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#### "An investment in our environment is an investment in our future"

#### Executive Order 569 (2016)



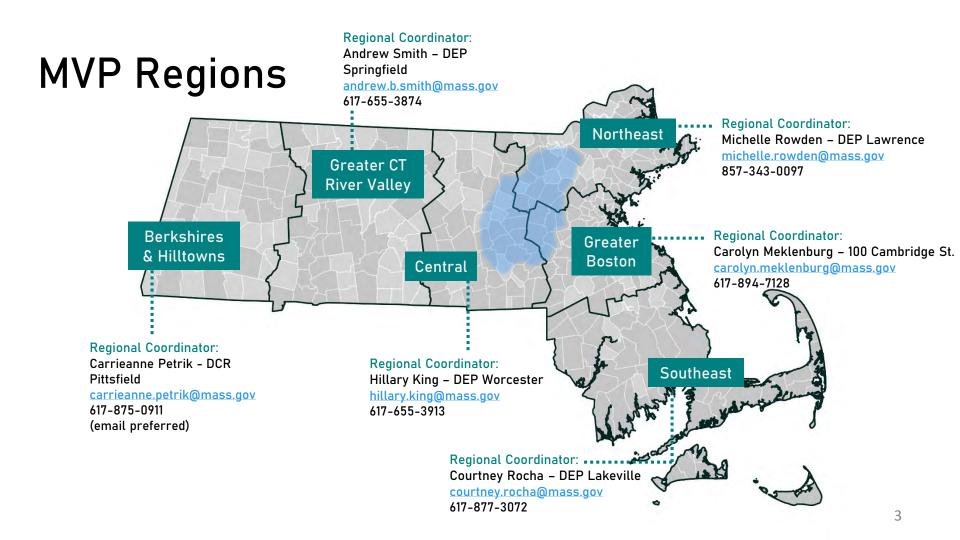
- Comprehensive approach to reduce GHG emissions to combat climate change and prepare for the impacts of climate change
  - State Adaptation Plan
  - Climate Coordinators
  - Agency Vulnerability Assessments
  - Municipal Support

#### **Environmental Bond (2018)**



- \$2.4 billion bond bill with focus on climate change resiliency
- Over \$200 million authorized for climate change adaptation
- Codifies EO 569, including the MVP Program

https://www.mass.gov/news/governor-baker-signs-legislation-directing-24-billion-to-climate-change-adaptation



#### The Climate is Changing - end of century projections:

#### RISING TEMPERATURES



- 10.8°F increase in avg annual temp.
- Up to 64 fewer days/year with min. temperatures < 32° F</li>
- Up to 64 more > 90°F days/year

#### SEA-LEVEL RISE



4- to 10.5-feet along the MA coast

# CHANGES IN PRECIPITATION



- 18% increase in consecutive dry days
- 57% increase in days with > 1 in. rainfall
- 7.3 inches additional annual rainfall

# EXTREME WEATHER

Increase in frequency & magnitude

### Why Municipal Vulnerability Preparedness?



RISING TEMPERATURES



CHANGES IN PRECIPITATION



SEA-LEVEL RISE



EXTREME WEATHER

Visit <u>resilientma.org</u> for more information from the State Hazard Mitigation and Climate Adaptation Plan (SHMCAP) about how climate change is intensifying natural hazards.

**Climate resilience:** is the ability of a community to **address the needs** of their built, social, and natural environment to **anticipate**, **cope with**, **and rebound stronger** from events and trends related to climate change hazards.

#### BUILDING CLIMATE RESILIENCE IN THE COMMONWEALTH

#### **CLIMATE MITIGATION**

(GWSA & Green Communities)

- Energy conservation & efficiency
- Increased renewables in electric grid
- Onsite renewable energy
- Sustainable transportation / improved fuel efficiency
- Capture and use of landfill and digester gas
- · Carbon sinks

#### CLIMATE ADAPTATION

(E0 569 & MVP)

Utilizing climate projections in planning and design

- Water/energy conservation
- Microgrids
- Strategic electrification
- Storage for peak demand response
- Resilience hubs

Risk & vulnerability

- Structure retrofit/relocation
  - Culvert upgrades
    - Dam removal
  - Adaptive resource management
    - Land acquisition

#### HAZARD MITIGATION

(SHMCAP, MEMA/FEMA)

- · Dry floodproofing
- Dam rehabilitation
- Slope stabilization
- Removal or reduction of flammable vegetation
- Generators for critical facilities

