Municipal Vulnerability Preparedness Program Action Grant Case Study

Municipality: Northbridge MA
Project Title: Flood Resilience and Water Quality Protection Through Better Causeway and Green Infrastructure Design
Award Year (FY): FY24
Grant Award: $ 402,627
Match: $ 137,831
Match Source: Combination of in-kind and cash sources. In-kind match is predominantly time for the Director of Public Works, Town Planner, and Town Conservation Agent, to administer the grant, participate in Steering Committee meetings as well as community engagement and public workshops. In-kind match also came from time spent by the Town Conservation Agent delineating wetlands at both project locations and completing wetlands reporting. The DPW also provided in-kind time supporting infiltration testing at potential green infrastructure locations
One or Two Year Project: One year
Municipal Department Leading Project: The Town Department of Public Works
Project Website URL: tiny.cc/NorthbridgeResilience

Community Overview:

- What is the population size of your community and where is it located?
    - The Town of Northbridge has a population of 16,335 (2020 US Census Bureau) and is located in central Massachusetts in the Central Region.
- Do you have any Environmental Justice or other Climate Vulnerable communities? (Think about both those who live and work in your town.)
    - The Town of Northbridge was previously identified as containing Environmental Justice (EJ) communities for linguistic isolation. After an update to the demographics in 2020, the Town was removed from the list of municipalities with EJ communities.
    - The Town of Northbridge is still home to a large proportion of residents that are climate vulnerable and can be considered 'other priority populations'.
    - The area bordering Grafton and Upton which is in the 66th percentile for Limited English Speaking, with 17% of households not possessing a high school diploma (81st percentile), 24% low income (64th percentile), and 11% People of Color (31st percentile). Neighboring portions of Grafton (Census Tract 7381, Block Group 2 and 3) are currently mapped EJ communities, according to the Massachusetts EJ Viewer, with minority populations of 28% and 35.8%, respectively.
    - The Block Group (BG) immediately adjacent to the Main Street causeway (BG: 250277501003) is in the 70th percentile for Age Over 64. This same population group is also in the 69th percentile for Unemployment, 36th percentile for Low Income, 41st percentile for People of Color, and 6% of residents do not have a high school education (38th percentile). The adjacent BG (250277501002)

contains a large portion of children and is in the 95th percentile for populations Under Age 5. This same population ranks high for People of Color (40th percentile), Over Age 64 (38th percentile), and 7% of the population does not have a high school education (43rd percentile). The nearby area of Whitinsville (BG: 250277501001) is in the 84th percentile for Age Over 64, 73rd percentile for children Under Age 5, and 43rd percentile for Low Income.

- Other unique traits of your municipality like who the top employers are, geography, history, etc.

Project Description and Goals:

- Where was the project located?
    - The project was located at two locations within the Town of Northbridge: 1) the Carpenter Road causeway and 2) the Main Street causeway.

- What climate change impacts did the project address?
    - This project addresses climate change related impacts including precipitation-induced, urban heat island effects, and access to green spaces. More specifically, a replacement bridge structure was advanced to the 25% design level that would be more resilient to current and future flood conditions. This takes into consideration projected precipitation rates and design flood, ensuring that the proposed structure would provide enough height to avoid inundation during a 10-year or 25-year flood event. On Main Street, the green infrastructure designs were advanced to permitting-level (70%) and include bioretention basins that will capture and treat stormwater runoff from the roadway. As part of this design, the project proposes the creation of new green space and the implementation of street trees. The creation of tree shade will provide relief for local residents during hot weather conditions and enhances an area that will be more enticing for people to utilize. Native plantings were proposed as part of the landscaping aspect, which will benefit local plant biodiversity. This is key to enhancing climate resilience as diverse ecosystems are more adaptive in the face climate changing.

- What were the specific goals and tasks of the project as stated in your application?
    - The specific goals of this project were multifaceted with broader Town-wide benefits as well as site specific goals.
    - For the Carpenter Road causeway the goals were to:
        - Begin design of a full replacement of the Causeway arch by developing 25% design plans that would:
            - Reduce the flood risk created by the design and failing condition of the archway within the causeway.
            - Create safer, more resilient emergency response routes to the western portion of Town.

