AGENDA

1. Welcome and Introductions
    a. Mary Waldron - Executive Director, Old Colony Planning Council.
    b. Hong-Hanh Chu - Global Warming Solution Act Program Manager, Executive Office of Energy and Environmental Affairs
    c. Steven Tupper - Transportation Program Manager, Cape Cod Commission
    d. Martin Pillsbury - Director of Environmental Planning, Metropolitan Area Planning Council
    e. Bill Napolitano - Rivers, Trails and Watersheds Coordinator, Southeastern Regional Planning and Economic Development District
    f. Ray Guarino – Principal Transportation Planner, Old Colony Planning Council
2. Logistics
    a. Housekeeping
    b. The Summit will be recorded and available on You Tube under the OCPC You Tube Channel.
    c. Questions will be taken through the Q and A button on Zoom.
    d. Five-minute questions and answers after each presentation
    e. Final questions and answers after all presentations.
3. Panel Presentations
4. Final questions and answers period
5. Closing remarks and contact information

Reducing Transportation Sector Greenhouse Gas Emissions in Massachusetts

Hong-Hanh Chu
GWSA Program Manager
Executive Office of Energy and Environmental Affairs
Hong-Hanh.Chu@mass.gov

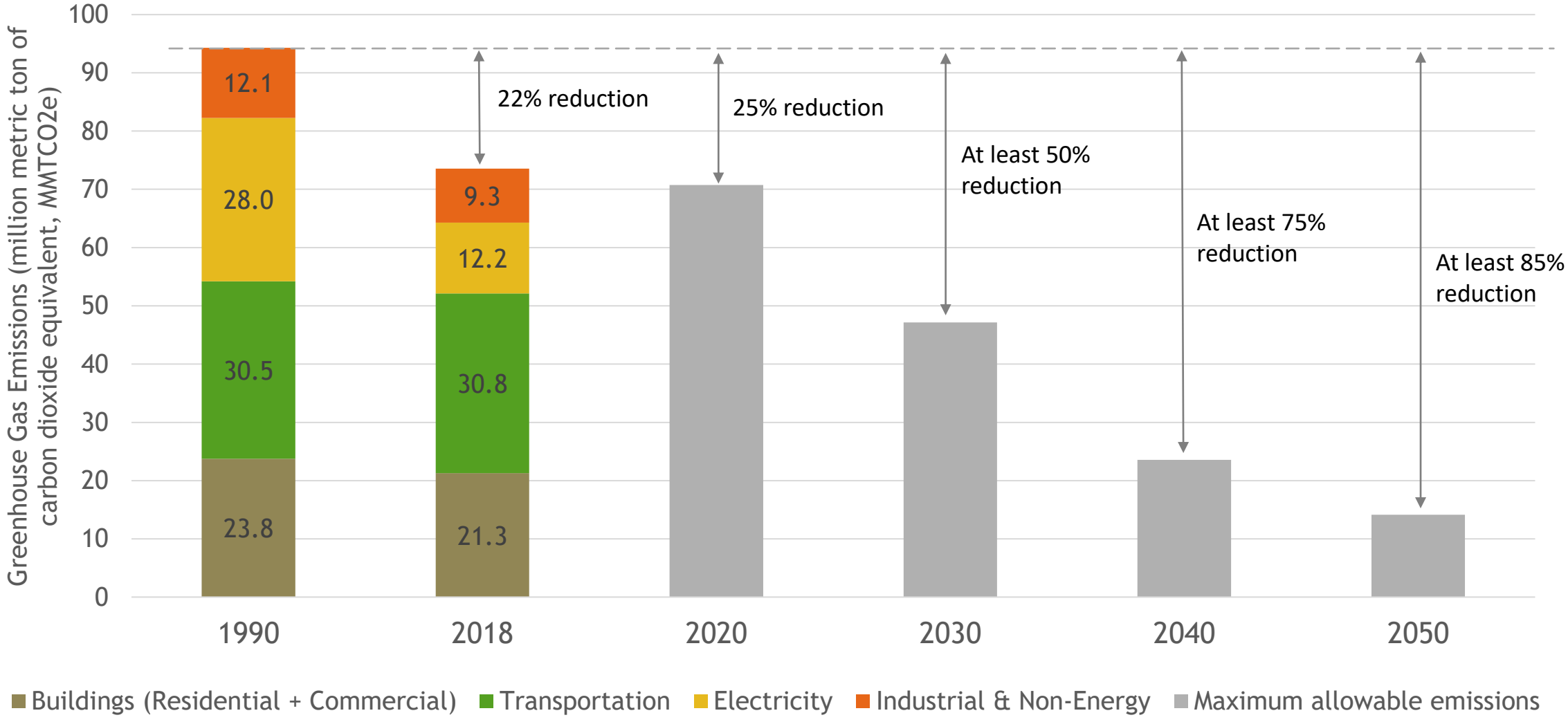
Executive Office of Energy and Environmental Affairs

Massachusetts Global Warming Solutions

Overview

- Statewide Emissions: Past & Future
- 2050 Roadmap: Approach & Key Findings
- Strategies to Reduce Transportation Emissions
- Next Steps for Clean Energy and Climate Plan for 2025 and 2030

Statewide Emissions: Past & Future



Net Zero emissions: sources of emissions = removal of emissions

2050 Roadmap: Approach

End Use Energy

Transitioning buildings, vehicles, and other end uses away from consuming fossil fuels

Energy Efficiency and Flexibility

Aggressively pursuing energy efficiency and flexibility to enable cost-effective decarbonization

Decarbonizing Energy Supply

Producing zero and low-carbon energy supplies to power our energy system

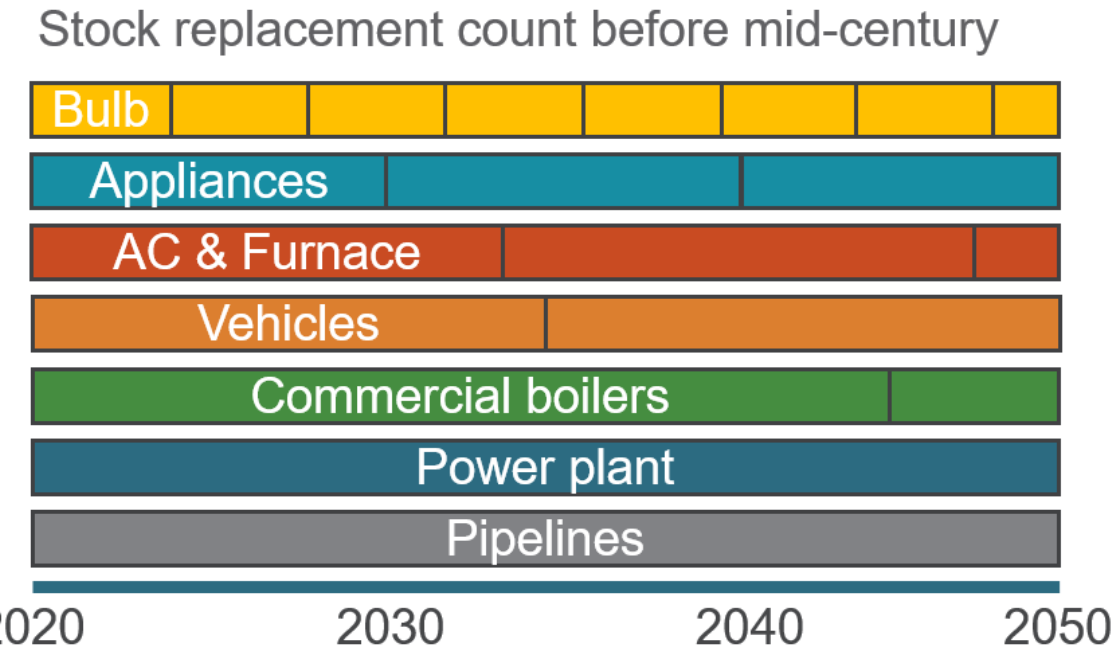
Carbon Sequestration

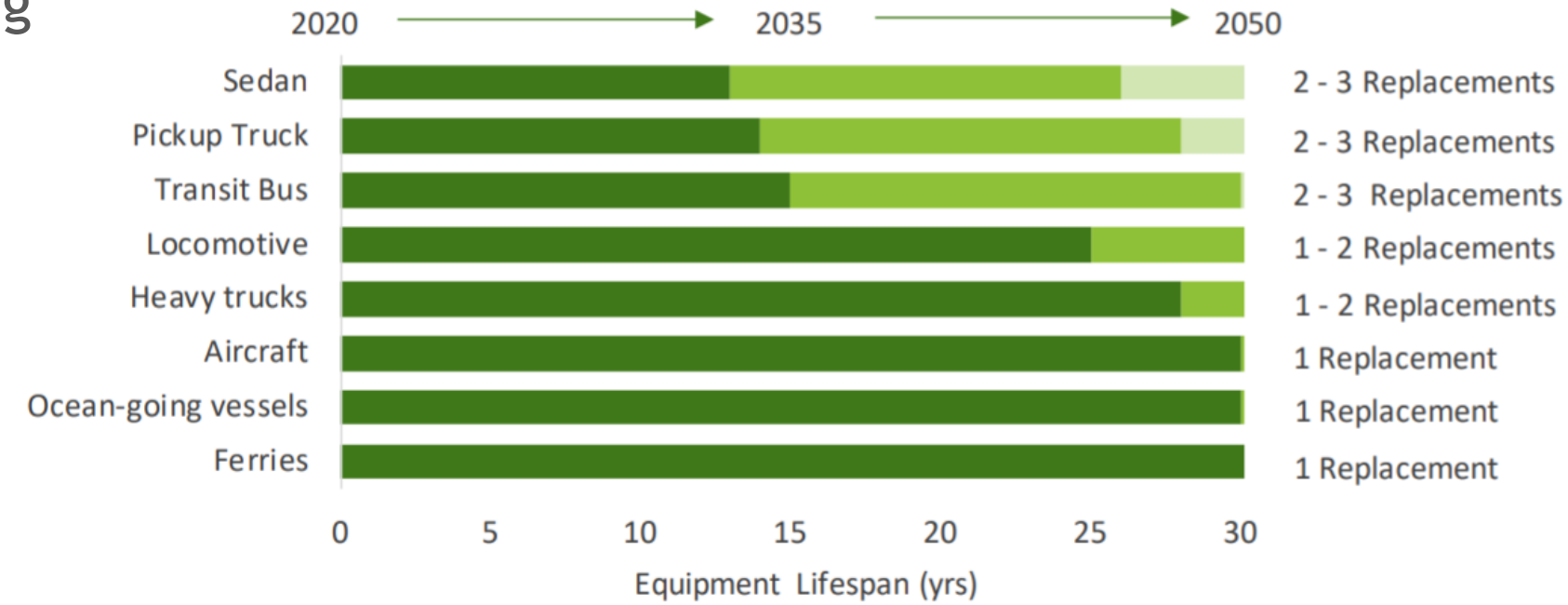
Balancing remaining emissions by facilitating carbon dioxide removal from the atmosphere

More information and reports at www.mass.gov/2050Roadmap

2050 Roadmap: Approach

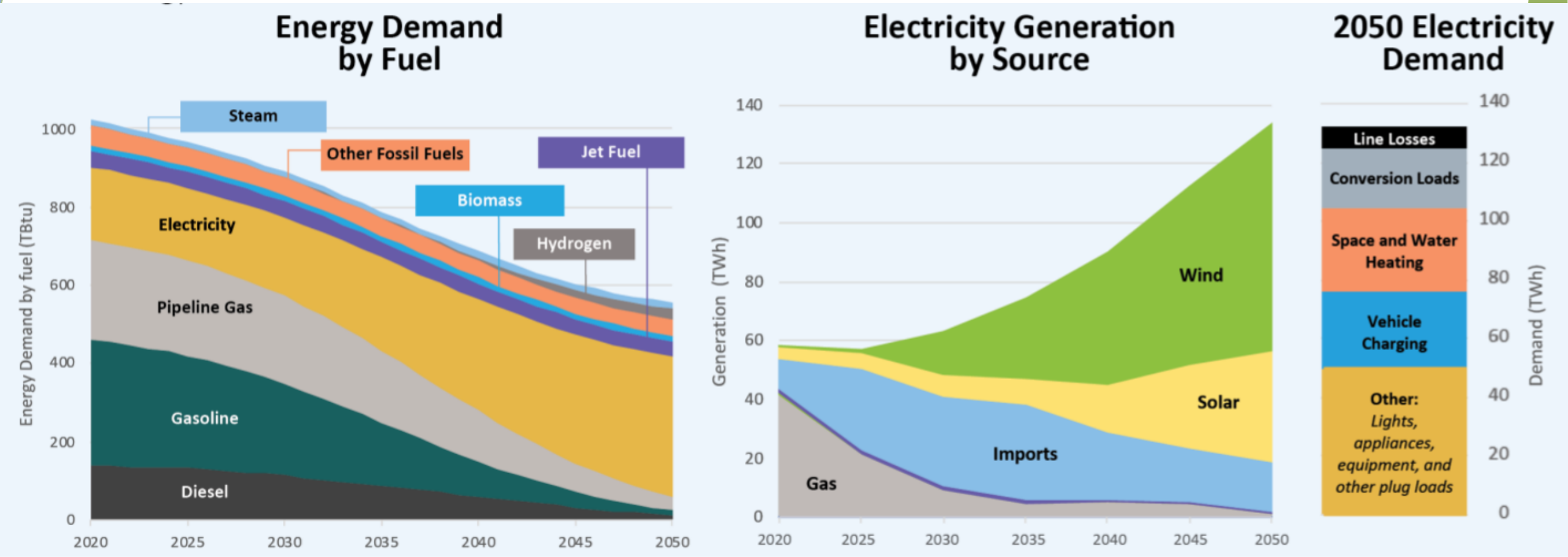
- Replacement of emitting equipment with low/non-emitting equipment at retirement age is the key to maintaining affordability.





More information and reports at www.mass.gov/2050Roadmap

2050 Roadmap: Key Findings



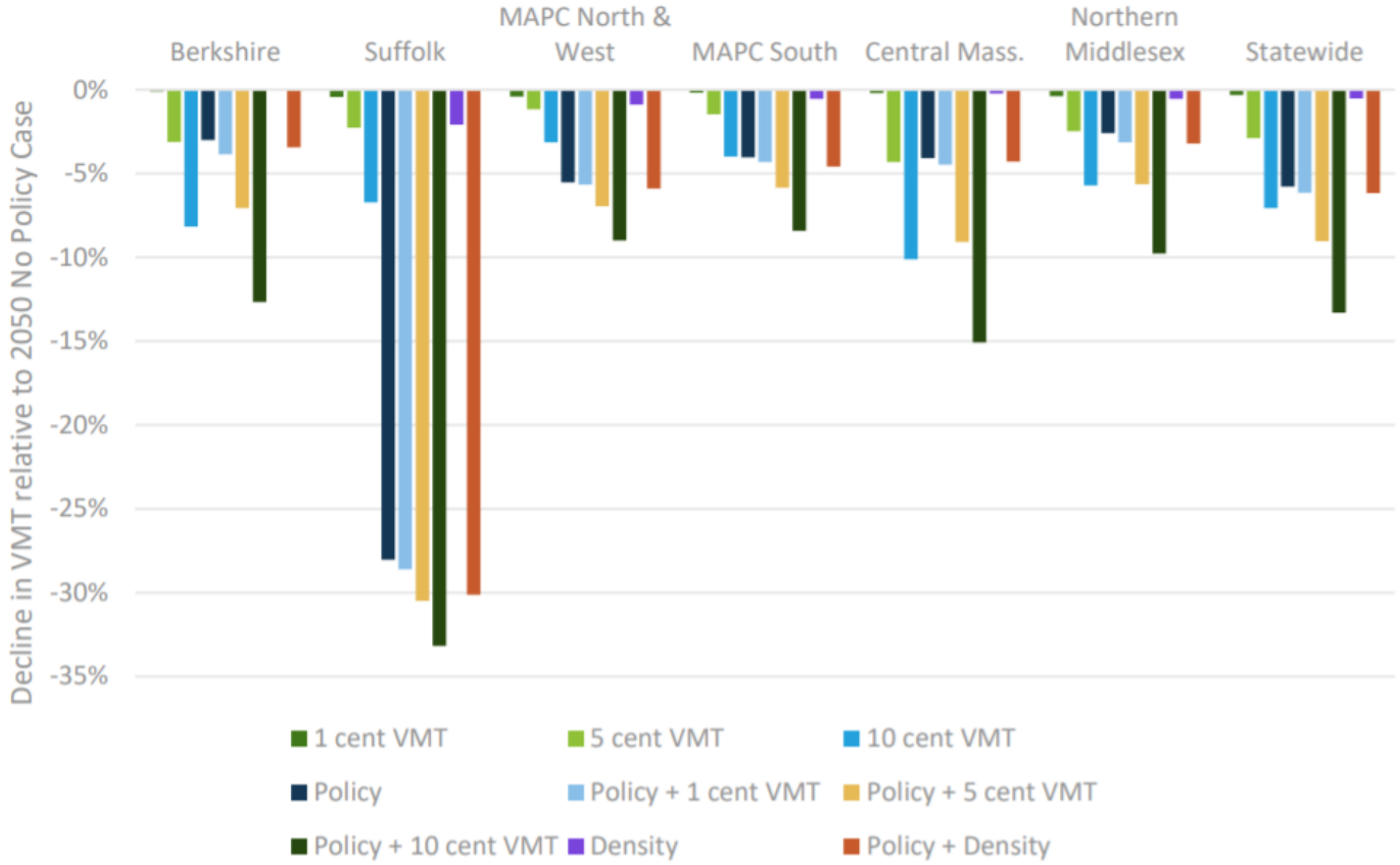
More information and reports at www.mass.gov/2050Roadmap

Table 14. Million Daily Vehicle Miles Traveled (DVMT) for EERPAT Analysis Regions for 2015 base year and 2050 reference scenario.

RPA/County	Population (thousands)			DVMT (millions)			DVMT per capita		
	2015	2050	Increase	2015	2050	% Increase	2015	2050	% Increase
Berkshire County RPC	142	127	-10.6%	3.4	3.7	8.4%	23.8	28.8	21.2%
MAPC: Suffolk	734	828	12.9%	8.7	11.3	30.4%	11.8	13.7	15.6%
MAPC: North & West	1758	2035	15.8%	35.5	43.0	21.1%	20.2	21.1	4.6%
MAPC: South	778	905	16.3%	18.1	23.6	30.2%	23.3	26.1	12.0%
Cape & Islands	268	171	-36.2%	8.3	6.5	-21.8%	31.0	38.0	22.4%
Central Mass.	566	655	15.7%	15.0	19.9	32.9%	26.4	30.4	14.9%
Franklin	76	67	-12.2%	2.3	2.6	11.3%	30.7	38.9	26.7%
Merrimack Valley	341	387	13.5%	7.3	9.4	28.5%	21.5	24.3	13.2%
Montachusett	244	240	-1.9%	6.0	7.4	23.7%	24.6	31.0	26.2%
Northern Middlesex	295	287	-2.9%	6.4	7.3	15.0%	21.6	25.6	18.4%
Old Colony	298	398	33.9%	9.6	12.9	33.8%	32.4	32.4	0.0%
Pioneer Valley	650	660	1.6%	13.4	16.5	23.1%	20.6	25.0	21.2%
Southern Mass	643	651	1.2%	14.9	18.5	24.4%	23.1	28.4	22.9%
Statewide	6792.4	7410.3	9.1%	148.9	182.6	22.6%	21.9	24.6	12.4%

More information and reports at www.mass.gov/2050Roadmap

Figure 20. Change in VMT by region as a result of VMT fees and transit policy. Note some RPA's are omitted for simplicity. Policy and Density are used to respectively indicate the application of transit policy and densificiantion policy as described in Table 13.

