



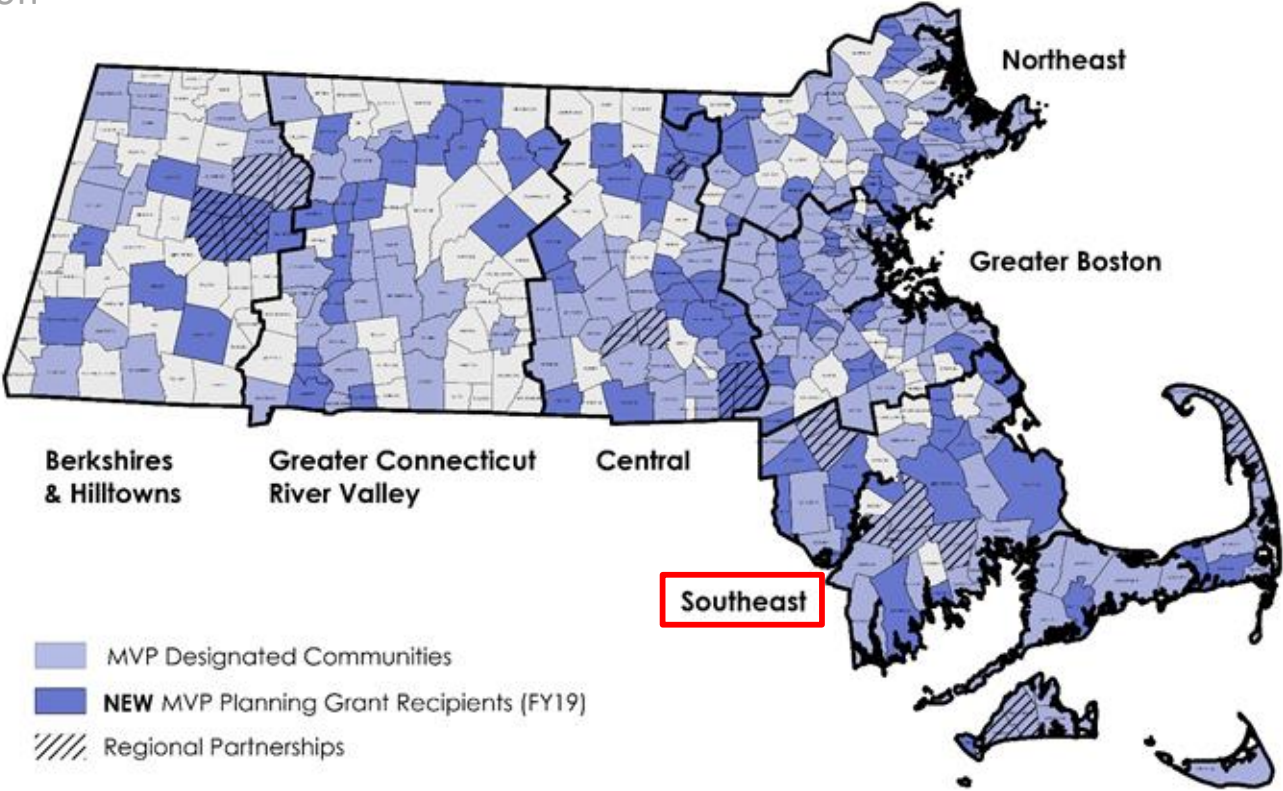
# FY18 Action Grant Summaries



Municipal Vulnerability Preparedness Program  
MA Executive Office of Energy and Environmental Affairs

# FY18 Action Grant Projects

## Southeast Region

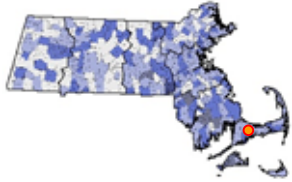


# FY18 Action Grant Projects

## Detailed Vulnerability and Risk Assessment

# Climate Change Vulnerability Assessment/Adaptation Planning

## Sandwich



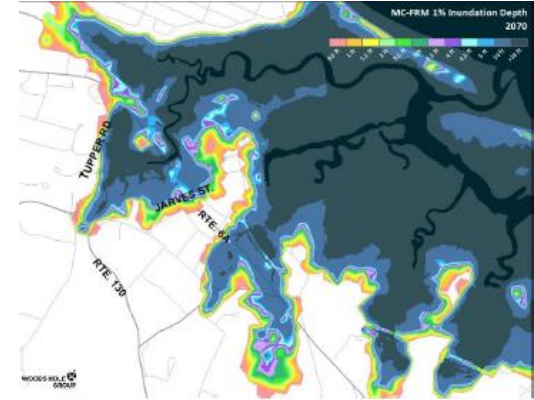
MVP Grant: \$88,025

Match Amount: \$29,350

Total Project Cost: \$117,375

### *Project Priorities:*

- Identify areas of the Town that are vulnerable to the combined effects of sea level rise and storm surge from extreme storm events;
- Assess the vulnerability of municipally owned public infrastructure and natural resources;
- Identify adaptation strategies that will help to mitigate the near- and long-term effects of **sea level rise** and **storm surge**; and
- Educate the public, Town officials, and legislators about those potential impacts.



**Downtown Sandwich 2070 1% Flood Inundation Depth**



**Rendering of Downtown Fire Station Inundation from 2030 1% chance events**

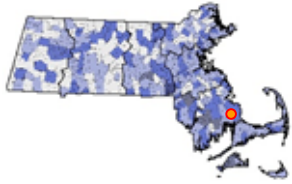


# FY18 Action Grant Projects

## Detailed Vulnerability and Risk Assessment

# Climate Change Water Resource Vulnerability and Adaptation Strategy Assessment

## Carver



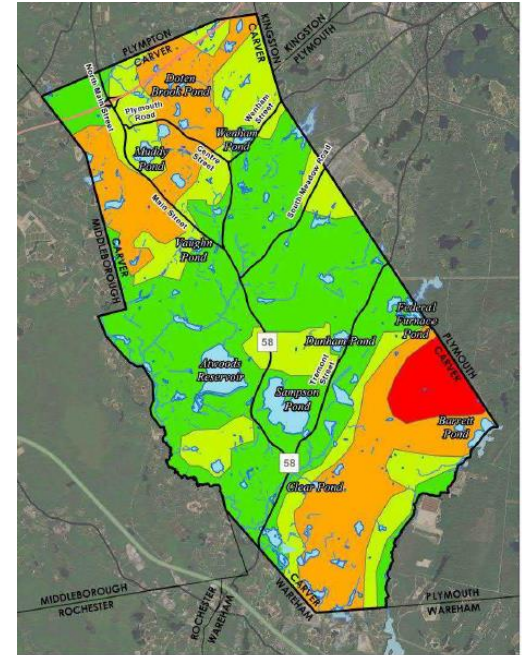
MVP Grant: \$196,979

Match Amount: \$65,790

Total Project Cost: \$262,769

### *Project Priorities:*

- Conduct a detailed vulnerability and risk assessment of surface water supply, with particular focus on water to support fire suppression activities
- Maintain successful agricultural (cranberry) production
- Ensure high surface water quality



Groundwater Level Drop

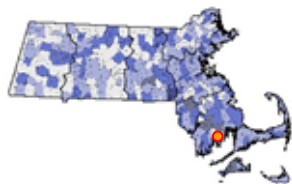
USGS simulated changes in groundwater level from average conditions for simulated drought conditions in October of 1966 with 2005 pumping rates

# FY18 Action Grant Projects

Risk Assessment and Community Outreach

## Comprehensive Climate Adaptation and Resilience Action Plan and Interactive Community Dashboard

### New Bedford



MVP Grant: \$165,120

Match Amount: \$55,040

Total Project Cost: \$22,160

#### Project Priority:

Develop resilience actions for six broad focus areas and rate contribution:

- Climate & Energy
- Economy & Jobs
- Infrastructure, Utilities, & Waste
- Natural Resources
- Public Health & Safety
- Transportation & Land Use

ACTIONS		Community Character	Empowerment	Equity	GHG Reduction	Resilience
1	Develop a long-term adaptation strategy for the Port	●	●	●	●	●
2	Create a city-wide energy and water conservation campaign and tracking system	●	●	●	●	●
3	Increase the type and number of community installations of renewable energy sources	●	●	●	●	●
4	Encourage community electric vehicle adoption	●	●	●	●	●
5	Create a green business certification program	●	●	●	●	●

● POSITIVE CONTRIBUTION ● NEUTRAL CONTRIBUTION ● NEGATIVE CONTRIBUTION

Top Six Actions for Climate and Energy

#### ACTION 1

Develop a long-term adaptation strategy for the Port

*This action would develop a plan to fortify the Port, including a study on vulnerabilities and actions to lessen them.*



PLANNING CONSIDERATIONS

IMPLEMENTATION STEPS		KEY PARTNERS	TIMEFRAME	COST*
1	Survey and map existing shoreline features and NBPA-owned or operated facilities to determine the assets and facilities that are vulnerable	Department of Environmental Stewardship	8 months	\$-\$
2	Inventory existing infrastructure and evaluate each element relative to remaining useful life and resilience to SLR	MA Seaport Council	3 months	\$-\$
3	For those infrastructure assets identified as vulnerable, evaluate redesigns and retrofits	A Coastal Zone Management	1 year	\$\$-\$\$\$
4	Conduct public outreach with general public and stakeholders in the port area to understand their current experience with climate change	Department of Environmental Stewardship	1 year	\$
5	Determine how to translate the results of the assessment into guidelines, best practices, and adaptation plans to ensure that private development is resilient to future coastal storms and climate impacts	Department of Environmental Stewardship	5-6 months	\$

\*Cost: \$ = <\$20,000; \$\$ = \$20,001 - \$100,000; \$\$\$ = \$100,001 - \$250,000; \$\$\$\$ = > \$250,001

#### Implementation Steps, Key Partners, Timeframe, and Cost for Action 1



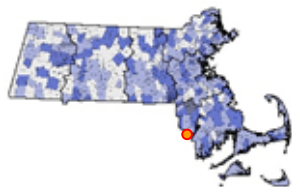
CLIMATE & ENERGY  
ACTIONS SNAPSHOT

# FY18 Action Grant Projects

# Public Water Supply Infrastructure Vulnerability Assessment

## Detailed Vulnerability and Risk Assessment

### Swansea



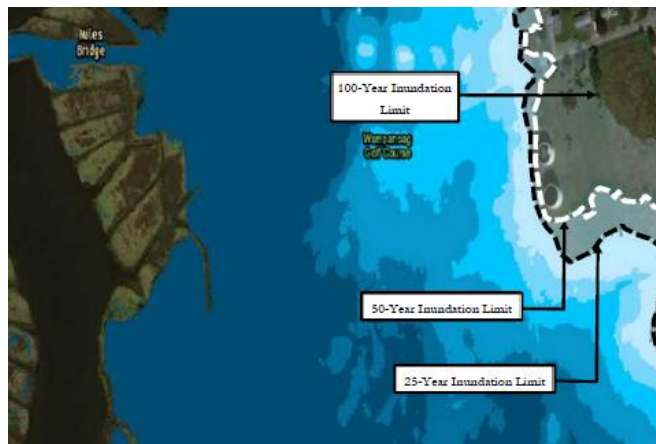
MVP Grant: \$28,495

Match Amount: \$9,520

Total Project Cost: \$38,015

### Project Priority:

The Town of Swansea conducted a climate change vulnerability assessment of its desalination treatment facility's raw water intake infrastructure and the primary access road to the infrastructure. The assessment was conducted by an engineering consultant, in collaboration with the Town's technical staff, developing a future resiliency plan to protect the public water supply from sea level rise and extreme storms.



