**Municipal Vulnerability Preparedness Program Action Grant Case Study**

**Municipality:** South Hadley
**Project Title:** Queensville Dam Removal Feasibility Study & Buttery Brook Watershed Enhancement
**Award Year (FY):** FY22
**Grant Award: $** 125,000
**Match: $** 40,750
**Match Source:** Cash & In Kind
**One or Two Year Project:** One
**Municipal Department Leading Project:** South Hadley
**Project Website URL:** https://www.southhadley.org/1096/Climate-Resiliency

**Community Overview:**

- With a population of just under 18,000, the Town of South Hadley is unique in that it is located in a transition zone between developed urban centers to the south and west (Holyoke, Chicopee and Springfield), and the more agricultural and rural communities to the north and east (Hadley, Granby and Belchertown), know as part of the Pioneer Valley region. This dichotomy serves as the single most important influence on the Town's growth and development and hence, its open space and natural resources planning.
- As of the 2020 Census, South Hadley has mapped Environmental Justice Communities of minority and low-income population. This totals 4,356 residents of South Hadley living in the southern half of town. The EJ Community encompasses the South Hadley Falls neighborhood and adjacent to the cities of Holyoke and Chicopee. The Queensville Dam and Titus Pond Conservation Area are located approximately 0.75 miles upstream of the Falls.
- In addition, South Hadley has significant natural features that have further influenced community planning that include the Mount Holyoke Range to the north, the Connecticut River to the west and Elmer Brook, Bachelor Brook, Stony Brook and Buttery Brook that flow east to west across South Hadley.

**Project Description and Goals:**

- *Where was the project located?*

  The project focused on the Buttery Brook watershed, including Titus Pond Conservation Area and Queensville Dam, as well as downstream areas along Mountain Avenue and Joffre Avenue. Buttery Brook watershed is South Hadley's most heavily developed watershed, with a high degree of impervious area and several stretches where the stream runs through underground culverts. Titus Pond is the headwaters of the system, and therefore a natural place to begin work to improve conditions in the watershed and manage upstream stormwater contributions that ultimately make their way through the dense neighborhoods of the South Hadley Falls area before Buttery Brook converges with the Connecticut River.

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

In the next ten years, South Hadley could experience up to five more inches of annual precipitation, with much of that increase concentrated during more extreme precipitation events, and over eight more inches in the next seventy years. Even more alarming is the projected rise in the number of days above 90 degrees F - up to over 19 in the next 10 years to up to 76 more days in 70 years. Our project sought to incorporate improvements in the upper portion of the Buttery Brook watershed to provide enhanced stormwater management at Titus Pond Recreation Area, utilizing nature-based approaches to manage and infiltrate stormwater close to where it falls, thereby decreasing the risks of flooding in adjacent neighborhoods, reducing impacts to vulnerable neighborhoods downstream along Buttery Brook, and creating new and improved recreational and public open space amenities for vulnerable residents in the Town's Smart Growth District, within easy walking distance of the new Senior Center and coming affordable housing developments. The South Hadley Falls anchors the Town's Federally designated Opportunity Zone and also anchors a State designated Economic Target Area.

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

  The project's overarching goals are to:

  - Eliminate the jurisdictional status and hazard threat associated with Queensville Dam by reducing the impounded area below jurisdictional thresholds
  - Address water quality issues in the existing impoundment
  - Create an improved Conservation Area with benefit to local residents, including the adjacent school, which is utilizing the area as a living laboratory, as well as adjacent neighborhood residents
  - Facilitate management of stormwater in the restored impoundment through the use of nature-based solutions (e.g., wetland step pools) and thereby reduce downstream flooding risk and erosion problems along Buttery Brook

  Project tasks centered around assessment of the feasibility of several watershed improvements intended to address these goals. Alternatives for removing the Queensville Dam were examined, including sediment assessment, and hydrologic and hydraulic analyses. Field data collection was also performed to advance downstream improvements including replacement of the culvert at Mountain Avenue, and options for daylighting or otherwise improving the buried stream section at Joffre Avenue were also evaluated.

- Did your project meet the goals set forth in your application in terms of:
  - Employing nature-based solutions

    The proposed design concepts successfully incorporate and center nature-based solutions for climate resilience. The Titus Pond restoration represents an opportunity to mimic natural processes within the confines of the urbanized and highly impacted system and demonstrate the benefits of nature-based approaches even in the midst of intense development and built-up land use. The modifications proposed and the declassification of the Queensville Dam will allow for restoration of the headwaters of Buttery Brook to a natural wetland ecosystem, which will provide additional flood

dampening and stormwater infiltration where the impoundment currently exists. Elimination of the impoundment and restoration to wetlands would also eliminate the warming effect that accompanies impounded water, providing for a cooler, healthier, better oxygenated stream and removing the risks to ecosystem and public health associated with the warm, stagnant water which currently characterizes the Titus Pond impoundment. The new wetland ecosystem will be a valuable recreational and educational resource for the community to learn about climate resiliency.

