

## Municipal Vulnerability Preparedness Program Action Grant Case Study

**Municipality:** Duxbury  
**Project Title:** Duxbury Climate Change Vulnerability Assessment and Adaptation Plan  
**Award Year (FY):** 2019  
**Grant Award: \$** \$131,712  
**Match: \$** \$44,365  
**Match Source:** In-Kind + MAPC Accelerating Climate Resiliency Grant Program  
**One or Two Year Project:** One (plus COVID-19 extension)  
**Municipal Department Leading Project:** Planning  
**Project Website URL:** <https://www.town.duxbury.ma.us/planning-department/pages/climate-resiliency-and-sustainable-land-use>

### Community Overview:

- What is the population size of your community and where is it located? Duxbury is located along the western shoreline of Cape Cod Bay. The population is estimated to be about 15,921 people as of 2019.
- Do you have any [Environmental Justice](#) or other Climate Vulnerable communities? (Think about both those who live and work in your town.) Senior citizens and low-income residents in Town live in some of the areas with the highest vulnerability to flooding. Also, much of the Town's industry is located on the coastline, making these businesses more vulnerable to the effects of sea level rise.
- Other unique traits of your municipality like who the top employers are, geography, history, etc. Being located on the coast, oyster shellfishing is a major agricultural industry in Town. There are also several historic districts in Town, including a historic Shipbuilders District on Washington Street, dating back several hundred years.

### Project Description and Goals:

- Where was the project located? Duxbury, MA (with additional focus on Snug Harbor)
- What climate change impacts did the project address? Sea level rise and coastal storms
- What were the specific goals and tasks of the project as stated in your application?
  - conduct a detailed vulnerability and risk assessment of municipal infrastructure, commercial infrastructure in the Snug Harbor business district, and natural resources
  - develop targeted strategies aimed at reducing risks from flooding, increased storm intensity, sea level rise and storm surge
- Did your project meet the goals set forth in your application in terms of:
  - Employing nature-based solutions
    - Yes, roadway adaptations included green infrastructure side-slope treatments and the report provided recommendations to support beach and dune nourishment as well as wetlands migration. Some district level

- Snug Harbor recommendations incorporated nature based solutions such as protective berms and wetlands transition areas.
- Improving equitable outcomes for and fostering strong partnerships with EJ and other Climate Vulnerable Populations
    - During the process of studying these impacts and reviewing the surrounding areas – Duxbury’s neighboring Kingston, Northern Plymouth, and meeting weekly with members of Plymouth’s Planning Board, and with members of the Jones River Watershed about adaptation, and more regional meeting attendance during the COVID via Zoom about resiliency and sharing this study in New England, a strong connection has been made with the Herring Pond Wampanoag Tribe. In addition, both Plymouth and Kingston have now adopted MVP plans that incorporate some of the same concerns and identify that our approaches to water and land management need to incorporate open space and nature-based solutions that integrate public recreational access to the waterfront in addition to solving travel and fishing-based economic and safety issues. The integration of the private sector and the input of the stakeholders has made a big difference in the wider participation at a regional and local scale from this project and related studies funded by the Commonwealth in the Duxbury-Kingston-Plymouth area.
  - Providing regional benefits
    - Yes, the vulnerability study and adaptation recommendations are a model for municipal and private assessment and collaboration, as well as an example of planning for other working waterfronts. Specific focus on vulnerable low-lying roadways serving isolated neighborhoods has Town-wide benefit. Additional focus on Snug Harbor businesses and non-profits has regional benefit since Snug Harbor is a hub for national oyster commerce and a regional hub for recreation and marine education.
  - Implementing the public involvement and community engagement plan set forth in your application
    - Public involvement and community engagement was achieved through a series of remote committee and public meetings, as well as direct consultations with the Snug Harbor stakeholders. Further significant outreach and engagement specific to Snug Harbor resulted from the MAPC planning process.
  - Finishing the project on time
    - The project was completed within the COVID-19 Amended Extension for FY19 grants.

**Results and Deliverables:**

- Describe, and quantify (where possible) project results (e.g. square footage of habitat restored or created, increase in tree canopy coverage, etc.). Report out on the metrics outlined in your application.

Potential vulnerability and exposure of structures and roadways in Duxbury	Present Day		2030		2050		2070	
	Quantity	Percent	Quantity	Percent	Quantity	Percent	Quantity	Percent
<b>Structures (Total 7341)</b>								
Nuisance Flooding (MHHW)	7	0.1%	20	0.3%	94	1.3%	274	3.7%
Storm Surge (10% Chance)	354	4.8%	526	7.2%	587	8.0%	715	9.7%
Storm Surge (1% Chance)	540	7.4%	602	8.2%	711	9.7%	807	11.0%
<b>Roadways (Total 183 miles)</b>								
Nuisance Flooding (MHHW)	0.39	0.2%	0.65	0.4%	2.73	1.5%	6.35	3.5%
Storm Surge (10% Chance)	7.31	4.0%	9.79	5.3%	11.1	6.1%	13.21	7.2%
Storm Surge (1% Chance)	10.13	5.5%	11.31	6.2%	13.3	7.3%	14.98	8.2%