        - Improve aquatic connectivity and water quality through better flow conditions through design of a bridge.
    - For both causeway projects, the goals were to:
        - Reduce the present occurrence of cyanoHABs by reducing nutrient and sediment loading into Carpenter Reservoir and Whitins Pond and improving mixing within Carpenter Reservoir. This will make the reservoir more resilient to potential future occurrences of cyanoHABs under changing climatic conditions.
        - Protect potential future drinking water supplies by looking for alternatives to use GI to reduce pollutant loading to the reservoir, specifically at the western approach to the Causeway.
        - Protect potential future drinking water supplies by using green infrastructure to reduce pollutant loading to the reservoir system.
    - For the Main Street causeway, the goals were to:
        - Create safer, more resilient pedestrian and bicycle pathways to the southwestern portion of Town where one of only two major grocery store retailers are located (e.g., Walmart Supercenter).
        - Promote local community involvement and engagement regarding climate related threats to Town waterbodies of recreational and community significance.

- Did your project meet the goals set forth in your application in terms of:
    - Employing nature-based solutions
        - Yes. This project resulted in the development of site plans for the Main Street causeway that strategically sites green infrastructure in areas that maximizes interception of stormwater runoff. Aside from the stormwater management practices, the planting of street trees and green spaces along the Main Street corridor will be enhanced from the existing conditions, which are all impervious asphalt.
    - Improving equitable outcomes for and fostering strong partnerships with EJ and other Climate Vulnerable Populations
        - Yes. This project included a strong public engagement component that allowed the Town to work closely with the local vulnerable groups. The concerns and challenges facing residents were taken into consideration during the design process. This is observed most overtly with the design of the Main Street causeway, as the project focused heavily on enhancing the pedestrian experience along the roadway to provide a safe means of access to the local Wal-Mart Supercenter – one of the only local grocery stores and one of the dominant businesses frequented by lower income households in the nearby neighborhoods.
    - Providing regional benefits
        - Yes. The proposed designs on the Carpenter Road causeway will enhance hydraulic exchange between the northern and southern reservoirs. Similarly, the green infrastructure designed for Main Street will reduce

the influx of excess nutrients, total suspended solids, and other pollutants. Considering the broader connectivity of these waterbodies to downstream receiving streams and ponds, the proposed water quality improvements will benefit riverine and lacustrine ecosystems. These water quality benefits also serve to improve water quality within Whitins Pond and Carpenter Reservoir, which have the potential to become future drinking water supply reservoirs. Over the next few decades, more extreme weather events and continued population growth will place a larger demand on drinking water supplies. From a regional standpoint, these waterbodies could become critical supplies for neighboring municipalities.

- Implementing the public involvement and community engagement plan set forth in your application
  - Yes. The Town exceeded its own expectations with respect to public involvement and community engagement. The school engagement task was overwhelmingly successful and well received by the community. Working with local fourth grade science classes provided an excellent opportunity to connect the real-world implications of the project with the planned science curriculum. The students were excited to learn about the proposed work and asked amazing questions. The insights provided by the students were critical to how the engineers approached future concept designs for the Main Street causeway, as it provided a more in-depth understanding of how the public uses that space. The Public Engagement Workshops were another valuable source of knowledge as residents were keen to speak up and challenge some of the proposed design elements. Ultimately, the final products of this work reflect the resident's passion and enthusiasm to see more climate resilient projects implemented in their community.
- Finishing the project on time
  - Yes. The project was completed on time and has developed all the deliverables outlined in the proposed Scope of Work. This project has successfully positioned the Town for future grant opportunities by preparing design plans, cost estimates, and initiated conversations regarding the relevant permits.

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.
  - As part of the Main Street green infrastructure designs, the project is proposing 15 different infiltration basins totaling ~7,500 sq ft, a porous concrete shared path equal to ~21,000 sq ft, the planting of 12 new shade trees, and the creation of new ~8,000 sq ft of green space (via pavement removal).

