



Municipal Match (at least 25% of total project cost):

\$108,000

Other: (other grant(s) applied for): \_\_\_\_\_

**6. Project Summary (1-2 short paragraphs describing the project):**

Dense urbanization combined with the impacts of climate change threaten the resilience of the City of Woburn's buildings and infrastructure, environment, and vulnerable populations. According to the City of Woburn Hazard Mitigation Plan 2015 Update (Metropolitan Area Planning Council, 2016), flooding is the most prevalent serious natural hazard in Woburn, occurring as both inland/riverine and urban stormwater flooding. It is expected to worsen with the more intense precipitation projected to occur under climate change. Also, the Mystic River has one of the Massachusetts' largest herring runs. With downstream improvements to fish passage recently constructed in Medford and Winchester, river herring migrate upstream to Horn Pond in Woburn. The City of Woburn has submitted another proposal for funding to the IndustriPlex Natural Resource Damage Trustees for design and construction of an improved fish passageway at the outlet of Horn Pond to facilitate the continued restoration of the watershed's river herring.

To address its need for resiliency in the face of climate change, the City of Woburn is seeking an MVP Action Grant to support an evaluation and restoration of Horn Pond Brook so that flooding is reduced, and habitat is improved for migratory fish passage. The City also plans to install two green infrastructure demonstration projects: a rain garden near its water treatment plant on Lake Avenue, adjacent to Horn Pond, to capture and treat stormwater and protect the brook's water quality, as well as shade tree plantings at the City's Senior Center.

## 7. Project Narrative

Please provide your full project narrative. See Section 3A for more specifics on each criterion. Use the rating system as a guide for what information should be included in the narrative to ensure the maximum score possible for your project. Only use the space provided.

### a. Problem This Project Will Address and Climate Change Adaptation

Dense urbanization combined with the impacts of climate change present a threat to the resilience of the City of Woburn's buildings and infrastructure, environment, and vulnerable populations. According to the City of Woburn Hazard Mitigation Plan 2015 Update (Metropolitan Area Planning Council, 2016), flooding is the most prevalent serious natural hazard in Woburn, occurring as both inland/riverine and urban stormwater flooding. While the City is in the process of conducting a multi-phased effort to identify and implement improvements to address discrete areas that experience street and drainage channel flooding, this flooding is expected to increase with the more intense precipitation projected to occur under climate change. Average annual precipitation in the Boston Harbor Basin, where Woburn is located, is projected to increase between 1.1 and 9.0 inches, up from 46.1 inches observed between 1971 and 2000. Additionally, there could be as many as four more 1-inch storms each year in the Boston Harbor Basin (Northeast Climate Science Center [NECSC] as presented in the Massachusetts Climate Change Clearinghouse; <http://resilientma.org/resources/resource::2152/massachusetts-climate-change-projections-statewide-and-for-major-drainage-basins>). This increased precipitation is expected to increase flooding of infrastructure and buildings, including roads and residences in the vicinity of Horn Pond and Horn Pond Brook. Increased stormwater flooding under climate change will likely cause impacts to water quality in Horn Pond and Horn Pond Brook from the discharge of polluted stormwater runoff and increased sedimentation.

Also under climate change, the number of consecutive dry days, recorded at 17 days between 1971 and 2000, is projected to increase by as many as four days by the 2090s. Extended dry periods could lengthen durations of low flows during late summers, lowering dissolved oxygen concentrations, increasing pollutant concentrations, and causing stress to aquatic organisms such as the river herring population which is being restored in the Mystic River watershed.

The annual average temperature is projected to increase from 50.1°F, as measured between 1971 and 2000, to between 3.5°F and 10.8°F by the 2090s. The number of days with maximum temperatures over 90°F is projected to increase between 12 and 67 by the 2090s, up from eight days between 1971 and 2000. Such increases will pose significant health risks to vulnerable populations such as the elderly, the infirmed, and people of low income. These temperatures will also present a challenge to the resilience of the aquatic organisms, including the river herring population.

To address its need for resiliency in the face of climate change, the City of Woburn is seeking an MVP Action Grant to support an evaluation and restoration of Horn Pond Brook so that flooding is reduced, and habitat is improved for migratory fish passage. The City also plans to install two green infrastructure demonstration projects: a rain garden near its water treatment plant on Lake Avenue, adjacent to Horn Pond, to capture and treat stormwater and protect the brook's water quality, as well as shade tree plantings at the City's Senior Center; to reduce stormwater runoff, protect against increased temperatures in Halls Brook, a tributary to Horn Pond; and provide cooling for the elderly - one of the City's most vulnerable populations. The MVP Action Grant will assist the City of Woburn in implementing the following of its priority actions, identified during its MVP Community Resilience Building Workshop:

- Horn Pond Brook hydraulic improvements for flood control and fish migration. Remove hydraulic impediments for fish and vegetation improvements.
- Increase storage, drainage upgrades, drainage improvements, raise roads and add green infrastructure in areas that flood regularly.
- Improve streams, crossings and culverts – increase capacity and clean regularly.
- Maximize site-specific stormwater retention. Identify opportunities for enhanced stormwater retention.

- Create stormwater storage areas in the Horn Pond area.
- Design parks to increase shade, and to reduce heat and stormwater. Create urban forest plan for public and private land.
- Assess condition of public trees, trimming branches and removing dead trees. Replant with new trees and inventory their condition. Replace trees damaged in storms.

**b. Need for Assistance**

The City has already taken steps towards resiliency by applying for funding from the IndustriPlex Natural Resource Damage Trustees to support restoration of the Mystic River Watershed Association’s river herring population through the improvement of fish passage to Horn Pond. The City also submitted a second proposal to the Trustees for an enhanced wetland as well as stormwater treatment and storage at Four Corners where flooding threatens Route 3 and nearby businesses. The City’s budget includes provisions for MS4 compliance. However, the median household income in Woburn is modest at \$83,304, which is somewhat higher than the median statewide income of \$74,167 (2013-2017 American Community Survey 5-Year Estimates). Also, 6.0% of the Town’s residents live below the poverty level and 35.16% are low- to moderate-income. Therefore, for the City to address its ambitious resilience priorities, it needs financial assistance through the MVP Program.

**c. Project Description, Rationale, and Public Benefit**

According to the Massachusetts Department of Fish and Game’s Division of Marine Fisheries (DMF), the Mystic River has one of the Massachusetts’ largest herring runs. This run is especially important because it includes both alewife and blueback herring, anadromous fish that are born in freshwater, migrate to saltwater to mature into adults, and then migrate back to freshwater to spawn.