Inundation Limits for 25-, 50-, and 100- year Coastal Storm (2100 with 7' SLR)

Critical Infrastructure Component <sup>1</sup>	Present-Day Coastal Flood Event Scenario <sup>1</sup>			
	10-Year (Present)	50-Year (Present)	100-Year (Present)	500-Year (Present)
<b>John Myles Bridge Deck and Approaches</b>				
Roadway Surface elevation 7.2 feet to 8.2 feet <sup>2</sup>	(1.7) <sup>3</sup>	(2.5) <sup>3</sup>	(4.4) <sup>3</sup>	(11.1) <sup>3</sup>
Old Providence Road Low Point on West Bridge Approach elevation 3.8 feet <sup>2</sup>	(5.1) <sup>3</sup>	(5.9) <sup>3</sup>	(7.8) <sup>3</sup>	(14.5) <sup>3</sup>
Old Providence Road Low Point on East Bridge Approach elevation 3.0 feet <sup>2</sup>	(5.9) <sup>3</sup>	(6.7) <sup>3</sup>	(8.6) <sup>3</sup>	(15.3) <sup>3</sup>
<b>Intake Station and Parking Area</b>				
Parking Lot elevation 4.0 feet to 4.9 feet <sup>2</sup>	(4.9) <sup>3</sup>	(5.7) <sup>3</sup>	(7.6) <sup>3</sup>	(14.3) <sup>3</sup>
Structure Floor elevation 10.9 feet <sup>2</sup>	0.0	0.0	(0.7) <sup>3</sup>	(7.4) <sup>3</sup>
<b>Storage Facility, Holding Tanks, and Access</b>				
Driveway Entrance and Parking Area elevation 20.0 feet to 22.5 feet <sup>4</sup>	0.0	0.0	0.0	0.0
Facility F.F.E. = 23.0 <sup>4</sup>	0.0	0.0	0.0	0.0
Storage Tanks Ground El. = 24.0 <sup>1</sup>	0.0	0.0	0.0	0.0
<b>Desalination Facility and Access</b>				
Facility F.F.E. = 42.0 feet – 44.0 feet <sup>4</sup>	0.0	0.0	0.0	0.0
Site Low Point El. = 32.0 feet <sup>4</sup>	0.0	0.0	0.0	0.0

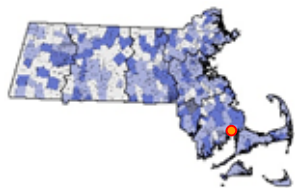
Critical Infrastructure Elevations vs. Present-Day Flood Event

# FY18 Action Grant Projects

## Detailed Vulnerability and Risk Assessment

# Climate Change Flood Vulnerability Assessment/Adaptation Planning

## Wareham



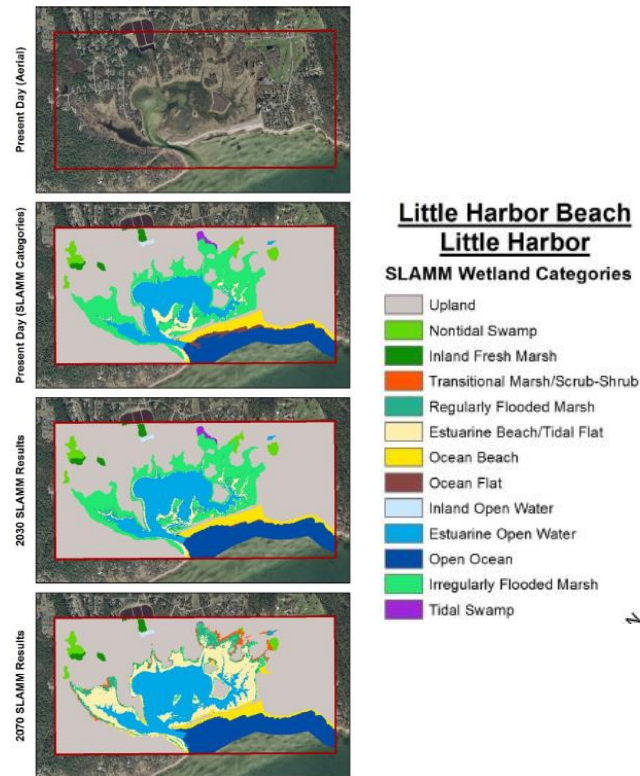
MVP Grant: \$62,735

Match Amount: \$21,006

Total Project Cost: \$83,741

### ***Project Priorities:***

- Provide data on likely future flooding scenarios and identified potential flooding impacts to municipally-owned infrastructure;
- Identify potential sea level rise impacts to natural resources
- Identify potential flooding impacts to specific population demographics;
- Identify potential adaptation strategies to reduce risk
- Prioritize investments in adaptation strategies
- Produce high-quality maps and graphics that can be used to disseminate project results to decision makers and the general public.

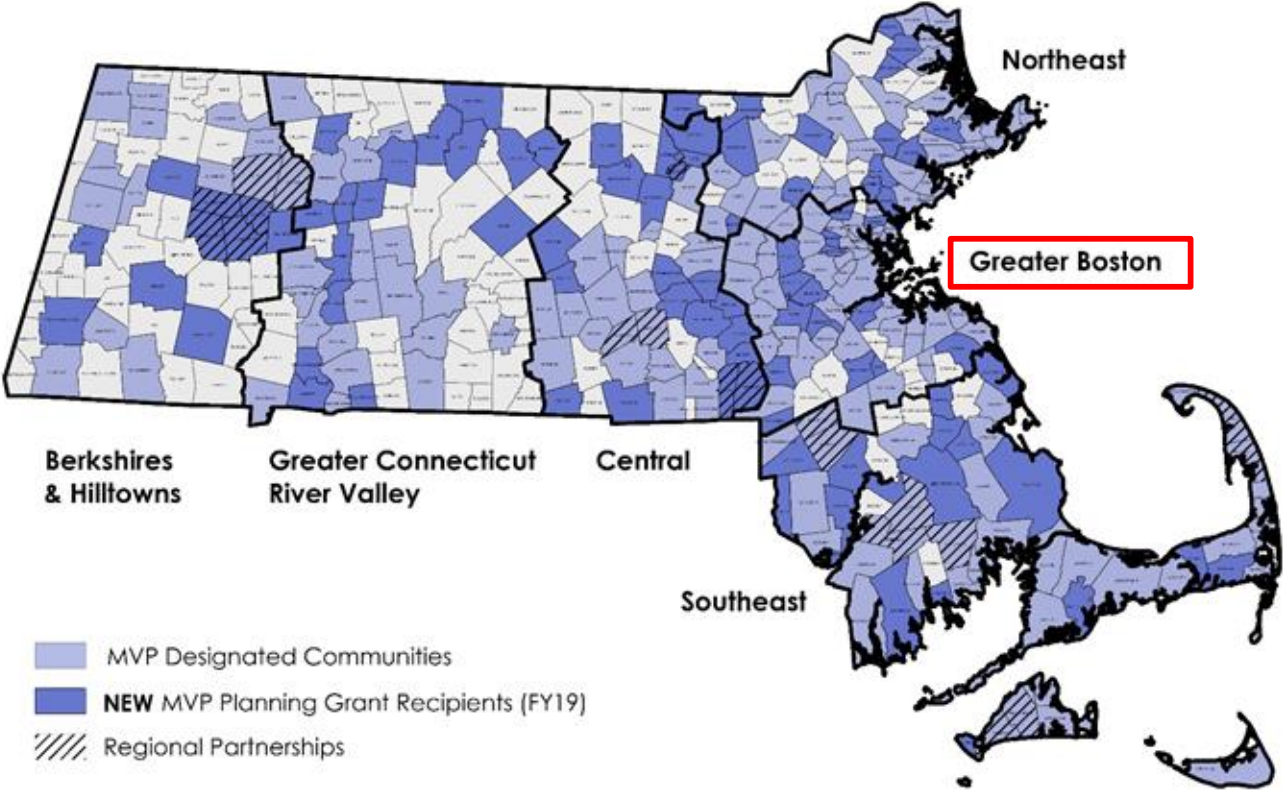


**Natural Resource Changes at Little Harbor,  
Wareham**



# FY18 Action Grant Projects

Greater Boston Region





# FY18 Action Grant Projects

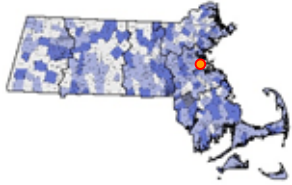
Community Outreach and Education

Ecological Restoration and Habitat Management

Nature-Based Flood Protection, Drought Prevention,  
Water Quality and Water Infiltration

## Mill Brook Corridor Flood Management Demonstration Project: Pilot Study and Implementation

### Arlington



MVP Grant: \$399,420

Match Amount: \$171,420

Total Project Cost: \$570,840

#### ***Project Priorities:***

- Build a green infrastructure (GI) demonstration project along Mill Brook to reduce flooding
- Educate residents about the benefits of GI
- Create a pedestrian-activated Mill Brook Corridor:
  - Increase access to the Mill Brook
  - Remove invasive species

*\*An expansion on existing Community Preservation Act (CPA) project*



**Concept design for Mill Brook Corridor and Wellington Park**

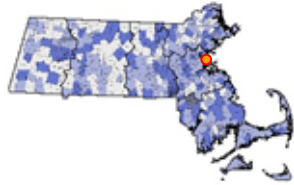


Image credits: Town of Arlington, Weston & Sampson

# FY18 Action Grant Projects

Local Bylaws, Ordinances, Plans, and Other Management Measures

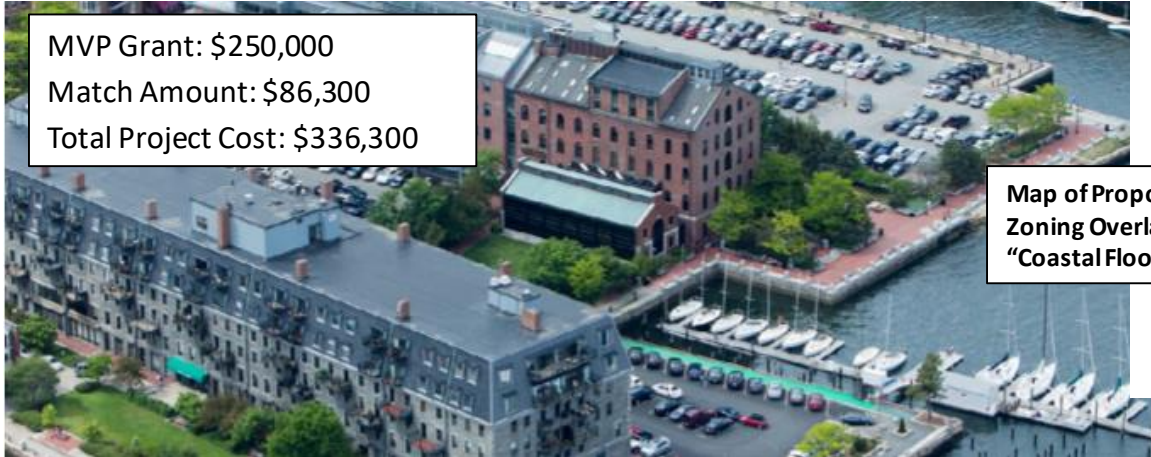
## Boston



### Project Priority:

- Develop *Flood Resilient Building Design Guidelines* and a *Flood Resiliency Zoning Overlay District* to adapt to flood risk protections for the year 2070 with 40" of sea level rise

