Municipal Vulnerability Preparedness Program Action Grant Case Study

Municipality: City of Worcester

Project Title: Worcester Senior Center Parking Lot – Nature-Based Solutions

Award Year (FY): 2020-2021

Grant Award: $378,356

Match: $126,119

Match Source: Capital, Operational, and In-Kind funds

One or Two Year Project: 2 year

Municipal Department Leading Project: Division of Energy and Asset Management

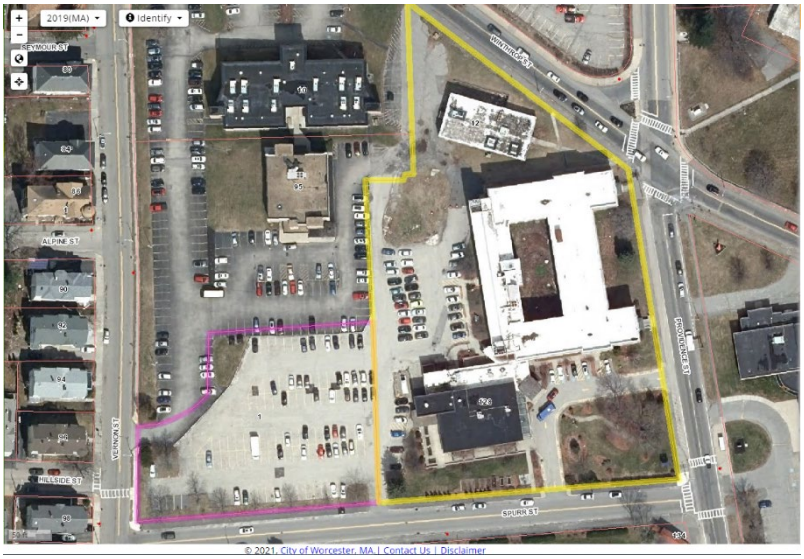
Project Website URL: www.WorcesterEnergy.org

Community Overview:

- What is the population size of your community and where is it located**? ~186,000, Central Massachusetts**
- Do you have any Environmental Justice or other Climate Vulnerable communities? (Think about both those who live and work in your town.) **Yes, the project took place in the EJ area.**
- Other unique traits of your municipality like who the top employers are, geography, history, etc.
    - **Location: Massachusetts, United States (Central MA)**
    - **Incorporated as a City: 1848**
    - **Population: 186,000, 2nd largest city in New England after Boston**
    - **Government Type: Council-Manager**
    - **Median Households Income: $46,407**
    - **Median House Price: $220,000**
    - **Home to 9 colleges and universities**
    - **60 Parks and 20 lakes and ponds**
    - **Art and Culture**
    - **Booming Healthcare and Biotech Industry**
    - **Gateway City; Revitalization**

Project Description and Goals:

- Where was the project located? – **Worcester Senior Center Parking Lot; most of the site is impervious (building or parking lot areas), totaling 4.22 acres.**



- What climate change impacts did the project address? – **Flooding and extreme heat**
- What were the specific goals and tasks of the project as stated in your application?

  The City was looking to provide green infrastructure solutions to a parking lot redesign of its Senior Center to address flooding and extreme heat natural hazards, identified by our community as part of the MVP planning process, and to serve as a successful example of nature-based solutions in heavily urbanized areas.

- 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

  Due to Covid-19 pandemic, the timelines were extended and community engagement was not done in person, but we believe we successfully met the goals of the project, and will continue to meet them, through ongoing successful maintenance of the green infrastructure on site, and promoting the rain gardens using different mediums – including social media and newsletters.

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.

  The rain garden and bioswales replaced both existing grassy areas and some paved surfaces, in total creating more pervious surfaces that address local flooding and heat island effect issues.