#### 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

# MVP CORE PRINCIPLES



Multiple benefits to a broad cross-section of the community

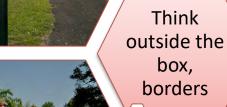
Address identified climate change impacts



Meaningful & equitable community outreach & engagement

Monitoring & maintenance





Knowledge sharing





Proactive



# MVP Planning G R A N T

\$15,000- \$100,000 per plan Roughly 9-month process *\$1M* available per year

mass.gov/service-details/mvp-planning-grant



# MVP Action GRANT

Open to MVP communities \$25,000- \$2M per project, over one or two FY \$10M available per year

mass.gov/service-details/mvp-action-grant



**MVP Program Status** 

Community Resilience **Building (CRB) Process** 89% participation 312 communities

**Action Grant Projects** 

FY 18: 37 FY 19: 36 FY 20: 53 FY 21: 41

**Total Awards** \$44M to date

**MVP** Region Boundaries

**Completed Planning Grants** 

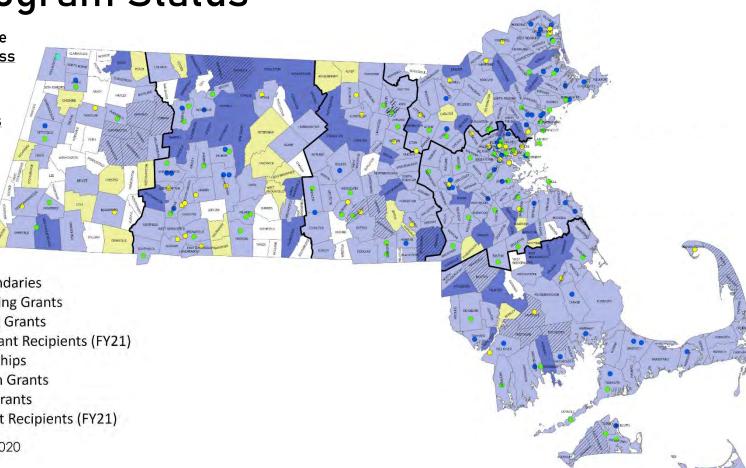
**Ongoing Planning Grants** 

**NEW Planning Grant Recipients (FY21)** 

Regional Partnerships

- **Completed Action Grants**
- **Ongoing Action Grants**
- **NEW Action Grant Recipients (FY21)**

Updated: September 2020



#### **MVP PLANNING Grant**



Lead a
community-driven
planning process
to understand
climate
vulnerabilities and
identify priority
adaptation actions.



Utilize statecertified MVP
providers, toolkit,
and climate data to
develop an MVP
Plan through
workshops and
community
outreach.



Be designated as an MVP Community and eligible for Action Grant

f...a:..a!

As an MVP Community:

- ✓ Submit yearly progress reports
- ✓ Apply to implement your priority actions

# MVP Action Grants: Project Types, Findings, and Case Studies

# Project Types



Planning, Assessments, and Regulatory Updates



Nature-based Solutions for Ecological and Public Health



Resilient Redesigns and Retrofits for Critical Facilities and Infrastructure

Statistics From Last Round 143 applications

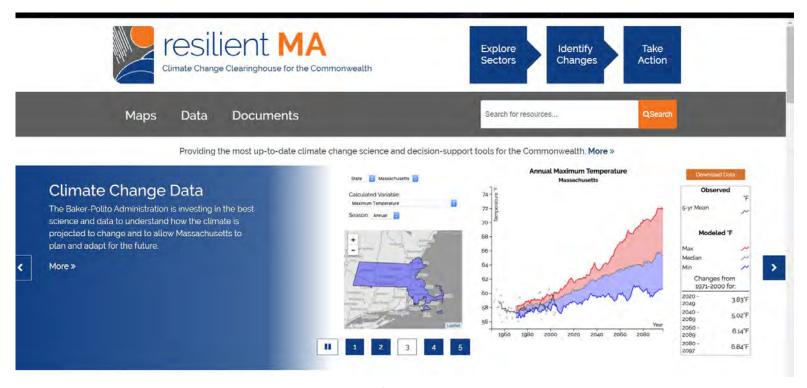
Over \$46 million requested

41 funded projects

Total funding \$10 million

Average grant size: ~\$250,000

# Climate Data and Projections



www.resilientma.org

What does the climate data look like...