MVP Grant: \$250,000  
Match Amount: \$86,300  
Total Project Cost: \$336,300



Map of Proposed Coastal Flood Resilience Zoning Overlay District from final report, "Coastal Flood Resilience Design Guidelines"

### Neighborhoods Impacted by the Overlay

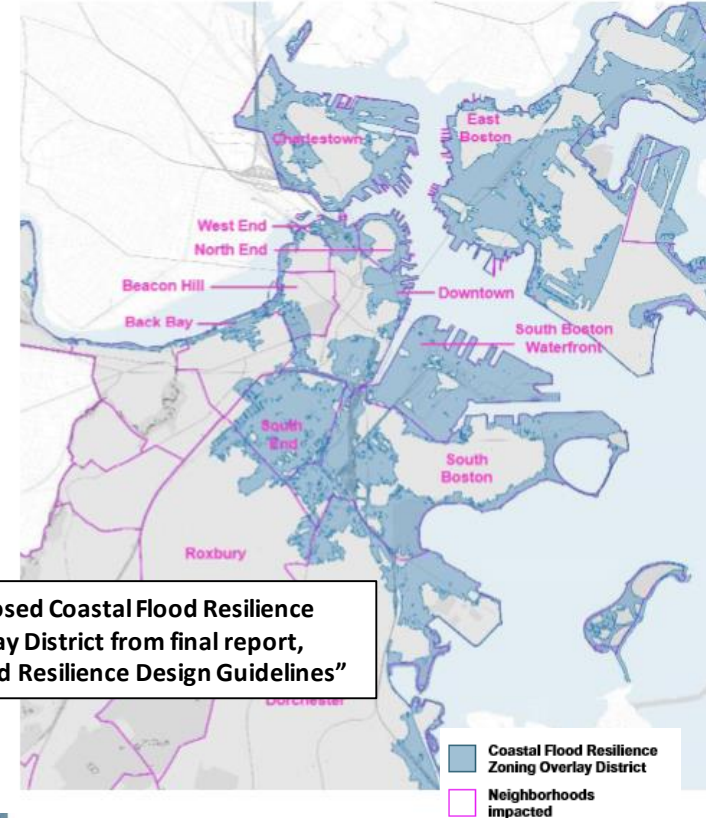


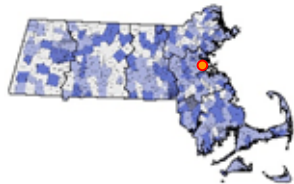
Image Credits: City of Boston, Boston Planning & Development Agency, Utile, Noble, Wickersham & Heart LLP, Kleinfelder, HDR, Offshoots

# FY18 Action Grant Projects

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

Climate Resilient Design Guidelines for Coolidge Corner,  
from p. 6 of final report



11

**Sustainable Roofing Strategies** reduce urban heat island effect and utility costs. Vegetated roofs can also retain stormwater.

12

**Tree Box Filters** capture stormwater, which is then taken up by the tree or filtered into the soil.

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: <ul style="list-style-type: none"><li>Climate Change Adaptation and Resilience Standard</li><li>Stormwater Management Standard</li><li>Vegetation Removal and Replacement Standard</li></ul>

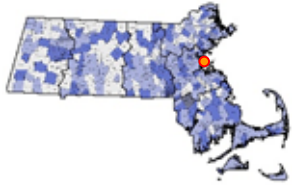
Chart on proposed changes to wetlands regulations from p. 9 of final report

# FY18 Action Grant Projects

Detailed Vulnerability and Risk Assessment  
Community Outreach and Education

## Cambridge Climate Change Preparedness & Resilience Catalyst Project

### Cambridge



MVP Grant: \$118,000

Match Amount: \$72,648

Total Project Cost: \$190,648

#### ***Project Priorities:***

##### Adaptive Capacity Evaluation

- Analyze the potential for two buildings to serve as community emergency response centers
- Develop recommendations for physical, infrastructural, operational and functional enhancements to these buildings

##### Resilience Toolkits

- Create resources to help renters, small homeowners, small businesses, and large organizations prepare for flooding, heat and extreme weather

##### Resilience Hub Business Plans

- Review existing social service organizations and their physical facilities
- Analyze their physical and organizational potential to act as “resilience hubs”
- Develop “resilience hub” business plans for each organization based on analysis



The Cambridge Community Center, one of the organizations proposed as a “resilience hub”

**Cambridge Renter** v.1

# Ready for Extreme Weather?

CLIMATE RESILIENCE TOOLKIT





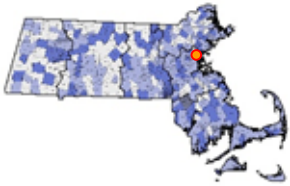
# FY18 Action Grant Projects

Detailed Vulnerability and Risk Assessment

Nature-Based Flood Protection, Drought Prevention, Water Quality and Water Infiltration

## Medford Open Space Plan Update

### Medford



MVP Grant: \$60,000

Match Amount: \$20,000

Total Project Cost: \$80,000



Image credits: City of Medford, MAPC

### ***Project Priority:***

- Update Medford's 2011 Open Space Plan considering anticipated climate change impacts and to analyze potential locations for green infrastructure through a community-driven process



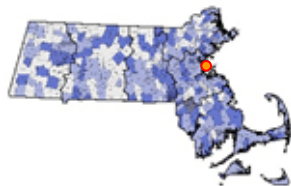
**Photos of a focus group conducted to collect feedback on existing conditions of Medford's open spaces**

# FY18 Action Grant Projects

## Detailed Vulnerability and Risk Assessment

# Drainage Model and Conceptual Strategies to Reduce Future Flooding in South Medford

## Medford



MVP Grant: \$60,830

Match Amount: \$20,277

Total Project Cost: \$81,107

### Project Priorities:

- Analyze existing stormwater infrastructure and flooding in South Medford, a neighborhood with a dense concentration of critical facilities as well as socially vulnerable populations
- Compare the efficacy of a range of solutions to identified stormwater management issues

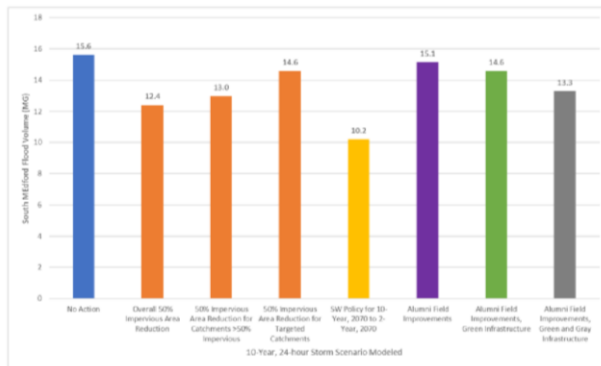
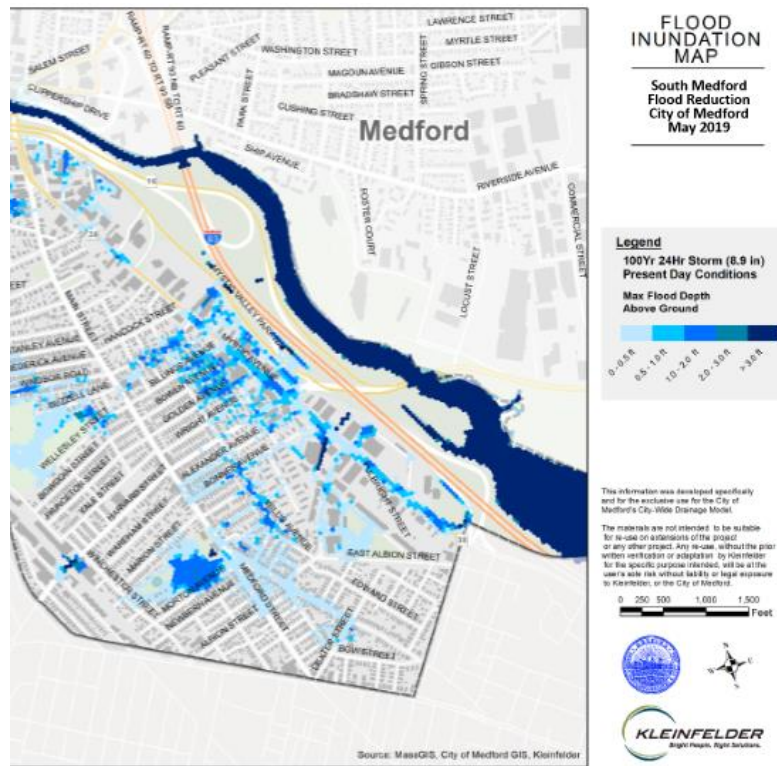


Image credits: City of Medford, Kleinfelder

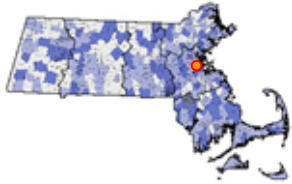


Left: Graph comparing stormwater management strategies  
Above: Portion of a flood map used in the analysis

# FY18 Action Grant Projects

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

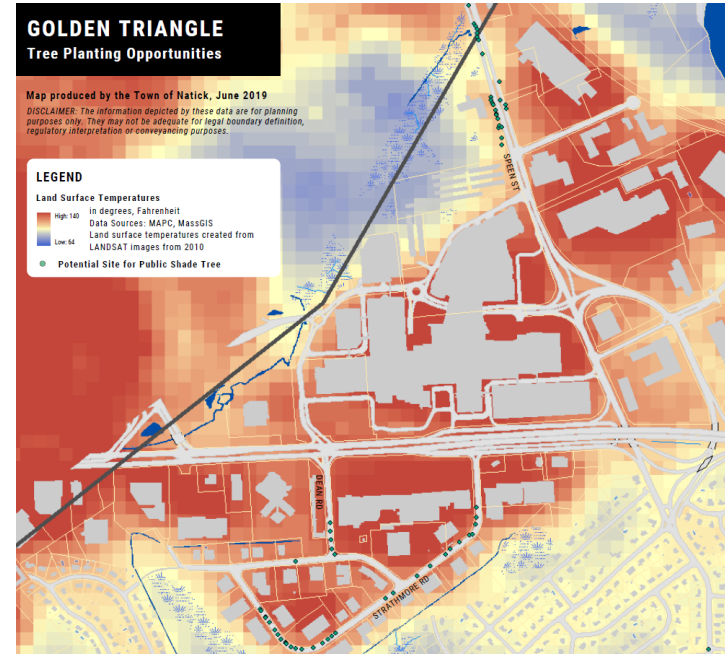
### Project Priority:

- 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

## Tree Planting Plan to Mitigate Heat Islands and Reduce Runoff



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

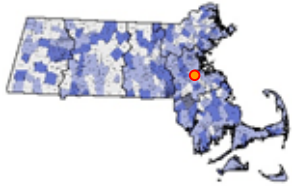


# FY18 Action Grant Projects

## Community Outreach and Education

# Water Conservation Campaign

## Natick



MVP Grant: \$16,640

Match Amount: \$40,820

Total Project Cost: \$57,460

### Project Priority:

- Develop and implement an online water tracking tool and utility platform, WaterSmart, and a corresponding communications/outreach plan that engages residents in thinking about their water use



