

Municipal Vulnerability Preparedness Program Action Grant Case Study

Municipality: South Hadley

Project Title: Queensville Dam and Buttery Brook Restoration

Award Year (FY): FY23

Grant Award: \$ 162,000

Match: \$ 54,650

Match Source: Cash & In-Kind

One or Two Year Project: one

Municipal Department Leading Project: Planning & Conservation Department

Project Website URL: <https://www.southhadley.org/1295/Queensville-Dam-Buttery-Brook-Restoration>

Community Overview:

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

With a population of just under 18,000, the Town of South Hadley is unique in that it is located in a critical 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), known 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.

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

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.

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

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, low-income 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. 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?
- 1) Eliminate the jurisdictional status and hazard threat associated with Queensville Dam by reducing the impounded area below jurisdictional thresholds.
 - 2) Address water quality issues in the existing impoundment
 - 3) 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.
 - 4) 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 improving the buried stream inlet at Joffre Avenue.

- Did your project meet the goals set forth in your application in terms of:

The 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 has recently had a program of sidewalk, roadway, bikeway, utility, and pedestrian safety improvements funded by a MassWorks grant. The site is 0.25 miles from the new South Hadley Senior Center and 0.1 miles from a fully 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, school students, and residents of the new 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

For the second year, the partnership with South Hadley High School students continued to monitor water quality in Titus Pond utilizing equipment installed during MVP FY 22 funding. The students will be continuing to monitor the site as the Titus Pond restoration project moves through construction, and will be able to continue monitoring the site post-restoration to see how water quality changes and quantify improvements. This year a field trip was taken to two different streams in town: Elmer Brook, a cold water fishery at the base of the Mount Holyoke Range and BATTERY Brook off Mountain Ave. At each location, macroinvertebrates samples were taken by students. There was a clear difference in water quality between the rural and urban streams in South Hadley. The students were provided waders and sampling equipment to continue similar macroinvertebrate sampling in the BATTERY Brook watershed and monitor water quality at Titus Pond through construction.

- 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.
- 1) The project should ultimately result in reclassification of the Queensville Dam as non-jurisdictional, based on the removal of the impoundment and reduction of total storage space behind the dam embankment (which cannot be removed since it is coincident with the Route 116 road embankment) to below 15 acre-feet during the 100-year event.
 - This will in turn achieve the Town's goal of reducing the liability of dam maintenance and reduce the associated flooding risks that would result from failure of the dam, which is currently classified as a significant hazard dam.

- 2) The project should alleviate risks associated with the undersized and poor-condition stream crossing at Mountain Avenue by replacing it with a crossing that meets the Massachusetts Stream Crossing Standards and will better protect the adjacent private property as well as the roadway and infrastructure from risk of flooding or damage.
 - 3) The project should improve conditions at the inlet to the Joffre Avenue culvert to prevent future flooding backups due to clogging and reduce ongoing impacts to adjacent properties.
 - 4) The project should result in improved water quality and habitat quality within Titus Pond Conservation Area and make this Town resource both more attractive and safer for South Hadley residents to access.
 - 5) The project should provide for additional stormwater management at the former Titus Pond impoundment, using nature-based solutions and green infrastructure to promote filtration and infiltration of stormwater at the Buttery Brook headwaters, thereby reducing potential flood risks and erosion downstream.
- Provide a brief summary of project deliverables with web links, if available.

Main Project Webpage: <https://www.southhadley.org/1295/Queensville-Dam-Buttery-Brook-Restoration>

Titus Pond Restoration Plan Set:

<https://www.southhadley.org/DocumentCenter/View/11501/Titus-Pond-Restoration-Design>

Mountain Ave Culvert Replacement Plan Set:

<https://www.southhadley.org/DocumentCenter/View/11502/Mountain-Ave-Culvert-Replacement-Design>

Public Comment Stations: <https://www.southhadley.org/DocumentCenter/View/10827/Public-Comment-Stations>

Bathymetry of Titus Pond:

<https://www.southhadley.org/DocumentCenter/View/10828/Detailed-Bathymetry-of-Titus-Pond>

Titus Pond Base Map: <https://www.southhadley.org/DocumentCenter/View/10830/Titus-Pond-Base-Map-FY23>

Mountain Ave GeoTech Report:

<https://www.southhadley.org/DocumentCenter/View/10831/Mountain-Ave-Geotech-Report-FY23>

Sediment Quality Memo:

<https://www.southhadley.org/DocumentCenter/View/10832/Sediment-Quality-Memo>

Hydrological & Hydraulic Analysis:

<https://www.southhadley.org/DocumentCenter/View/10886/Hydrologic-and-Hydraulic-Analysis---Buttery-Brook-Watershed-Restoration>

High School Field Trip: <https://www.southhadley.org/DocumentCenter/View/11500/FY-23-MVP-HS-Field-Trip>

Homeowner DIY Workshop:

<https://www.southhadley.org/DocumentCenter/View/11503/Homeowners-Workshop-and-Engagement>

Homeowner DIY Workshop Materials:

<https://www.southhadley.org/DocumentCenter/View/11504/Homeowners-DIY-Stormwater-Materials>

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.

Engagement with the high school students was fantastic but school policy prohibits any spontaneous water sampling trips, even within walking distance of the school.

Regular mailings and door-to-door contact with abutters during the project proved to be effective. Several reached out to the town to ask about how their property might be impacted by the project. Many expressed thanks for the information that was mailed to them about the project and appreciated being kept informed.

Right-sizing culverts and increasing daylight in the BATTERY 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 climate resiliency is with local residents and other stakeholders in the community.

Partners and Other Support:

- Include a list of all project partners and describe their role in supporting/assisting in the project.

- 1) South Hadley Department of Public Works– assisted with coordination of subcontractors and provided important historical information about Titus Pond and the Buttery Brook tributaries.
- 2) Laura Ketteringham, South Hadley High School Middle School science teacher– incorporated in-class discussions about climate resiliency in South Hadley with the Conservation Administrator.
- 3) 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.
- 4) Place Alliance – Subcontractor that collaborated on restoration design and conceptual graphics.
- 5) O'Reilly, Talbot & Okun Engineering Associates – Subcontractor that performed geotechnical services for soil investigations, a discussion of geotechnical considerations for the dam removal feasibility study and preliminary recommendations at Queensville Dam.
- 6) Sherman & Frydryk – subcontractor for basemap, bathymetry & 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.