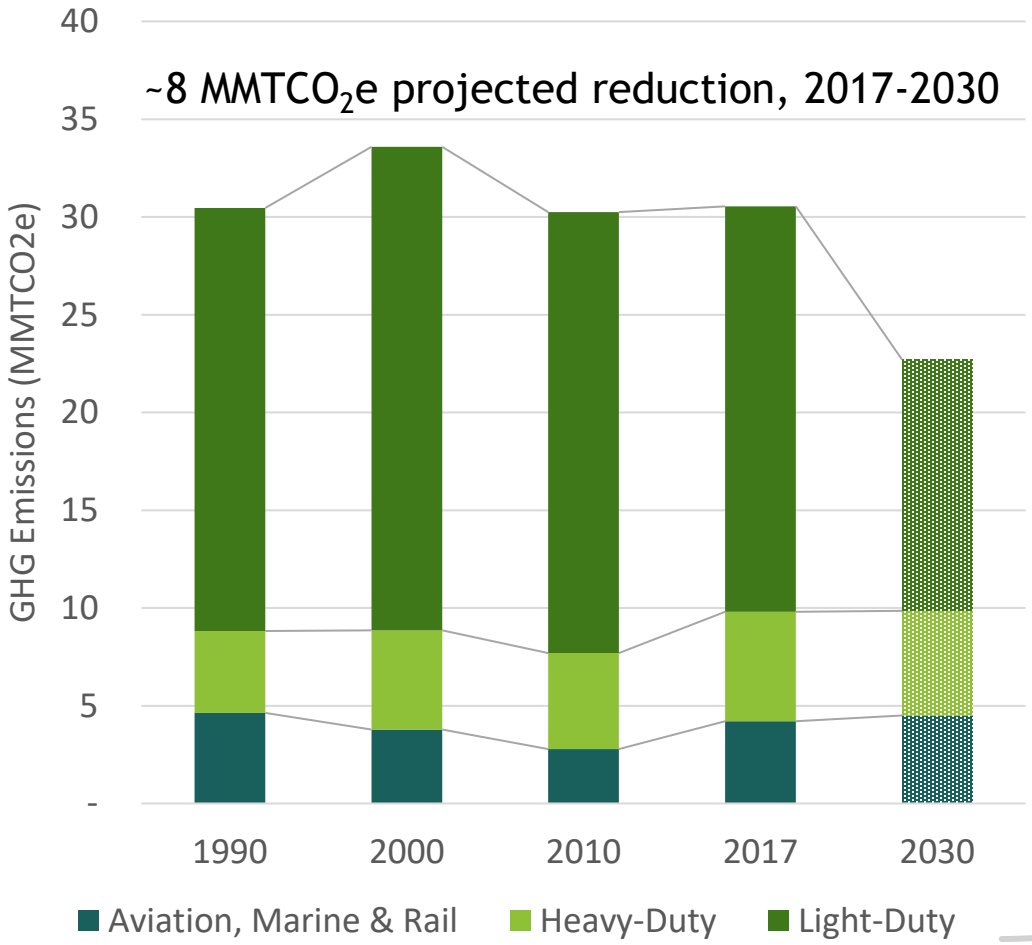


More information and reports at www.mass.gov/2050Roadmap

Interim Clean Energy & Climate Plan for 2030: Major Transportation Transformations

Where emissions reductions are expected to come from?

Historical & Projected MA GHG Emissions



What do the emissions savings translate to?

Key Metrics

At least **750,000**	**Light-duty zero-emission vehicles on the roads**
20,000	**Medium/Heavy-duty zero-emission vehicles on the roads**
20% (approximate)	**Reduction in carbon intensity of diesel fuel**
15%	**Reduction in commuter miles**
56 billion miles	**Light-duty vehicle miles traveled (VMT) each year stabilized at this level**

How are we going to achieve it?

Main Strategies

- *T1. Cap Transportation Sector Emissions and Invest in Clean Transportation Solutions;*
- *T2. Implement Coordinated Advanced Clean Vehicle Emissions and Sales Standards;*
- *T3: Reduce Upfront ZEV Purchase Cost Burden;*
- *T4. Deploy Electric Vehicle Supply Equipment & Enable Smart Charging;*
- *T5. Engage Consumers & Facilitate Markets;*
- *T6. Stabilize Light-Duty VMT & Promote Alternative Transportation Modes.*

Interim Clean Energy & Climate Plan for 2030: Transportation Emissions Reduction Strategies/Actions

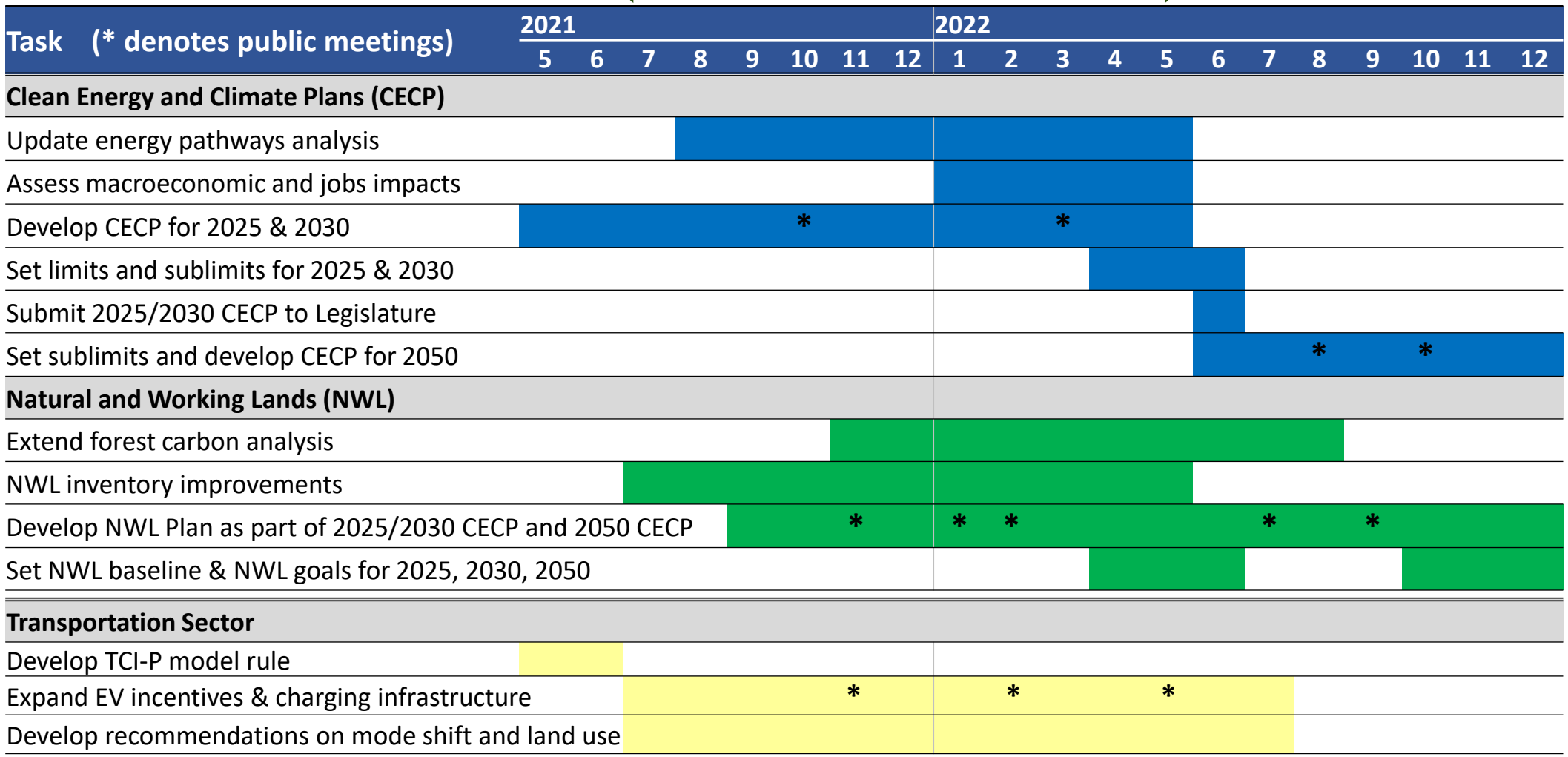
- T1. Cap Transportation Sector Emissions and Invest in Clean Transportation Solutions
  - Transportation Climate Initiative Program (TCI-P)
  - Low Carbon Fuel Standard
- T2. Implement Coordinated Advanced Clean Vehicle Emissions and Sales Standards
  - California's Advanced Clean Cars Standard II, Advanced Clean Trucks Rule, Advanced Clean Fleets
  - Multi-state Zero Emission Medium/Heavy-Duty Vehicle MOU and Action Plan
- T3: Reduce Upfront ZEV Purchase Cost Burden
  - Expansion of MOR-EV incentives to commercial & nonprofit fleets, and medium/heavy-duty trucks.
- T4. Deploy Electric Vehicle Supply Equipment & Enable Smart Charging
  - Utilities' plans for residential charging incentives, DCFC rebates, demand charge alternatives, off-peak charging rebate, EV time of use rate, as well as advanced metering infrastructure
- T5. Engage Consumers & Facilitate Markets
  - ACT4All Program to pilot equity-focused transportation programs
- T6. Stabilize Light-Duty VMT & Promote Alternative Transportation Modes
  - Complete Streets funding
  - Smart Growth resources and planning assistance grants

What Could Getting to **50%** in 2030 Look Like?

Sector	Gross GHG Emissions ($MMTCO_2e$) 1990	2017	2030 (45%)	GHG Reductions from 2017	Key topics to achieve 50% emissions reduction by 2030
Buildings	23.8	19.7	10.3	9.4	To be explored through Commission on Clean Heat and Regulatory process at Department of Public Utilities
Transportation	30.5	30.5	22.5 - 22.7	7.8 - 8	Explore opportunities to limit light-duty vehicle fleet growth
Electricity	28.2	13.6	8.5 - 9.4	4.2 - 5.1	2021 Climate Law increased RPS and created municipal light plants' commitments to reducing GHG emissions
Non-Energy & Industrial	12.0	9.2	7.8 - 9.7	(0.5)* - 1.4	Federal action on HFCs, complemented by additional action from MassDEP.
Total Gross Emissions	**94.5**	**73.0**	**49.1 - 52.1**	**20.9 - 23.9**	**50% Emissions Limit: 47.3 $MMTCO_2e$ (1.8 – 4.8 $MMTCO_2e$ additional reductions)**
% Reduction from 1990	**-**	**23%**	**45% - 48%**		

*Negative reduction indicates an increase -- this reflects partial mitigation of emissions growth.

Preliminary Timeline of Clean Energy and Climate Plan for 2025 and 2030 (2025/2030 CECP)



* Denotes public meetings

Targets for 2022

- Comments and questions on emissions limits and sublimits, plans to achieve them, and other related topics can be submitted to GWSA@mass.gov
- Visit www.mass.gov/2030CECP for updates on the 2025/2030 CECP development.
- Public meetings planned for March 2022 on:
  1. Proposed emissions limits and sublimits for 2025 and 2030;
  2. Proposed goals for reducing emissions from and increasing carbon sequestration on natural and working lands (NWL)
  3. Proposed policy portfolio that aim to achieve these emission limits, sublimits, and NWL goals.

Resilient Transportation and Climate Adaptation

Regional Planning for Climate Action

STEVEN TUPPER

Cape Cod Commission

CAPE COD
COMMISSION

CAPE COD
COMMISSION

The Cape Cod Commission

...is the regional land use planning, economic development, and regulatory agency created in 1990 to serve the citizens and 15 towns of Barnstable County, Massachusetts

MISSION

...To protect the unique values and quality of life on Cape Cod by coordinating a balanced relationship between environmental protection and economic progress.

REGIONAL PLANNING FOR CLIMATE ACTION

DATA AND INFORMATION

ENGAGEMENT/ ACTION PLAN

RESOURCES AND TECHNICAL SUPPORT

FUNDING

REGIONAL PLANNING FOR CLIMATE ACTION

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ENGAGEMENT/ ACTION PLAN

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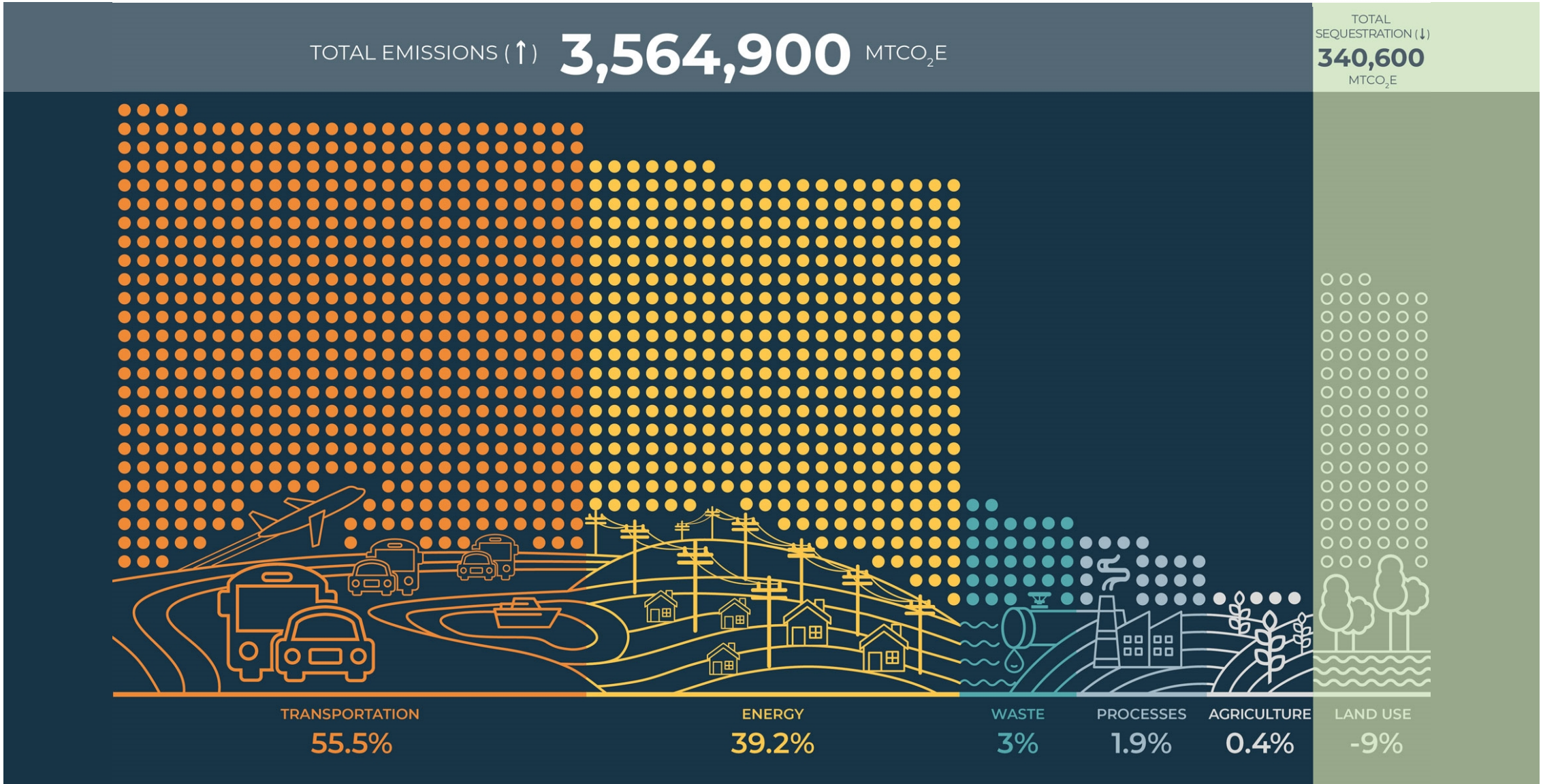
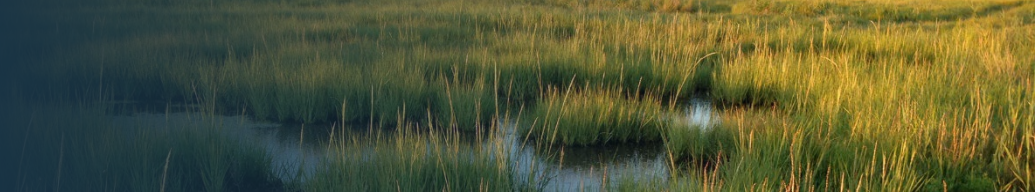
FUNDING

REGIONAL GHG EMISSIONS INVENTORY

TOTAL NET EMISSIONS **3,224,300** $MTCO_2E$



REGIONAL GHG EMISSIONS INVENTORY

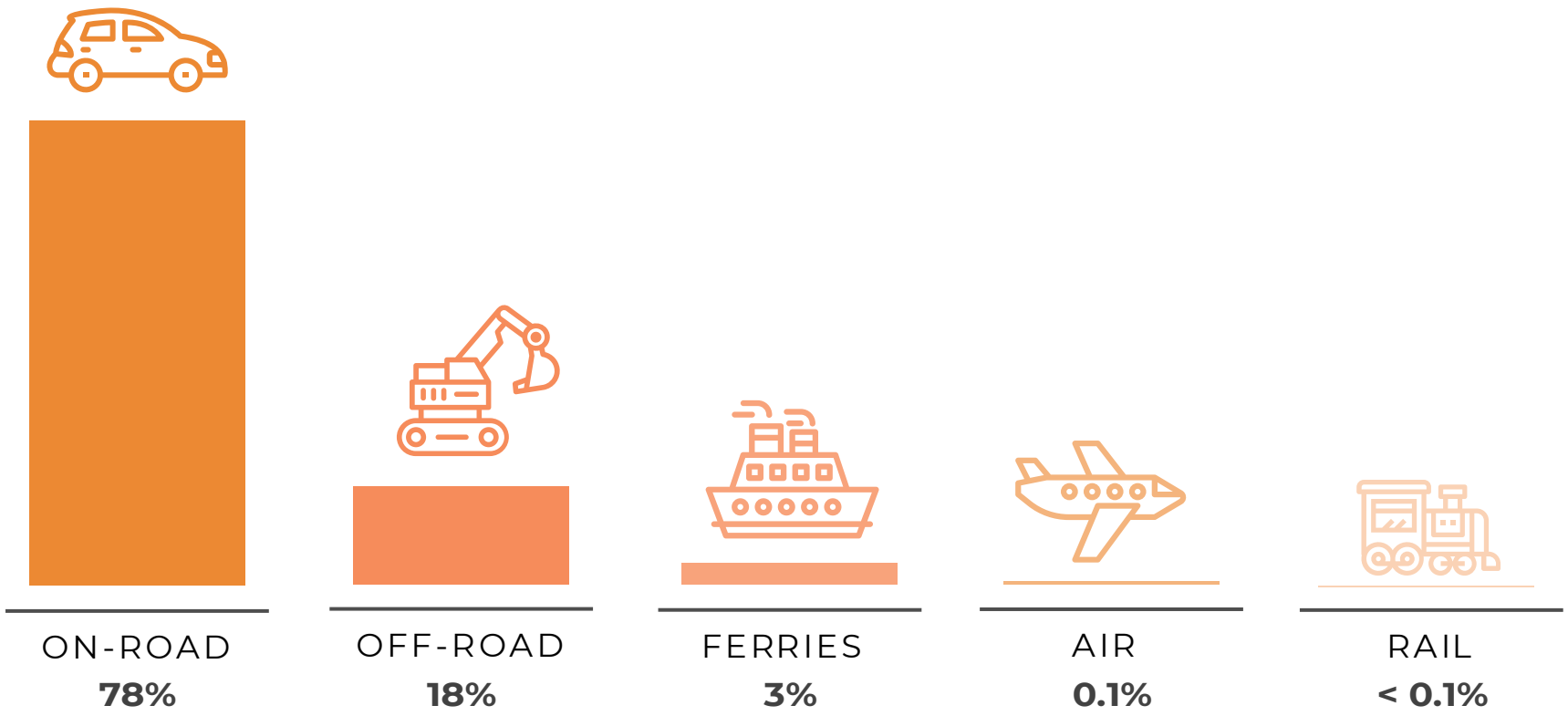


TRANSPORTATION

55.5%
of total Cape Cod greenhouse gas emissions

COMPARED WITH
45.7% OF STATE EMISSIONS

ON-ROAD
vehicles account for 43% of the region's emissions and nearly 80% of transportation emissions