In 2011, a new dam and fish ladder were installed at Upper Mystic Lake in Medford and in 2016, a new fish ladder was installed at Center Falls Dam, located at the Mill Pond in Winchester Center. These improvements have facilitated passage of the migratory fish which have experienced an enormous growth in recent years. According to fish counts provided by volunteers at the Mystic River Watershed Association (MyRWA), the watershed’s river herring population has increased dramatically - from nearly 200,000 in 2012 to 750,000 in 2016 (Table 1). DMF attributes the increase in river herring, whose population crashed statewide in the mid-2000s, to the watershed’s additional habitat, noting, “The large increase in returning herring gives us confidence that the restoration of access to Upper Mystic Lake has benefited this population.”

**Table 1. River Herring in Mystic River**

Year	Herring Count
2012	198,933
2013	193,125
2014	239,057
2015	477,829
2016	448,060
2017	630,000
2018	750,000

With the new fish ladder at Center Falls Dam, the river herring are now able to migrate upstream to Horn Pond in Woburn where DMF has installed a passageway for the fish to enter into the pond. However, the passage is steep and difficult to successfully complete so less than half of the fish that try are able to make it into the pond. To facilitate the continued restoration of the watershed’s river herring, the City of Woburn has submitted a proposal for funding to the IndustriPlex Natural Resource Damage Trustees for a project to design and

construct an improved fish passageway at the outlet of Horn Pond, across the street from 48 Lake Avenue. The project, which has considerable community and agency support, would open up the 201-acre Horn Pond as additional habitat for the herring. The pond is fed by several brooks and discharges via Horn Pond Brook to the Aberjona River, a tributary to the Mystic River. The City has recently installed a camera to enable viewing of the migrating fish by residents as well as by MyRWA's volunteer citizen scientists and would install a permanent viewing station with funding from the IndustriPlex settlement.

At the same time that the herring run is positioned for further restoration, the City is struggling to address localized flooding from urbanization. Severe flooding occurred in Woburn in March 2010, when a total of 14.83 inches of rainfall fell and damages totaled \$35.24 million. A vulnerability analysis conducted in support of the Hazard Mitigation Plan estimated damages from flooding in Woburn ranging from \$10,025,898 to \$50,129,492 (City of Woburn Hazard Mitigation Plan 2015 Update, by the Metropolitan Area Planning Council, 2016).

Flooding occurs along Horn Pond Brook during extreme precipitation events. Apartment buildings, single family homes, and the roads at University Apartments, Lake Avenue, Lake Terrace and Lake Circle are within the FEMA flood hazard zone with a 1% chance of flooding and are regularly flooded (Figures 1 and 2). The City of Woburn Hazard Mitigation Plan identified twelve "Locally Identified Hazard Areas" with undersized drainage infrastructure; #1 on the list was Lake Terrace and Lake Circle where flooding is attributed to an inadequate drainage system. The City has been addressing this issue through a series of operational and infrastructural improvements. In severe weather events and in anticipation of rainfall events of 4 inches or greater, the City lowers the elevation of Horn Pond to increase the pond's capacity to store stormwater runoff. When the capacity is exceeded, the pond crests, creating flooding of the local roadways and impacting the residences and apartments directly abutting Horn Pond Brook. Previously, the spillway outlets were not large enough to carry the volume of water contained in a large storm so in 2017, a new outlet control structure was installed at the dam to address this issue. However, flooding remains an issue in Horn Pond Brook. With more intense precipitation events projected under climate change, stormwater runoff is expected to increase, as will streamflows which will exacerbate downstream flooding in the urbanized Horn Pond/Horn Pond Brook watershed.