Right-sizing and increasing daylight through the Mountain Avenue culvert will remove barriers to aquatic and terrestrial passage and increase habitat connectivity, while also increasing the capacity of the structure to safely pass storm flows during large precipitation events and reduce the risk of the structure becoming clogged by debris or other material moving downstream. Re-alignment of the crossing to better match the stream channel path will also help to eliminate geomorphic risks due to the existing sharp bend at the culvert inlet and will simultaneously pull the culvert further from the adjacent residence, helping to protect private property from flood impacts.

- Improving equitable outcomes for and fostering strong partnerships with EJ and other Climate Vulnerable Populations
    - This project focuses on improving the Buttery Brook watershed, South Hadley's most heavily developed and most populated watershed, beginning at its headwaters. The project site is located approximately 0.75 miles upstream of a mapped EJ community in a census tract that is identified as both a low-income (median household income of $50,313) and minority (27%) population. The site is just south of the Town's Newton Street-Lyman Street Smart Growth District which is undergoing a program of sidewalk, roadway, bikeway, utility, and pedestrian safety improvements as part of an ongoing MassWorks grant. The site is 0.25 miles from the new South Hadley Senior Center and 0.1 miles from the permitted affordable housing complex being developed within the former Woodlawn Plaza. Restoration of the Titus Pond impoundment will not only help to reduce downstream flooding by improving stormwater management at the headwaters, but will also provide an improved public space for passive recreation and environmental education that will be easily accessible to climate vulnerable residents, including seniors and residents of the affordable housing complex.
- Providing regional benefits
    - Buttery Brook flows into the Connecticut River. Improvements to the stream therefore have larger water quality benefits that extend to the larger region's waterways. Both the improvements to water quality which will come from eliminating the impoundment and the upstream stormwater management made possible in and around the restored wetlands at the former impoundment will have water quality benefits for the downstream watershed and help to improve water quality in the Connecticut.
- Implementing the public involvement and community engagement plan set forth in your application
    - One of the most exciting aspects of community engagement in the project was our partnership with South Hadley High School students to install water quality

monitoring equipment in Titus Pond. The students will be continuing to monitor the site as we move through detailed design, and will be able to continue monitoring the site post-restoration to see how water quality changes and quantify improvements. We are looking forward to involving these students in a community design process in the next phase of the project, and introducing additional public stakeholders into those engagement activities as well.

        - A new element for South Hadley was a public art piece: a mural painted on Main Street in South Hadley Falls, where Buttery Brook is culverted under the street. Main Street is slated to be repaved in 2023, so this project was planned as a temporary installation. The intent of this art installation is to bring awareness to the Buttery Brook Watershed and the efforts underway to restore it. The goal of the mural installation was a way to connect residents to the local waterways and raise awareness about how the choices we make can impact the health of our waterways. Volunteers from the community assisted with the painting. The artist skillfully added details of plants and animals found in our region.
    - Finishing the project on time
        - All project elements were completed on time and on budget.

**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.
- Provide a brief summary of project deliverables with web links, if available.
- Site Survey and Base Mapping: https://www.southhadley.org/DocumentCenter/View/9649/Site-Survey-and-Base-Mapping
- Wetland Delineation Report: https://www.southhadley.org/DocumentCenter/View/8959/Wetland-Delineation-Report
- Sediment Quality Memo: https://www.southhadley.org/DocumentCenter/View/8960/Sediment-Quality-Memo
- Hydrologic & Hydraulic Analysis: https://www.southhadley.org/DocumentCenter/View/9667/Hydrologic-and-Hydraulic-Analysis
- Preliminary Geotechnical Report Queensville Dam Removal Feasibility: https://www.southhadley.org/DocumentCenter/View/9651/Preliminary-Geotechnical-Report-Queensville-Dam-Removal-Feasibility-Study
- Preliminary Geotechnical Report Joffree and Mountain Ave: https://www.southhadley.org/DocumentCenter/View/9650/Preliminary-Geotechnical-Report-Joffree-and-Mountain-Ave
- Queensville Dam Declassification Analysis: https://www.southhadley.org/DocumentCenter/View/9662/Queensville-Dam-Declassification-Analysis
- Titus Pond Conservation Area Conceptual Design: https://www.southhadley.org/DocumentCenter/View/9663/Titus-Pond-Conservation-Area-Concept-Plans
- Downstream Improvements Memo: https://www.southhadley.org/DocumentCenter/View/9665/Downstream-Improvements-Memo

- Queensville Dam Removal Feasibility Study & Buttery Brook Watershed Enhancements Final Report: https://www.southhadley.org/DocumentCenter/View/9666/Queensville-Dam-Removal-Feasibility-Study--Buttery-Brook-Watershed-Enhancement-Final-Report