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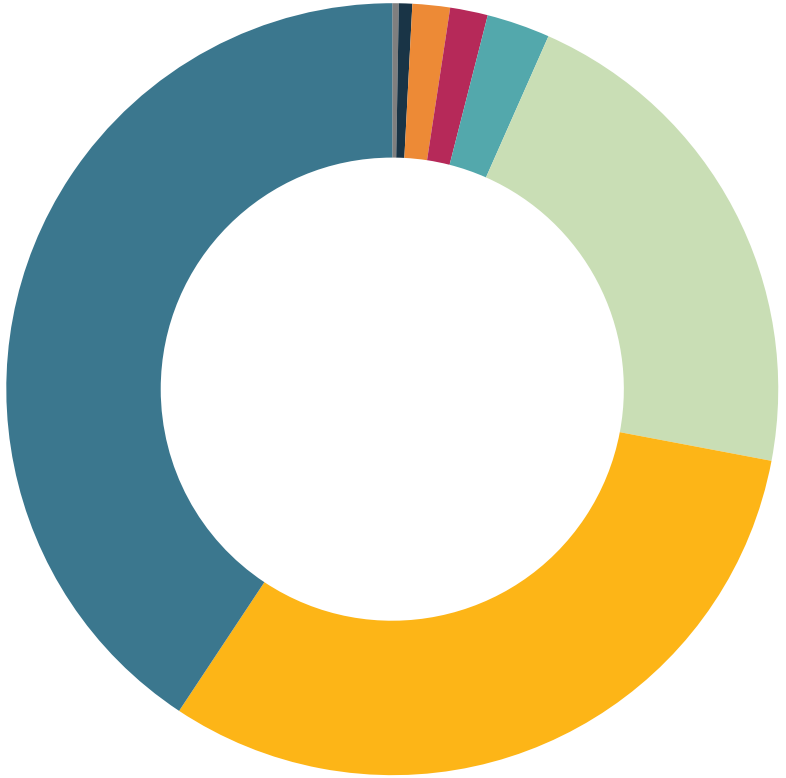


Vehicles Registered in Barnstable County (2017)

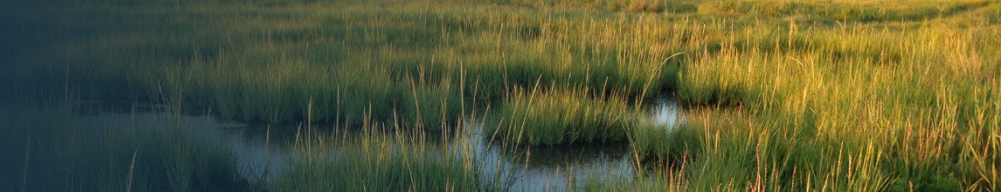
223,320 gas/diesel vehicles
1,256 electric vehicles

Vehicle Type

- Bus *6.2 mpg*
- EV
- Heavy Truck *5.3 mpg*
- Misc. MV *5.3 mpg*
- Motorcycle *44 mpg*
- Light Truck *17.5 mpg*
- SUV *17.5 mpg*
- Auto *24.2 mpg*

Text in italic shows average miles per gallon by vehicle type

Data source: 2017 Barnstable County Vehicle Registrations, MA Division of Motor Vehicles



ECONOMIC IMPACTS OF CLIMATE HAZARDS

1

Fiscal impacts of what the region might face due to climate change

SEA LEVEL RISE & STORM SURGE IMPACTS

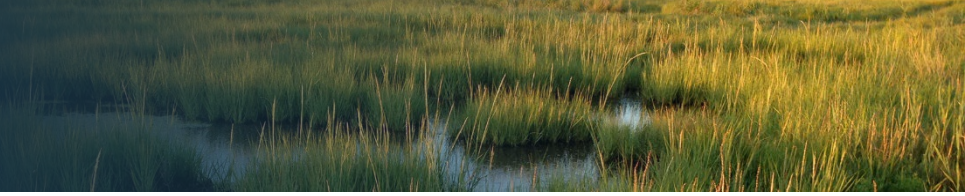
COASTAL EROSION IMPACTS

WATER QUALITY IMPACTS

PUBLIC HEALTH IMPACTS

FISHERIES, AQUACULTURE, & AGRICULTURE IMPACTS

PRECIPITATION IMPACTS

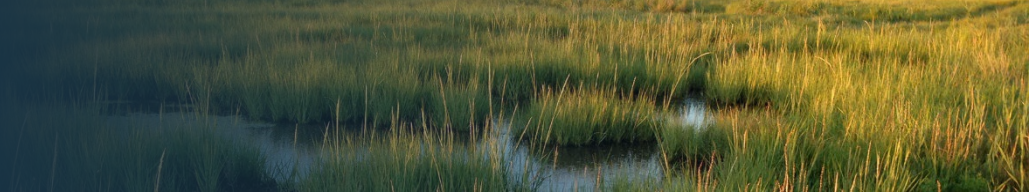


MITIGATION SCENARIOS

2

4 scenarios for comparison

- BUSINESS AS USUAL
- ELECTRIFICATION
- EFFICIENCY + ELECTRIFICATION
- SEASONAL TO YEAR-ROUND SHIFT



MITIGATION SCENARIOS METRICS

3

Comparison of mitigation scenarios

EMISSIONS COMPARISONS

EV MARKET SHARE

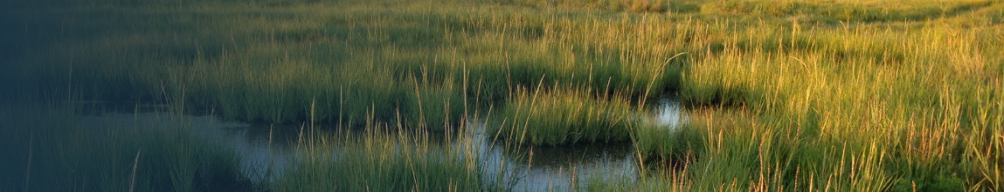
VEHICLE MILES TRAVELED

ENERGY CONSUMPTION

HOMES WEATHERIZED

HEAT PUMPS

CRITERIA POLLUTANTS



ECONOMIC IMPACTS OF CLIMATE ACTION STRATEGIES

4

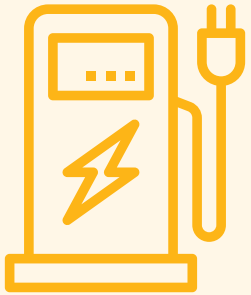
Potential costs and benefits and cost-effectiveness of climate action strategies

COST OF DOING NOTHING

ADAPTATION STRATEGIES

Cost-benefit

MITIGATION STRATEGIES



Cost-effectiveness

REGIONAL PLANNING FOR CLIMATE ACTION

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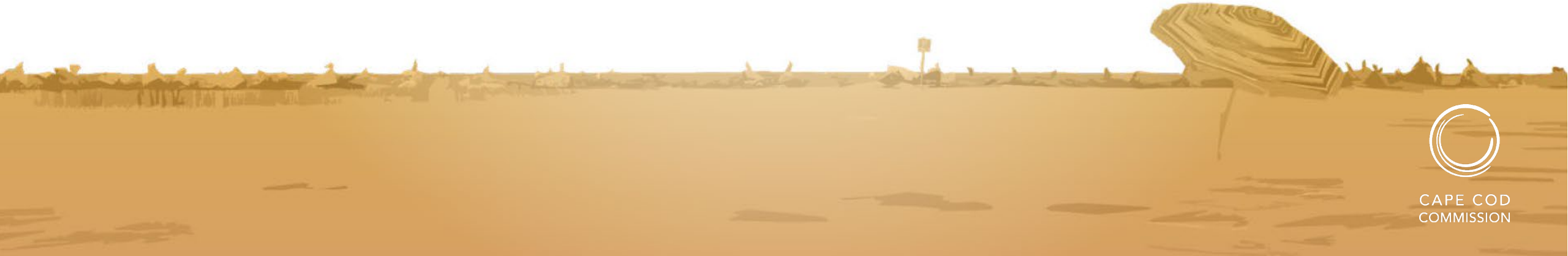
FUNDING

Climate Action Plan

CAPE COD



CAPE COD COMMISSION

CAPE COD CLIMATE ACTION PLAN

PURPOSE STATEMENT

To identify, study, and monitor the causes and consequences of climate change on Cape Cod as a basis to guide and develop science-based policies, strategies, and actions that governments, businesses, organizations, and individuals can pursue to:

- improve the region's resilience to climate hazards; and
- mitigate climate change on Cape Cod through reducing net regional greenhouse gas emissions in support of the framework and targets established by the Commonwealth.

Stakeholder Meeting Timeline

FALL 2020 - WINTER 2021

OCTOBER
- SUBREGIONAL MUNICIPAL WORKING GROUPS
- STAKEHOLDER WORKING GROUPS MEETING #1

NOVEMBER
- FOCUS GROUPS MEETING #1
- STAKEHOLDER WORKING GROUPS MEETING #2

DECEMBER
- CROSS-SECTOR STAKEHOLDER MEETING
- STAKEHOLDER WORKING GROUPS MEETING #3

JANUARY
- COMMUNICATIONS STAKEHOLDER WORKING GROUP MEETING #1
- FOCUS GROUPS MEETING #2
- COMMUNICATIONS STAKEHOLDER WORKING GROUP MEETING #2

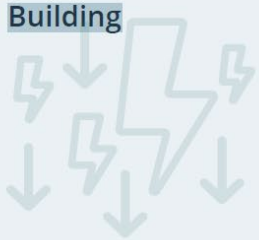
260+ participants

PRIORITY STRATEGIES

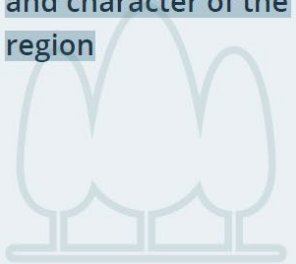
11 Strategies to focus the region's climate action efforts

Adaptation and mitigation strategies

Reduce energy consumption and strive towards Net Zero Energy Building



Promote efficient land use policies and development patterns that protect the nature and character of the region

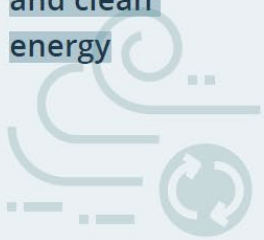


Address vulnerabilities in public infrastructure and in the road network, including adapting critical transportation infrastructure for climate change impacts

Identify approaches to managing development in coastal resource areas region-wide

Address vulnerable buildings and structures threatened by flooding and erosion through retrofits and relocation

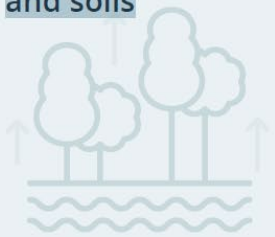
Generate and increase the use of safe, reliable, and clean energy



Reduce vehicle miles traveled and support low and no carbon transportation options

Accelerate the electrification of the transportation system

Reduce emissions by increasing protected open space, including enhancing carbon storage and sequestration in forests, wetlands, and soils



Increase education and communications about climate change mitigation and adaptation options

Support increases in municipal capacity and provide technical assistance

Priority Strategies

The priority mitigation and adaptation strategies broadly characterize the areas where the region should focus its climate action efforts

Reduce vehicle miles traveled and support low and no carbon transportation options

- Utilize virtual options to reduce vehicle trips
- Enhance public transit and shared transportation options
- Enhance bicycle and pedestrian options

Priority Strategies

The priority mitigation and adaptation strategies broadly characterize the areas where the region should focus its climate action efforts

Accelerate the electrification of the transportation system

- Encourage investments in EV charging infrastructure
- Support programs that incentivize EV adoption
- Explore opportunities for electrification of public transit and fleet vehicles and vessels

REGIONAL PLANNING FOR CLIMATE ACTION

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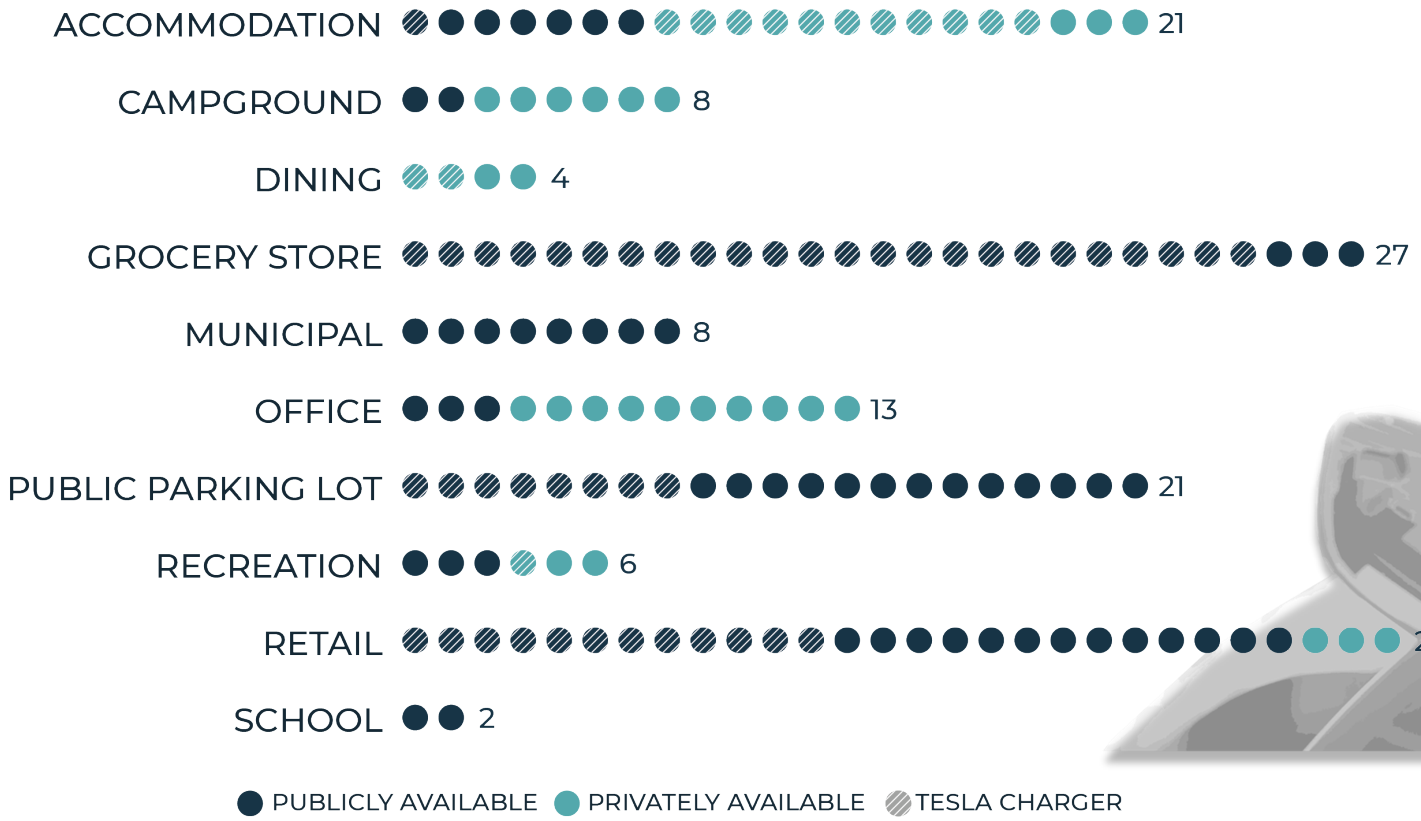
Siting Electric Vehicle Charging Stations on Cape Cod

Cape Cod Commission

CHARGING STATIONS BY LOCATION TYPE



BY 2050

214,000
Electric Vehicles

$82 MILLION

Estimated value of cumulative health benefit through 2050 by reducing criteria pollution by switching to electric vehicles

(SER1 scenario)

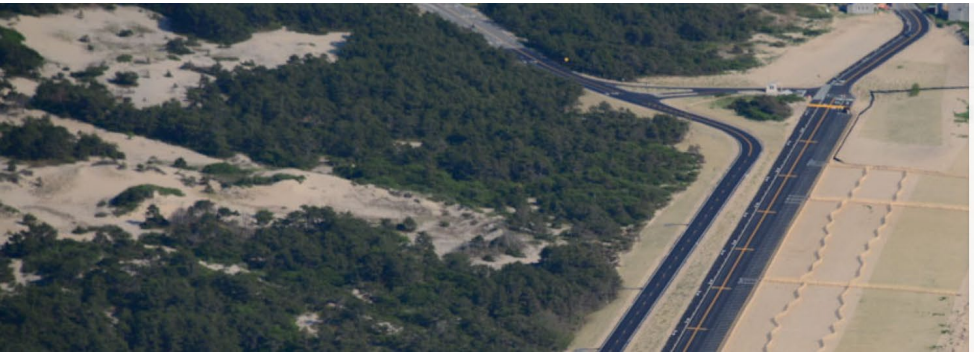
Managed Retreat

and other adaptation strategies for low-lying roads

Cape Cod Commission

Adaptation Strategies

Adaptation strategies to respond to coastal infrastructure problems related to extreme events and sea level rise include:



RETREAT OR RELOCATE

REAL WORLD EXAMPLE

Herring Cove Beach North Parking Lot, Provincetown, MA (2018-2019) Sections of the north parking lot, asphalt revetment, and coastal areas near the south parking lot have sustained damage due to wave

Best Practices in Environmental Messaging

The following best practices can be used when preparing outreach materials about the need to adapt our transportation corridors in the face of increasing risk from climate change and sea level rise.

The Cape Cod Coastal Planner

◆ ◆ ◆

Building on the analysis generated for the Cape Cod Commission's Sea Level Rise Viewer, this interactive application allows the user to apply different adaptation strategies to various zones along the shoreline. Once a strategy is selected, the Coastal Planner will generate anticipated impacts of applying the strategy, including a variety of financial and habitat indicators as compared to a no-action scenario. The tool also takes contextual features like Sea Level Rise, disconnected roads, and flood zones into account, which can be helpful when assessing vulnerability.