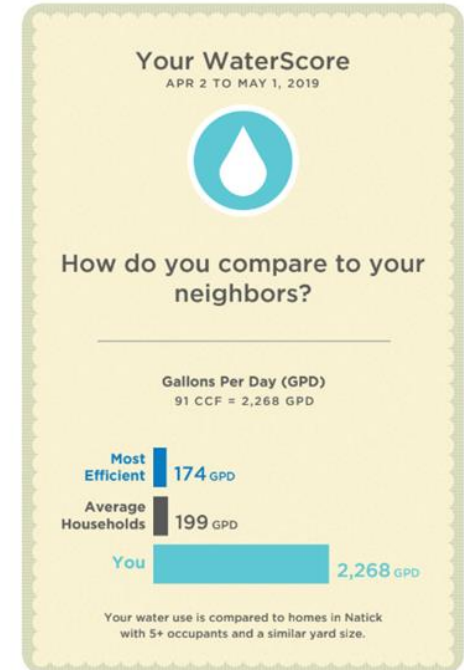
Public outreach for  
Natick's WaterSmart  
Program

Image credits: Town of Natick, WaterSmart



Natick WaterSmart Program  
Department of Public Works Water Division  
75 West St Natick, MA 01760

508-647-6557 water@natickma.org



A report comparing a resident's water use to others in Natick

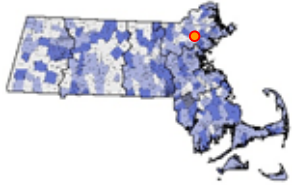


# FY18 Action Grant Projects

Local Bylaws, Ordinances, Plans and Other  
Management Measures

## Low Impact Development Regulation Development and Zoning Bylaw Inclusion

### Natick



MVP Grant: \$39,053

Match Amount: \$13,021

Total Project Cost: \$52,074

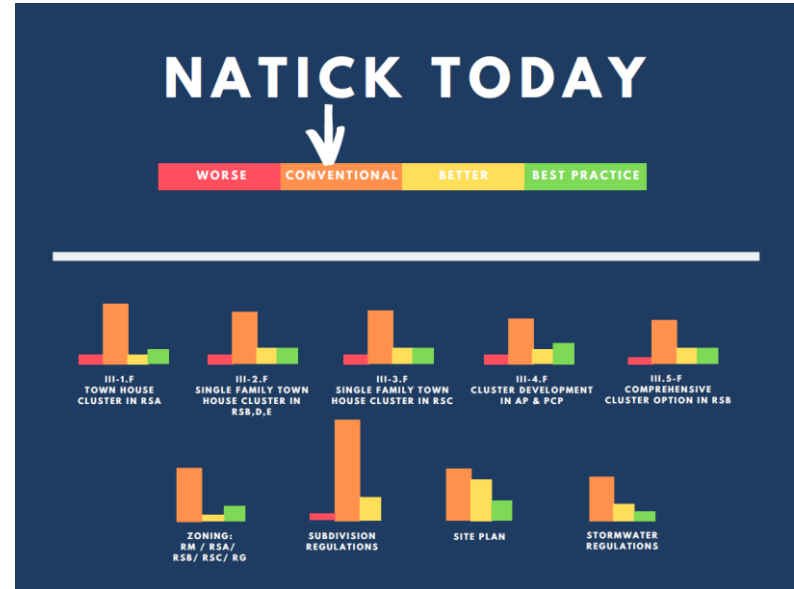
#### ***Project Priority:***

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

Image credits: Town of Natick, Dodson & Flinker



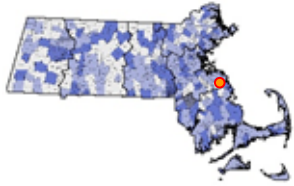
Summary of Local Land Use Regulations Against Best Practices

# FY18 Action Grant Projects

## Detailed Vulnerability and Risk Assessment

# Comprehensive Wastewater Treatment Resilience Feasibility Study

## Scituate



MVP Grant: \$75,100

Match Amount: \$25,900

Total Project Cost: \$101,000



Sands Hill Pump Station

### Project Priorities:

- Characterize the flood hazard (flood elevations, water depths, duration and flood-related loads)
- Assess the wastewater treatment system flood vulnerability to different probability flood events
- Estimate flood-related losses



### Near Term Solutions:

- Electrical/Instrumentation Manholes
- Lagoon Restoration
- Pump Station Hardening



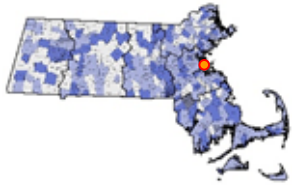
### Long Term Option: 1. Perimeter Flood Protection Flood/Levee Wall

# FY18 Action Grant Projects

Detailed Vulnerability and Risk Assessment  
Nature-Based Flood Protection, Drought  
Prevention, Water Quality and Water Infiltration  
Community Outreach and Education

## Detailed Vulnerability and Risk Assessment, Green Infrastructure, Public Education and Communication

### Somerville



MVP Grant: \$350,000  
Match Amount: \$164,000  
Total Project Cost: \$514,000

#### ***Project Priorities:***

- Perform higher-resolution precipitation-based flood modeling
- Analyze opportunities for green stormwater infrastructure throughout the City
- Produce outreach materials on flooding

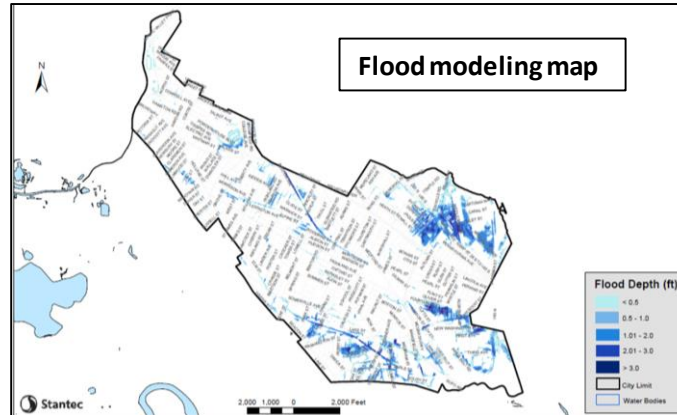


Image credits: City of Somerville, Stantec



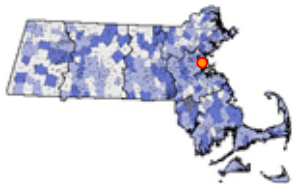
An example from Somerville's series of  
flood risk communication materials

# FY18 Action Grant Projects

Detailed Vulnerability and Risk Assessment

Nature-Based Flood Protection, Drought Prevention,  
Water Quality, and Water Infiltration

## Winthrop



MVP Grant: \$156,799

Match Amount: \$52,266

Total Project Cost: \$209,065

### *Project Priority:*

- Analyze nature-based and conventional flood control techniques that provide coastal storm damage protection and enhance natural resources



Photo from final report showing existing flood conditions at Ingleside Park

## Ingleside Park Feasibility Study and Permitting

Image credits: Town of Winthrop, Woodard & Curran, LEC



**Attachment A: Aerial Orthophoto**  
Ingleside Park and Donovan Beach  
Winthrop, Massachusetts

N  
February 7, 2019

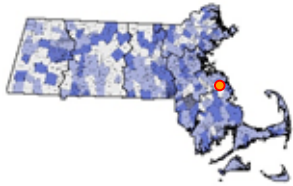


# FY18 Action Grant Projects

## Fort Point Road Coastal Infrastructure Resilience Project

Redesign & Retrofit and Local Bylaws

### Weymouth



MVP Grant: \$129,557

Match Amount: \$43,186

Total Project Cost: \$172,743

#### ***Project Priorities:***

##### Private Property Access and Maintenance

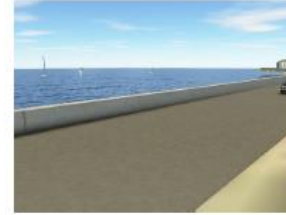
- Legal access for 25 properties for wall repairs, improvements, and maintenance. Findings and recommendations provided to the town.

##### Engineering Studies and Survey

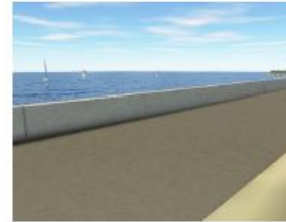
- Existing topographic survey
- Coastline conditions assessment
- Three 25-40-foot deep borings drilled behind the seawall on Fort Point Road

##### Public Engagement and Permit-Level Design

- Three alternative wall designs were presented at a public meeting on March 21, 2018. A preferred alternate was selected based on feedback from the public and technical advisors.
- Final Deliverables: Conceptual Graphic, Permit Level Design, Opinion of Probable Construction Cost and Permitting Memo