  For example, per the stormwater reports, during the Type III 24-hr 100-YR Rainfall of 6.60 inches[1], the stormwater treatment areas would treat the following volumes of the water runoff:

  - Bioretention Area 1 Storage=1,664 cubic feet
  - Bioretention Area 2 Storage=1,157 cubic feet
  - Cultecs Storage=5,355 cubic feet

  Before improvements, the street drainage system would have received 10.16 cubic feet per second; and as a result of the project, will receive 5.85 cubic feet per second

  During the Type III 24-hr 1-YR Rainfall of 2.60 inches, the stormwater treatment areas would treat the following volumes of the water runoff:

  - Bioretention Area 1 Storage=1,171 cubic feet
  - Bioretention Area 2 Storage=221 cubic feet
  - Cultecs Storage=2,466 cubic feet

- Provide a brief summary of project deliverables with web links, if available.
  - **Winter-Spring of 2020 – Engineering (see Attachments)**
  - **Majority of the construction work took place during the summer-fall of 2020**
  - **Punchline list of items was addressed during the spring 2021 (related to performance of the raingardens, evaluation of the snow clearing impacts after the winter)**
  - **Site signage was designed, manufactured and installed in the spring of 2021 (see Attachments)**

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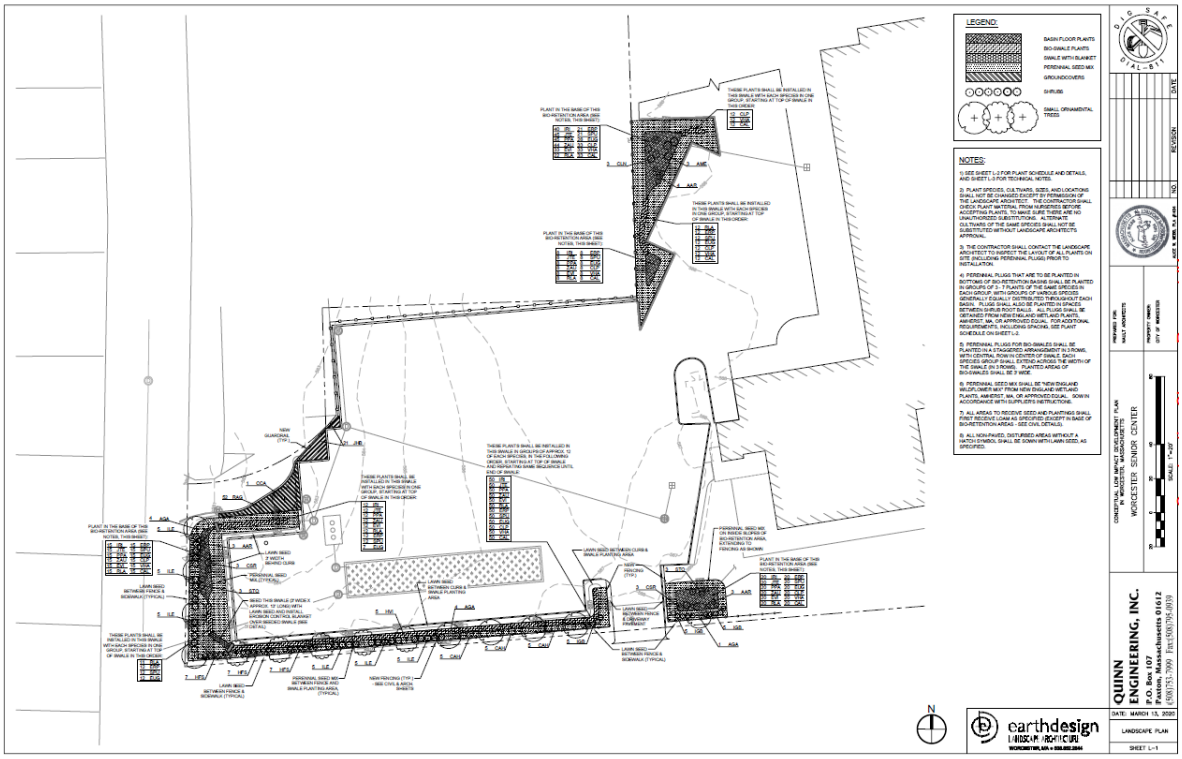
Bioretention Area 1	Peak Elev=582.72' Storage=1,664 cf Inflow=2.89 cfs 0.097 af
Bioretention Area 2	Peak Elev=586.84' Storage=1,157 cf Inflow=0.82 cfs 0.050 af
Cultecs	Peak Elev=582.90' Storage=5,355 cf Inflow=4.22 cfs 0.382 af
Vernon Street Drainage System Pre:	Inflow=10.16 cfs 0.688 af
Vernon Street Drainage System Post:	Inflow=5.85 cfs 0.570 af