- Overall, Duxbury benefits from significant elevation, such that much of the Town’s infrastructure, including emergency services, Town Hall, many schools, and the library are not vulnerable to storm surge even through 2070. The above screening level assessment summary and the detailed vulnerability assessment does indicate increasing vulnerability, especially for low-lying roads. The detailed vulnerability assessment also confirmed that Snug Harbor’s public and private assets are especially vulnerable.
- Potential solutions ranged from general strategies for assets and natural resources, to recommended changes to local regulations in order to increase community resilience, to specific recommendations for Town and Snug Harbor private assets, to planning/vision level district solutions for Snug Harbor. Low lying roads serving potentially isolated communities were a top priority for the Town.
- Provide a brief summary of project deliverables with web links, if available.
  - The primary deliverable is the Duxbury Climate Change Vulnerability Assessment and Adaptation Plan report, which summarizes the vulnerability assessment and recommended adaptation actions. Other project deliverables include a public/private asset geodatabase with vulnerability and risk assessment results, and individual deliverables to Snug Harbor stakeholders with recommended adaptation actions. The report is available on the project website: <https://www.town.duxbury.ma.us/planning-department/pages/climate-resiliency-and-sustainable-land-use>.

**Lessons Learned:**

- What lessons were learned as a result of the project? Focus on both the technical matter of the project and process-oriented lessons learned.

It was very beneficial to have the public input and stakeholder meetings to focus in on what is critical, what is publicly supported, what the expectations and to learn about the 5-year strategic plans of our partners in the private and NGO sector of the Snug Harbor area and greater bay are thinking. The variety of means to get people to the meetings: phone calls, walk-ins, public posts, short media outreach announcements and letters were all used, and most importantly, the most affected business – the private marina – and the

Harbormaster – were on board from the beginning. By meeting and talking about these specific issues, we got a better scope of work for the implementation study, and built up a trust factor that worked even where other issues – parking availability, sidewalk issues – sometimes cloud the partnering approach. We got a good grasp of what the timing will be for the infrastructure investments, and built a complex partnership over common interests while learning from each other what needs to be considered. Working together made this project infinitely better than had it been a public-sector-only component, and the dynamic range of users in the harbor really contributed a wide range of viewpoints to the concerns that need to be addressed, long term and short term. It is much better to have taken this group approach because group solutions will be best supported and potential partnerships will amplify the careful expenditure of planning, expertise and available funding to give us the best solutions heading into the future. We also learned more about the dynamics and history of the site by having these one-on-one meetings in addition to the group meetings. The private sector is already looking at decision-making and investments using the study, which was just released!

- What is the best way for other communities to learn from your project/process?

The approach to the public outreach was important – breaking down the stakeholders into meaningful user groups made the input more meaningful. Look at both the MAPC Snug Harbor study and its approaches and the inventory and recommendations from Woods Hole Group, and think about how these dynamics might work in terms of your project – how to reach them, what are they thinking about – our harbormaster and marina owner came to us with their questions early on, helping to drive the dynamics of the study. Who stands to lose – what do you think they have at stake – ask questions of the Woods Hole Group and contact Val (now in Kingston), and the future Duxbury Planner as already more studies and plans for implementation are evolving from this important study.

### **Partners and Other Support:**

- Include a list of all project partners and describe their role in supporting/assisting in the project.
  - Metropolitan Area Planning Council – Snug Harbor resiliency vision and stakeholder engagement
  - Amory Engineers – support in development of critical elevations, review of Town consequence scoring
  - Bayside Marine, Duxbury Bay Maritime School, Duxbury Yacht Club, Island Creek Oysters, Sweetser’s Building (owner and tenants) – Snug Harbor stakeholder group, including Department Heads and notably Jake Emerson the Harbormaster, Joe Grady in Conservation, the DPW Director Peter Buttkus, Town Manager Rene’ Read, Facilities Manager Brian Cherry, Water Superintendent Peter Mackin and each of the private property owners in and around Snug Harbor – homeowners included – made this study a useful and viable tool for the community and each other by sharing their concerns, questions and information

about critical infrastructure and thoughts about what should be the future in Snug Harbor. Special thanks to JR Kent of Bayside Marine, who not only asked the right questions early and often, but gave countless hours and expertise to this project to make the input as good as it can be from all of the Snug Harbor businesses.

**Project Photos:**

- In your electronic submission of this report, please attach (as .jpg or .png) a few high-resolution (at least 300 pixels per inch) representative photos of the project. Photos should not show persons who can be easily identified, and avoid inclusion of any copyrighted, trademarked, or branded logos in the images. MVP may use these images on its website or other promotional purposes, so please also let us know if there is someone who should receive credit for taking the photo.
  - [See attached](#)