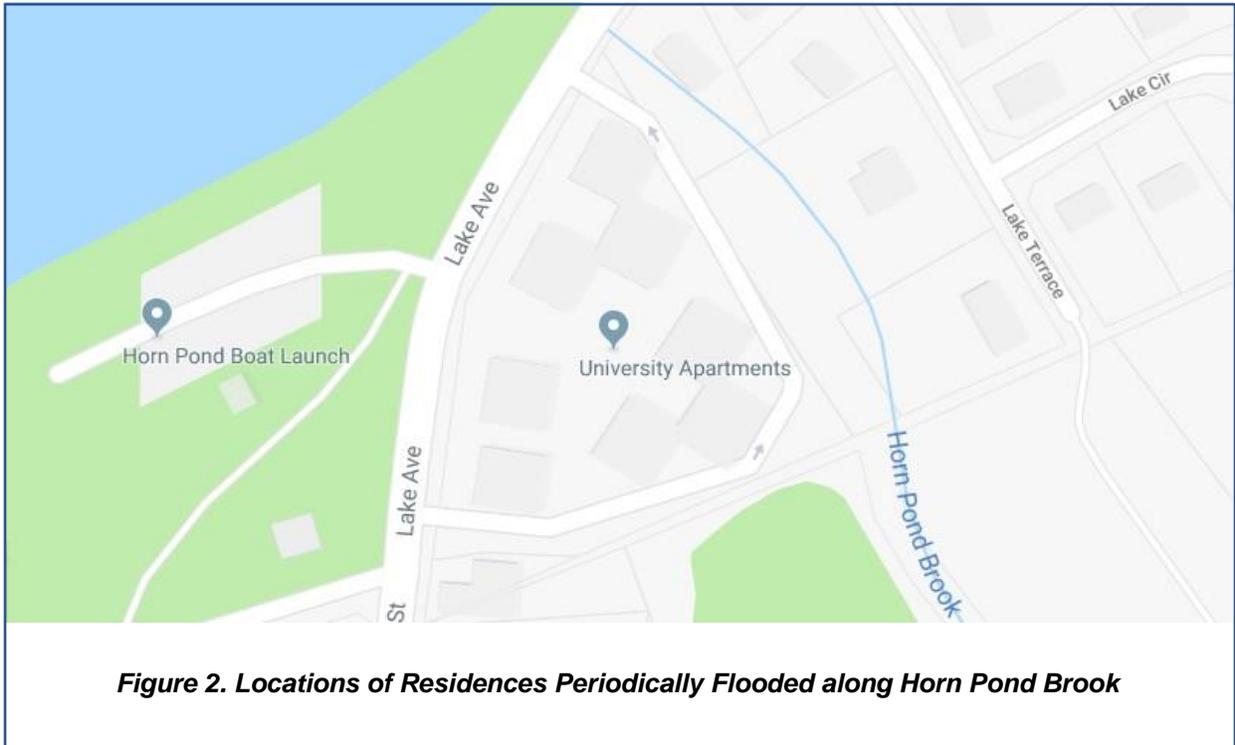
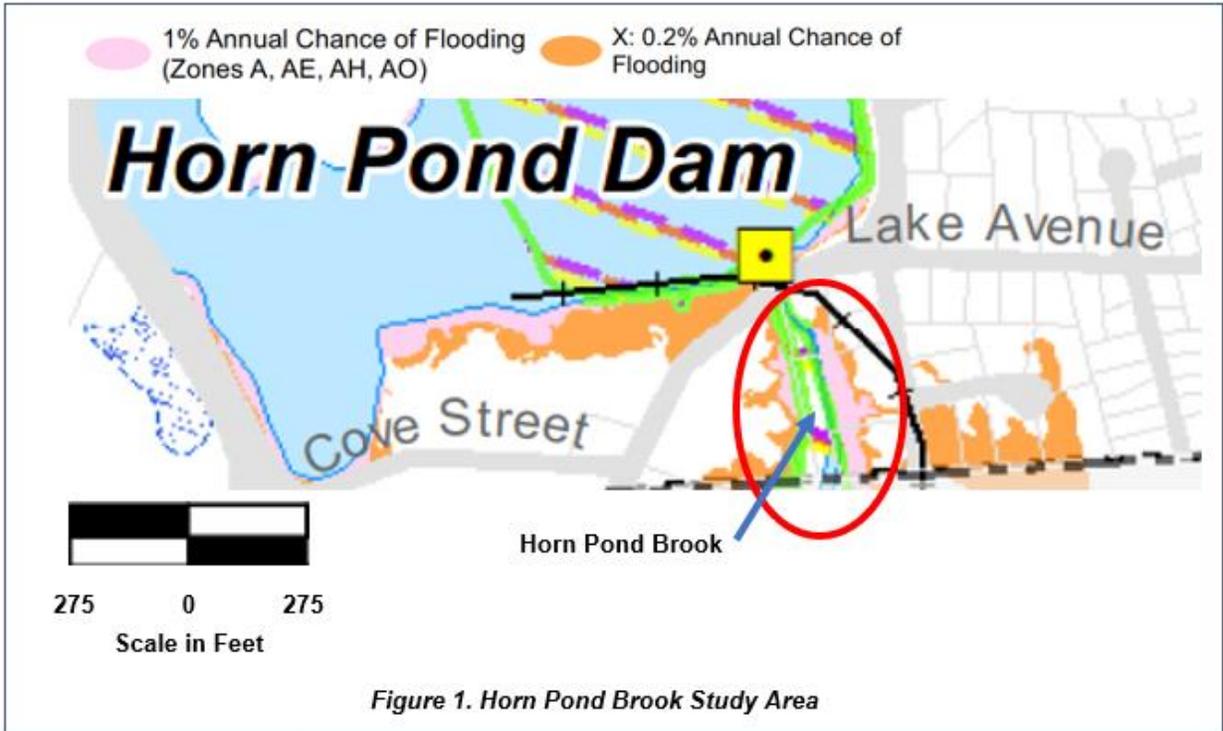
To alleviate the increase in stormwater runoff and to protect the water quality of Horn Pond and Horn Pond Brook, the City needs to develop a strategy to reduce the direct connection of stormwater runoff from impervious surfaces to receiving waters. The City also proposes to install a green infrastructure demonstration project of a rain garden near its water treatment plant on Lake Avenue, adjacent to Horn Pond, that will capture and treat stormwater through a nature-based system and will protect the brook's water quality.

#### Repair and Restoration of Horn Pond Brook

The City of Woburn requests MVP funding to maintain Horn Pond Brook to relieve flooding of adjacent properties, removing debris including shopping carts, and repairing or replacing the broken stone walls that line the brook's embankments (Figure 3). In addition to addressing future impacts of flooding, the stream restoration will need to consider increased temperature and its impact on streams and their fisheries. The City will develop a stream restoration design that is protective of the needs of the increasingly robust migratory river herring population.

#### Green Infrastructure Stormwater Designs

Increased temperatures from climate change, coupled with Woburn's impervious surfaces, are also expected to increase the City's urban heat island effect, the demand for air conditioning, and the temperatures of smaller streams. Therefore, the City proposes a second green infrastructure demonstration project of shade tree planting at the City's Senior Center, to provide cooling for the elderly - one of the City's most vulnerable populations, reduce stormwater runoff, and protect against increased temperatures in Halls Brook, a tributary to Horn Pond. By increasing its tree canopy, the City will reduce the air temperatures - both indoors and outdoors - and will reduce the temperature of stormwater running off of pavement and into adjacent streams and wetlands.





*Figure 3. Various Views of Streambank Failures along Horn Pond Brook*

To address its needs for resiliency, the City of Woburn is applying for an MVP Action Grant application to support a project that addresses several Priority Actions from the City's MVP Summary of Findings Report and MVP Community Resilience Building Workshop. These actions are:

- Horn Pond Brook hydraulic improvements for flood control and fish migration. Remove hydraulic impediments for fish and vegetation improvements.
- Increase storage, drainage upgrades, drainage improvements, raise roads and add green infrastructure in areas that flood regularly.
- Improve streams, crossings and culverts – increase capacity and clean regularly.
- Maximize site-specific stormwater retention. Identify opportunities for enhanced stormwater retention.
- Create stormwater storage areas in the Horn Pond area.
- Design parks to increase shade, and to reduce heat and stormwater. Create urban forest plan for public and private land.
- Assess condition of public trees, trimming branches and removing dead trees. Replant with new trees and inventory their condition. Replace trees damaged in storms.

## Scope of Work

### **Task 1 Horn Pond Brook Restoration**

#### **1.1 *Field Investigations***

The City of Woburn will conduct field investigations, including assessment of the environmental, structural, and geotechnical conditions at Horn Pond Brook. The City will conduct field inspections to assess conditions of Horn Pond Brook. A two-person team will conduct a walking stream survey using tablets and GPS to map stream conditions, document field conditions and identify unmapped structures. Field work to be conducted and data to be collected includes:

- GPS information for unmapped drainage structures
- Channel and stream embankment debris, channel cross-section, slope, sinuosity, and existing erosion/deposition features
- Extent of cleaning and maintenance required (based on debris, in-stream obstructions, and sediment depths at culverts and within the stream bed); estimation of the amount of debris and sediment to be removed.
- Types of equipment available at the City for future stream/culvert maintenance/cleaning efforts. The appropriateness of the equipment to be utilized will be evaluated during the field reconnaissance.
- Locations of embankment erosion
- Structural condition of sidewalls, culverts and headwalls
- Areas for drainage system improvement
- Type and location of invasive species
- Weather, field, and seasonal conditions best suited for maintenance and cleaning efforts, recognizing the needs of the migratory fish run
- Mapping identifying recommended access points for cleaning/maintenance and sediment, debris, trees and/or shrubs to be removed or cut back.
- Photos documenting the condition of the stream and identifying obstacles that may impede future maintenance and cleaning efforts
- Locations of future recommended stream and drainage improvements

#### **1.2 *Wetlands Delineation***

To determine the project proximity to protected wetland and riverfront resources, a wetland scientist will delineate wetland resources at Horn Pond Brook and the site of the proposed rain garden. The Team will meet with the City's Conservation Agent prior to the start of the field reconnaissance. The purpose of this meeting is to identify pertinent information to be collected in the field and incorporated into the Notice of Intent. The Team will prepare a final wetland delineation memorandum, which will include filling out required MassDEP data forms. Wetland flags will be left in the field as required.