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Resilient Transportation and Climate Adaptation

Regional Planning for Climate Action

STEVEN TUPPER

Cape Cod Commission

CAPE COD
COMMISSION

Climate Adaptation and Resilience in the MAPC Region

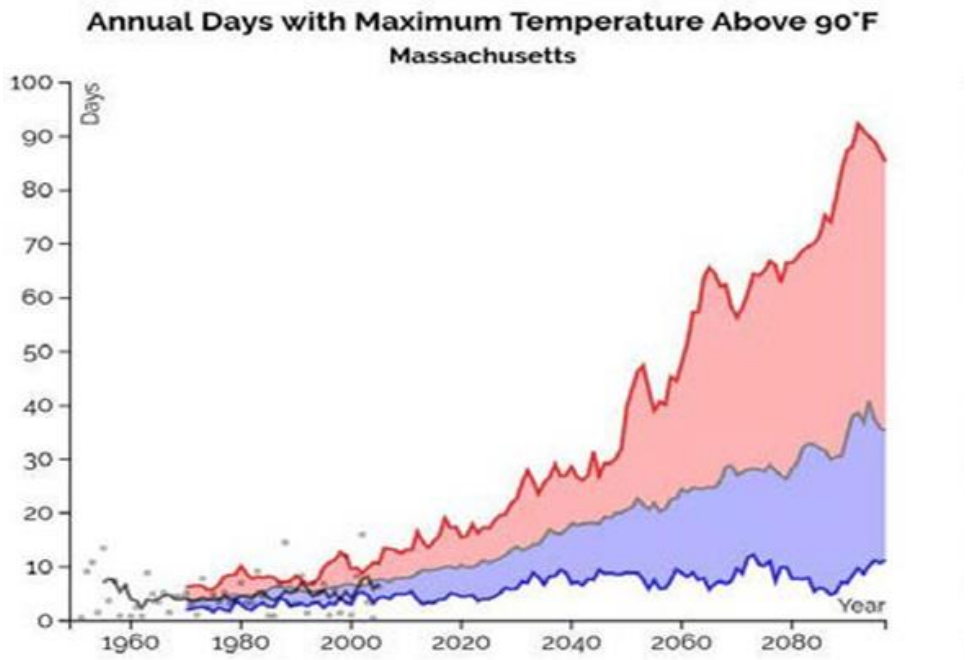
Martin Pillsbury, Director of Environmental Planning

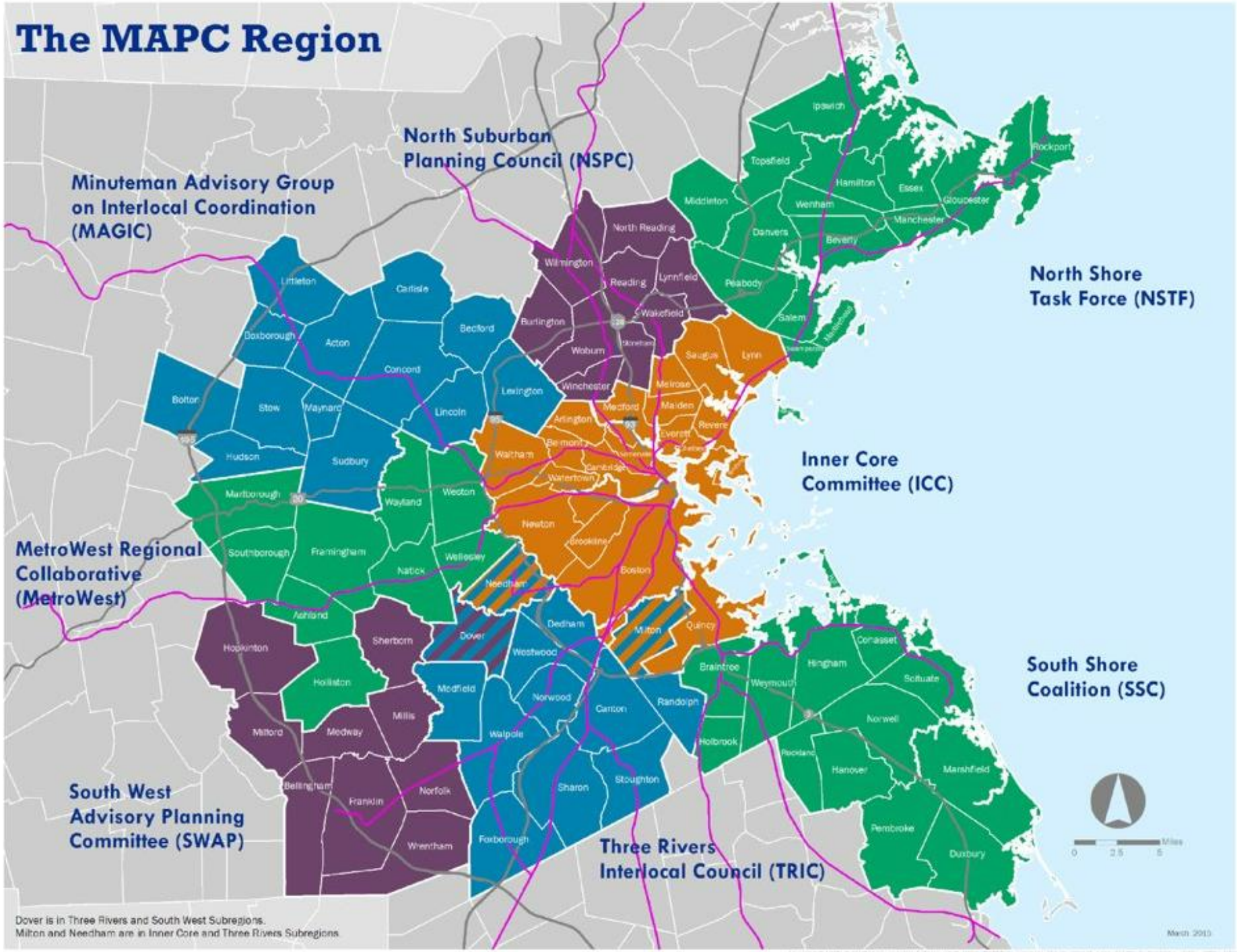
October 20, 2021

MAPC
METROPOLITAN AREA PLANNING COUNCIL

Agenda

1. Overview of MAPC
   - Climate Mitigation and Adaptation Technical Assistance
   - Climate Programs and Resources
2. MetroCommon 2050 & Climate Priorities
3. Climate Advocacy
4. Conclusion, Q&A





101 municipalities

1,440 square miles

Nearly 3.2 million residents

1.8 million jobs (2010 Census)

MAPC Climate Mitigation & Adaptation Technical Assistance

Collective Procurements for Climate-Smart Technology & Energy Management Services	Energy-Use and Greenhouse Gas Inventories	Climate and Energy Action Plans	Climate Resilient Land Use Strategies
MVP and Climate Resiliency Plans	Hazard Mitigation Plans with Climate Integration	Health Impact Assessments	Outreach Programming and Education

MAPC

Across the 101 cities and towns in our Greater Boston region…

21 **municipalities** have, or are developing, **climate action plans**

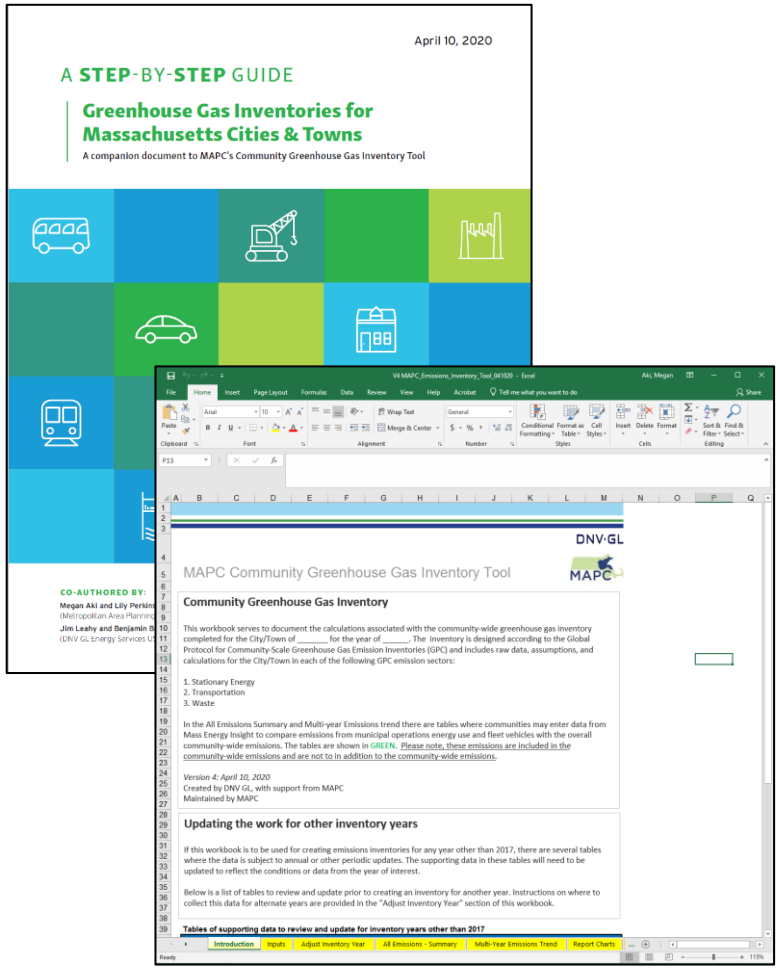
66 **Municipalities** have **volunteer committees** dedicated to climate, sustainability, or energy issues

33 **municipalities** have adopted **goals to reduce greenhouse gas emissions** community-wide

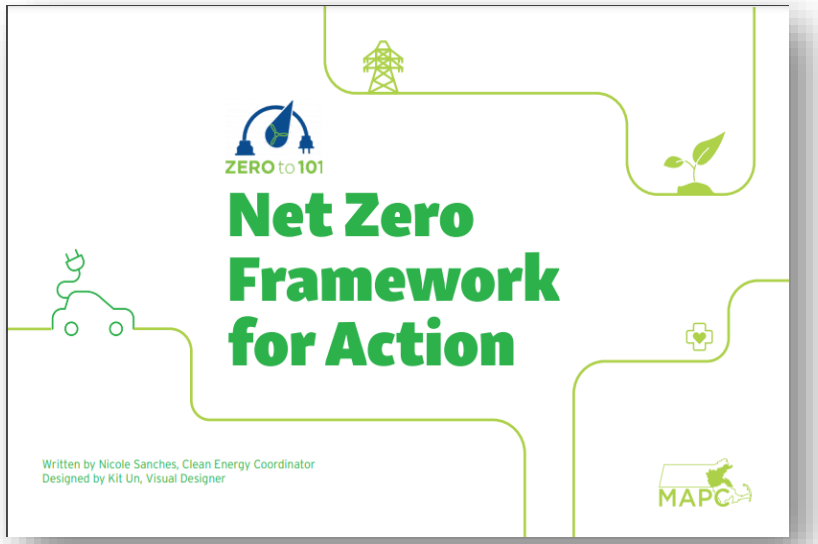
100 municipalities are **certified Municipal Vulnerability Preparedness (MPV) communities**

**Based on a preliminary review completed by MAPC of municipal websites and publicly available information.*

MAPC Climate Programs and Resources

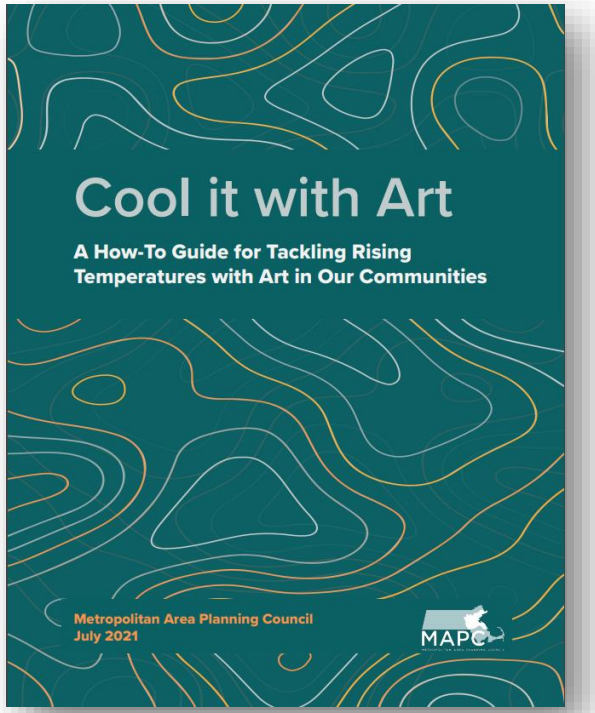


Step-by-step Guide and GHG Inventory Tool for MA Cities & Towns



Municipal Net Zero Playbook

CLIMATE PERSPECTIVES



MAPC

Climate Resilient Land Use Resources

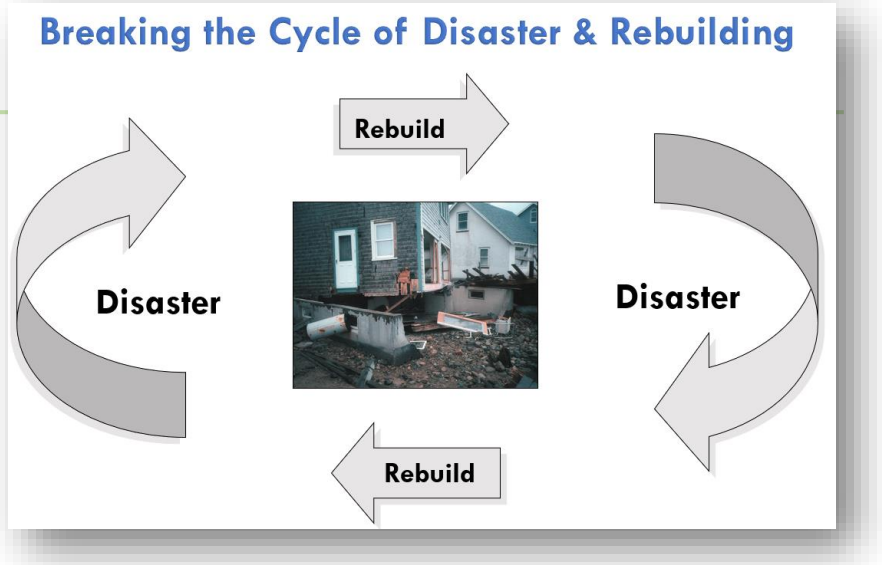
MAPC's new climate resilience resource

Features regulatory language and policy examples from MAPC's 101 communities and beyond – on floodplain and wetlands restrictions, tree protection and water conservation, design standards and zoning incentives, and more.

www.mapc.org/resource-library/climate-resilient-land-use

MAPC

Hazard Mitigation and Climate Planning



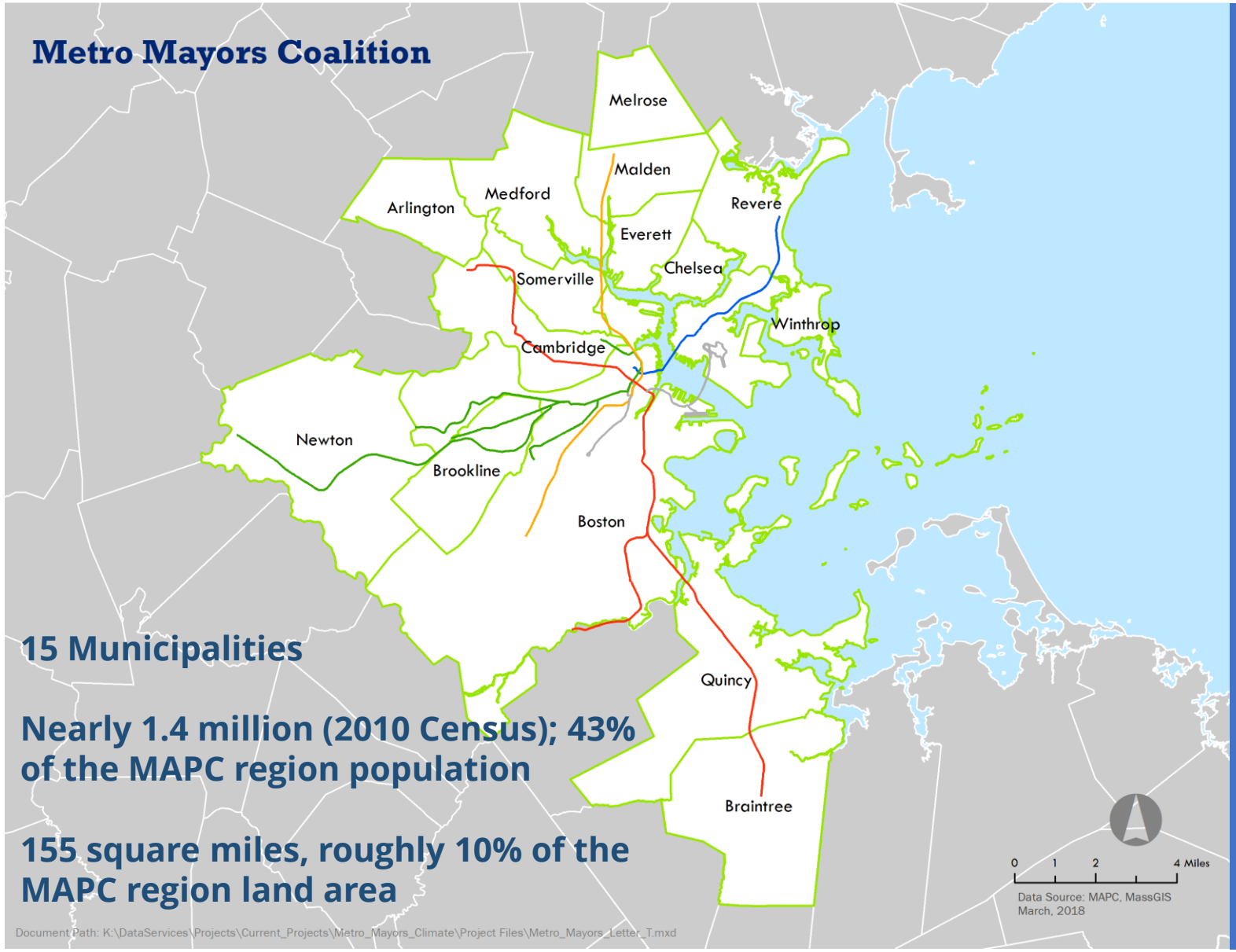
- **Integrating climate into Hazard Mitigation Plans**
  - Analyze climate projections, including extreme heat, drought, flooding, sea-level rise.
  - Align MPV priority actions with HMP mitigation

- **Municipal Vulnerability Preparedness**
  MA prepared 21 MVP plans; 100 cities and towns are designated MVP municipalities

- **Prepare vulnerability assessments and climate resilience plans (Duxbury, Brookline, Braintree, Newton, Scituate)**

- **Assist communities with updating regulations and bylaws to incorporate climate change considerations.**

Metro Mayors Coalition Climate Taskforce



15 Municipalities

Nearly 1.4 million (2010 Census); 43% of the MAPC region population

155 square miles, roughly 10% of the MAPC region land area

Climate Preparedness Commitment
Spring 2015

Climate Mitigation Commitment
Fall 2016

Strategic Priorities:

- Enhance Local Alignment and Capacity Building
- Mitigate Heat Impacts
- Mitigate Flooding Impacts
- Deepen Regional, State and Federal Coordination on Infrastructure Activities
- **Net Zero/Carbon Free Region by 2050**

Accelerating Climate Resiliency Grant Program

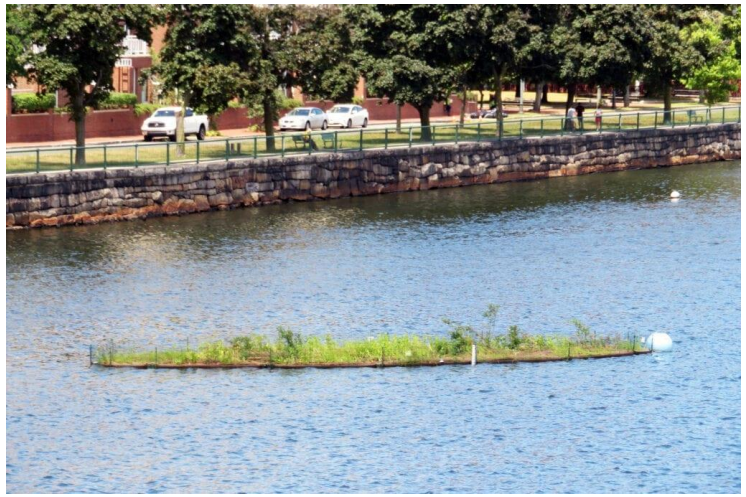
Accelerate climate resilience in the region by helping municipalities advance strategies that protect people, places, and communities from the impacts of climate change

Program Priority Areas

- *Nature-based solutions for climate resilience*
- *Municipal climate resiliency policy*
- *Innovative financing or infrastructure investment models*
- *Capacity building through coalitions or convenings*
- *Contributions to social resiliency or cohesion*
- *Combined mitigation and adaptation strategies*
- *Local food systems or agricultural resiliency measures*
- *District-scale climate resiliency pilots*
- *Public outreach, marketing, artistic, cultural projects to advance knowledge & action*

MAPC

Examples of climate projects in MAPC region



Charles River Floating Wetlands - improve water quality, control toxic algal blooms, and improve fish habitat and health.

Strengthening Social and Climate Resilience - educate local residents in East Boston about climate impacts and community and emergency preparedness.

Sustainable Landscaping - created three sustainable landscaping demonstration gardens located at the Concord-Carlisle High School, Junction Park, and the Concord Free Public Library, featuring species of ground cover that require less maintenance and less water than standard turf lawn.

MAPC

- Getting Around the Region
- Homes for All
- A Climate-Resilient Region
- A Net Zero Carbon Region
- Dynamic and Representative Governments
- A Healthy Environment
- Economic Security
- Economic Prosperity
- Healthy and Safe Neighborhoods
- Thriving Arts, Culture, and Heritage

MetroCommon 2050 Goals

Metro Boston is prepared for – and resilient to – the impacts of climate change.

The Metro Boston region is highly energy efficient and has reduced its greenhouse gas (GHG) emissions to net zero.

Greater Boston's air, water, land, and other natural resources are clean and protected – for us and for the rest of the ecosystem.

MetroCommon 2050 Policy Recommendations

Accelerate the transition to a clean energy future.

Decarbonize buildings and transportation.

Prepare for and respond to climate change threats.

Address regional water challenges.

MAPC

Equity Assessment and Considerations in all MAPC projects

Who has been historically impacted?

Who will be most impacted by the types of changes to our climate we expect to see?

How will the benefits of this strategy be distributed?

