

Municipal Vulnerability Preparedness Program Action Grant Case Study

Municipality: City of Waltham

Project Title: Resilient Stormwater Action and Implementation Plan

Award Year (FY): FY21

Grant Award: \$217,370.00

Match: \$72,562

Match Source: \$22,000 Cash, \$50,562 in-kind

One or Two Year Project: One Year

Municipal Department Leading Project: Planning Director

Project Website URL: <https://www.city.waltham.ma.us/engineering/pages/waltham-resilient-stormwater-action-implementation-plan>

Community Overview:

- *What is the population size of your community and where is it located?*

Waltham is a city located in Middlesex County with a population estimate of 62,495 as of 2019 (US Census Bureau, 2019). It is the sixth largest city in terms of population in Middlesex County, and is located eleven miles west of Boston.

- *Do you have any [Environmental Justice](#) or other Climate Vulnerable communities? (Think about both those who live and work in your town.)*

Waltham is home to two types of environmental justice communities. The environmental neighborhoods are block groups whose annual median household income is equal to or less than 65 percent of the statewide median (\$62,072 in 2010). The percent of persons in poverty in Waltham is 9.4 percent. In some neighborhoods, there are also 25% or more of the residents that identify as a race other than white. Additionally, there is an undocumented population that is not reflected in the census, which is considerable. The city has considered needs of these community members during hazard mitigation planning and preparation.

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

Waltham's economy can be contributed to the commuting population in Waltham. The economy employs 35,987 people and is specialized in professional, scientific, and tech services; educational services; and information. Reportedly, the population in Waltham nearly doubles during the day because the city is a center for employment. Much of the city's economic activity is concentrated along Route 128, and significant recent business tenants include Boston Dynamics, ElevateBio, Zoom Info, and Cambridge Savings Bank. The medium household income is \$81,215. Waltham is home to a diverse housing stock, with dense multi-family housing in the southern neighborhoods of the city and larger lot single-family housing in the northern neighborhoods.

Project Description and Goals:

- *Where was the project located?*

The investigation area included the following sub basins: Beaver Brook, Chester Brook, West Chester Brook, Clematis Brook, Stoney Brook, Masters Brook, and Plympton Brook.

- *What climate change impacts did the project address?*

Waltham's Resilient Stormwater Action and Implementation Plan addresses how nature-based solutions can be implemented to reduce flooding and urban heat island effect, and where the greatest opportunity for action lies.

- *What were the specific goals and tasks of the project as stated in your application?*

The Resilient Stormwater Action and Implementation Plan addresses the following high priority action items from the HMP-MVP plan:

- Reduce the impact of riverine and stormwater flooding on roads, floodplains, and adjacent properties.
 - Assess and inventory stream crossings such as culverts and bridges; prioritize/rank these assets based on vulnerability.
 - Recommend improvements and develop an implementation plan for projects such as replacement of culverts and storm drainage that cause flood hazards and areas where elevation of roads would improve resilience.
 - Identify and upgrade infrastructure to handle flooding, maintain drains, and create upstream storage to reduce flooding. Invest in low impact development to reduce flooding.
 - ⊖ Work locally, and in cooperation with, surrounding communities to reduce flooding through watershed management, stormwater management, flood mitigation, and roadway.
- Collaborate between City departments and private entities to plan stormwater improvements.
- Restore wetlands and floodplains for flood mitigation and flood storage. As an example, restoring wetlands and floodplains at the Fernald property would reduce flooding risk downstream of Beaver Brook. Wetlands can provide flood protection for culverts.
- Improve development and management strategies to reduce impervious surfaces. Consider ways to encourage installation of green infrastructure to reduce stormwater runoff.

- *Did your project meet the goals set forth in your application in terms of:*
 - *Employing nature-based solutions*
 - *Improving equitable outcomes for and fostering strong partnerships with EJ and other Climate Vulnerable Populations*
 - *Providing regional benefits*
 - *Implementing the public involvement and community engagement plan set forth in your application*
 - *Finishing the project on time*

The plan provides a detailed analysis on the location and existing conditions of culverts, storm drains, and streams and an assessment of where the greatest opportunity for low impact development/green infrastructure are located. The projects were prioritized and ranked so that the final product resembles a work plan rather than a high-level strategy. Over 300 nature-based or green infrastructure solutions were identified.