#### **1.3 *Site Survey***

A survey team will visit the site to record ground elevations and physical structures at numerous points in the proposed work area at Horn Pond Brook from Horn Pond to the Winchester town line and at the proposed rain garden near the Woburn water treatment plant/Horn Pond parking lot. Transects across parts of the stream will be recorded as required to aid in the stream restoration and hydraulic design. The site survey will help the design team understand the location and extent of infrastructure and buildings, and natural resources, including wetlands, riverfront and floodplain, that exist in the project area.

#### **1.4 *Design***

To support design, the City of Woburn will conduct limited subsurface exploration immediately behind the

brook's banks to obtain information such as the type and dimensions of the existing wall, and subsurface conditions. The City will perform preliminary geotechnical and structural analyses to develop up to three restoration/repair/replacement alternatives for segments of the brook and wall as well as limited environmental sampling to understand potential obligations under the Massachusetts Contingency Plan (MCP).

Geotechnical. The City will conduct test borings and test pits to fill in data gaps at the sites. The City will review existing data and findings of the geotechnical studies to make preliminary recommendations for allowable soil bearing capacity, lateral earth pressures, frictional resistance, and seismic design considerations

Structural. Using data collected during the field visit and the above geotechnical investigation data, the City will develop three alternative plans for stream improvements. Wall alternatives will include green infrastructure options such as removing rock debris and restoring banks to a more natural state. Evaluation of the different options will be based on resilience, anticipated durability, environmental impact, construction schedule, and cost to determine the proper choice of action for each wall segment.

Environmental. To support the potential excavation and off-site disposal of soil associated with the future repairs to stream and its banks, soil samples will be collected and analyzed from the soil borings advanced on the properties for disposal characterization parameters pursuant to MassDEP Policy #COMM-97-001, Reuse and Disposal of Contaminated Soil at Massachusetts Landfill. This will enable the City to develop a compliance strategy for the redevelopment of the properties in accordance with the Massachusetts Contingency Plan (310 CMR 40.000).

Modeling. The project will also include hydraulic and hydrologic modeling of Horn Pond Brook. Weston & Sampson will develop a rainfall-runoff model with HydroCAD of the upgradient watershed to determine runoff hydrographs into Horn Pond and resulting outflow hydrographs from Horn Pond Dam during a range of **design flood events and future climate scenarios**. This model will incorporate features such as drainage patterns, stormwater infrastructure, land cover and soil mapping to estimate the streamflow at the project site during a variety of rainfall conditions.

Weston & Sampson will then develop a hydraulic model of the Horn Brook channel and floodplain in the project area using the U.S. Army Corps' HEC-RAS modeling platform. Design flows developed with HydroCAD will be used as an input variable to a hydraulic model of the Horn Brook channel and floodplain in the project area using the Army Corps' HEC-RAS modeling platform. Design floods to be simulated for current and future conditions include:

- 2-year
- 10-year
- 25-year
- 50-year
- 100-year
- 500-year

Outputs from this hydraulic model, including depth of flow, velocity, top width, and other hydraulic characteristics will be used to inform our design. This hydraulic model will be used to evaluate streamflow characteristics under a variety of storm events, including velocity, water level, lateral flooding extents, shear stress on the channel and floodplain (erosion potential). Through an iterative approach, this model will support our development of up to three conceptual-level design alternatives.

Fluvial Geomorphology. Detailed fluvial geomorphological will be conducted in Horn Pond Brook. Information collected will include reference reach evaluation, stability analysis, sediment modeling, and dimensionless ratios for pattern and profile.

Based on information developed as part of this subtask, the City will develop up to three restoration/repair/replacement alternatives for segments of the brook and wall. This design will include

recommendations for cleaning the channel and will also include proposed strategies for riparian corridor improvements. Project partner Streamworks will comment on these strategies as to their geomorphic and ecosystem consequences. Design will include development of a detailed stream maintenance plan.

### **1.5 Design Drawings and Specifications**

Cursory sketches of the preferred alternative design at Horn Pond Brook will be converted into design drawings that present the plan view of the alternative and up to three typical cross-sections. Specifications for proposed material to be added to the channel and/or floodplain as part of the preferred design will also be prepared for public bidding. Specifications for restoration of the brook and for the rain garden will include notice to bidders, bid forms, contract, technical specifications and other information required to describe the work to be done and to provide a basis for measurement and payment of the work performed by the prospective bidders.

### **1.6 Permitting**

The City of Woburn will prepare and submit environmental permit applications. This task includes attendance at meeting of the Woburn Conservation Commission, meetings with Massachusetts Department of Environmental Protection (MassDEP) representatives, and a meeting with MEPA.

Notice of Intent (NOI) for Ecological Restoration Project. Prepare and submit an NOI for Ecological Restoration Project to the City of Woburn Conservation Commission for the proposed project. The project team will attend two (2) public hearing to discuss the project. The Notice of Intent Application will include:

- Prepare forms and notifications for Wetland Regulations and Wetlands Ordinance
- Incorporate project narrative
- Include support documentation of the project
- Identify and notify abutters in accordance with NOI filing requirements
- Provide distribution of NOI filing as required
- Present project at public hearings
- Provide additional information as may be requested by Commission

Stormwater Report. As required by the Massachusetts Wetlands Protection Act, a stormwater report will be created for this project. This report will detail how the project will meet all of ten of the stormwater performance standards as required in the Massachusetts Stormwater Handbook.