MAPC's *State of Equity* addresses equity issues across sectors

REMAP provides guidance for Racial Equity Municipal Action Plans

MAPC

MAPC Federal and State Legislative and Policy Activities

MAPC serves on the state's Global Warming Solutions Act Implementation Advisory Committee (GWSA IAC)

MAPC and five other RPA's serve on MEPA's Advisory Committee for Updating MEPA Regulations on Environmental Justice (CCC, CMRPC, MVPC, OCPC, PVPC)

MAPC is a founding member of the Water Infrastructure Alliance

MAPC Climate Advocacy Priorities

Increasing State and Federal funding for climate resilience

Targeting GHG Emission Sources

- Electricity
- Buildings
- Transportation
- Working across the economy

Land use connection across all priorities

A Partnership/Green Infrastructure-based Approach to Climate Change Resiliency Planning

Bill Napalitano, Rivers, Trails, and Watersheds Program Manager, SRPEDD
bnap@srpedd.org

The **mission of SRPEDD** ***"is to plan a future for southeastern Massachusetts that includes expansion of economic opportunity, protection of natural and historic resources, and development of excellent physical and cultural amenities."***

The **SRPEDD region** is made up of **twenty-seven communities** including four cities (Attleboro, Fall River, New Bedford and Taunton) and twenty-three towns in southeastern Massachusetts.

The **800 square mile** SRPEDD region, which stretches from Attleboro to Wareham, is home to nearly **600,000 people**.

Within the SRPEDD region, there is a total of approximately **348 miles of tidal shoreline**. This includes the coastline and tidal areas along the Taunton River. The south coastal communities along Buzzards Bay account for over ¾ off this total, with nearly 275 miles.

It is also estimated that there are **over 90 miles of federal interstate highways** (including Routes 195 and 6, which run along the southern boundary of the region, through our coastal communities) and **3,321 miles of arterial, collector, and local roadways.**

Air Quality and the Regional Transportation Plan . . . It all starts here

Transportation planning for mobile air quality/GHG issues is largely tied into computer modeling and conformity attainment (adherence to standards). SRPEDD's staff employs its transportation and traffic modeling and air quality analysis tools in cooperation with federal, state, and local partners in planning for the region.

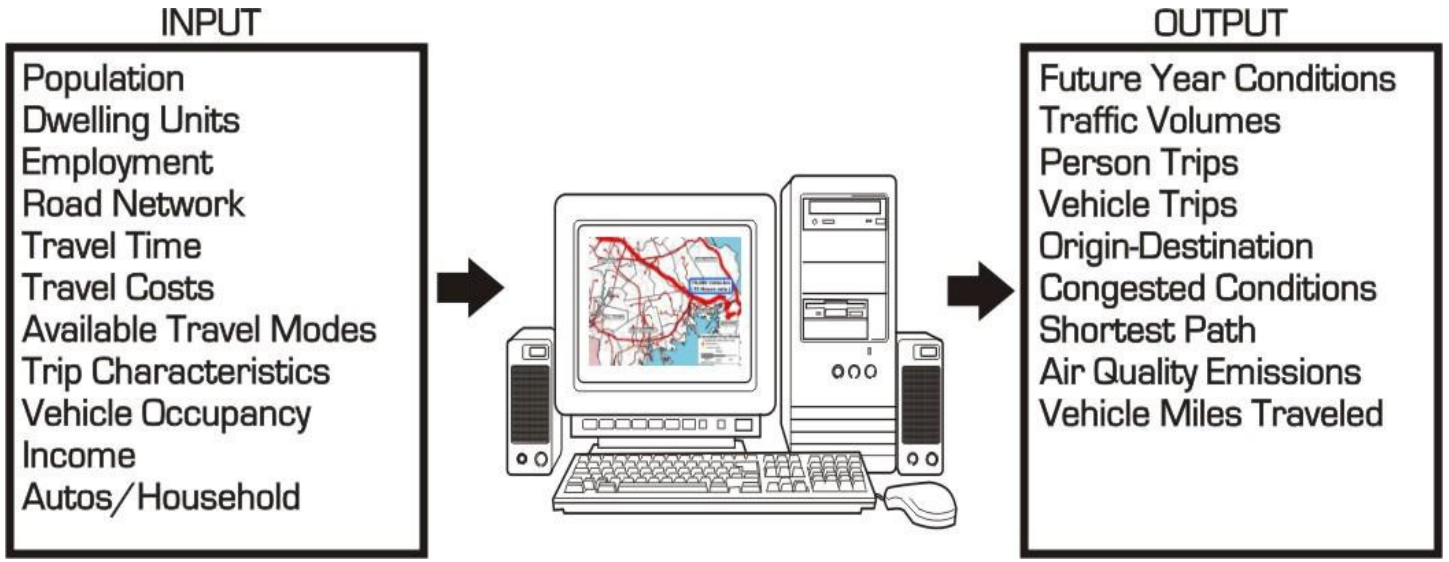
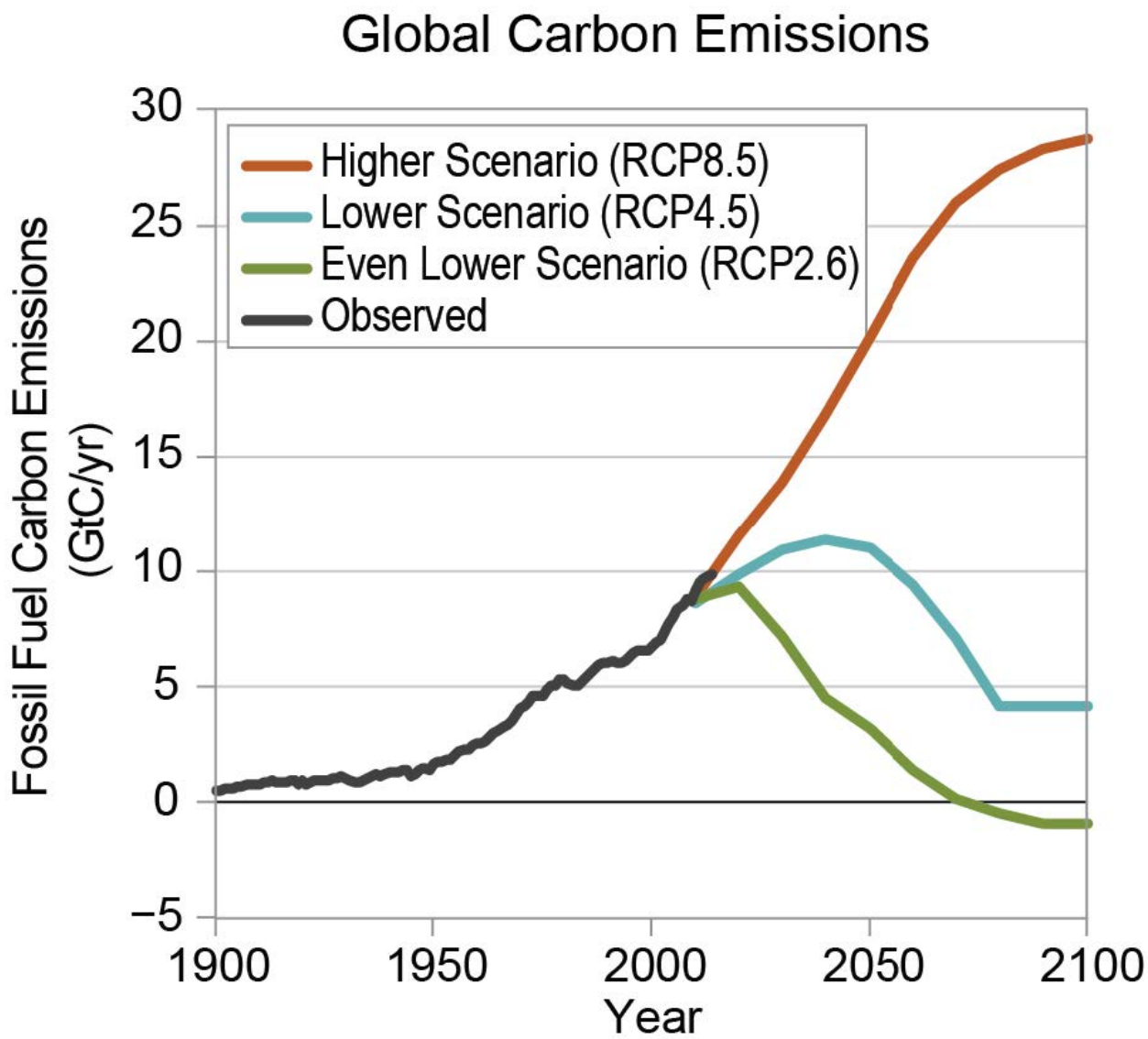
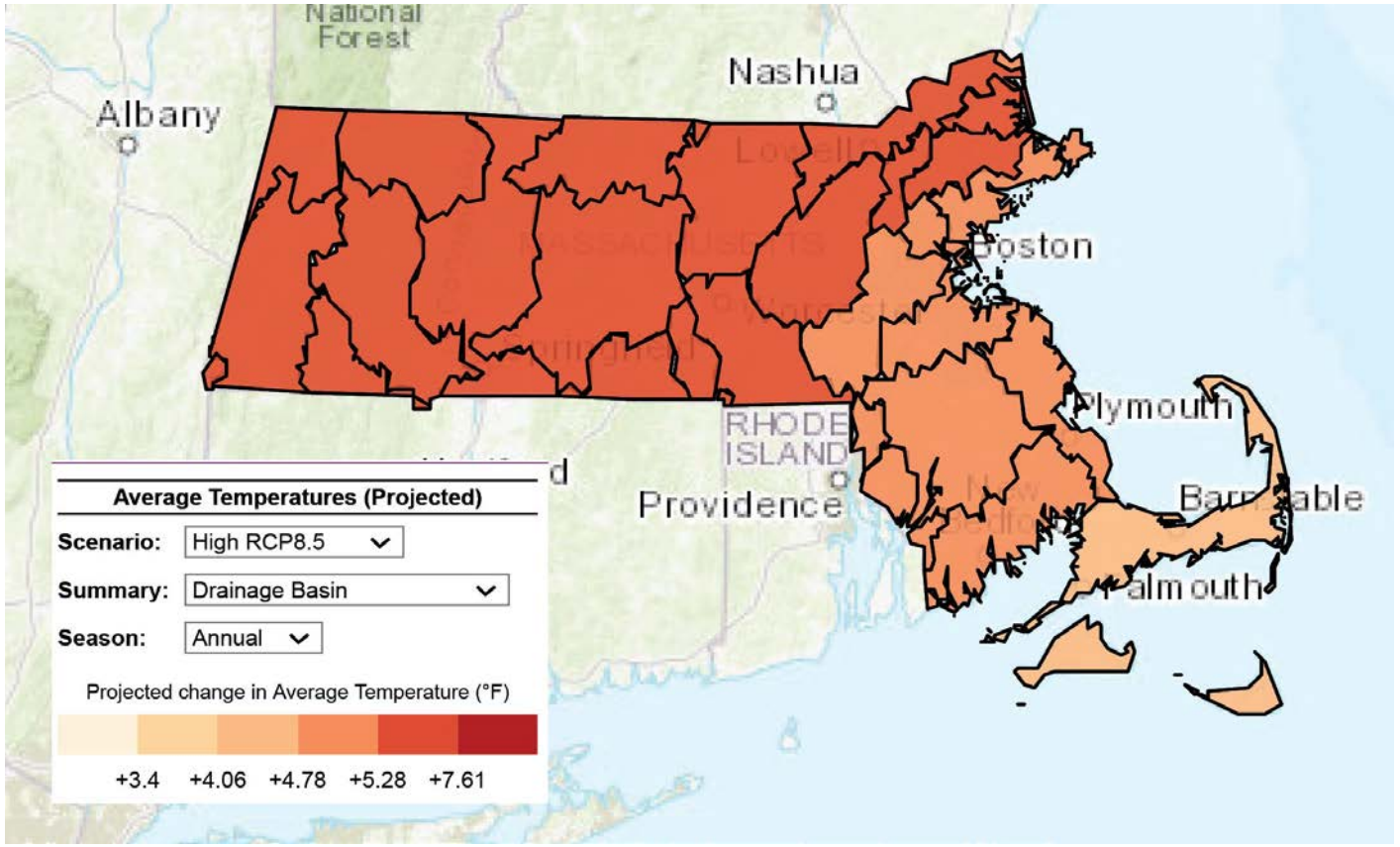


Figure B- 10: Travel Demand Forecasting Model


Global Carbon Emissions
Higher Scenario (RCP8.5)
Lower Scenario (RCP4.5)
Even Lower Scenario (RCP2.6)
Observed
Fossil Fuel Carbon Emissions (GtC/yr)
30
25
20
15
10
5
0
−5
1900
1950
2000
2050
2100
Year

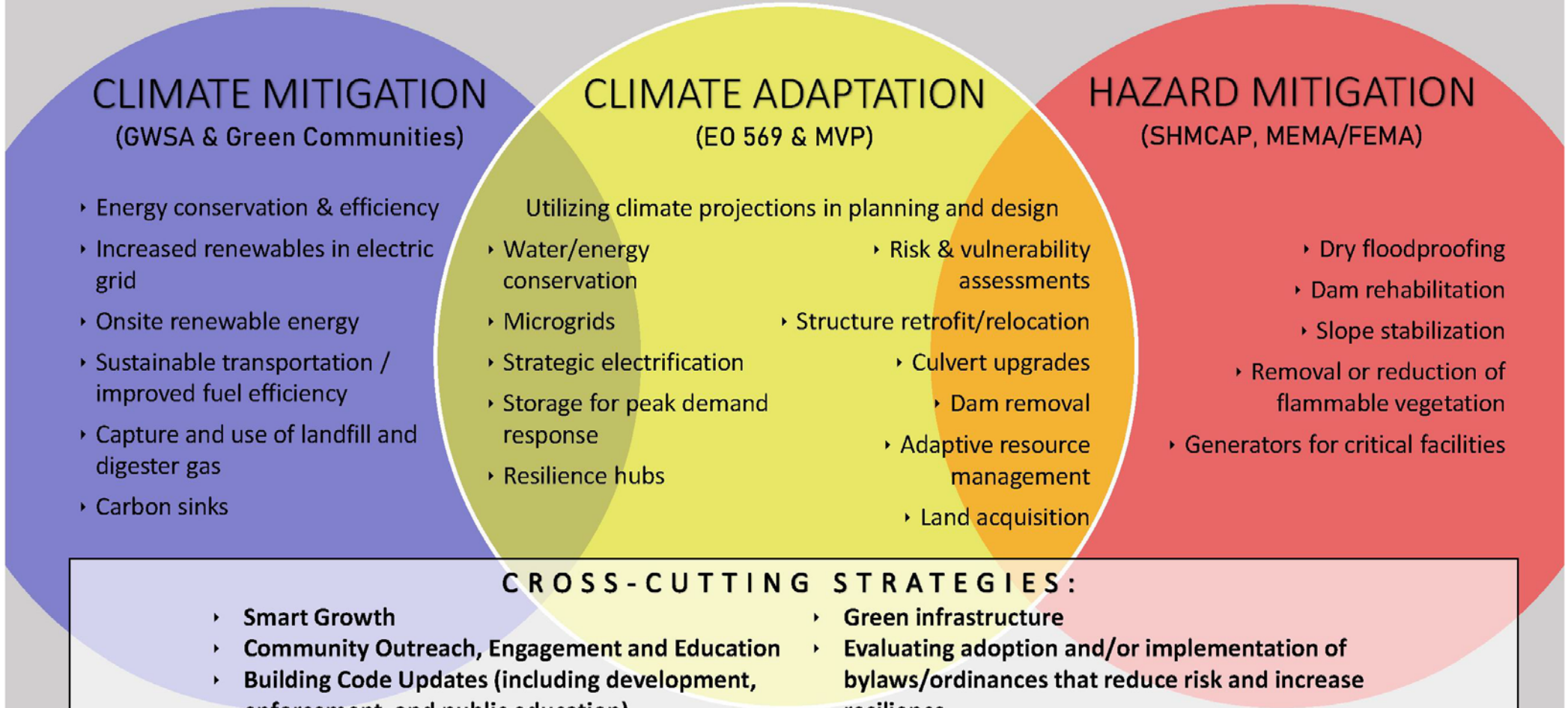
Taunton River Watershed		
	2050	2090
RCP8.5	+5.2°F	+9.0°F



How is SRPEDD"s staff working to promote environmental coordination with our Regional Transportation Plan and Climate and Resiliency Planning in the district? We work with dozens of partners and have a very active "boots on the ground" approach . . .

- **The GRRIP/Flood Inundation program, stormwater management work** funded through our UPWP and other federal, state, and foundation grants
- **Dam Removal/River Restoration projects** with numerous federal, state, local, regional, and non-profit partners; repurposing degraded portions of the built environment while integrating the resiliency built into the natural environment
- **Stream Continuity studies/culvert assessments** with Save the Bay, Mass Audubon, The Nature Conservancy, and the Taunton River Watershed Alliance
- **Flood Inundation, Tidal Encroachment, and salt marsh studies** with Save the Bay, Manomet, the Wildlands Trust, and our communities
- Green infrastructure considerations in Open Space Planning, and Resiliency in Master Plans
- Integrating recommendations found in Open Space, Transportation, MVP, Hazard Mitigation Plans and others such as the Taunton River Watershed Climate Adaptation Plan

BUILDING CLIMATE RESILIENCE IN THE COMMONWEALTH



CROSS-CUTTING STRATEGIES:

- **Smart Growth**
- **Community Outreach, Engagement and Education**
- **Building Code Updates (including development, enforcement, and public education)**
- **Green infrastructure**
- **Evaluating adoption and/or implementation of bylaws/ordinances that reduce risk and increase resilience**

DRAFT 3/30/2020

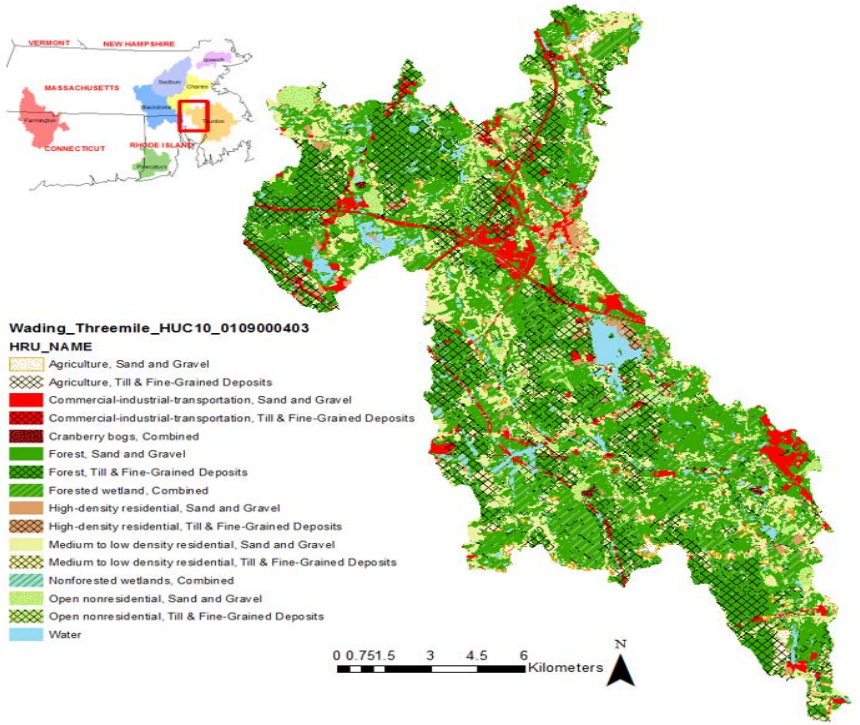
INTEGRATED PLANNING

Strategies such as integrated land-use and transportation planning, or improving the quantity and quality of public-transit service, can reduce GHG emissions and also benefit environmental justice and vulnerable communities.

The Environmental Program at SRPEDD has been integrating recommendations from MVP, HMP, Green Infrastructure (GI) Mapping, and Corridor Plans into local Open Space Plans, Master Plans, regional Watershed Plans and other studies and updates for the past several years.