The project included outreach programs for presenting the Resilient Stormwater Action and Implementation Plan. Videos were used as a new type of outreach platform to residents. Building new relationships with local non-profits was not possible during the COVID-19 pandemic, but the City looks forward to future opportunities to partner. The City of Waltham coordinated with the City of Cambridge, which has water supply sources in Waltham. This was done in order to protect the public water supply and to consider opportunities to increase groundwater recharge.

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 stream and culvert assessment within six subbasins, the field crew investigated 25.7 miles of stream, and inspected 68 culverts and 140 outfalls.

Within the focus watershed areas, over 300 green infrastructure projects have been identified. In addition to stormwater volume reduction and water quality improvement, these projects were calculated to reduce impervious surfaces in Waltham by 1,716,680 square feet (39.4 acres).

- *Provide a brief summary of project deliverables with web links, if available.*

The City of Waltham has completed the ten tasks outlined in the application, including:

- Task 1. Project Kickoff
- Task 2. Climate Resilience Assessment
- Task 3. Public and Stakeholder Engagement

- Task 4. Illicit Discharge Detection and Elimination
- Task 5. Construction and Post Construction Site Runoff Stormwater Control
- Task 6. Pollution Prevention and Good Housekeeping
- Task 7. Action Identification
- Task 8. Action Prioritization
- Task 9. Implementation Chapter
- Task 10. Reporting and Grant Management

The City of Waltham keeps an MVP Project page at the following web address: <https://www.city.waltham.ma.us/engineering/pages/waltham-resilient-stormwater-action-implementation-plan>. The website was updated throughout the project period to inform the public on the project description, progress, and to ask for feedback.

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.*

The front end of this project was very heavily focused in gathering accurate field data. The site was often not very easily accessible, proving to be difficult for both field staff and for GPS equipment to gather precise data. Certain stream reaches took longer than anticipated because of the site conditions and the need to ensure the GPS unit was precise. The lag time between gathering field data and then processing it in the office also made it difficult to get immediate feedback. Lidar data may be just as accurate as hand held device, depending upon the site conditions.

It is important that field staff are considering outreach and engagement opportunities while in the field. There are many opportunities for photos and videos, but the team must consider presentation. This includes well composed photographs and stable, longer videos.

Modeling level of effort should be heavily dependent on the project goal. If the goal is to understand how green infrastructure could reduce flooding or mitigate climate change on a community-wide or watershed-wide level, then the project and modeling efforts would be best served by focusing on the “big picture scenarios”, such as “what happens if we require all new development to retain two inches of runoff onsite”, or “What if we reduce impervious cover by 25%?” An evaluation of big picture scenarios can be done easily and effectively combined with a similar assessment of sizable flood storage projects. These questions can be answered with both 1D and 2D models.

On the other hand, if the goal of a stormwater modeling project is to evaluate a series of specific, small area projects, a more detailed modeling approach is required to effectively understand the flood reduction benefits of such projects. The stormwater model required to do so should be built with significantly more detail, including as much existing stormwater infrastructure as possible, smaller subcatchments, and a dense 2D mesh capable of identifying

flooding impacts at 10+ locations within the immediate vicinity of the project area. It is also important to realize that benefits of these specific green infrastructure projects tend to occur on a local scale. These green infrastructure systems can dramatically reduce flooding in the targeted area, but these types of projects are unlikely to significantly reduce flooding in downstream brooks and rivers.

The prioritization method that was used on green infrastructure for this project may be useful in other projects. Integrating the green and grey infrastructure was useful, but at times it proved to be difficult because it was unclear how all of the data points were related. This is a process that can be improved in the future.

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

The City of Waltham maintains a project website at <https://www.city.waltham.ma.us/engineering/pages/waltham-resilient-stormwater-action-implementation-plan> which includes public engagement features such as informational videos and fact sheets.

Partners and Other Support:

- *Include a list of all project partners and describe their role in supporting/assisting in the project.*
 - The project did not have any formal partners beyond our technical consultants.

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.