Proposed Sheet Pile Seawall- EL 12.0 FT



Proposed Sheet Pile Seawall- EL 13.5 FT



Proposed Seawall Finishes



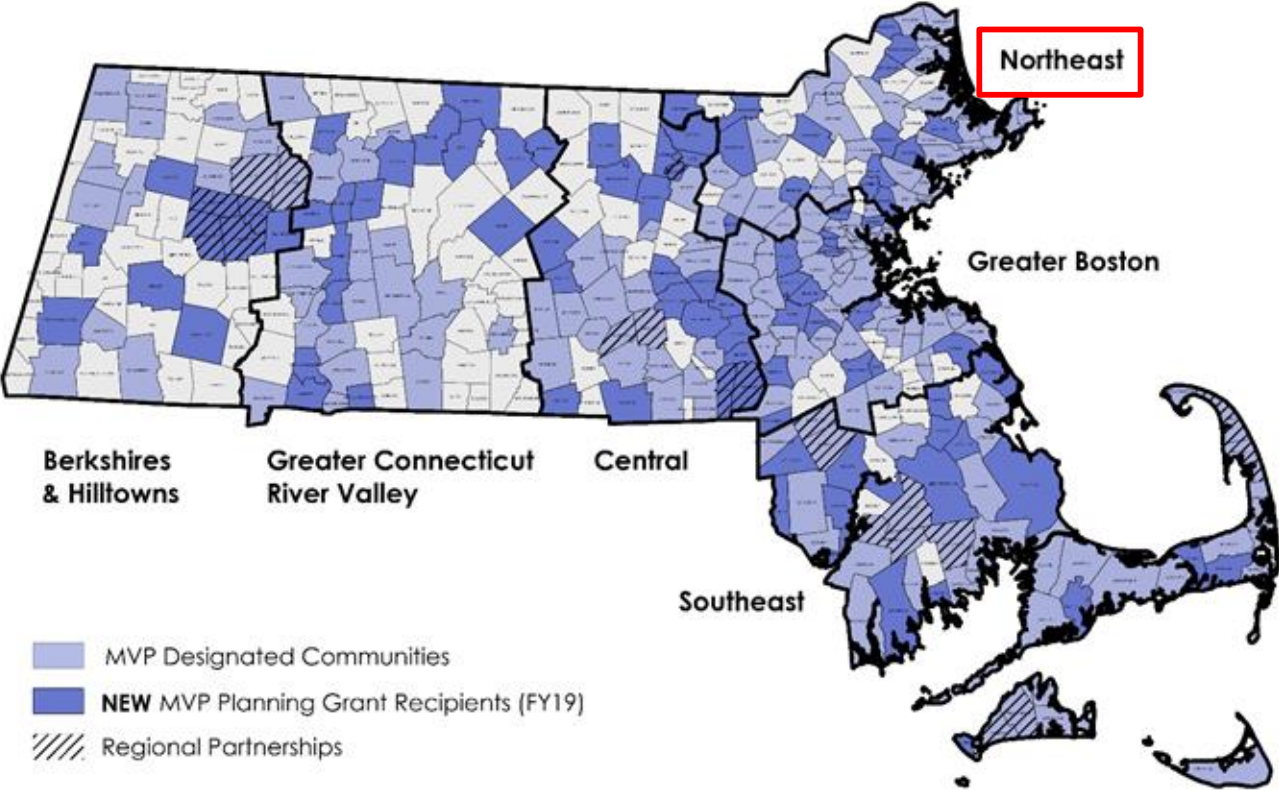
Proposed Seawall Finishes

#### **Fort Point Road Seawall Alternatives Analysis**

Image credits: Town of Weymouth, Tighe & Bond

# FY18 Action Grant Projects

Northeast Region

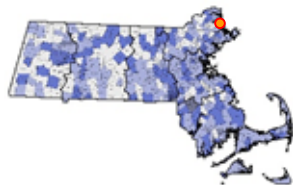


# FY18 Action Grant Projects

Nature Based Solutions, Assessment and Analysis

## Living Shoreline Feasibility Study for Essex Bay

### Essex



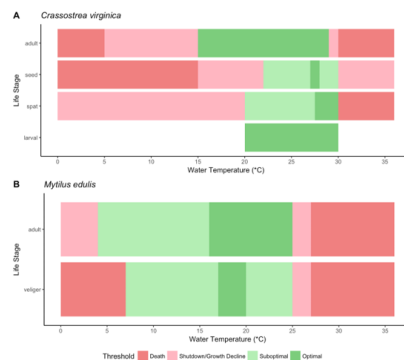
MVP Grant: \$15,000

Match Amount: \$5,000

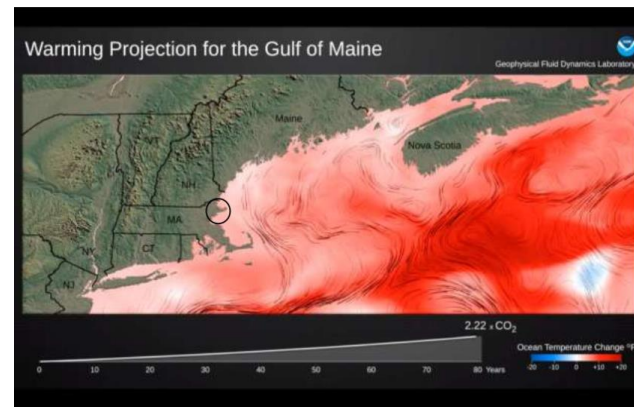
Total Project Cost: \$20,000

#### Project Priorities:

- Review existing scientific literature, design strategies, and nature-based strategies
- Incorporate with climate projections and MVP Priority Actions
- Final report on findings



Review of temperature thresholds for A: *Crassostrea virginica* and B: *Mytilus edulis* during different life stages



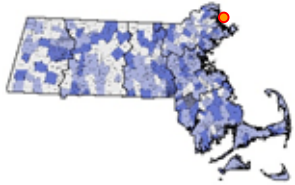
Review of seawater temperature projections

# FY18 Action Grant Projects

Nature Based Solutions, Assessment and Analysis

## Assessing Marsh Management Techniques After Natural Sediment Accretion Event

### Essex, Ipswich, Newbury



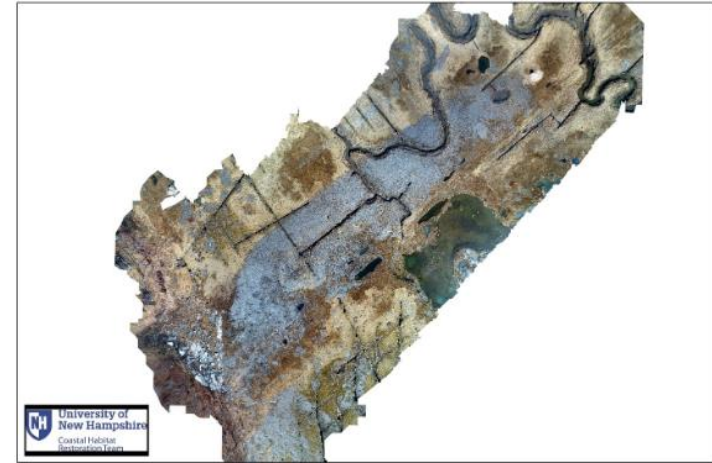
MVP Grant: \$60,000

Match Amount: \$52,920

Total Project Cost: \$112,920

#### ***Project Priorities:***

- Document the scale and distribution of a natural sediment event in three areas of the North Shore
- Map the area, thickness and volume of the sediment deposited, and use these data to track changes or redistribution of sediment on the marsh surface over time; and
- Examine the effect of sediment deposition on marsh plant community structure and resilience over the range of sediment thicknesses across the three marsh sites



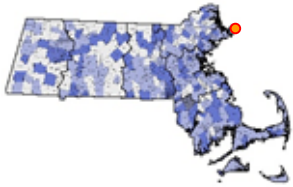
**Orthophoto of Area of Sediment Deposition**



# FY18 Action Grant Projects

## Vulnerability Assessment and Analysis

### Gloucester



MVP Grant: \$107,044

Match Amount: \$35,726

Total Project Cost: \$138,802

#### Project Priorities:

- Identify potential climate change related risks to the watershed and water supply system
- Assessment and analysis of alternative management strategies for the city's water supply and reservoir system, including watersheds
- Develop recommendations for management and infrastructure strategies to mitigate for identified risks to water supply reliability

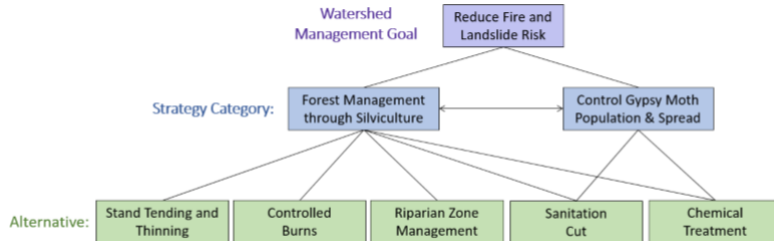
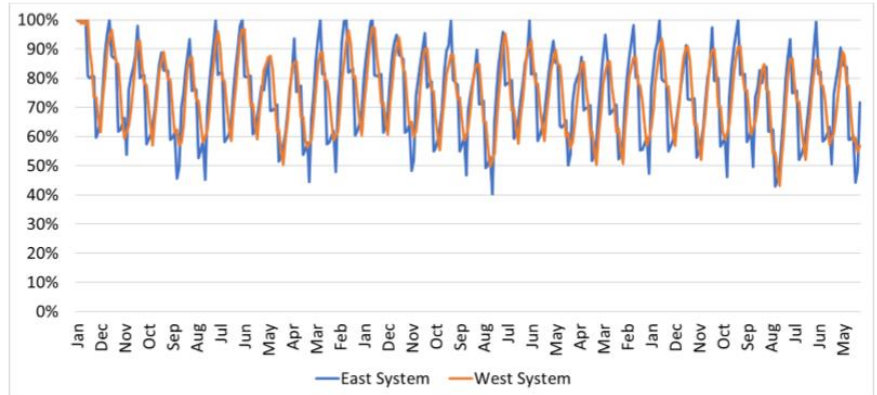


Diagram of Land Management Alternatives to Reduce Risk of Fire and Landslide

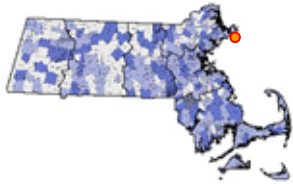


Total Supply Available with Operational Changes Implemented

# FY18 Action Grant Projects

Flood Mitigation, Ecological Restoration, Redesign and Retrofit

## Manchester By-The-Sea



MVP Grant: \$88,180

Match Amount: \$30,300

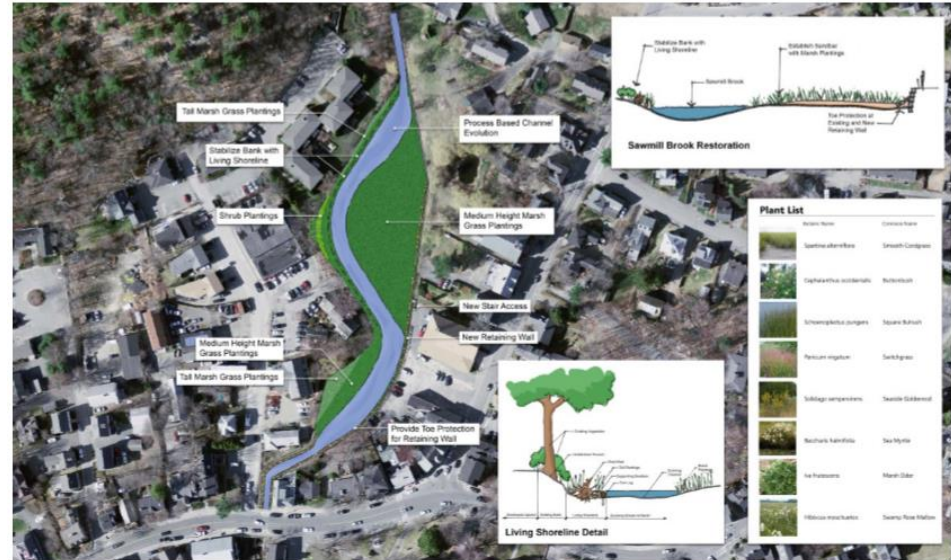
Total Project Cost: \$118,482



## Permitting and Design for Ecological Restoration and Habitat Management to Increase Resiliency

### Project Priorities:

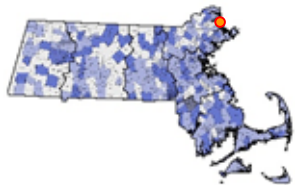
- Alternatives Analysis for Restoration Areas
- Evaluate Options for Stormwater Outfall
- Geotechnical Studies and Property Research
- Permitting Level Design
- Public Outreach



# FY18 Action Grant Projects

Nature-Based Flood Protection  
Climate Risk Assessment

## Newbury



MVP Grant: \$225,840

Match Amount: \$75,282

Total Project Cost: \$301,122

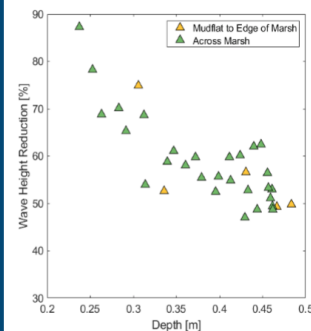
### *Project Priorities:*

- Use hydrodynamic and wave modeling along with field studies to evaluate the effectiveness of marshes in reducing storm surges and wave energy
- Determine if defenses to Newbury can be improved through CZM StormSmart principals and Living Shoreline solutions

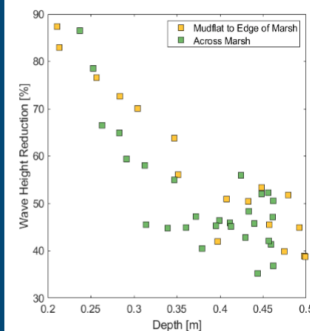
## Assessing storm energy reduction by the vegetated salt marsh platform in Newbury, MA