MEPA Environmental Notification Form (ENF) Submission. Consult with MEPA on the applicability of the MEPA regulations to the project. We anticipate that the design of the project and environmental impacts generated will require an Environmental Notification Form. This notification will include:

- Preparation of application form(s) and address all relevant elements
- Preparation of Project Narrative providing history and justification of project
- Identification of resources and methods for mitigation and restoration as well as minimization of impacts
- Incorporation of plans illustrating project limits and resource areas
- Submission of ENF with distribution as required (after client review and signature)
- Provide public advertising as required
- Attend and assist in presentation of project at public site meeting
- Incorporation of agency and client comments from site meeting
- Provide responses to ENF comments developed during public review process

MassDEP 401 Water Quality Certificate. Prepare and submit to MassDEP a Water Quality Certification under Section 401 of the Clean Water Act. This permit application is for work that will take place within waterways or adjacent wetlands and will include:

- Prepare application, plans, narrative, justification for proposed work
- Provide notification of abutters and placement of legal advertisement
- Provide support documentation including material sampling and testing, as may be required
- Provide coordination throughout review and approval process
- Address public comments as may be required

U.S. Army Corps of Engineers 404 Pre-Construction Notification. Prepare and submit to the U.S. Army Corp of Engineers a Pre-Construction Notification (PCN), formerly a Category II permit, under Section 404 of the Clean Water Act. This permit is a federal permit required for work within waterways or wetlands. The ACOE permit has several thresholds, including dredging in intertidal and coastal zones. This application will include:

- Prepare application, plans, narrative, justification for filling and structures
- Submission based on PCN filing
- Provide all support documentation of material sampling and testing
- Provide coordination throughout review and approval process

## **1.7 Construction**

The City will implement recommended maintenance and construction. This work is expected to include:

- Installation of natural streambank in portions of the brook to reduce the use of concrete and stone walls
- Trimming of trees, removal of invasive species, and brush contributing to overgrowth along stream embankments
- Removal of debris and obstructions impeding flow within the stream bed and along the stream embankment (shopping carts, abandoned pipe segments, tires, yard waste, TVs)
- Cleaning of culverts and minor sediment removal immediately upstream and downstream of culverts
- Nature-based improvements to portions of sidewalls

### ***Deliverables Task 1:***

- Letter report summarizing the findings from the field reconnaissance
- Wetlands delineation and required MassDEP data forms
- Topographical site survey at Horn Pond Brook and site of the rain garden
- Submittal of environmental permits
- Design drawings, specifications, and bid packages for the Horn Pond Brook restoration
- Cleaning and construction of brook enhancements
- Stream maintenance plan

## **Task 2 Rain Garden**

### **2.1 Construction**

A concept design (Figure 4) for the rain garden ([Aberjona River Watershed Project: Concept Plan for a Vegetated Swale Retrofit, Horn Pond Parking Lot, October 2012](#), prepared for the Mystic River Watershed Association by Bioengineering Group) will be taken to final design. This will include design drawings and specifications indicating the type of materials, including plants, that will be used to construct the rain garden. In developing the design for the rain garden, future stormwater flows that could result from increased

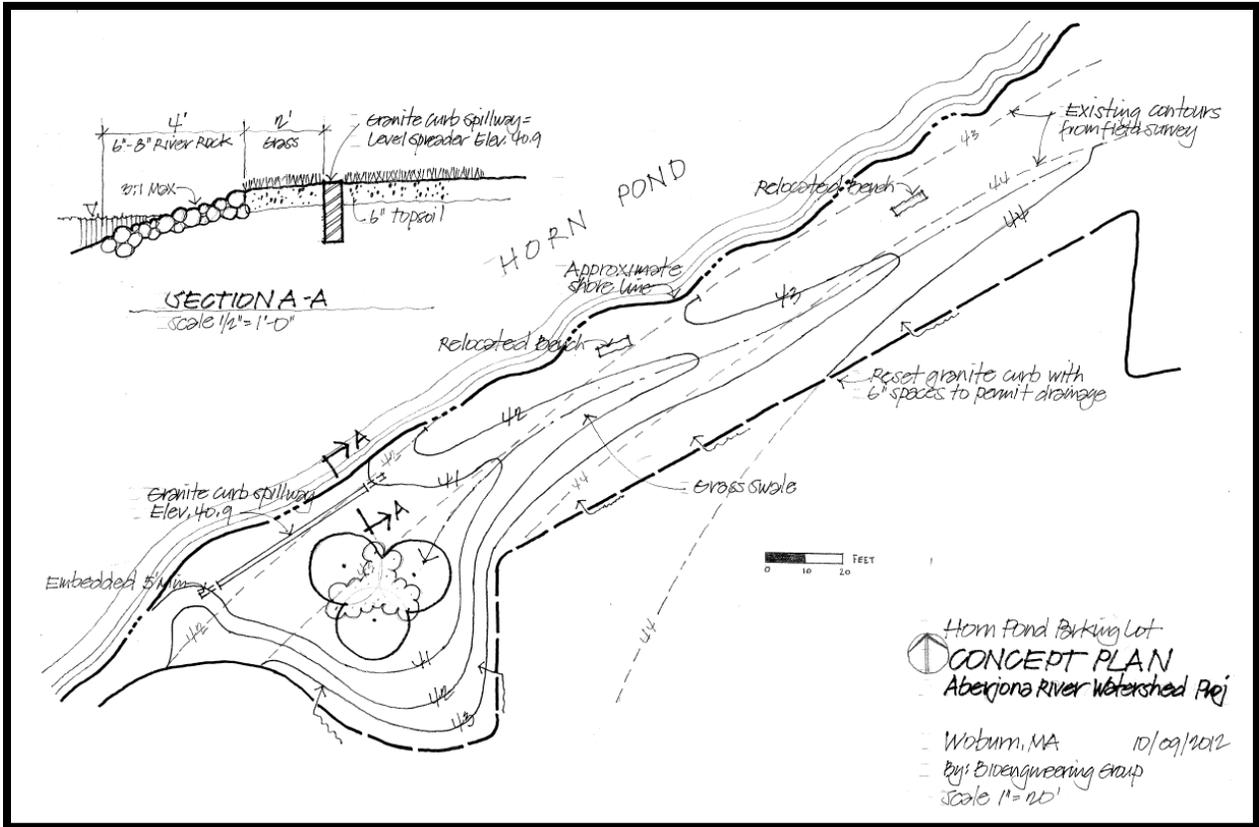


Figure 4. Concept Plan for Rain Garden at Horn Pond Parking Lot

precipitation intensity under climate change will be considered. Specifications for restoration of the brook and for the rain garden will include notice to bidders, bid forms, contract, technical specifications and other information required to describe the work to be done and to provide a basis for measurement and payment of the work performed by the prospective bidders.

## 2.2 Plantings

A list of proposed plantings for the rain garden will be prepared for review by the City's Engineer, Conservation Agent and Department of Public Works.