Build out model inputs for EPA Watershed Management and Optimization Support Tool (WMOST) Wading-Three Mile Watershed Model:

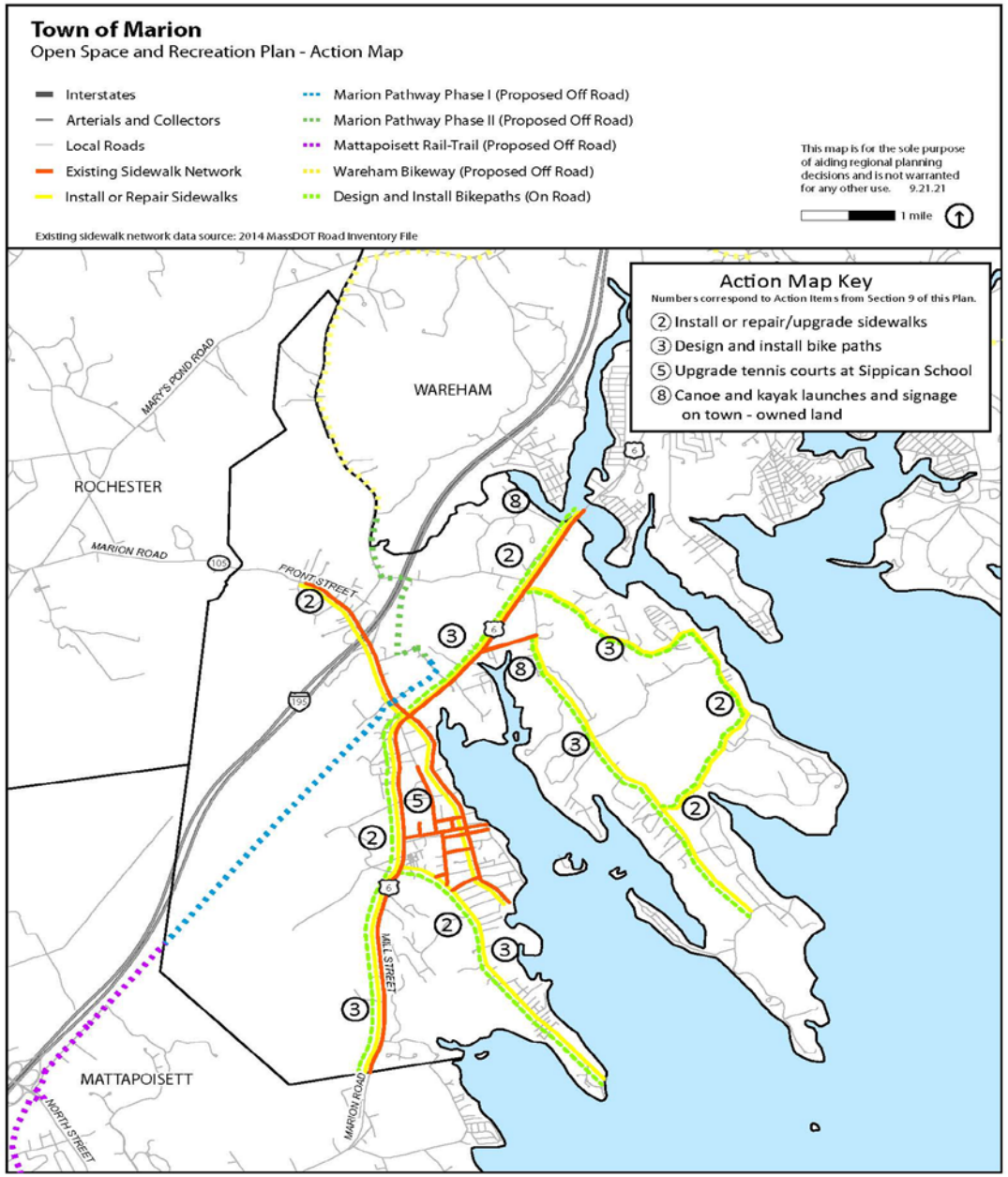
- Future projections and control totals down to the Transportation Analysis Zone (TAZ) level.
- Future development scenarios ranging from small-scale zoning changes to big shifts due to factors such as climate change.
- SRPEDD's existing traffic model with more detailed, granular inputs for corridor studies.



This map was developed for the Marion Open Space and Recreation Plan. It combines recommendations from the Regional Route 6 Corridor Study, the Marion Master Plan, the South Coast Bikeway Plan and inter-municipal Shared Use Pathway plans.

This effort was also coordinated with SRPEDD's Transit Planning staff in order to properly consider the expanded New Bedford to Wareham bus service that also accommodates bicyclists.

By affording more transit and transportation options/alternatives, we can hopefully decrease automobile trips and curb emissions in the region.

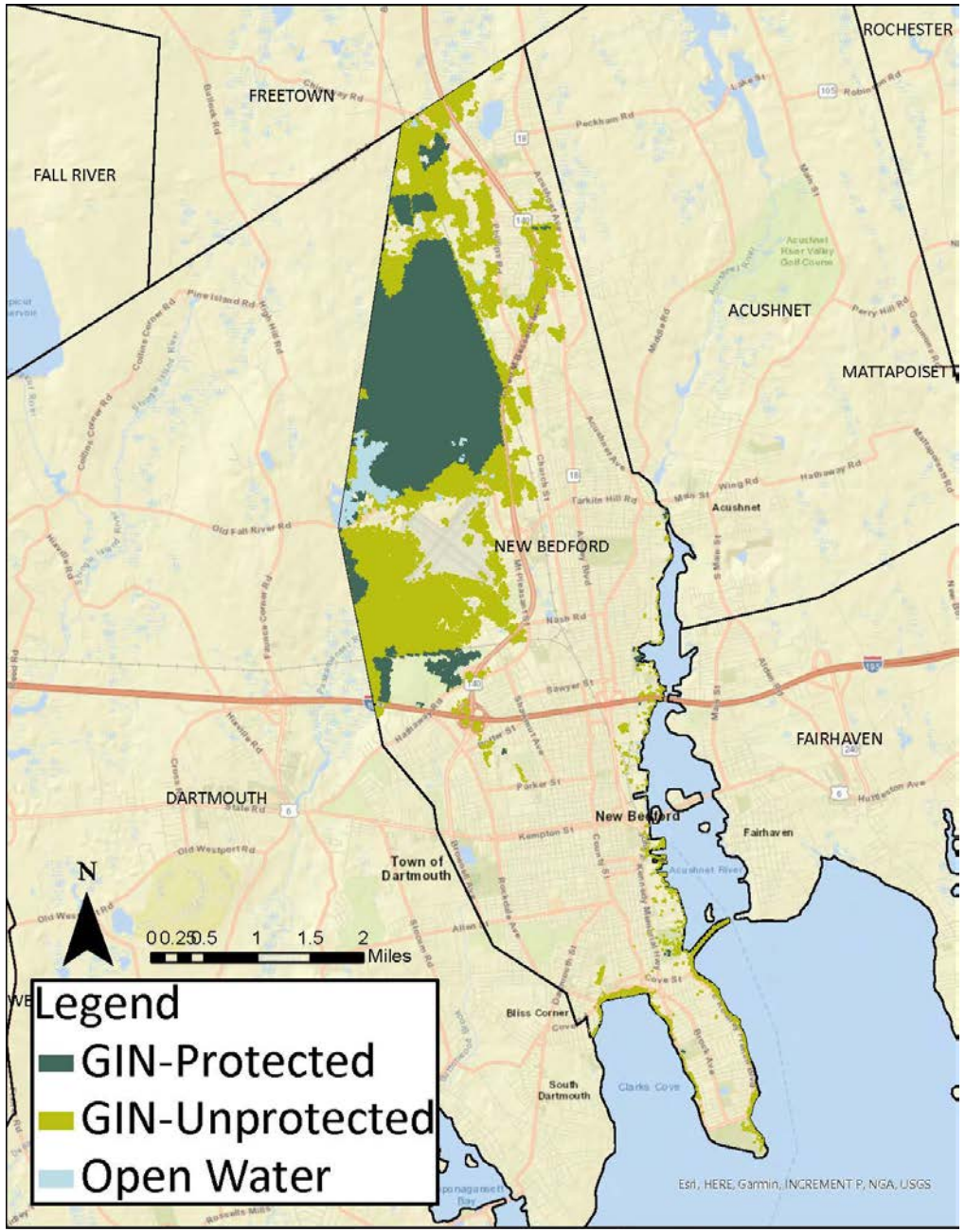


PROVISIONS FOR THE RETENTION OF CRITICAL GREEN INFRASTRUCTURE IN TRANSPORTATION CORRIDOR PLANNING AND ALONG EXISTING CORRIDORS THROUGHOUT THE REGION

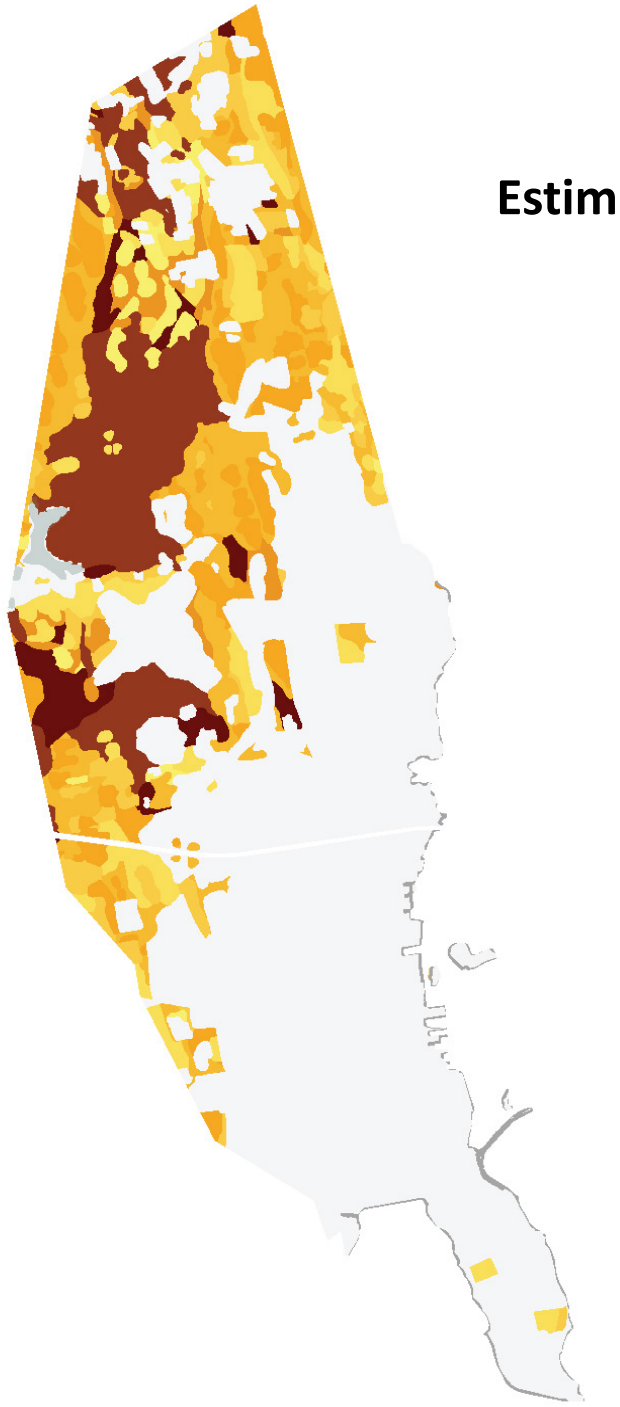
- MA forests **sequester 14%** of the state's gross annual carbon emissions
- An average acre of forestland stores **85 tons carbon**
- Capacity **increases** over time as forests mature

New Bedford is currently working on a local Resilience Plan. SRPEDD staff provided the Green Infrastructure Network (GIN) map on this slide, and the Soil Organic Carbon map on the following slide, in order to help the City plan for carbon and GHG balance in the adjacent north-south highway corridor.

Even in this heavily urbanized city, there is a great deal of unprotected GI land providing free ecological services.



Estimated Carbon Pool: New Bedford Soil Organic Carbon (SSURGO)



Fine Grain Soil Organic Carbon (SSURGO) 0-100cm depth g/m2

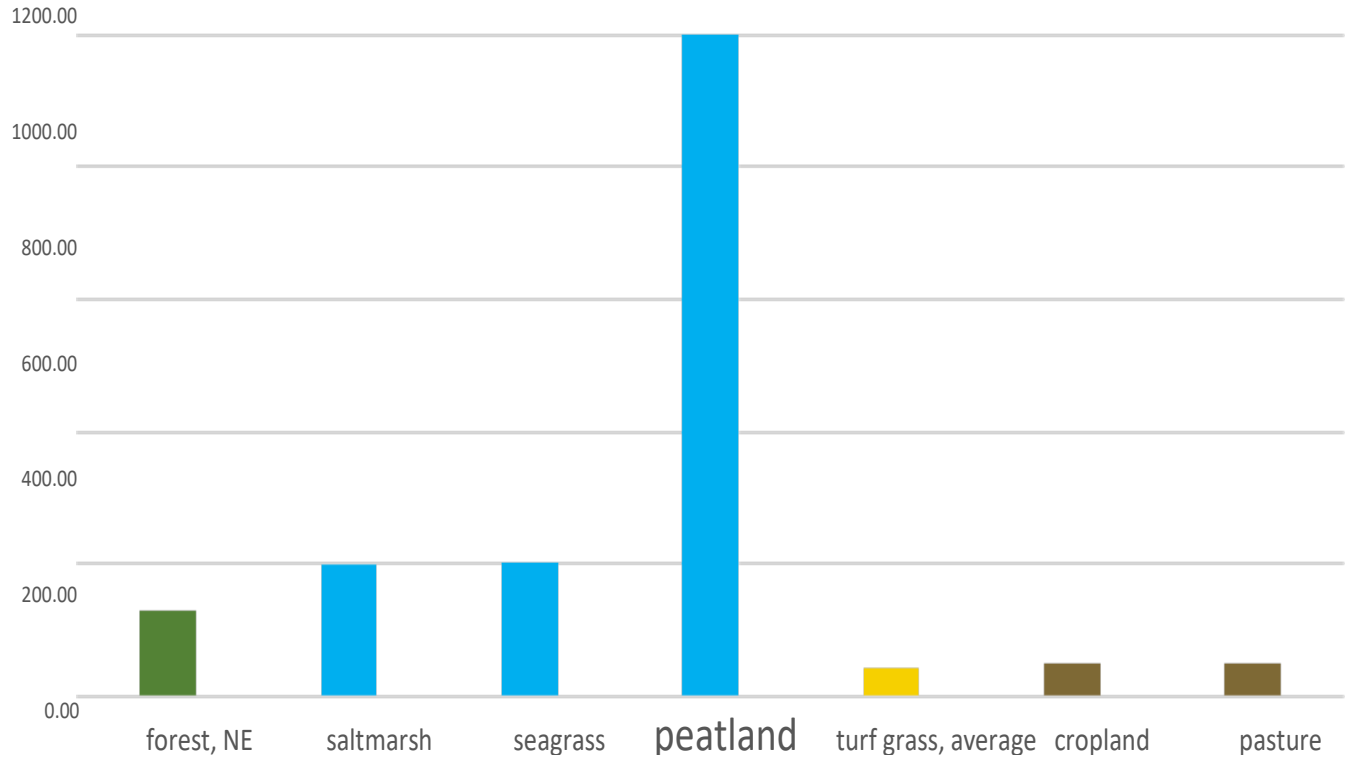
- 0 - 2000
- 2000 - 5000
- 5000 - 10000
- 10000 - 15000
- 15000 - 20000
- 20000 - 25000
- 25000 - 30000
- 30000 - 35000
- 35000 - 40000
- 40000 - 50000
- 50000 - 60000
- 60000 - 80000
- 80000 - 110000

Sources: NRCS SSURGO Data

Soil Carbon Stocks tons/hectare

Excluding carbon in biomass

Land Cover/ Use Type
Forest
Wetland
Turf/ Landscaping
Agriculture

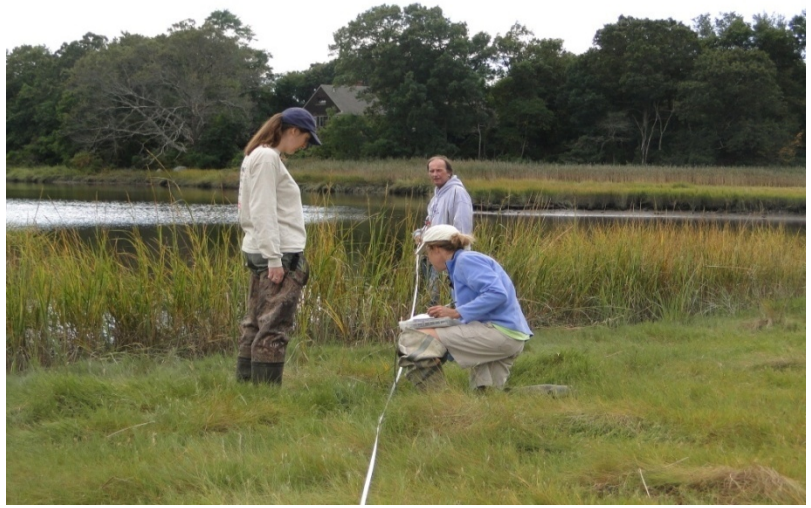


RELATED WORK ON OUR URBAN AND RURAL ROADS AND WATERWAYS

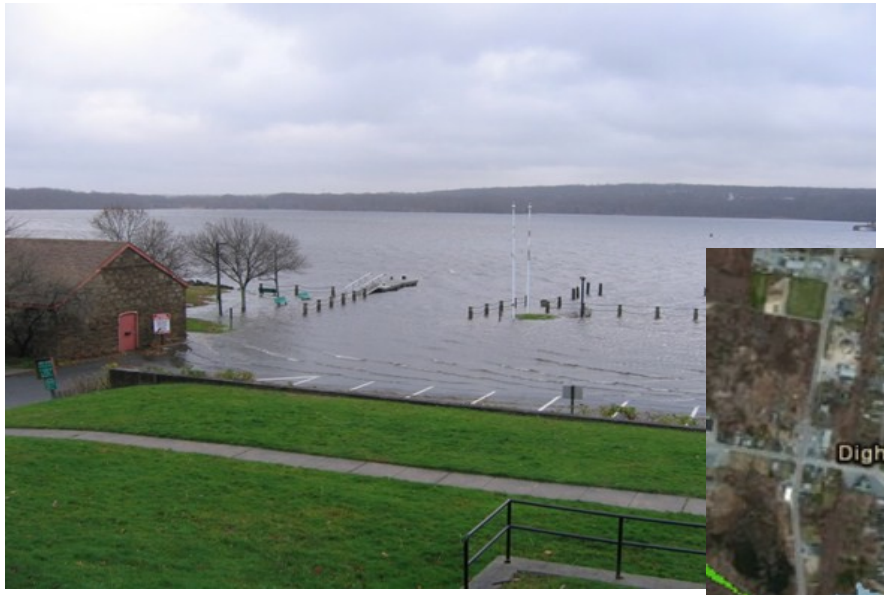
Flood Hazard work, Old Providence Rd.
in Swansea, MA (upper right)

Dam Removal/River Restoration work,
Mill River, Taunton, MA (below)