**Lessons Learned:**

- The outcome of a feasibility study may conclude that a project is not feasible. Due to the complex nature of Queensville Dam supporting Route 116/Newton St., full removal of Queensville Dam is not a path that South Hadley will pursue. The concept of daylighting the outlet at Titus Pond is not feasible due to the depth of the existing culvert and proximity of private property. This realization changed the scope of work a bit. While continuing the work towards watershed enhancements, the project also investigated options to declassify the existing dam, primarily ways to reduce the size of the impoundment. The concept that emerged from the project was not what we initially anticipated, however, it meets all of the core project goals, and will be substantially more cost-effective to construct.
- Installation of a wall mural would have been easier than the street mural. Overall, the street mural installation did exactly what it was intended to do: spark interest and conversation. Most people were surprised to learn there was a brook running under Main Street. The project has opened the door for other environmentally centered public projects in South Hadley to spread awareness and increase education.
- Engagement with the high school students was fantastic, both in the classroom and in the field.
- Regular mailings to direct abutters during project proved to be effective. Several reached out to the town to ask about how their property might be impacted by the project. Some reached out to learn more or express thanks for the information.
- Right-sizing culverts and increasing daylight in the Buttery Brook watershed is going to be a very expensive investment. Funding this work will require additional grants to be matched against capital planning earmarks in the annual municipal budget.
- What is the best way for other communities to learn from your project/process?
- Keep the conversation going about how important planning for climate change resiliency is.

**Partners and Other Support:**

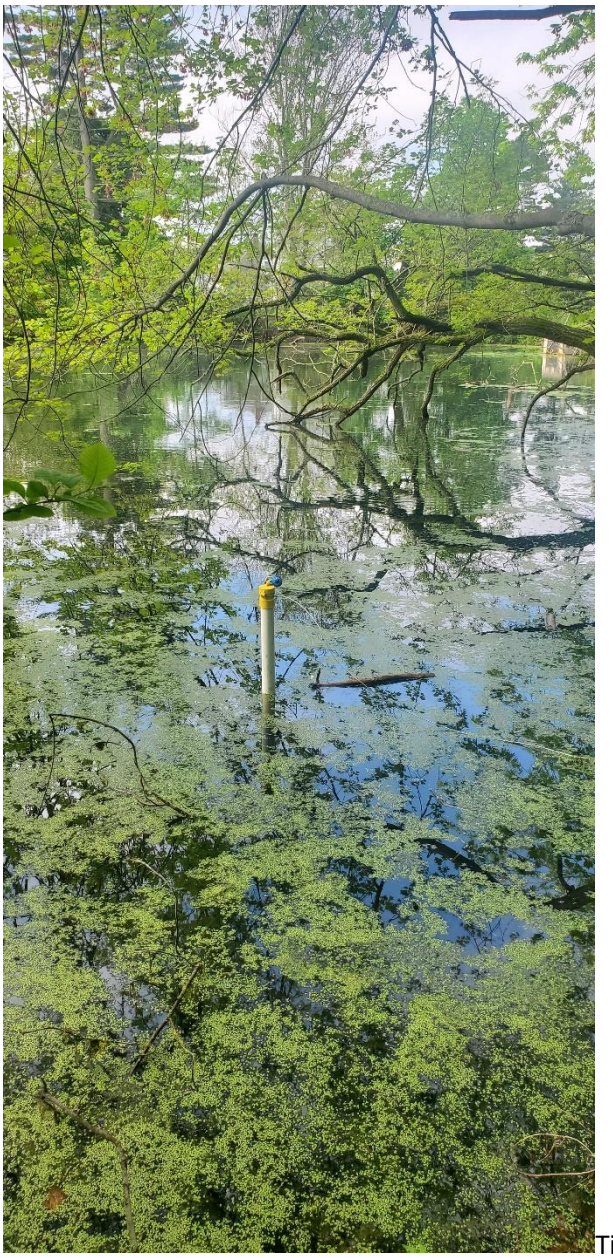
- South Hadley Local Cultural Council – awarded the Town a $1,000 grant to support to the public art piece of this project.
- South Hadley Department of Public Works– assisted with coordination of subcontractors and provided important historical information about Titus Pond and the Buttery Brook tributaries.
- Laura Ketteringham, South Hadley High School Middle School science teacher– incorporated in-class discussions about climate resiliency in South Hadley with the Conservation Administrator. Coordinated the site visit to install the monitoring equipment at Titus Pond which will be used in curriculum long term.
- Simone Germain – freelance artist subcontractor for street mural installation “Buttery Brook Under Our Feet”.

- Fuss & O'Neill – Project engineer that performed the technical work including, but not limited to, wetland delineation & evaluation, hydrologic & hydraulic analysis, dam declassification analysis, concept development and watershed enhancement recommendations.
- Place Alliance – Subcontractor that collaborated on restoration design and conceptual graphics.
- O'Reilly, Talbot & Okun Engineering Associations – Subcontractor that performed geotechnical services for preliminary soil investigations, a discussion of geotechnical considerations for the dam removal feasibility study and preliminary recommendations at Queensville Dam. Also performed these services for the proposed replacement of two culverts, one located on Joffre Ave and one on Mountain Ave.
- Sherman & Frydryk – subcontractor for base mapping & site survey.

**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.

- “Buttery Brook Under Our Feet” street mural



Titus Pond Monitoring Equipment