**Deliverables Task 2:** Design drawings, specifications, and bid packages for the rain garden

## Task 3 Trees at Senior Center

### 3.1 Plant Trees

The Team will work with the Woburn Senior Center to identify areas where shading from trees would be beneficial to the area's seniors who visit the Senior Center. The Team will also consider how the placement of new trees could provide cooling to the Center itself, which will enable the City to reduce its energy consumption – and associated greenhouse gas emissions – during the summer.

### **Deliverables Task 3:** Shade trees planted at the Senior Center

#### **Task 4 Public Outreach**

The community engagement for this project will be targeted to neighborhood residents, adjacent environmental justice communities, seniors, and the general public. The outreach strategy is divided into three components, which are summarized below. See Section 7-e for more details.

##### **4.1 Fish Monitoring**

In partnership with the Mystic River Watershed Association, the project team will educate the public about the river herring run and the multiple benefits of the brook restoration to river herring and the general welfare of the local ecosystem. There is ongoing operation of a [fish camera at Horn Pond](#). Outreach will occur in tandem with the river herring run so that the live fish camera has the most visual impact. The fish monitoring and education about river herring will be woven into online content, informational materials, social media posts, and community meetings.

##### **4.2 Informational Materials and Web Content**

Informational and web content will showcase the climate resiliency components of the project: the reduction in stormwater runoff provided by the rain garden; the flood control provided by the stream restoration; and the cooling by shade trees at the Senior Center. The content will also capture the benefits of the project to fisheries habitat. Engagement tactics could include:

- Up to 2 fact sheets
- Event materials
- Website content
- Up to five social media posts

The final site design will include educational signage regarding the rain garden at Horn Pond and the stream restoration.

##### **4.3 Outreach to Neighborhood**

The community engagement strategy includes two events.

The project team in conjunction with the Mystic River Watershed will host an “outdoor open house” at the Horn Pond Boat Launch in August or September to launch the project. This outdoor event will showcase the project and provide educational materials about river herring. Community will be invited to provide feedback on the project.

The project team hopes to partner with seniors and a local youth organization to plant trees at the senior center as a second event in the fall of 2019. Alternatively, the project team will host an interactive community meeting toward the end of the project to report progress and to take questions. Any feedback provided at this meeting will be useful for future projects. The meeting could also be an opportunity to educate the public about stormwater best practices that they can implement at their own home.

**Deliverables Task 4:** Up to 2 fact sheets, event materials, website content, up to five social media posts

#### **Task 5 Management**

The City will perform the required program management described in the Request for Responses.

**Deliverables Task 5:** The City will submit monthly progress reports and a final project report.

**d. Feasibility and Transferability**

The City of Woburn has an easement for Horn Pond Brook. The City will conduct outreach to neighborhood residents to inform them of the project goals and benefits. Feedback will be considered. Public buy-in is expected to be high because the project will result in increased in flood control, reduced flooding impacts to adjacent buildings and infrastructure, and improved aesthetics. In addition, the City has partnered with the Mystic River Watershed who has expertise in both community engagement and fisheries. This strategic partnership will support the project's effort to incorporate community and environmental needs into climate action. The Senior Center is operated by the City's Council on Aging. The Senior Center will be provided with educational information about the tree plantings.

The City of Woburn has selected contractors who have experience in similar brook restoration projects who have provided cost estimates and technical guidance for the proposal, and have the technical capacity to complete the job. The proposal has also utilized preliminary site inspections to assess the project scope. The City's Project Manager and City Engineer Jay Corey has successfully administered other state grants, including the MVP Planning grant; he is committed to managing this project in an organized and timely fashion.

There is no suspected contamination in the project site. Permits or approvals will need to be obtained from MassDEP, the US Army Corp of Engineers, and MEPA. Time to acquire these permits is accounted for in the project schedule.

The City has many areas of flooding from small brooks. The expertise and lessons learned from the brook restoration will be applicable to future projects elsewhere in the City to reduce local flooding of brooks in urbanized settings. The rain garden and tree plantings will also serve as local example of green infrastructure for future municipal and private installations in Woburn.

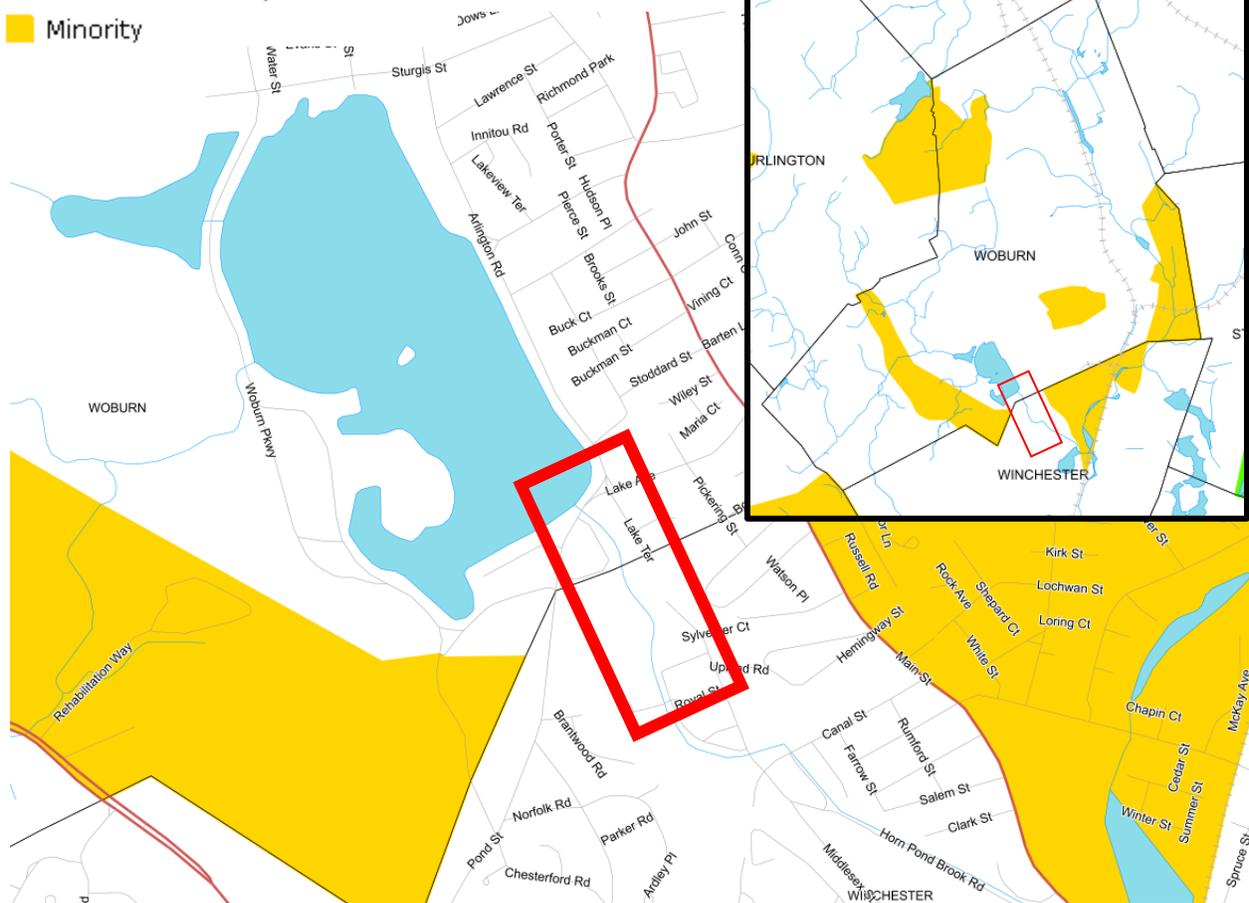
The stream restoration, rain garden, and tree plantings will serve as models for other communities facing similar issues, especially the 22 communities in the Mystic River Watershed. The Mystic River Watershed Association's Resilient Mystic Collaborative will provide opportunities for the project to be a regional example. The final report will include a short section (similar to an executive summary) tailored for other communities interested in completed similar work that will detail the project goals, scope, and lessons learned from the project.