Freetown, MA (lower right)
marsh assessment with Save The Bay

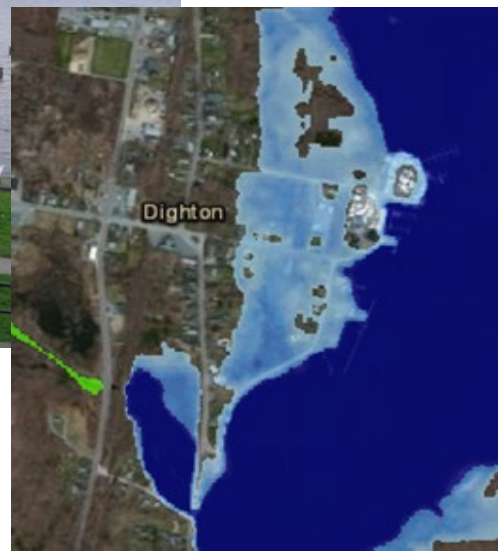


Work along the Wild & Scenic Taunton River



Wave damping assessment in Berkley

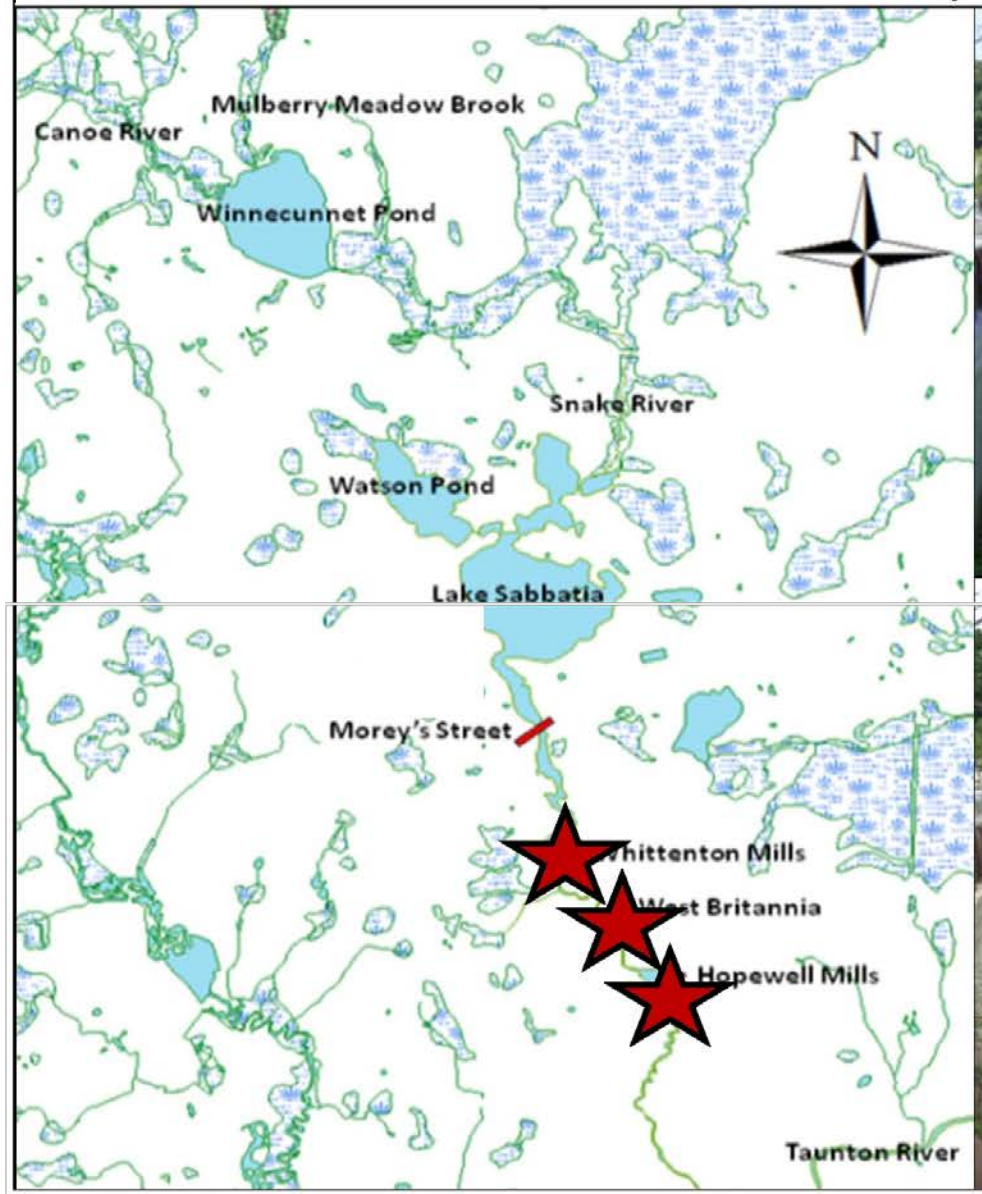
Flood hazard inundation/Resiliency work in Somerset



Climate Change/Sea Level Rise work in Dighton

Evolution of a Dam Removal Site
Hopewell Mills Dam, Mill River, Taunton
2012-2018

Mill River Restoration Project, Taunton
30 river miles and 400 acres of spawning habitat restored



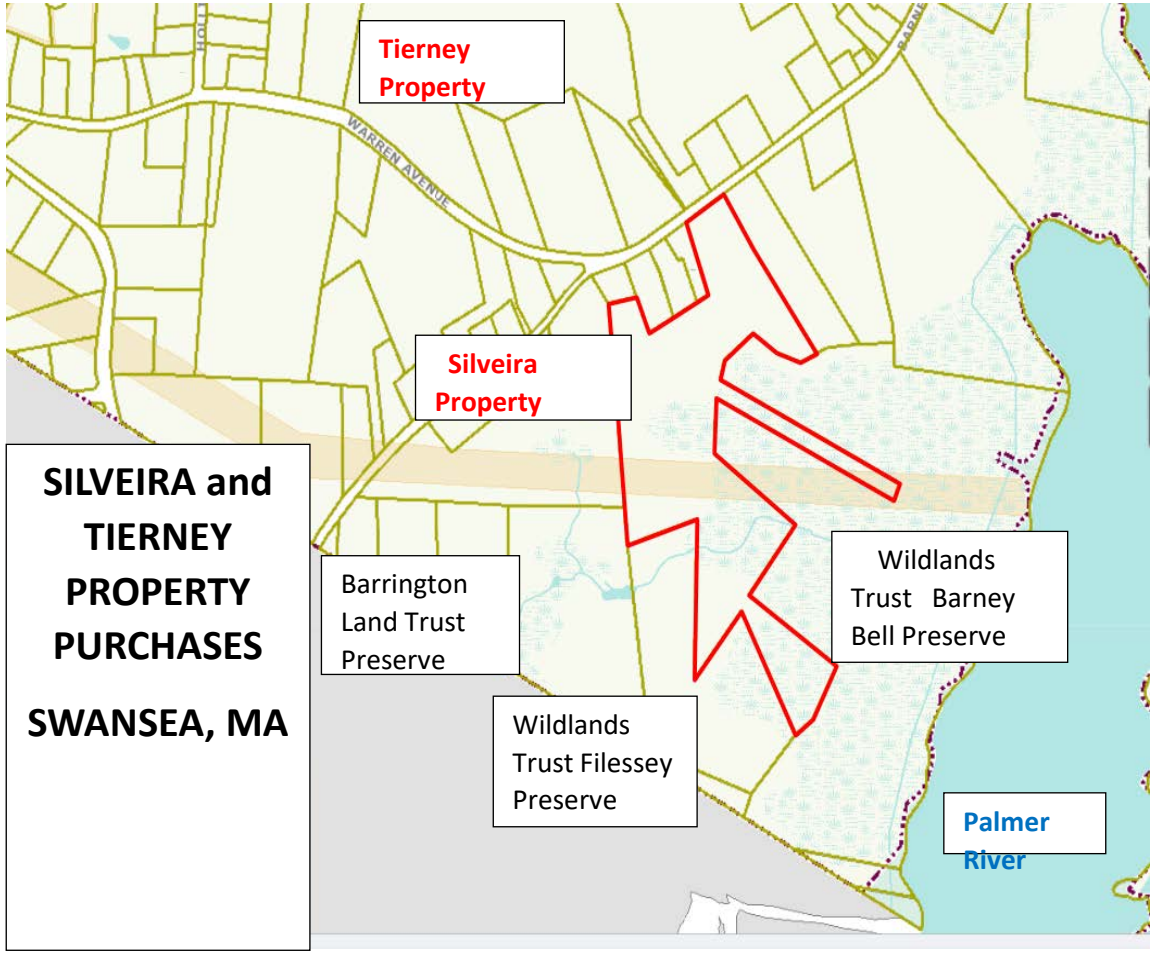
Marsh and Habitat Preservation, Swansea: Conserving Green Infrastructure Near the Route 6 Corridor

Who: The Town of Swansea, The Wildlands Trust, Blount Fine Foods (Fall River)

Where: Barneyville Road, below the Old Providence Road (Miles) Bridge, southwest Swansea, along the Palmer River, near the Route 6 corridor. The property abuts the Wildlands Trust's Barney Bell Preserve property, and is in close proximity to the Palmer River and Barrington Land Trust Property.

Why: Flood Inundation Studies, conducted by SRPEDD and Save The Bay (2011, 2012), had recommended preserving marshland at the mouth of the Palmer as part of a green infrastructure approach to help dissipate wave energy and storm surge impacts, as well as to retain and enhance carbon sequestration capability.

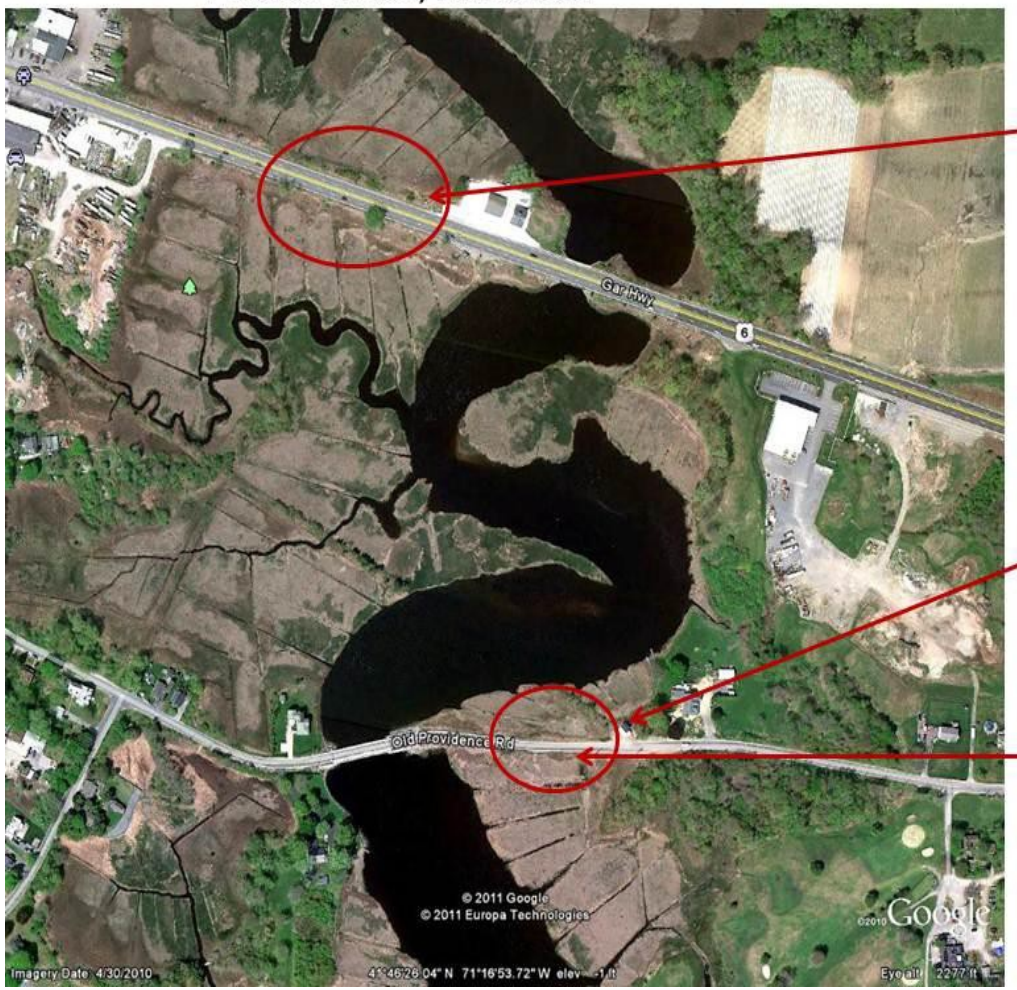
The acquisition of this land will also allow the marsh to migrate with predicted sea level rise and increased tidal inundation.



Benefits and Co-benefits of the Silveira and Tierney purchases include:

- Retention of identified green infrastructure in an area where it contributes to the dissipation of energy associated with storm, extreme tidal, and flood events, and contributes to carbon sequestration
- Increased amount of conservation land protected in perpetuity in this area along the Palmer (almost 100 acres in total properties that are contiguous or in close proximity to one another)
- Retention of stream continuity and habitat connectivity between parcels in a coastal river corridor
- Eliminated threats to water quality due to development in an area of the river below the desalination plant intake

Palmer River, Swansea



LOOKING DOWN THE ROAD . . . "Room to Grow," the Nemasket River Study, the Assawompset Ponds Watershed and Climate Action Plan, and the SRPEDD REGIONAL RESILIENCY PLAN . . .

Climate Change Transportation Vulnerability Assessment

OLD COLONY PLANNING COUNCIL

70 School Street
Brockton, MA 02301
508.583.1833
ocpcrpa.org

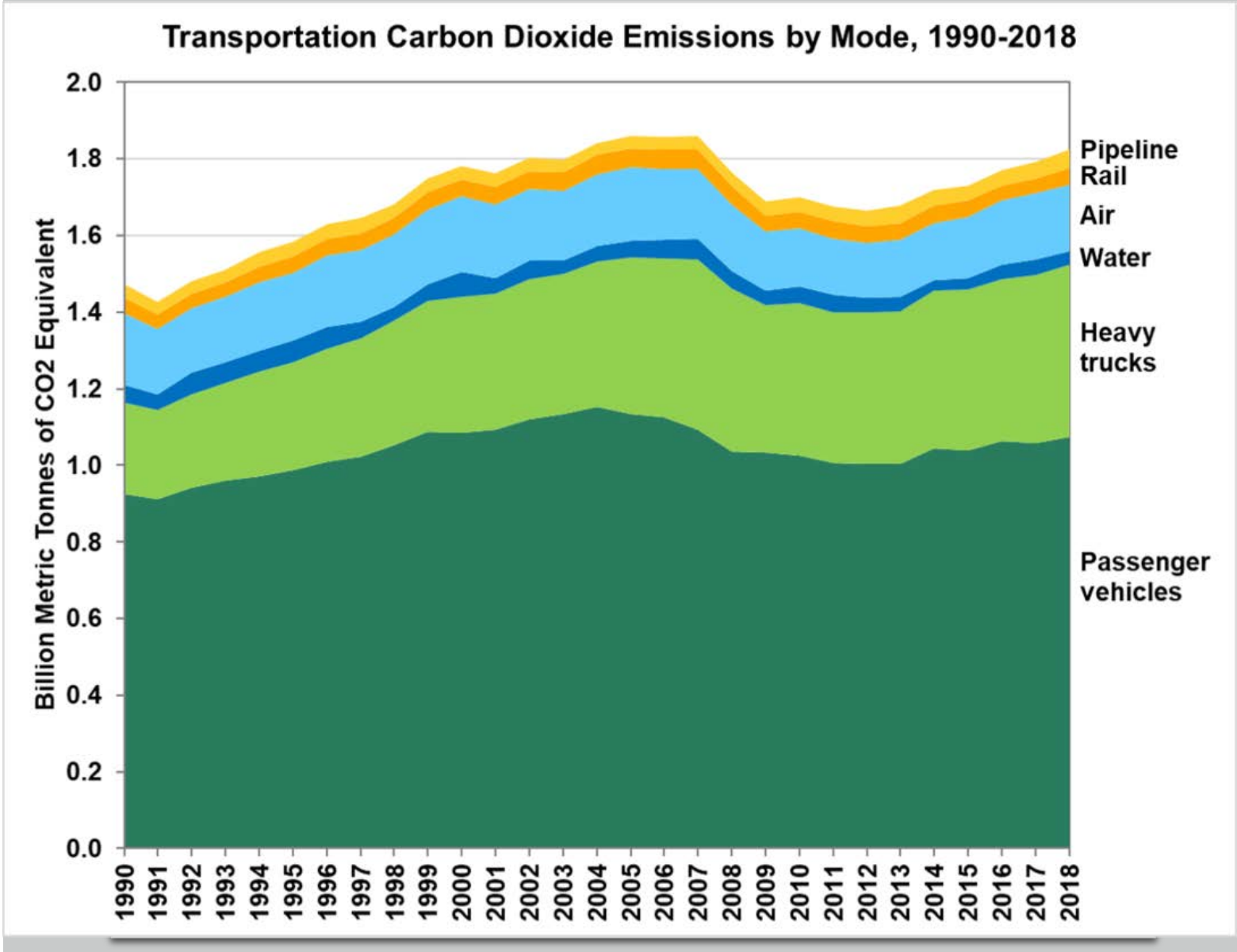
October 2021

OCPC Climate Change Transportation Vulnerability Study (UPWP) Purpose and Objectives:

- Update previous OCPC studies (2010 and 2011)
- Align with the Federal and State Response to Climate Change
- What is the Climate Change Impact in the OCPC regional transportation system and OCPC Communities Response?
- Develop Strategies/Projects for adaptation, management, mitigation.

Transportation Carbon Emissions
(in the USA)

EPA and Bureau of Transportation Statistics



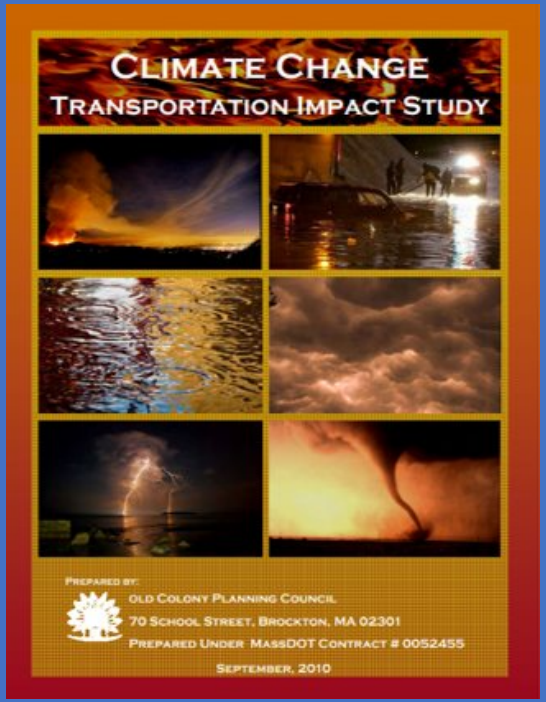
Federal Directives and Initiatives EO 13653 (2013) "Preparing the US for the Impacts of Climate Change"

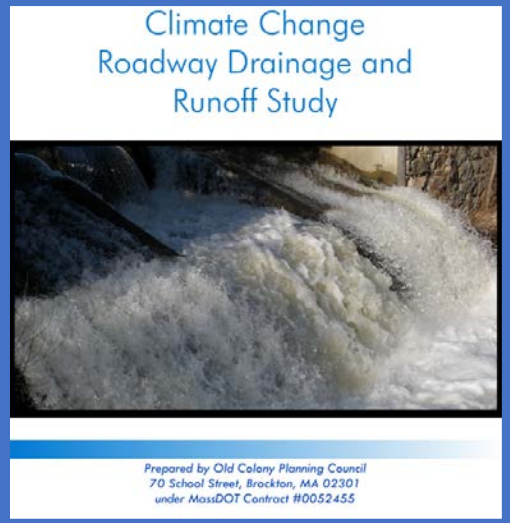
- Engage in strong partnerships and information sharing at all levels of government.
- Risk-informed decision making and the tools to facilitate it.
- Adaptive learning, in which experiences serve as opportunities to inform and adjust future actions.
- Support state and local governments in preparedness planning and resiliency.
- FHWA Document existing capabilities data on performance and assess vulnerabilities.
- FHWA – Loss of Routes, situational awareness, loss of service life, and inability to shelter in place.
- FHWA – Increased safety risk.
- FHWA – Loss of mobility and economic productivity.