### Wave height reduction

#### South Transect



#### East Transect



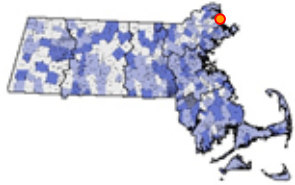
**Initial results from modeling wave height reduction as a result of the presence of a vegetated salt marsh platform**



# FY18 Action Grant Projects

## Climate Risk Assessment

### Newburyport



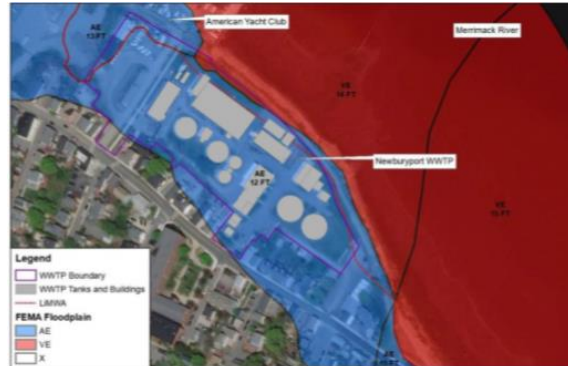
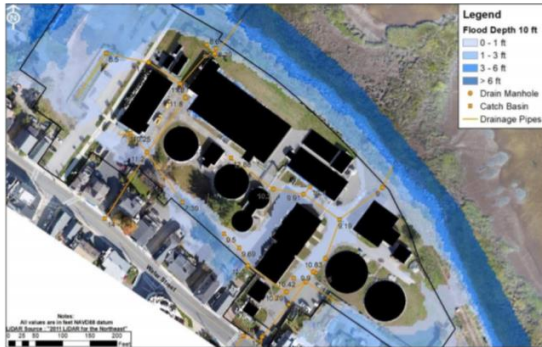
MVP Grant: \$122,695

Match Amount: \$41,305

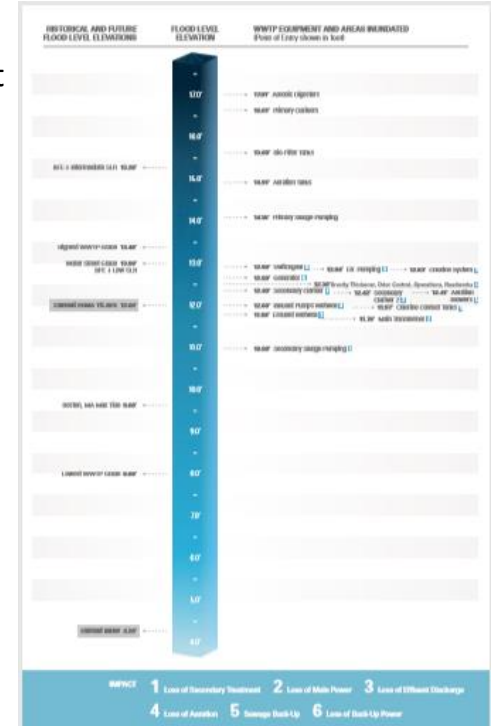
Total Project Cost: \$164,000

#### Project Priorities:

- Inventory critical assets at the wastewater treatment site
- Climate Risk Assessment for the WWTP, quantifying the impacts to assets to mitigate the risk to assets and increase resilience
- Develop priority list of protective strategies



Flood Hazard Map



Impacts to Critical Assets at Varying Flood Levels

Drainage Vulnerability: Manhole and Catch Basin Rim Elevations

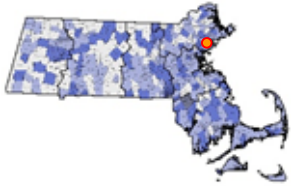


# FY18 Action Grant Projects

Redesign and Retrofit, Nature Based Solutions

## Lawrence Brook Watershed Risk Assessment

### Peabody



MVP Grant: \$243,400

Match Amount: \$86,907

Total Project Cost: \$330,307

#### ***Project Priorities:***

- Evaluate watershed and assess alternatives for flood mitigation
- Storm simulations to inform conceptual design
- Develop conceptual design for stormwater improvements, green infrastructure and LID techniques

Scenario	Design Storm	Estimated Peak Flood Depth (Feet)	Estimated Total Area Flooded (acres)
Existing Conditions	1-year, 60-minutes	0.28	0.259
	2-year, 60-minutes	1.07	0.544
2018 New Outfall with Upstream Green BMPs and Storage	1-year, 60-minutes	0.00	0.000
	2-year, 60-minutes	0.00	0.000
2070 Future Baseline Conditions	1-year, 60-minutes	0.40	0.270
	2-year, 60-minutes	1.41	0.897
2070 New Outfall with Upstream Green BMPs and Storage	1-year, 60-minutes	0.00	0.000
	2-year, 60-minutes	0.44	0.144

**SWMM Modelling Predicted Flood Depth and Extent at  
45 Walnut Steet**



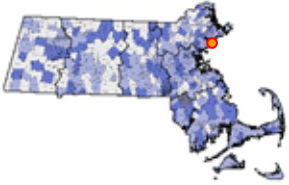
**Modelling shows Elimination of Flooding and 80% Reduction in Flood Extent for the 2070, 1 year, 60 minute storm after Implementation of Green Infrastructure Techniques Upstream**

# FY18 Action Grant Projects

Redesign and Retrofit, Nature Based Solutions

## Improving Flood Resiliency of North River Canal in Peabody

### Peabody



MVP Grant: \$224,216

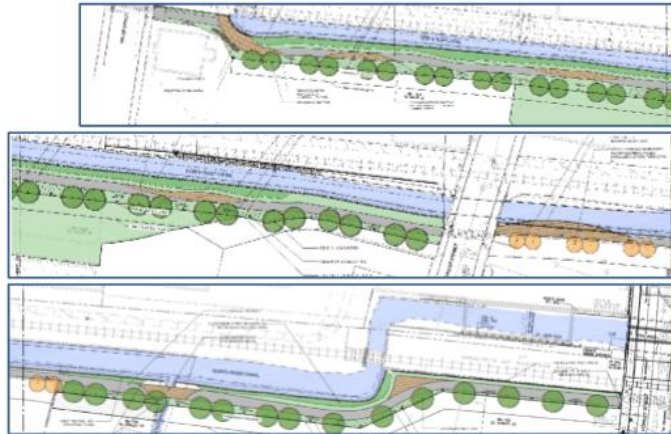
Match Amount: \$74,739

Total Project Cost: \$298,955

#### ***Project Priorities:***

- Evaluation to determine how best to accommodate flood waters along the banks of the canal
- Geotechnical and structural analyses to evaluate wall replacement design alternatives
- Develop plans for replacement of the south canal wall to support the construction of a Riverwalk and improve flood resilience along the North River Canal

**Riverwalk Concept Plan showing  
Incorporation of Green Infrastructure**



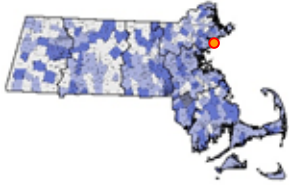
**Photo of Existing North Canal Wall**

# FY18 Action Grant Projects

Redesign and Retrofit

## Salem Sanitary Sewer Trunk Line Relocation Assessment

### Salem



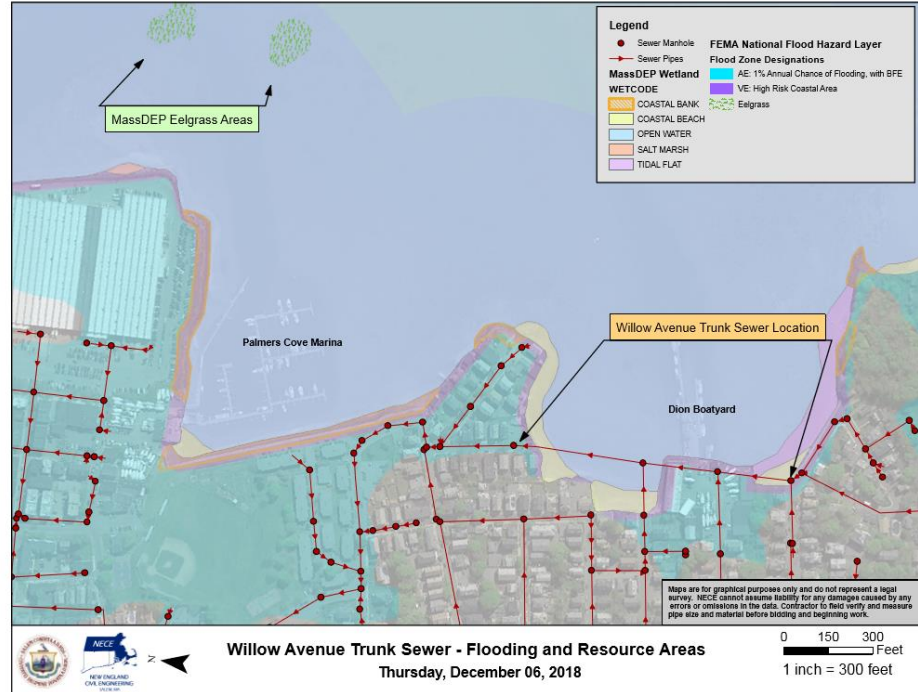
MVP Grant: \$345,000

Match Amount: \$115,000

Total Project Cost: \$460,000

#### ***Project Priorities:***

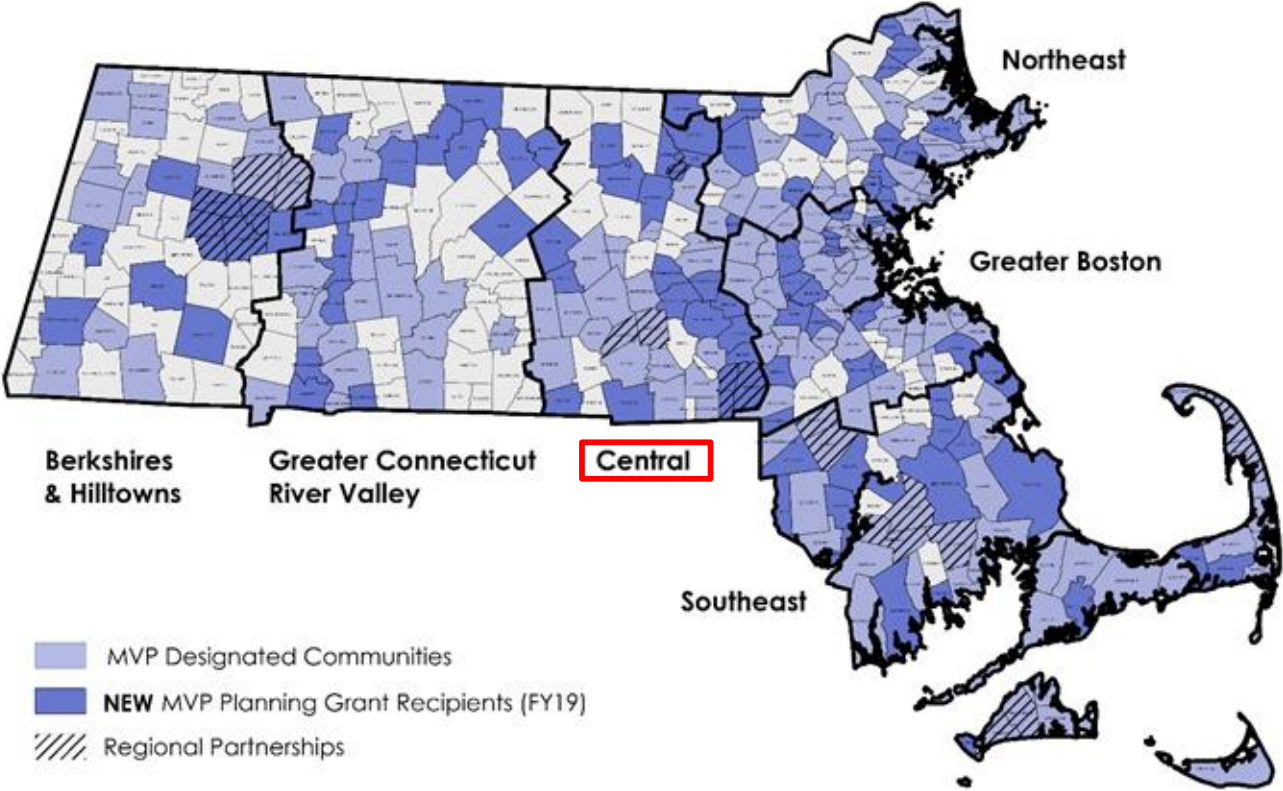
- Evaluate alternatives to relocate critical sewer infrastructure out of a resource area and outside a hazardous area where it is subject to damage from storms and storm surge