**e. Community Outreach, Engagement, and Education**

The project site is adjacent to several environmental justice neighborhoods (Figure 5). Twenty-five percent or more of the residents with the environmental justice neighborhoods identify as a race other than white. The City's minority populations include people who are Asian, Black or African American, and Latino or Hispanic. Although the neighborhood where the brook restoration will occur is not an environmental justice area, the surrounding areas to the east and west of Horn Pond Brook are in environmental justice neighborhoods. The area is impacted when flooding impedes travel on primary roads, like Lake Avenue, which is in FEMA flood hazard zone with a 1% chance of flooding.

## Environmental Justice Populations 2010

■ Minority



*Figure 5. Environmental Justice Neighborhoods in Woburn*

Seniors were identified in the MVP Planning process as one of Woburn's most socially vulnerable communities. Seniors are particularly vulnerable to heat. Planting trees at the senior center will provide shade and urban cooling for the Senior Center itself and to seniors wishing to reap the mental and physical benefits of enjoying the outdoors. See Figure 6 to see there is a large lawn with no shade.

The community engagement strategy has three prongs.

### Fish Monitoring

In partnership with the Mystic River Watershed Association, the project team will educate the public about the river herring run and the multiple benefits of the brook restoration to river herring and the general welfare of the local ecosystem. There is ongoing operation of a fish camera at Horn Pond. Outreach will occur in tandem with the river herring run so that the live fish camera has the most visual impact. River herring spawn upstream from approximately May to June and return to the ocean later in the summer. Therefore, outreach will occur toward the beginning and end of the project schedule. The goal will be to educate the public, and especially the neighborhoods around the project site, about what is literally in their own backyards! In addition, this outreach will connect people with nature and grow support for future improvements to the river herring run. The fish monitoring and education about river herring will be woven into online content, informational materials,



*Figure 6. Aerial View of the Woburn Senior Center*

social media posts, and community meetings.

#### Informational Materials and Web Content

Fact sheets will be created for outreach events. The content for the fact sheets will be used to draft text and graphics for the webpage. The fact sheets and website will showcase the climate resiliency components of the project: the reduction in stormwater runoff provided by the rain garden; the flood control provided by the stream restoration; and the cooling by shade trees at the Senior Center. The content will also capture the benefits of the project to aquatic habitat. Up to 5 social media posts will be created for the City of Woburn's Engineering Department's Facebook page and the City of Woburn Twitter to promote the web content and the outreach

events. The City's newsletter will be utilized to promote events. When needed, public comment will be available online. The project team intends to send educational and promotional material to local organizations, including the Council on Aging. By utilizing several outreach channels, the outreach will go beyond the traditionally represented groups. The final site design will include educational signage regarding the rain garden at Horn Pond and the stream restoration.

#### Outreach to Neighborhood (2 meetings)

The community engagement strategy includes two events. The project team in conjunction with the Mystic River Watershed will host an "outdoor open house" at the Horn Pond Boat Launch in August or September to launch the project. The Boat launch attracts many people during nice weather who walk around the pond. Hosting an event at a location where residents are already likely to be will increase the reach of the project's engagement. This will also reduce barriers for local residents, including environmental justice communities that may lack transportation to or are unlikely to attend an event at City Hall. This outdoor event will showcase the project and provide educational materials about river herring. Community will be invited to provide feedback on the project.

The project team is hoping to identify a local youth organization to partner with to plant the trees and provide an opportunity for intergenerational engagement in the fall. Seniors will be invited to join as participants or onlookers. Alternatively, the project team will host an interactive community meeting toward the end of the project to report progress and to take questions. Any feedback provided at this meeting will be useful for future projects. The meeting could also be an opportunity to educate the public about stormwater best practices they can take at their own home.

#### **f. Incorporation of Nature-based Solutions and Strategies**

The City of Woburn's proposed MVP Action Grant application includes several applications of nature-based solutions. The City proposes to:

- Construct a rain garden near Horn Pond to capture stormwater from the parking lot at Woburn's water treatment facility;
- Plant trees at the Senior Center;
- Develop a stream restoration of Horn Pond Brook to enhance the habitat for the restored river

- herring population;
- And increase public awareness of nature-based solutions by educating the public through the ongoing operation of a camera used for counting of migrating river herring at Horn Pond Dam, and posting educational pieces on the City’s website regarding the rain garden at Horn Pond and the cooling benefits of the shade trees at the Senior Center.

**g. Timeline**

PROJECT SCHEDULE												
	2019						2020					
TASK DESCRIPTION	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
<b>Task 1: Horn Pond Brook Restoration</b>												
Sub-task 1.1: Field Investigations												
Sub-task 1.2: Wetlands Delineation												
Sub-task 1.3: Site Survey												
Sub-task 1.4: Design												
Sub-task 1.5: Design Drawings and Specifications												
Sub-task 1.6: Permitting												
Sub-task 1.7: Construction												
<b>Task 2: Rain Garden</b>												
Sub-task 2.1: Construction												
Sub-task 2.2: Plantings												
<b>Task 3: Trees at Senior Center</b>												
Sub-task 3.1: Plant Trees												
<b>Task 4: Public Outreach</b>												
Sub-task 4.1: Fish Monitoring												
Sub-task 4.2: Informational Materials and Web Content												
Sub-task 4.3: Outreach to Neighborhood												
<b>Task 5: Management</b>												
Sub-task 5.1: Monthly Reports												
Sub-task 5.2: Final Report												

## **h. Project Management and Partners**

### City of Woburn

John E. Corey, Jr., P.E., City Engineer in Woburn, will serve as the local Project Manager for the grant. He will assemble a core team for the project and serve as the point of contact for the grant. As Woburn's City Engineer for 20 years, Mr. Corey oversees engineering design services and surveying for municipal projects as well as utility inspections for subdivisions and site developments. He earned a Bachelor of Science in Civil Engineering from Merrimack College. His resume is attached to this application.

