

# SEARLES POND/BLOODY BROOK RESILIENCE PLANNING – MVP CASE STUDY



City of Methuen – Bloody Brook Culvert Improvements  
Bloody Brook at Bicknell Avenue  
Looking North

July 2022

Municipal Vulnerability Preparedness Project -  
City of Methuen

Project partnership of City of Methuen, City of Lawrence, Merrimack  
River Watershed Council (MRWC) and GroundWork Lawrence (GWL)

# Searles Pond/Bloody Brook Resilience Planning – MVP Case Study

**MUNICIPAL VULNERABILITY PREPAREDNESS PROJECT - CITY OF  
METHUEN**

## **MVP PROJECT ADMINISTRATION SUMMARY**

**Award Year (FY):** FY22

**Grant Award:** \$ 80,250

**Match:** \$ 27,002

**Match Source:** City of Methuen, Merrimack River Watershed Council, GroundWork Lawrence

**One- or Two-Year Project:** One-Year

**Municipal Department Leading Project:** Methuen Dept. of Economic & Community Development

**Project Planning Team:**

- Joseph Cosgrove, Methuen DECD Environmental Planner/Energy Manager
- Milagros Puelos, Lawrence Water Commissioner
- Joseph Giarrusso, Methuen Conservation Officer
- Stephen Gagnon, Methuen DPW Engineering Administrator
- Susie Bresney, MRWC, MA Water Resources Program Manager
- Jose Tapia, MRWC, Program Associate for Urban Resilience
- Brad Buschur, GWL Project Director
- Tennis Lilly, GWL Climate Resilience Program Manager
- Eddie Rosa, GWL Community Engagement Director

**Project Website URL:** [www.merrimack.org/bloodybrook](http://www.merrimack.org/bloodybrook)

## COMMUNITY OVERVIEW

Methuen (population 53,059) and Lawrence (population 89,143) are Gateway cities in the Merrimack Valley region of northeastern Massachusetts. Both communities share a heritage as industrial manufacturing centers and magnets for the immigrant workers who made the textiles, shoes and electronic products produced here over the last century and a half.

Central to the region's development has been the Merrimack River and its tributaries which include the Spicket River and Bloody Brook. The river is our source of energy, recreation and water supply. This project focused on Bloody Brook, a neglected stream which flows along a 1.3 mile urban/suburban developed corridor along Jackson Street from Methuen's Searles Pond to an outlet at the Spicket River.

The project area is a 20-block neighborhood of approximately 600 households in Methuen and Lawrence. It includes sections of Census Tract 2525.01 in Methuen, an environmental justice (EJ) neighborhood because of high concentration of minority residents. Impacted Block groups are within a census tract which has a poverty rate of 9.2% and where 42% of the residents are of Hispanic background. The impacted Lawrence neighborhoods are in Block Groups of Census Tract 2006 and 2507, areas defined as EJ because of high concentrations of residents low-income, minority and English isolation households. These neighborhoods have poverty rates of 19.1% and 13.3%, according to the 2019 American Community Survey. More than 85% of the residents are Hispanic.

The Bloody Brook Watershed has **292 acres** of impervious land cover, which translates to almost **40%** of the entire watershed (756 acres). Of these 292 acres, there are:

- **91 acres** of roadway (31% of all impervious areas and 12% of the entire watershed)
- **89 acres** of structure rooftops (31% and 12%); there are 2,269 structures within the watershed.
- **112 acres** of "other impervious areas" (38% and 15%); these areas are primarily comprised of parking lots and driveways

## PROJECT DESCRIPTION & GOALS

The Searles Pond/Bloody Brook Corridor Resilience Planning Project is an assessment and capacity-building phase project designed as an initial step of a program to improve flood resilience in EJ neighborhoods of Lawrence and Methuen along the Jackson Street corridor. Localized flooding creating property damage and forcing road closures - including at the busy Jackson St./Swan Street intersection near the Lawrence line - are regularly occurring on average 2-3 times each year during flash rainstorms, according to Methuen DPW.

For most of its relatively short run, the Bloody Brook is underground; the brook's natural course was altered and directed into culverts over a century ago. The daylighted section of the brook runs along Queen Ave, crossing Jackson Street and flowing along Bicknell Ave, where it runs through the front yards of nearly a dozen homes before entering a culvert for the rest of its run to the Spicket River. Searles Pond serves as a stormwater catchment for Jackson St./Prospect St section of Methuen. The area includes Methuen High School, the Tenney Grammar School and Holy Family Hospital. The pond is part of the headwaters of the Bloody Brook that runs from the pond into the Spicket River in Lawrence.

Climate change impact measures of this resilience planning project focused on flooding, which has been a long-standing problem for residents in the area and under climate change projections augurs for even more severe property damage impacts. This flooding is exacerbated by differing culvert sizes along the

Methuen-Lawrence corridor that create bottleneck obstructions incapable of handling flows from intense, extreme storm events

Searles Pond itself presents both challenges and opportunities. The pond handles stormwater flows from surrounding uplands and roadways but has limited capacity to effectively treat runoff. Habitat values in the pond and surrounding uplands are poorly understood and invasive vegetation presents a management challenge. The pond has significant ecological and recreational potential, especially if a meaningful connection can be maintained with the adjacent woodlands around Holy Family Hospital. Among the central goals of this project were 1) to create a meaningful community dialogue about climate change impacts based on real data and conditions assessments and 2) build relationships among the two cities, neighborhoods and institutions in fostering more attention and ultimately long-term care and investment in the Corridor's environmental resources of Searles Pond, Bloody Brook and open space areas to mitigate flood impacts as well as support building neighborhood place-making.