    - The 25% design of the replacement structure for the Carpenter Road causeway will result in raising the existing causeway by
        - The proposed 70-foot structure will increase the hydraulic opening size of the causeway's bridge culvert to ~1,080 sq ft from the existing 120 feet. Under normal conditions, this will increase the hydraulic flow through the culvert.
- Provide a brief summary of project deliverables with web links, if available.
    - Project deliverables from past phases of the project and the public engagement tasks can be found on the project website at:
        - tiny.cc/NorthbridgeResilience
    - All other project deliverables are available on the project specific SharePoint folder.

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.
- What is the best way for other communities to learn from your project/process?
    - The project website developed for this project provides an excellent reference for communities looking to undertake projects that may seem too complex or grandiose. The Town of Northbridge has worked diligently to identify and pursue opportunities to develop this project, beginning with a Town-wide Green Infrastructure Master Plan and

Partners and Other Support:

- Include a list of all project partners and describe their role in supporting/assisting in the project.
    - This project has received support from the municipal departments, local service providers, and local residents, including. At the Town level, the Town Planner, Conservation Agent, and Director of the Publics Works, have been heavily involved in grant management activities and active members of the Steering Committee. These individuals have attended numerous permitting and public meetings in support of the project, in addition to lending technical expertise and time where possible (e.g., wetland delineation or infiltration testing). They have also been integral to the public engagement aspects of the project, helping to coordinate the public workshops and utilizing connections at the Northbridge Elementary School.
    - Representatives from the Whitinsville Water Company have also been staunch supporters of this project and are dedicated members of the project Steering Committee. Terry McGlone and Steven Cheney have provided assistance in understanding property boundaries between the Town and the WWC, have coordinated with the project engineers to provide guidance in siting green infrastructure along both causeways, and have shared valuable institutional

knowledge privy to the WWC. Working alongside the WWC is critical to ensuring that this project is designed with future climate resilience, specifically regarding the quality of public drinking water supplies.

- Rounding out the project Steering Committee are two residents of the Town of Northbridge. Christopher Allen and Barry Gold have been contributing members since the earliest inception of the project and are an excellent sounding board when discussing public engagement strategies and design concepts prior to public presentation.

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.

FIGURE 1. PHOTOGRAPH FROM THE PUBLIC ENGAGEMENT WORKSHOP ON JUNE 12TH 2024, HELD AT THE NORTHBRIDGE ELEMENTARY SCHOOL. PHOTO CREDIT: BILL GUENTHER, FUSS & O'NEILL INC.

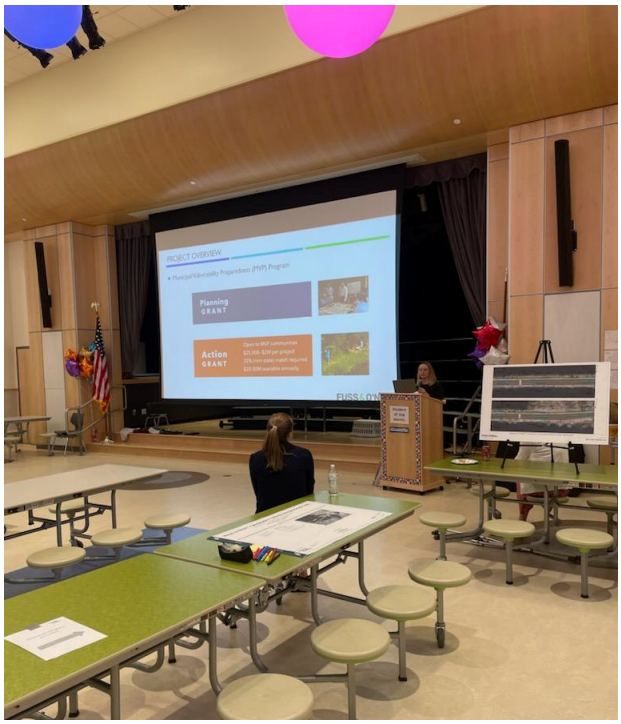

FIGURE 2. PHOTOGRAPH FROM THE PUBLIC ENGAGEMENT WORKSHOP ON JUNE 12TH 2024, HELD AT THE NORTHBRIDGE ELEMENTARY SCHOOL. PHOTO CREDIT: BILL GUENTHER, FUSS & O'NEILL INC.