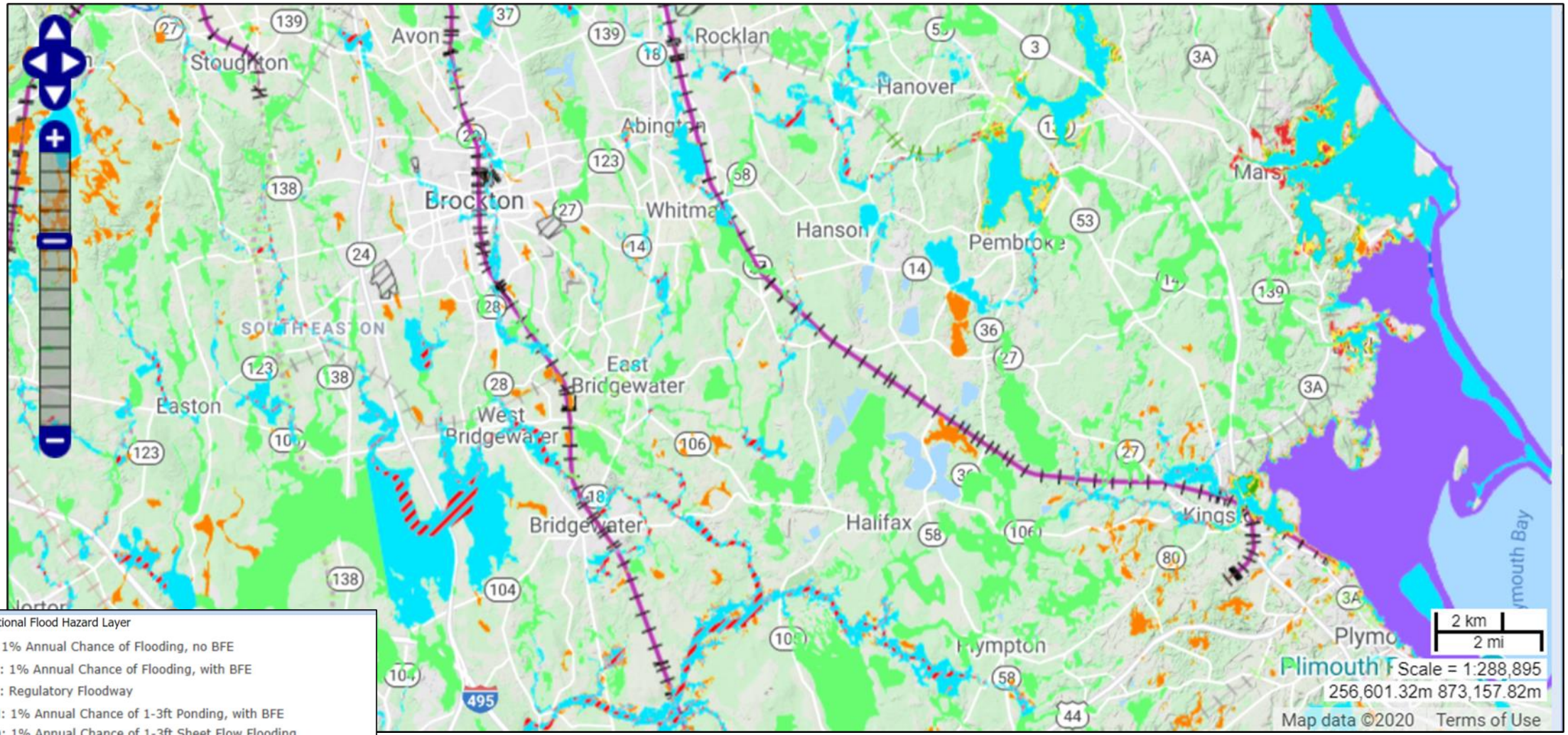
Provided by [Massachusetts Dept. of Public Health - Bureau of Environmental Health]



Climate Change Vulnerability Map

Provided by Massachusetts Dept. of Public Health - Bureau of Environmental Health