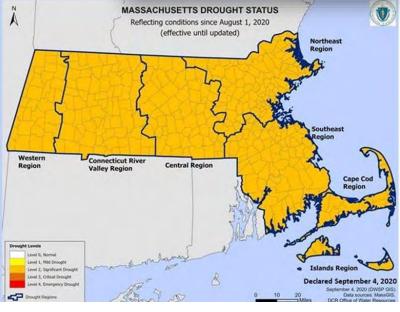


The New York Times https://nyti.ms/2d3Z0aK

#### Scenes From New England's Drought: Dry Wells, Dead Fish and Ailing Farms

By Jess Bidgood

Sept. 26, 2016



# Nature-based Solutions







Projects that **restore**, **protect**, and/or **manage** natural systems and/or mimic natural processes to address hazards like flooding, erosion, drought, and heat islands in ways that are **cost-effective**, **low maintenance**, and **multi-beneficial** for public health, safety, and well-being.



#### **DID YOU KNOW?**

#### Spending time in nature helps to:

- Strengthen your immune system
- Speed up recovery from medical treatment
- Lessen feelings of depression
- Lower glucose levels in diabetics
- Improve mental focus and concentration



#STANDUPFORFORESTS

COASTAL AREAS ARE AMONG THE MOST **ECONOMICALLY** VALUABLE AND ECOLOGICALLY PRODUCTIVE IN THE U.S.®



87K jobs in the seafood industry in Massachusetts in 2016, the second highest in the U.S., contributing \$7.7 billion in sales, the third highest in the U.S.9

SPENT ON SOURCE WATER PROTECTION

SAVED IN WATER

TREATMENT COSTS.3

20%

POTENTIAL DECREASE IN FLOOD HEIGHT IN TOWNS DOWNSTREAM BY STRATEGIC PLANTING OF TREES ON FLOODPLAINS.13



Increase in electricity

use for cooling following reduction in tree canopy

cover by 30% in Worcester's Greendale neighborhood, prompted by an Asian longhorned beetle infestation.9







Mass Audubon Losing Ground 2020 Report

TO THE U.S. ECONOMY, 21

1 of 3 bites

WE EAT DEPENDS ON

POLLINATORS, 20 AND THEY

**CONTRIBUTE MORE THAN** 

Cohen-Shacham, E., Walters, G., Janzen, C. and Maginnis, S. (eds.) (2016). Nature-based Solutions to address global societal challenges. Gland, Switzerland: IUCN. xiii + 97pp.

#### TABLE 1. COMMUNITY BENEFITS OF GREEN STORMWATER INFRASTRUCTURE

#### Constructed Stormwater Wetlands



#### **Bioretention Areas & Rain Gardens**





	GREEN STORMWATER INFRASTRUCTURE									
HEALTH BENEFITS	Linear Buffer Park / Trail	Stormwater Park	Stormwater Planter	Parkway Bioswale	Rain Garden	Street Trees	Green Roof	Permeable Pavement	Permeable Bikc Lanc	District
Improved Outdoor Air Quality			**		* *					**
Improved Indoor Environmental Quality			**					0.0	0.0	0
Reduced Noise Pollution									**	**
Reduced Heat Stress	• #				*	**	•			
Improved Community Cohesion + Mental Health			**	٠						
ECONOMIC BENEFITS										
Improved Workforce Development / Job Creation	***	***				***				***
Increased Vacant Land Reactivation	***	***								***
Increased Property Values	**	***	•	**	٠	**	***			***
Increased Sales Revenue			••	**	**				••	**
Increased Recreational Revenue	***	***							***	
CLIMATE ADAPTATION / RESILIENCE										
Reduced Flooding	***	***					0.0			***
Reduced Urban Heat Island Temperatures	**	***		٠		***	***			***
Protected Water Quality (reduced runoff and combined sewer overflows)	***	***			**	***	0.0		••	***
CLIMATE MITIGATION / AVOIDANCE										
Reduced Greenhouse Gases	***	***	***	***		***	***			***
Reduced Energy / Fuel Use	**	**				***	***			16.01
TRANSPORTATION BENEFITS					9-					
Reduced On-Street Flooding	**	**	**	••	**	***		***	***	***
Improved Safety	••								**	**
Increased Opportunities for Active Transportation	***	***	**	•••					***	**

• • • high benefit

• • medium benefit

· low benefit

# Why do we need Nature-based Solutions?

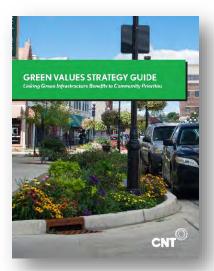
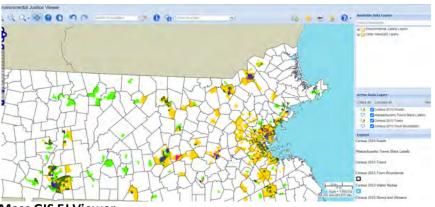