**Current conditions map demonstrating the location of the existing trunk sewer**

# FY18 Action Grant Projects

Central Region

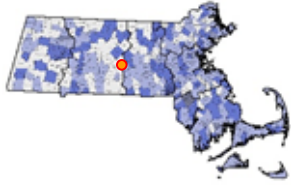




# FY18 Action Grant Projects

Flood Mitigation, Storm Damage Reduction,  
Nature-Based Solutions

## Charlton & Spencer



MVP Grant: \$300,000

Match Amount: \$100,007

Total Project Cost: \$400,007

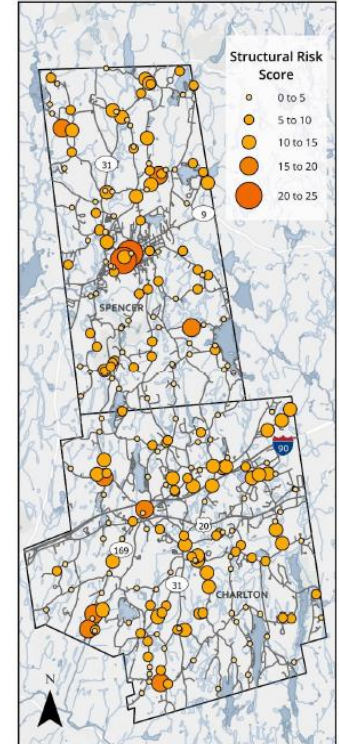
## Integrated Water Infrastructure Vulnerability Assessment and Climate Resiliency Plan

### *Project Priorities:*

- Identify water-related infrastructure at risk of flooding under present day and projected future climate change conditions
- Prioritize at-risk infrastructure
- Recommend site-specific and community-wide adaptation measures
- Engage municipal staff and the public in both communities.



Dams Assessed in Charlton and Spencer



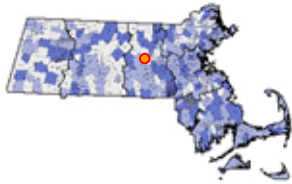
Conceptual Design for Adare Place  
Outlet Improvements and Stream  
Channel Restoration

# FY18 Action Grant Projects

Detailed Risk Assessment

## Water/Sewer Infrastructure Green Emergency Power Study

### Holden



MVP Grant: \$24,588

Match Amount: \$8,260

Total Project Cost: \$32,848

#### ***Project Priorities:***

- Review existing facility information including record drawings, equipment information and utility bills
- Conduct a site visit to each facility to determine existing conditions both site conditions as well as electrical systems and requirements.
- Assess each facility to determine an electrical load profile and existing infrastructure to determine if energy upgrades may reduce the electrical load consumption.
- Assess each facility for its environmental conditions, such as structure heights, availability of unshaded property, boundaries of EPA Zone 1 area as well as flood plain elevations
- Establish preliminary opinions of cost for each potential solution.

Station	Recommended Technology	TOTAL
Brattle Street Vault Interconnection	Batteries Only	\$61,200
Salisbury Street Interconnection	Portable Generator	\$107,690
Mill Street Wellfield	Storm Switch for Portable Generator	\$8,640
Mason Road Wellfield	Storm Switch for Portable Generator	\$15,840
Spring Street Wellfield	Storm Switch for Portable Generator	\$15,840
Chapin Water Tank	Solar PV & Batteries	\$92,880
Jefferson Tank	Solar PV & Batteries	\$92,880
Portable 100kW Generator	Portable Generator	\$86,031

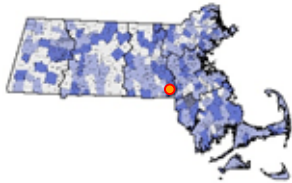
**Summary of findings of cost of recommended technology for facility stations**

# FY18 Action Grant Projects

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:***

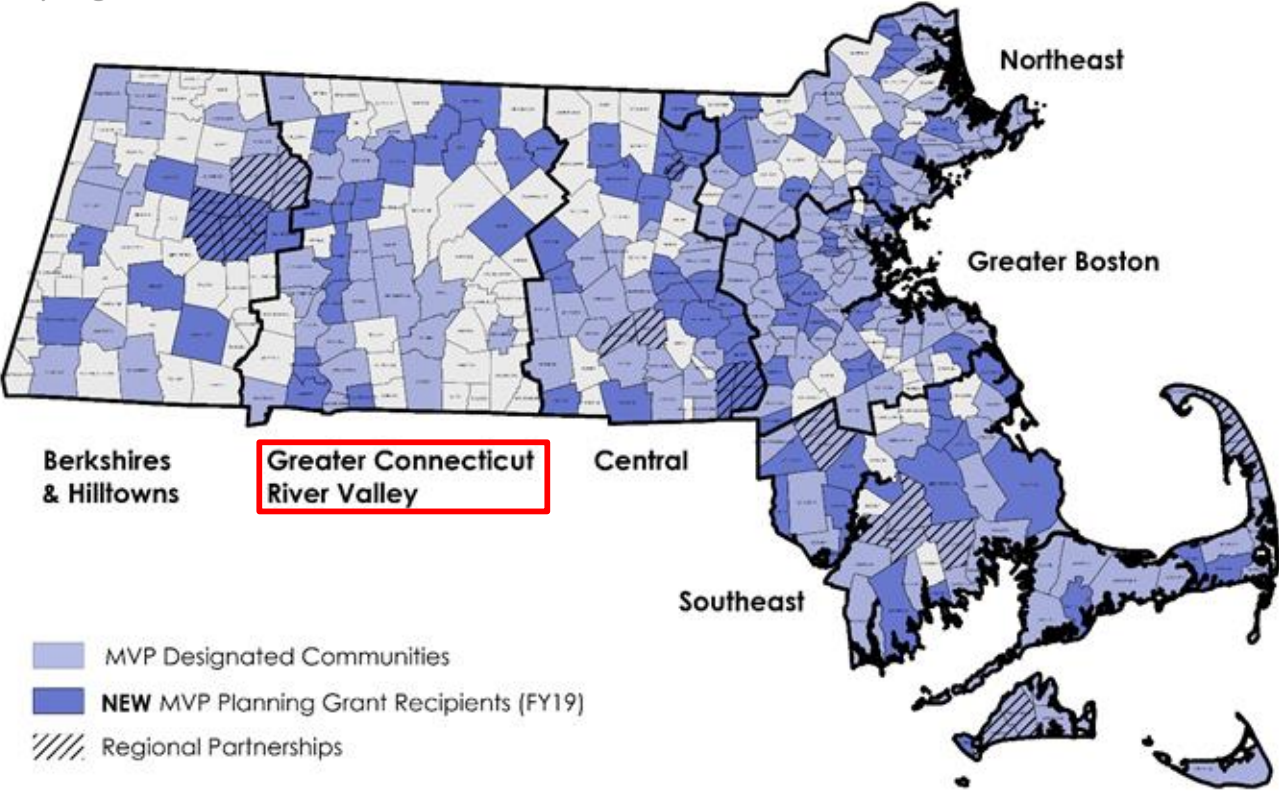
To integrate low impact development standards into local bylaws and subdivision regulations

#### **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

# FY18 Action Grant Projects

Connecticut River Valley Region

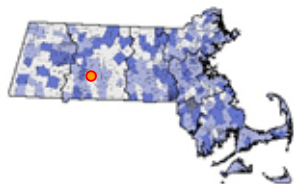




# FY18 Action Grant Projects

Detailed Vulnerability Assessment, Nature Based Solutions

## Belchertown



MVP Grant: \$151,467

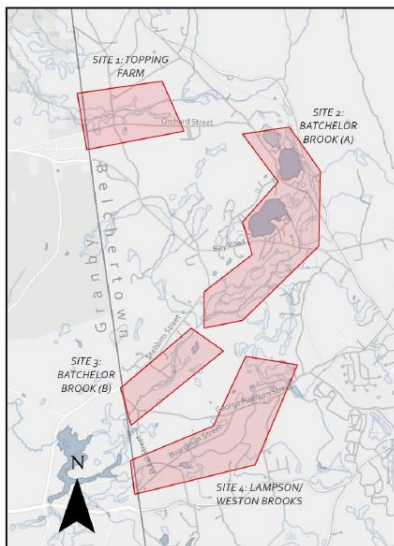
Match Amount: \$50,532

Total Project Cost: \$201,999

## Town-Wide Road Stream Crossing Assessment and Climate Change Adaptation Plan

### ***Project Priorities:***

- Identify and provide recommendations and concept designs for high-priority crossings to enhance community resilience, mitigate existing and potential flooding, and increase stream continuity and aquatic passage
- Provide recommendations for areas that are known to be heavily influenced by beaver activity.