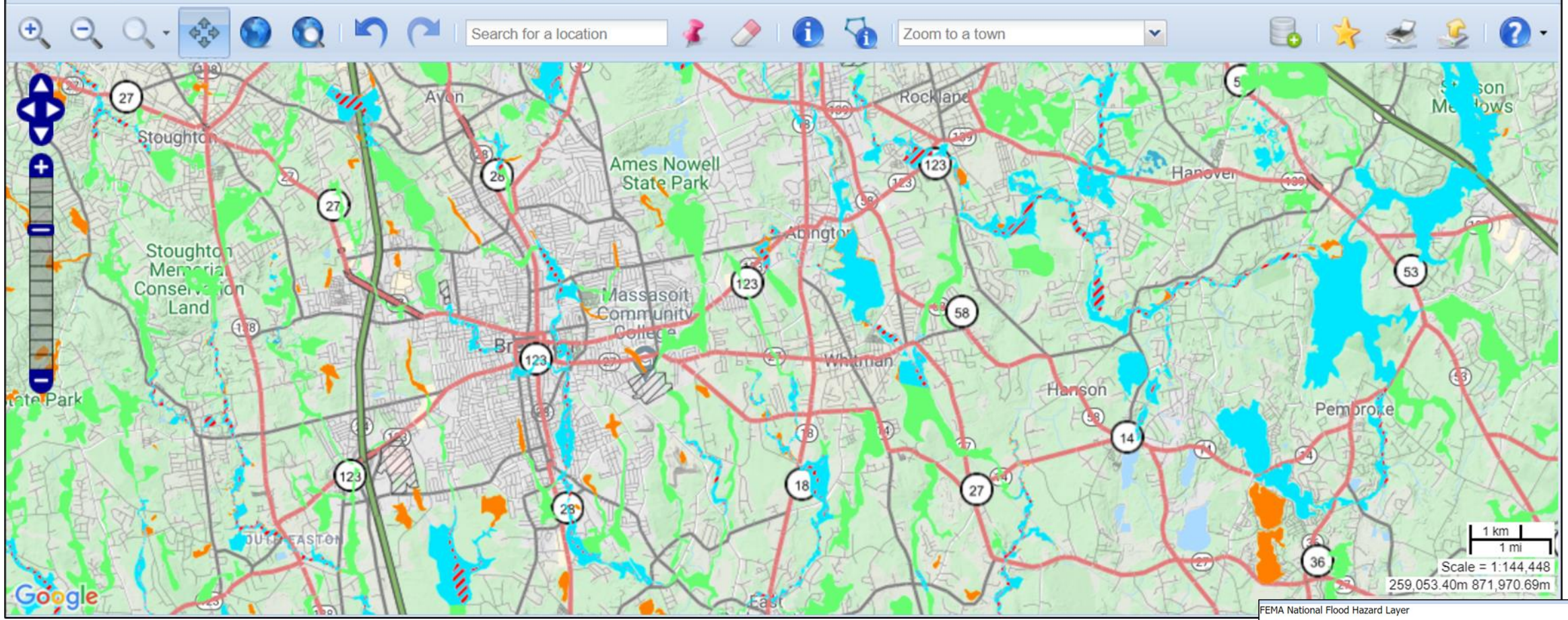


FEMA National Flood Hazard Layer

- A: 1% Annual Chance of Flooding, no BFE
- AE: 1% Annual Chance of Flooding, with BFE
- AE: Regulatory Floodway
- AH: 1% Annual Chance of 1-3ft Ponding, with BFE
- AO: 1% Annual Chance of 1-3ft Sheet Flow Flooding, with Depth
- VE: High Risk Coastal Area
- D: Possible But Undetermined Hazard
- X: 0.2% Annual Chance of Flooding
- X: 1% Drainage Area < 1 Sq. Mi.
- X: Reduced Flood Risk due to Levee
- Area Not Included
- Area with no DFIRM - Paper FIRMs in Effect

Climate Change Vulnerability Map

Provided by [Massachusetts Dept. of Public Health - Bureau of Environmental Health]



Massachusetts Decarbonization Roadmap

The Executive Office of Energy and Environmental Affairs planning process to identify cost-effective and equitable strategies to ensure Massachusetts reduces greenhouse gas emissions by at least 85% by 2050 and achieve net-zero emissions.

Public Engagement – Release of draft reports in January 2021

- RoadMap to 2050 (decarbonization plan)
  - www.mass.gov/2050Roadmap
- Clean Energy and Climate Plan CECP
  - www.mass.gov/2030 CECP (Public comments accepted on the plan until March, 2021)

System Transformations to 2050

TRANSPORTATION

- Cars, trucks, and buses are emissions-free and mostly electric; zero-carbon fuels like hydrogen help power the rest of the transportation system.
- A healthy public transit system, bike lanes, sidewalks, and transit-oriented development complement vehicle electrification and help to reduce congestion.

BUILDINGS

- High-performance heat pumps provide clean, energy-saving heat and air conditioning for most homes.
- More energy efficient buildings and electric appliances help reduce monthly energy bills for most families and small businesses.

ENERGY SUPPLY

- Wind and solar power are widely deployed to decarbonize the grid and meet the growing demand for clean electricity.
- A diverse mix of energy resources ensures year-round reliability.
- Improved transmission and distribution systems increase access to a diverse set of low-cost resources and allow offshore wind to help power New England.

NON-ENERGY

- Organic wastes are composted at greater rates, single use plastics are reduced and recycled, and waste generation overall is minimized.
- Agriculture and industry are managed responsibly to reduce emissions.
- Potent industrial greenhouse gases are replaced by climate-friendly alternatives.

LAND USE

- Forests and other natural and working lands are managed strategically to enhance carbon sequestration while maintaining and building ecosystem health and resiliency.

Massachusetts Decarbonization Roadmap

OCPC Climate Change Vulnerability Transportation Assessment (Completion Date September 2021)

Next Steps

- Public Outreach
  - Public Meeting
  - Local Input
  - Develop Recommendations
- Draft Report to stakeholders for review and comment
- Finalize Report September 2021

Questions/Comments?

Contact Information:

Raymond Guarino Principal Transportation Planner

Old Colony Planning Council

Brockton, MA 02301

rguarino@ocpcrpa.org www.ocpcrpa.org 508-583-1833 Ext 212