Landscape Plan:



View of the Underground Stormwater System (Cultec) being installed (drone view):

View of the Underground Stormwater System (Cultec) being installed:

View of the bioswales (Summer 2021):

View of one of the three signs (Summer 2021):

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?
    - **Project Timing:**
        - The best opportunity for considering adding green infrastructure is when grey infrastructure needs upgrades/replacements and during parking lot upgrades.
    - **Project Management:**
        - Assign a solid consistent project management team, to ensure continuity during the process and resolution of the problems as they come up
    - **Concept Design:**
        - Pervious pavement was a cost-prohibitive solution for the project, given the large area of the parking lot (close to 2 acres).
        - For heavily urbanized areas, a hybrid approach of grey and green infrastructure may need to be considered.
    - **Engineering:**
        - Ensure municipal engineers, planners, and other staff have sufficient time to review and provide input on the design.
        - We recommend hiring a stormwater design company with solid experience doing nature-based solutions in the portfolio.
        - The Landscape Architect, which should be part of the stormwater design company, should provide the following important services:
            - Design the rain garden plants species, numbers and locations, working collaboratively with the stormwater engineering
            - Inspect the site during key points, such as excavation, soil placement, planting, plants establishment (Year 1); and provides affidavit that the work was done according to the plans.
            - Provide a) 1st Year Maintenance Plan and b) Long-Term Maintenance Plan for the site, which are to be used to either do the work in-house or contract it out.
    - **Construction:**
        - Ensure that Landscape Architect inspects the site during installation
        - Take pictures throughout construction process, both to ensure proper installation and for future storytelling about the project
        - Invest in designing clear and attractive signage so that it will continue to tell the story long after initial outreach and education.
        - Ensure that 1st year green infrastructure maintenance is done correctly and the rain garden is performing as designed.

- Make sure that trash removal is part of the maintenance contract. Seek neighborhood and tenant assistance with ongoing trash removal.
- Snow/Salt:
    - Clearly designate snow storage areas on site; in the lowest place possible, to prevent melting and then icing over.
    - Provide barriers (wheel stops) between the parking and the raingarden, to avoid snow plows plowing snow into the raingarden.
    - Communicate clearly with the snow plowing company ahead of the storms during the first winter season.

Partners and Other Support:

- Include a list of all **project partners** and describe their role in supporting/assisting in the project.
    - **Division of Energy and Asset Management – project managers**
    - **Worcester Senior Center staff**
    - **Contractors/Consultants:**
        - **Nault Architects Inc, and their consultants:**
            - **Quinn Engineering, Paxton Civil Engineering**
            - **Earth Design, Inc., Worcester Landscape Architecture**
        - **A.F. Amorello & Sons Inc. for construction and landscape maintenance for the first year.**

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 Attachments.**

Attachments:

A) Landscape Plan; by Quinn Engineering and Earth Design Landscape Architecture; dated March 13, 2020.

B) Explanatory narrative about the decision to provide grey and green infrastructure on site; by Quinn Engineering; dated May 15, 2020.

C) Final Construction Control Document, by Nault Engineering; dated April 8, 2021.

D) Urban Gardens Sign – 2 on the fence, 1 freestanding

E) 3 pictures of the signs installed on-site

F) Maintenance Information:

   1) Operation and Maintenance Plan, Stormwater Collection and Treatment System; dated August 10, 2020

   2) Landscape Maintenance Specifications for First Year after Planting and Seeding: Bio-retention Areas, Bio-swales, and Adjacent Landscaped Areas at the Worcester Senior Center

   3) Long-Term Landscape Maintenance Specifications: Bio-retention Areas, Bio-swales, and Adjacent Landscaped Areas at the Worcester Senior Center

G) Final Worcester FY20 MVP Action Grant Scope – Amendment May 2021.

H) High-resolution representative photos of the project.