**Right: Priority field sites selected for beaver assessments**

**Left: Reinforced natural beaver dam  
(A) Human constructed beaver dam analogue (B)**

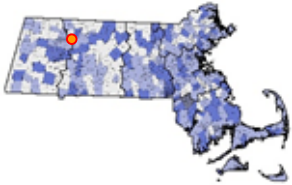


# FY18 Action Grant Projects

Redesign and Retrofit, Mapping, Bylaws and Ordinances

## Culvert Redesign and Retrofit and Bylaw Update

### Deerfield



MVP Grant: \$47,325

Match Amount: \$19,611

Total Project Cost: \$66,936

#### ***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

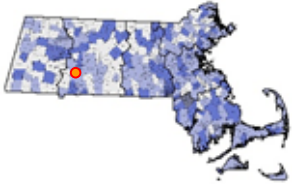


# FY18 Action Grant Projects

Detailed Vulnerability and Risk Assessment,  
Further Planning

## Meeting an Immediate Need by Learning from Hurricane Maria Survivors in Holyoke

### Holyoke



MVP Grant: \$149,825  
Match Amount: \$50,600  
Total Project Cost: \$200,425

#### Projects Priorities:

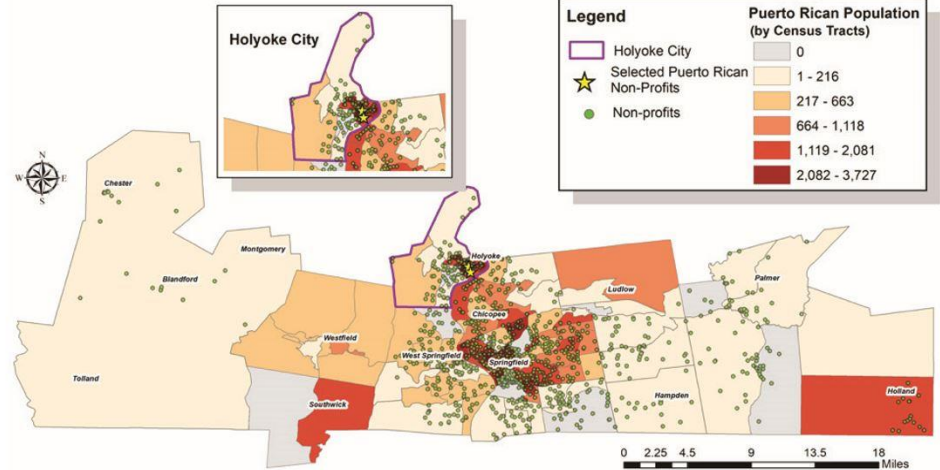
- Gather a detailed demographic analysis of individuals who arrived in the Town from Puerto Rico as a result of Hurricane Maria
- Develop recommendations for planning for future climate change migrants in Holyoke

Informational  
graphics from  
Holyoke's final  
report

Table 12

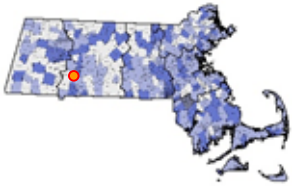
How did the Holyoke municipal government respond to your needs? Was the response...	Freq.	Percent
Helpful	26	63.4
I don't know	7	17.1
Neither helpful nor unhelpful	2	4.9
There was no response from this resource	6	14.6
Total	41	100

### Hampden County's Puerto Rican Population, 2017

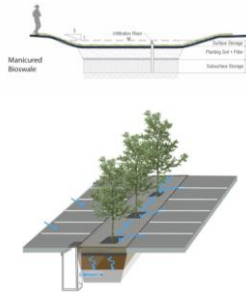


## Nature-Based Flood Protection to Reduce Vulnerabilities

# Northampton

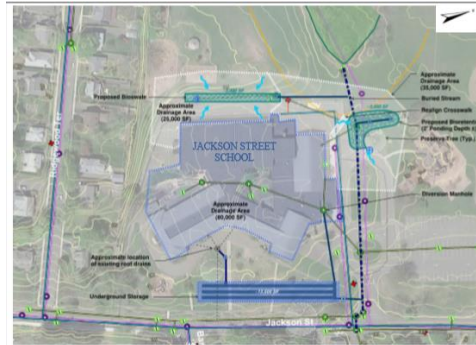


Total Project Cost: \$534,400

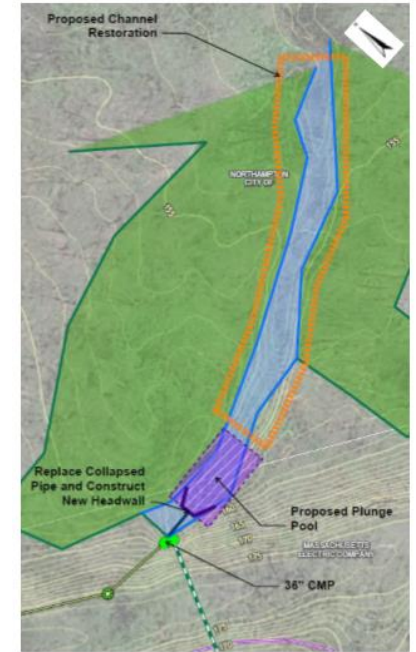


## Bioswale and Tree Filters for Parking Lot Stormwater Improvements

- Design green infrastructure to detain, retain, and treat storm water using nature-based solutions for 10 sites
- Improve stormwater quality and reduce stormwater quantity
- Maximize social and environmental co-benefits
- Provide demonstration projects to inspire future longer term and positive impact projects



## Conceptual Design for Jackson Street School stormwater retrofits



## Conceptual Design for Adare Place Outlet Improvements and Stream Channel Restoration

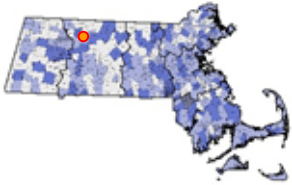


## FY18 Action Grant Projects

Detailed Vulnerability Assessment  
Nature-Based Flood Mitigation

## Montague City Road Flooding Protection Project: Design and Permitting

### Montague



MVP Grant: \$33,750

Match Amount: \$11,250

Total Project Cost: \$45,000

#### ***Project Priorities:***

- Analyze alternative nature-based storm damage protection and other bioengineering methods to adapt to seasonal flooding that routinely closes one of Montague's main thoroughfares
- Create design and obtain necessary permits to construct the chosen alternative, a vegetated drainage swale



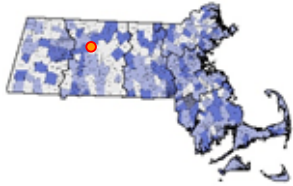
Analysis of existing flood conditions along Montague City Road

# FY18 Action Grant Projects

## Resilient Pelham

### Detailed Vulnerability and Risk Assessment

## Pelham



MVP Grant: \$137,250

Match Amount: \$45,753

Total Project Cost: \$183,003

### ***Project Priorities :***

#### Resilient Roadways: Town-wide Survey & Assessment

- Assess and incorporate nature-based solutions toward removing vulnerabilities such as failing culverts and the potential threat of roads washing out
- Create a prioritized culvert and roadway asset management plan, with associated cost estimates, will be developed.

#### Resilient Communications

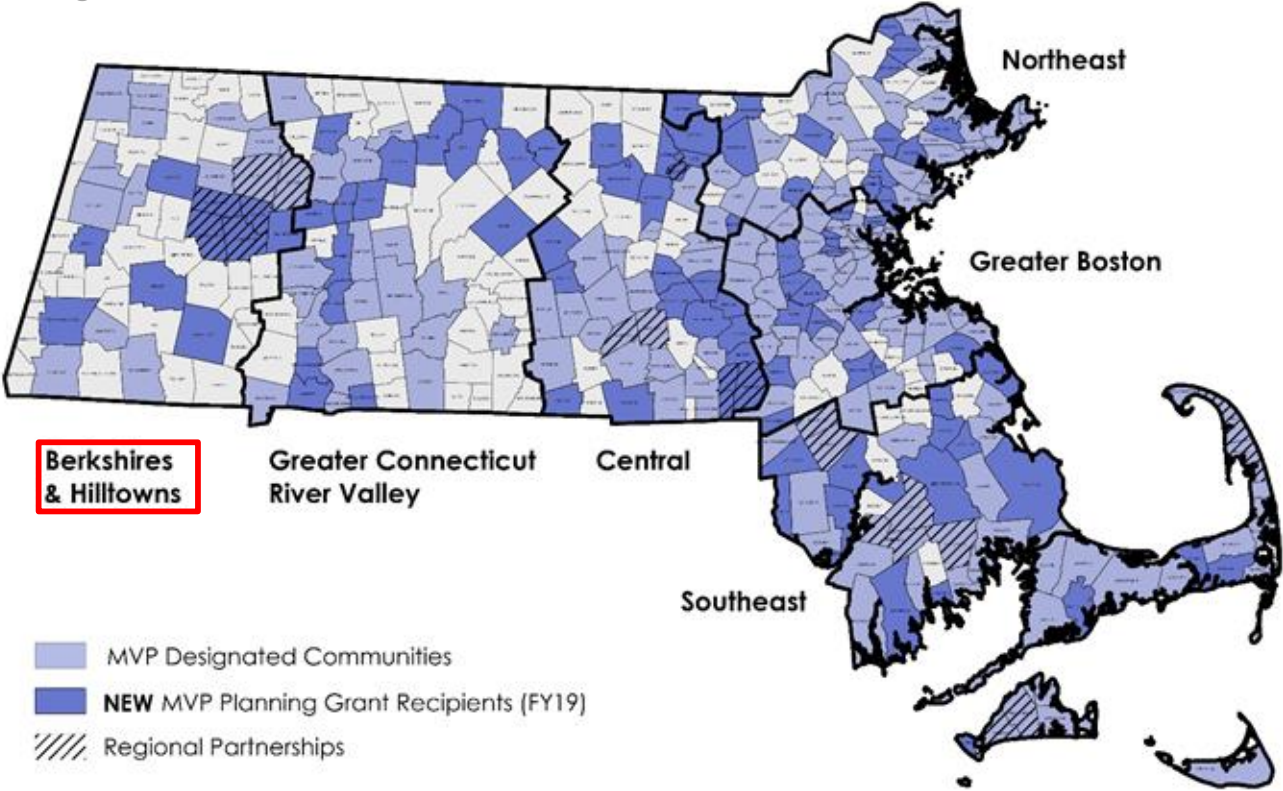
- Develop new directory of all residents who have opted in to adding their email addresses and phone numbers to the existing street listing
- Robust outreach campaign - including door to door canvassing - to enroll as many Pelham residents as possible in the existing Reverse- 911 system
- Compile a narrative of Pelham milestones as shared by longtime residents



**Community Resilience Building workshop identifying culverts as top concern**

# FY18 Action Grant Projects

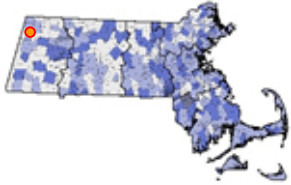
Berkshires & Hilltowns Region



# FY18 Action Grant Projects

## Data Collection and Mapping

### Adams



MVP Grant: \$56,250

Match Amount: \$18,750

Total Project Cost: \$75,000

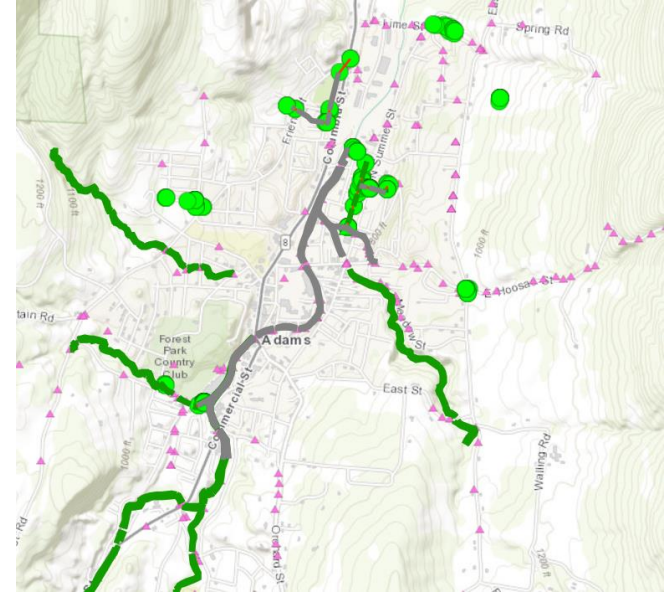


Documented Storm Damage

## Assessment and Conceptual Design for Adaptation and Resiliency for the Town of Adams

### *Project Goals:*

- Update the Town's Stormwater Management Strategic Plan
- Assessment and Analysis of high priority floodprone sites;
- Conceptual Design Alternatives to adapt to future conditions and mitigate flood damage
- Mapping update of critical stormwater conveyances.



Updated Mapping of Stormwater Conveyances





<https://www.mass.gov/municipal-vulnerability-preparedness-program>