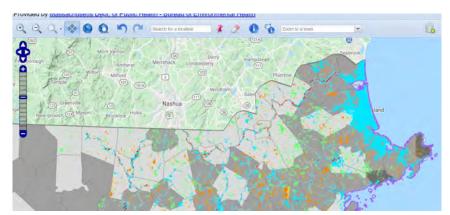
Table from the Center for Neighborhood Technology's <u>Green Values Strategy Guide</u> for municipalities,

# Environmental Justice and Climate Vulnerability



**Mass GIS EJ Viewer** 

http://maps.massgis.state.ma.us/map\_ol/ej.php



**Mass DPH Climate Vulnerability Map** 

http://maps.massgis.state.ma.us/map\_ol/cc\_vuln.php

Local Bylaws, Ordinances, Plans, and Other Management Measures

# Climate Resiliency Policy Audit/Amendments and LID and Design Guidelines

#### **Brookline**



MVP Grant: \$56,188

Match Amount: \$18,750

Total Project Cost: \$74,938

#### **Project Priority:**

 Assess regulatory gaps and opportunities for the incorporation of climate adaptation, resilience measures, and low-impact design guidelines with a focus on integrating natural resources with the built environment

Table 2. Climate Resilience and Adaptation Goals and the Wetlands Regulations

Goals	How to Incorporate Goals into Wetlands Regulations
Incorporate climate change into planning and decision-making	Update language with definitions related to climate adaptation and resilience that can be used across planning and regulatory tools where applicable.
Protect against stormwater impacts	Add performance standards that can be updated to include a:
Chart on proposed ch	panges to wetlands regulations from n. 9 of final report



- Sustainable Roofing Strategies reduce urban heat island effect and utility costs. Vegetated roofs can also retain stormwater.
- Tree Box Filters capture stormwater, which is then taken up by the tree or filtered into the soil.

Local Bylaws, Ordinances, Plans and Other Management Measures

# Low Impact Development Regulation Development and Zoning Bylaw Inclusion

Image credits: Town of Natick, Dodson & Flinker

#### **Natick**



MVP Grant: \$39,053 Match Amount: \$13,021 Total Project Cost: \$52,074

#### **Project Priority:**

Review and draft new regulations based on a 2016 assessment of local land use regulations against state best practices for low impact development

The project proposes changes to the following regulations:

- Stormwater and Erosion Control Bylaw and Regulations
- Subdivision Regulations
- Cluster Development Zoning
- Aquifer Protection District Zoning

NATICK TODAY

WORSE CONVENTIONAL BEFFER BEST PRACTICE

HIGH HIGH HIGH HIGH HIGH

HOUSE CLUSTER IN RSC

**Summary of Local Land Use Regulations Against Best Practices** 

Local Bylaws and other Management Measures

#### Integration of Low Impact Development Standards into Local Bylaws and Subdivision Regulations

#### Mendon



MVP Grant: \$8,025 Match Amount: \$2.900

Total Project Cost: \$10,925

#### **Project Priority:**

To integrate low impact development standards into local bylaws and subdivision regulations

#### **Examples of Standards added to Mendon Zoning By-Laws:**

- Parking areas shall be strongly encouraged to be designed to include landscaping to include low impact development techniques.
- All open space shall be designed to add to the visual and ecosystem amenities of the area by maximizing its visibility for persons passing the site or overlooking it from nearby properties, for stormwater mitigation, and enhancing ecological integrity.
- Surface parking lots with over 15 parking spaces serving uses located in Highway Business or General Business Districts must have at least one shade tree (minimum two-inch caliper) for every 15 provided parking spaces.
- Total impervious area on any given site shall be minimized as possible through the use of natural plantings and construction of Low Impact Development best management practices

Redesign and Retrofit, Mapping, Bylaws and Ordinances

#### Deerfield



MVP Grant: \$47,325 Match Amount: \$19.611

Total Project Cost: \$66,936

#### Culvert Redesign and Retrofit and Bylaw Update

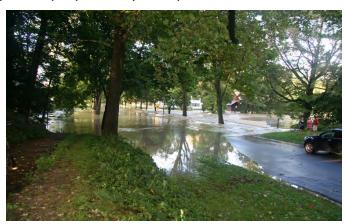
#### **Projects Priorities:**

- Prepare engineering design plans to replace a partially collapsed and vulnerable culvert to improve flow and fish/wildlife passage, reduce flooding and protect public safety
- Improve zoning and development controls in the Deerfield River floodplain to protect flood storage areas and protect public safety and reduce future flood losses
- Incorporate new flood maps into proposed bylaw updates