Climate Change Challenges to Transportation in the OCPC Region

1. Riverine - Inland flooding adjacent to wetlands, rivers, and streams
2. Coastal sea level rise

OCPC 2010





OCPC 2011

Flooding (March 2010 storm event) **multiple roads** throughout OCPC **communities 15 inches in two weeks**

Dams, Stormwater, and drainage

Sea Level Rise Manomet, Plymouth

Air Quality and Health

Repairing/modifying seawalls for minimum erosion

Repairing dams, **Improve** and clean **local storm** drainage, detention, use **multi-use retention basins**

Regulation – adopt update stormwater **treatment and retention provisions** and **floodplain management plans.**

Consider LID and Track elevation for rail

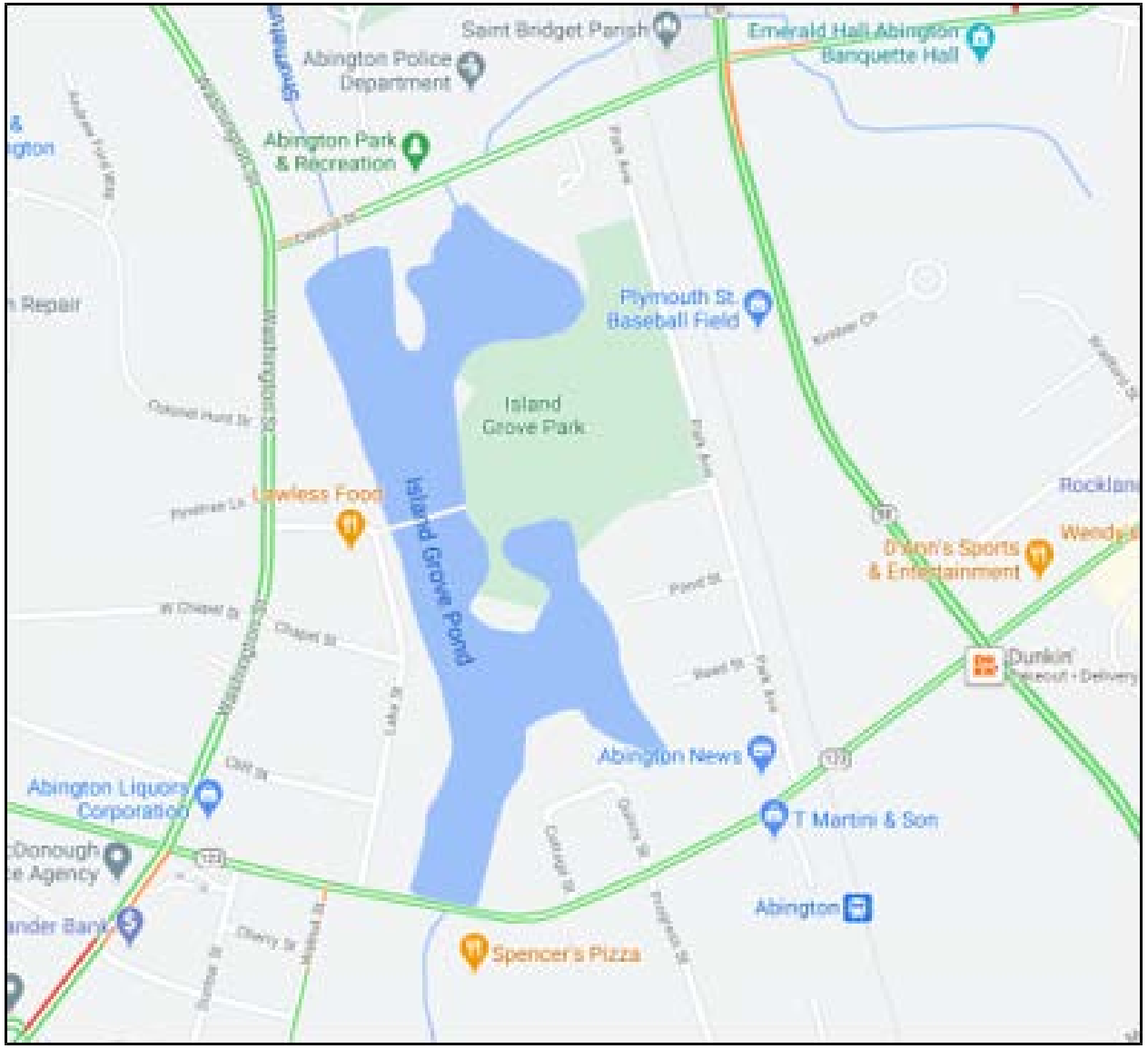
Stormwater mapping and mapping of impervious areas

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	

ABINGTON Community Resilience Building Workshop
Summary of Findings 2020

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) TIP project Design
2. Repair Island Grove Pond Dam - located at the southern end of the pond at Centre Ave. (Rt. 123)



Bridgewater

The affects of storm event March 2010, Bridge Street left and Bridge Street today 2021 Right Bridgewater

Municipal Vulnerability Preparedness Plan

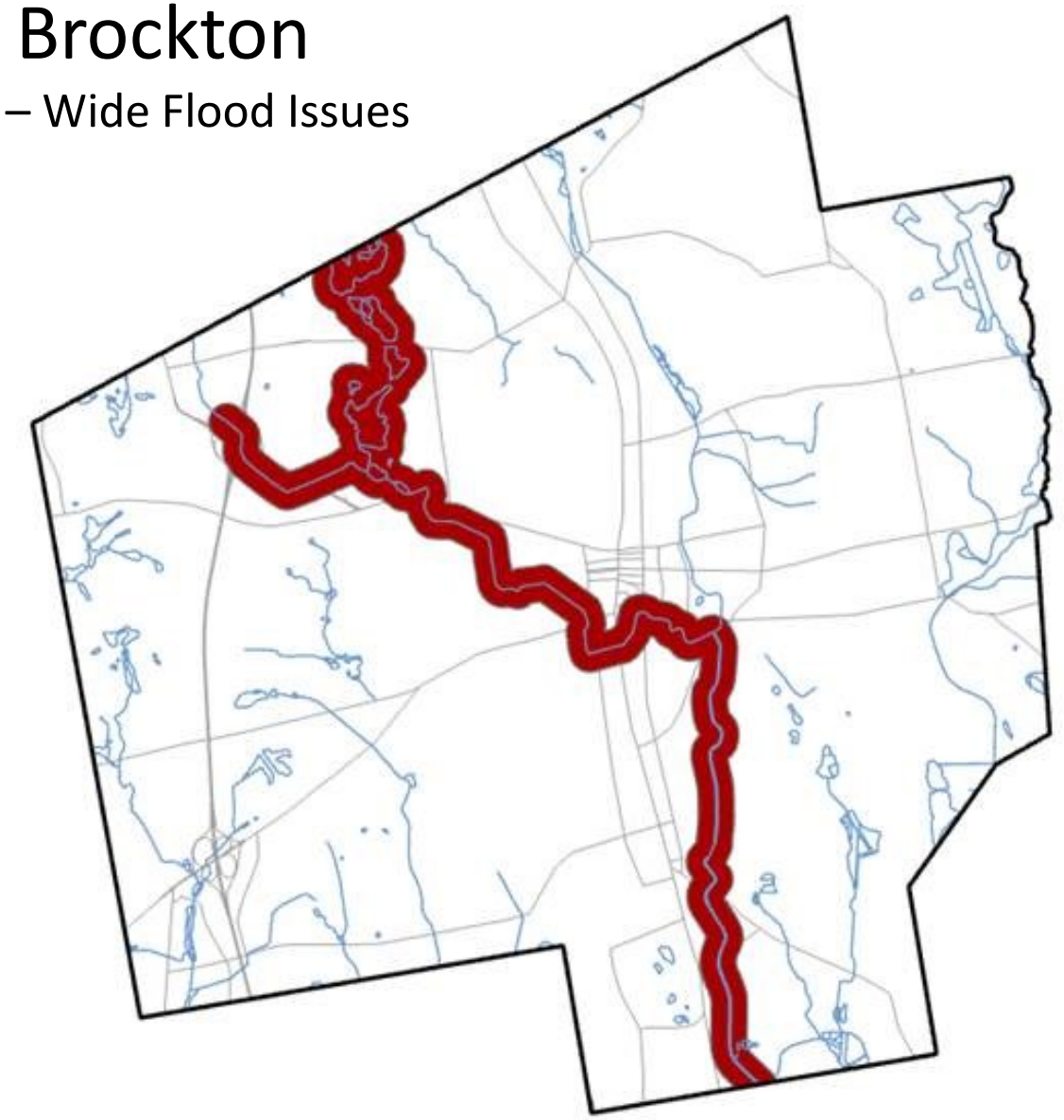
1. Obtain Effective hydraulic computer models from FEMA and develop Town-wide Hydrologic and Hydraulic (H&H) models based on UMass climate change (CC) projections for the 2050's and
2. Develop a Culvert and Bridge Improvement Master Plan

The affects of storm event March 2010, Titicut Street at the Taunton River

Brockton

City – Wide Flood Issues

Salisbury Brook near Pleasant Street Brockton March 2010

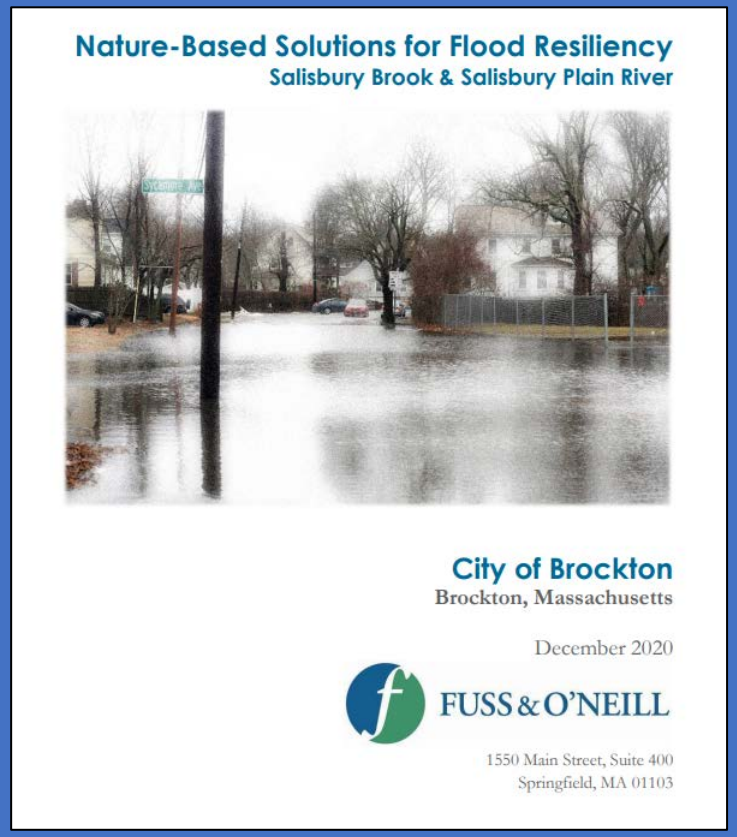


Salisbury and Trout Brooks in Brockton

(MVP Nature-Based Solutions for Flood Resiliency Salisbury Brook & Salisbury Plain River)

https://brockton.ma.us/city-departments/planning/

Brockton City – Wide Flood Issues and MVP Recommendations

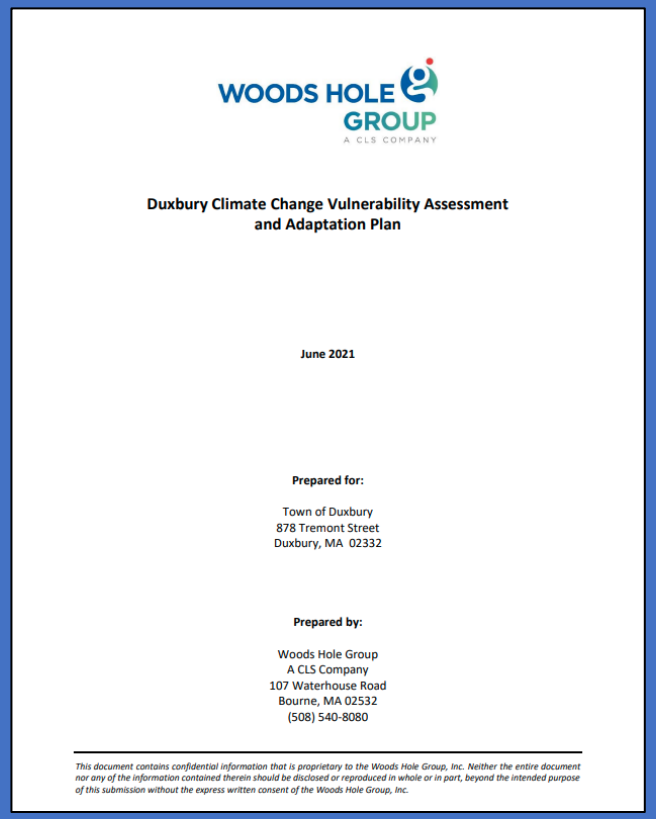


- Nature-based solutions to flood storage - restoring and/or enhancing natural habitat storage functions of pond/floodplains and lowering flood elevations (techniques excavation, widening river channels where development encroached the floodplain or buried stream channels.

- Expand flood capacity at Ellis Brett Pond and Install spillway gate - Water levels could be lowered before large storm events, then the gate could be raised to allow for detention of runoff for later release to the river in a controlled manner. In addition, proposed excavation and wetland restoration for a nine-acre area.

- Floodplain restoration of undeveloped parcels near Sargent's Way Excavation is proposed at three undeveloped City-owned parcels between Plain Street and Sargent's Way to create an additional 18,300 cubic yards of floodplain storage.

Duxbury Climate Change Vulnerability Assessment and Adaptation Plan June 2021



WOODS HOLE GROUP
A CLS COMPANY

Duxbury Climate Change Vulnerability Assessment and Adaptation Plan

June 2021

Prepared for:

Town of Duxbury
878 Tremont Street
Duxbury, MA 02332

Prepared by:

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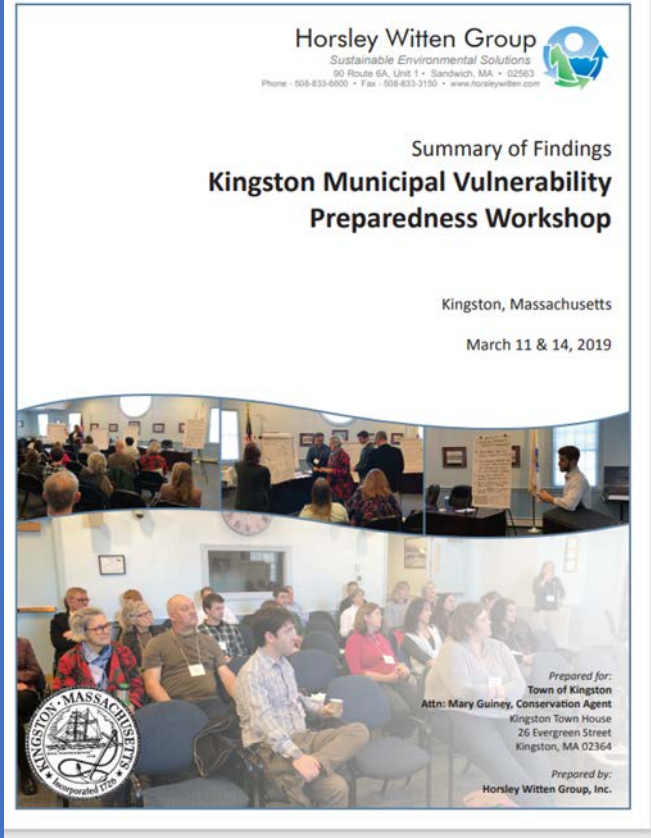
- Consultant completed a Climate Change Vulnerability Assessment and Adaptation Plan for Duxbury using an MVP implementation grant. The purpose was to determine the coastline sea level rise impacts to roads, bridges, culverts in 10-year, 50-year horizon.

- Included evaluation of roadway inundation and culverts with present Day, 2030, and 2070 low-lying roadway risks.

- Adaptation Strategies
  - Keep new development away from areas of current and future risk.
  - Modify vulnerable areas to improve flood tolerance, for example elevate structures and infrastructure above a design flood elevation.
  - Improve flood protection hard structures (e.g. modular seawalls) or soft solutions (e.g. dunes and vegetated berms).
  - Move (retreat) existing at-risk assets to higher ground to reduce exposure to flooding.

KINGSTON Municipal Vulnerability Preparedness Plan

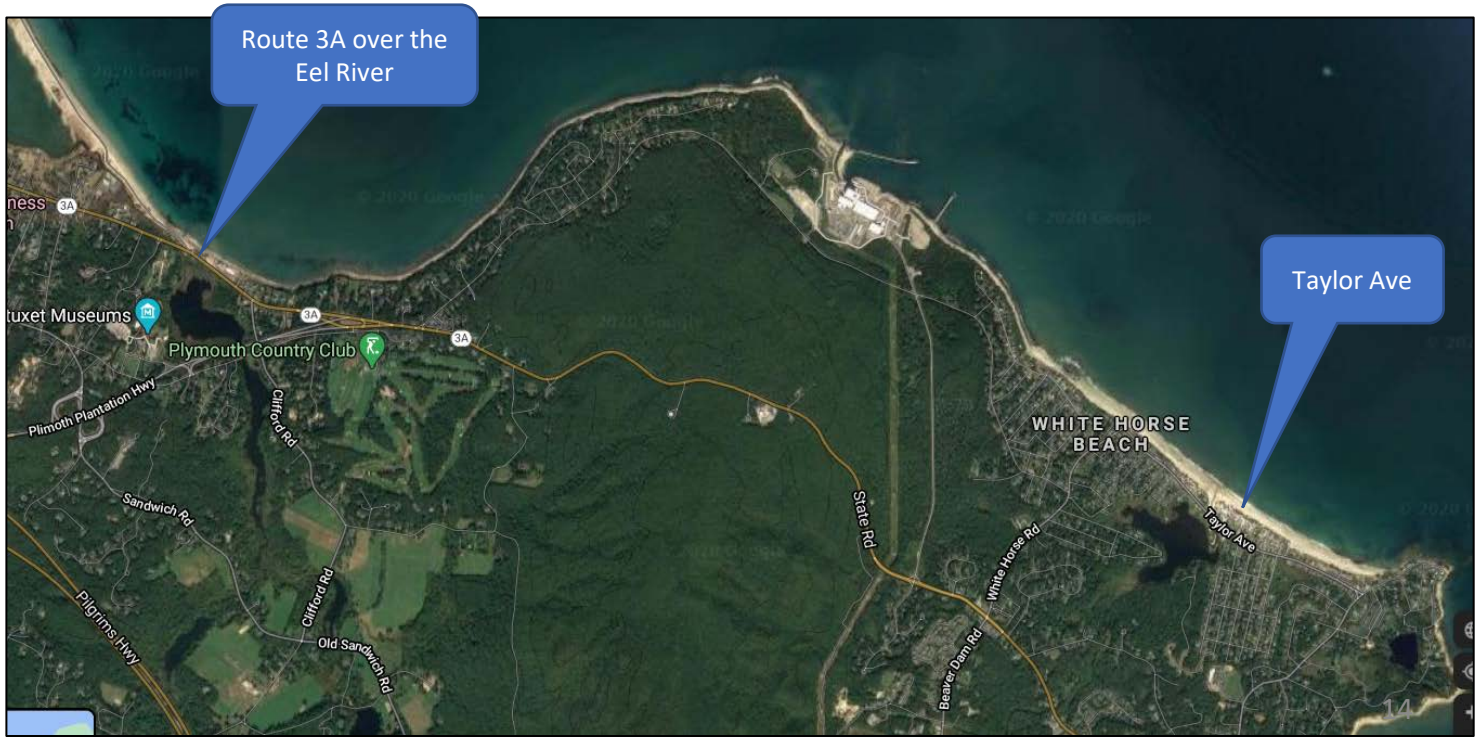


- Several culverts in town, including ones at Lake Street and Tussock Brook are in the planning process of being removed or retrofitted to improve flow and reduce flooding.
- The town has installed Vortechs® stormwater treatment at several outfalls combining swirl concentration and flow controls into a shallow treatment unit that traps and retains trash, debris, sediment and hydrocarbons from stormwater runoff.
- Consultant for Kingston and JRWA - Landing Maritime Resilience Plan Project with Jones River Watershed Association and the Town of Kingston. (Sea Level Rise)

Plymouth

Municipal Vulnerability Preparedness Plan

Coastal Sea Level Rise



Climate Change Resiliency and Adaptation

POTENTIAL FUNDING OPPORTUNITIES SUMMARY

Mass Municipal Vulnerability Preparedness Program	• Planning and action grants (for municipalities to address Climate Change and integrated with HMP)
Coastal Resilience Grant Program	• Eligibility 78 communities within the CZM • Planning, design, retrofits, seawalls, erosion protection, shoreline restoration, Sea Level Rise.
Resilient Communities Program	• (NFWF and federal funds) Green infrastructure projects to enhance community capacity to plan and implement resiliency projects from threats such as sea level rise.
Green Communities	• To reduce municipal energy use (Dept. of Energy Resources)
Dam and Seawall Repair or Removal Program	• The repair or removal of coastal infrastructure (dams, levees, sea walls, etc.)
Culvert Replacement Municipal Assistance Grant Program	• Assistance to municipalities Replacement of undersized, perched, or degraded culverts
Transportation Improvement Program (TIP)	• Transportation projects including bridges, road reconstruction, repaving, and drainage.
Federal Grants	•EPA Clean Water State Revolving Fund low interest loans for Grants NPS pollution, stormwater management, estuary and watershed improvements, and green infrastructure. •FEMA Hazard Mitigation Grant Program (HMGP)Flood Mitigation Assistance (FMA) Grant Program - Pre-Disaster Mitigation Grant Program (PDM)

Grant Funding Inventory (snepnetwork.org)

FINAL QUESTIONS?

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OLD COLONY
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