Specific tasks of the Project to accomplish goals were:

- Community Outreach & Engagement
- Conditions Assessment & Flood Modeling Update using climate change projections
- Alternatives Definition and Evaluation
- Preparation of a Corridor Resilience Plan with implementation strategy

Project draft plans were completed in April 2022 and finalized in June 2022 for on-line posting and distribution.

### **Results and Deliverables:**

#### ➤ Community Outreach & Engagement

We conducted several community meetings and workshops for the public to attend, and developed an interactive on-line StoryMap for community members to view and learn about the project area and project findings. Below are links to view outreach and engagement materials.

- November 30th, 2021 Public Meeting: Introduction and Project Kick off: [Watch the recording](#)
- Open House field events on site at Searles Pond – November/December 2021
- April 13th, 2022 Public Meeting: Flooding and Water quality issues: [Watch the recording](#)
- April 27th, 2022 Public Meeting: Potential Solutions: [Watch the Recording](#)
- Bi-weekly water-quality & environmental condition monitoring along Corridor done by a local volunteer community scientist, trained by project staff (every other Thursday from Fall 2021 to May 2022)
- We prepared a [StoryMap](#) virtual tour of the Bloody Brook Corridor in Spanish and English. The StoryMap provides accessible, visual, interactive explanations about where flooding occurs now and will worsen in the future and why (based on modeling results), as well as explanations of how water quality is linked to climate change with an interactive dashboard to view water quality data collected throughout the project.

## ➤ Conditions Assessment & Flood Modeling Update for the Corridor

- We developed a computer model to estimate flooded areas after large storms using climate change rainfall data from NOAA Atlas 14++. The model indicated flood impact to 225 property structures in the Corridor. Expected annual property damage is estimated at \$4,019,849. More than 90% of the property damage occurs in 25-year or more frequent storm events with a greater than 4% chance of occurring in any year, according to the model.
- We surveyed residents of homes in and near the 500-year flood zone to better understand how often they experience flooding, and reality-tested those experiences with results of our hydrologic and hydraulic modeling.
- We conducted Bi-weekly water-quality & environmental condition monitoring along the Corridor (every other Thursday from Fall 2021 to May 2022). Collected data were analyzed to better understand potential pollution sources, and best locations for multi-beneficial nature-based solutions that improve water quality in addition to alleviating flooding.

## ➤ Alternatives Definition & Evaluation

- The project identified watershed management activities, nature-based green infrastructure improvements and in-stream improvements including dam modifications at Searles Pond and culvert capacity upgrades which would alleviate flooding and improve water quality. Also investigated was option of restoring the Bloody Brook segment south of Swan St. as an open, natural channel.

## ➤ Preparation of a Corridor Resilience Plan with recommended implementation strategy

- The project resulted in a final report providing management options for mitigating flooding, improving water quality, and improving resiliency to climate change. These options include ways to manage Searles Pond and the adjacent upland areas for wider public use while restoring habitat functions along the entire Corridor. The proposed projects were guided by community input and the best solutions to resolve the found issues.
- Action recommendations included stormwater management measures of runoff control including tree planting, impervious surface reduction and rain barrel program targeted within the Corridor. The Project Team identified 52 potential sites where infiltration trenches and basins and other Green Stormwater Infrastructure Improvements are feasible. These sites were prioritized and assigned preliminary ratings based on impact with 14 ranked high priority for action.

## **Lessons Learned:**

- What lessons were learned as a result of the project?

Both Methuen and Lawrence have an abundance of infrastructure needs in the areas of water, sewer and stormwater. The storm drain infrastructure needs within the Bloody Brook neighborhood are in a sense competing with other infrastructure needs throughout both communities. Each City has its own individual capital planning and investment decision-making processes. This project was helpful in providing planning data and an agenda to help build the case for funding of area-specific projects. Many of the preferred options will require continued engagement and coordination of both cities in terms of scheduling and submission of federal and state funding requests. Some options discussed – including daylighting the brook south of Swan Street – appear infeasible at present because of the economic and social impact cost of displacing 41 homes.

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

Our project is a model for how two cities can coordinate to build a team approach with non-profit community partners in planning, problem-solving and setting an agenda for mitigating Corridor-specific flooding impacts projected to become worse with climate change in the coming decades.

## **Partners and Other Support:**

City of Methuen and City of Lawrence thank partners Merrimack River Watershed Council and Groundwork Lawrence Inc. and technical engineering consultant Pare Corp.

Also, thanks to the Nevins Memorial Library for providing meeting space and equipment. In addition, we are grateful for the outreach support of Methuen Community Studios which filmed the project's community meetings and provided streaming service at [www.methuentv.org](http://www.methuentv.org).