#### **Site Design Practices**

- Reduce storm pipes, curbs and gutters
- · Preserve sensitive soils
- Cluster buildings and reduce building footprints
- · Reduce road widths
- · Minimize grading
- · Limit lot disturbance
- Reduce impervious surfaces



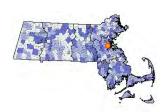


Detailed Vulnerability and Risk Assessment Nature-Based Infrastructure and Technology Solutions to Reduce

Vulnerability to Extreme Heat and Poor Air

Quality

#### **Natick**



MVP Grant: \$9,025 Match Amount: \$3,396 Total Project Cost: \$12,421

https://rb.gy/l0rveg

# Tree Planting Plan to Mitigate Heat Islands and Reduce Runoff

#### **Project Priority:**

- Perform an analysis of heat islands and tree canopy in Natick
- Identify opportunities for tree planting

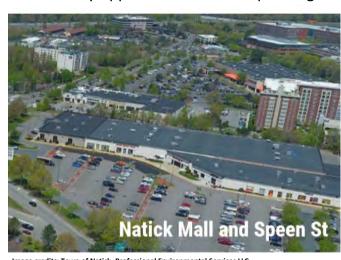
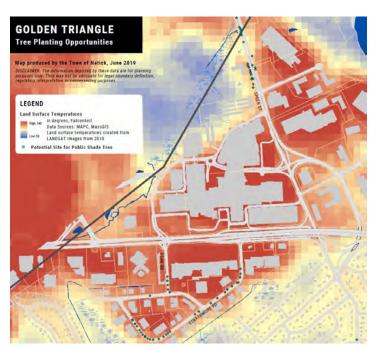


Image credits: Town of Natick, Professional Environmental Services LLC



Map of land surface temperature and tree planting opportunities near the Natick Mall.

#### Pine Island Pond Watershed Lands (PIPWL) Project

Ecological Restoration and Habitat Management to Increase Resiliency

#### Mattapoisett



MVP Grant: \$960,000 Match Amount: \$460,000

#### **Project Priorities:**

Acquire 120 acres of undeveloped forest, wetland, and salt marsh vulnerable to climate change for permanent conservation



Image credit: town of Mattapoisett



Map prepared by: Buzzards Bay National Estuary Program, land acquired through project outlined in red

Open Space Preservation, Ecological Restoration and Habitat Management to Increase Resiliency

#### Littleton



**Project Priorities:** 

Acquire 20 acres of forest and wetland vulnerable to climate change for permanent conservation

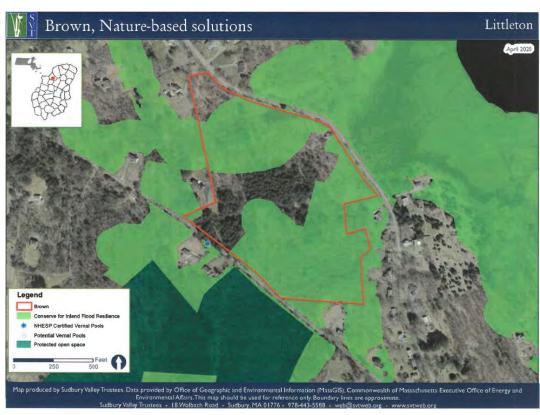
MVP Grant: \$763,050 Match Amount: \$288,675

Total Project Cost: \$1,051,725



Image credit: Town of Littleton

#### **Brown's Woods Land Acquisition Project**



Map prepared by: Sudbury Valley Trustees, land acquired through project outlined in red







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- MVP Planning Reports: <a href="https://www.mass.gov/info-details/municipal-vulnerability-preparedness-mvp-program-planning-reports">https://www.mass.gov/info-details/municipal-vulnerability-preparedness-mvp-program-planning-reports</a>
- MVP Action Projects: <a href="https://www.mass.gov/info-details/municipal-vulnerability-preparedness-program-action-grant-projects">https://www.mass.gov/info-details/municipal-vulnerability-preparedness-program-action-grant-projects</a>
- A full list of municipalities by MVP Region can be found <u>here</u>
- Additional state grant opportunities for cities and towns: mass.gov/lists/community-grant-finder
- Resilient MA Climate Change Clearinghouse for the Commonwealth: resilientma.org