### Weston & Sampson

Project partner Weston & Sampson Engineers, a full-service civil and environmental engineering firm, will support the City's efforts on this project by providing engineering, permitting, and outreach services. Weston & Sampson has over 600 staff with capabilities in structural, geotechnical, and environmental engineering, hydraulic and hydrologic modeling, environmental permitting, landscape architecture, and public outreach. Subconsultants will include a driller to assist with the geotechnical investigations and a laboratory for analyses of soil samples.

David Elmer, P.E. will be Weston & Sampson's Principal-in-Charge on the Project. A vice president in the firm's wastewater program, Mr. Elmer has over 20 years of experience with wastewater collection and storm drain systems and has been responsible for managing numerous projects in Woburn. He earned a Bachelor of Science in Civil Engineering from Worcester Polytechnic Institute. He will be supported by staff from various disciplines including engineering design, environmental permitting, and public outreach.

### Mystic River Watershed Association

Patrick Herron is the Executive Director of the Mystic River Watershed Association (MyRWA). Under his leadership, MyRWA has initiated many new programs including climate resiliency, river herring monitoring, the water chestnut removal program, Mystic Greenways and phosphorus TMDL. He has written and managed many of the grants that have underpinned this work and established collaborations across the watershed. Patrick completed a doctorate in plant ecology at the University of Connecticut in 2007 and held postdoctoral positions at Woods Hole Marine Biological Laboratory and the Rowland Institute at Harvard University.

MyRWA Deputy Director Julie Wormser leads the organization's Climate Resilience program. Prior to joining MyRWA, she was a senior policy director at a variety of non-profit organizations including Boston Harbor Now, Environmental Defense Fund, Appalachian Mountain Club, and The Wilderness Society. As Executive Director of The Boston Harbor Association, Julie was instrumental in drawing attention to Boston's need to prepare for coastal flooding from extreme storms and sea level rise. She coauthored *Preparing for the Rising Tide* and *Designing With Water*, and co-led the Boston Living with Water international design competition with the City of Boston and Boston Society of Architects. Julie holds a BA in biology from Swarthmore College and an MPA from Harvard University's Kennedy School of Government.

### Streamworks, PLLC

Streamworks is experienced in all facets of stream, wetland, and stream buffer projects: from conceptualization through design, funding, permitting, and public outreach. Streamworks has analyzed, designed, and supervised construction of stormwater management systems, stream restorations, stream crossings, and wetlands. Streamworks is also experienced in all facets of dam removal and stream crossing designs. These projects span rural, agricultural, commercial, industrial, and urban settings. In addition, Streamworks is experienced in planning for field campaigns for field data collection (including geomorphic assessments) from small ephemeral streams to fourth order streams.

Streamworks President Thomas P. Ballestero, PE, PhD is a hydrologist and water resources engineer. He is an Associate Professor in the Civil Engineering Department at the University of New Hampshire and the Director and Principal Investigator of the UNH Stormwater Center. Dr. Ballestero's experience includes surface water runoff, stream restoration (in close collaboration with the US Fish & Wildlife Service), and bedrock

hydrogeology. Dr. Ballestero teaches advanced courses on stream restoration, sediment transport, open channel flow, engineering hydrology, and hydrologic monitoring. Dr. Ballestero holds professional licensure as a: Professional Engineer, Professional Hydrologist, Professional Geologist, and Groundwater Professional. He and his team will advise on the restoration of Horn Pond Brook.

8. Attach **Yearly Progress Report** (use EEA-provided template in Attachment F)

9. Attach **Statement of Match** (described in Section 2E)

April 19, 2019

(see attached letter) \_\_\_\_\_

Date

Signature of Chief Municipal Officer

Scott D. Galvin, Mayor

Name and Title (Typed)

2019 \_\_\_\_\_

Duration of Term

Mailing Address: City Hall, 10 Common Street, Woburn, MA 01801

Telephone: (781) 897- 5901

**Attachment B: Budget (see template on COMMBUYS)**

**MUNICIPAL VULNERABILITY PREPAREDNESS PROGRAM FY 19**

**MVP ACTION GRANT**

**RFR ENV 19 MVP 02**

<b>FY19 MVP Action Grant Scope Template</b>					
<b>Project Task Description</b>	<b>Deliverables</b>	<b>Due Date</b>	<b>Grant</b>	<b>Match</b>	<b>Total</b>
<b>Task 1: Horn Pond Brook Restoration</b>					
Sub-task 1.1: Field Investigations	Field Investigation Summary	10/31/2019	\$62,740.00	\$11,800.00	\$74,540.00
Sub-task 1.2: Wetlands Delineation	Wetlands Delineation Memorandum	8/31/2019	\$10,000.00	\$0.00	\$10,000.00
Sub-task 1.3: Site Survey	Topo Survey Results	9/30/2019	\$10,000.00	\$0.00	\$10,000.00
Sub-task 1.4: Design	Three Alternative Plans for Stream Improvements	10/31/2019	\$38,925.00	\$6,000.00	\$44,925.00
Sub-task 1.5: Design Drawings and Specifications	Design of Preferred Alternative	10/31/2019	\$29,970.00	\$0.00	\$29,970.00
Sub-task 1.6: Permitting	NOI for Ecological Restoration, Stormwater Report, MEPA ENF, MassDEP 401 Certificate, US Army Corp 404 Notification	1/31/2020	\$39,500.00	\$14,600.00	\$54,100.00
Sub-task 1.7: Construction	Nature-based Improvements to Sidewalls and Stream Maintenance Plan	4/30/2020	\$69,300.00	\$75,600.00	\$144,900.00
<b>Total Task 1 Cost</b>			<b>\$260,435.00</b>	<b>\$108,000.00</b>	<b>\$368,435.00</b>
<b>Task 2: Rain Garden</b>					
Sub-task 2.1: Construction	Design drawings, specifications, and bid packages for the rain garden	9/30/2019	\$13,750.00	\$0.00	\$13,750.00
Sub-task 2.2: Plantings	List of Proposed Plantings	10/31/2019	\$13,550.00	\$0.00	\$13,550.00
<b>Total Task 2 Cost</b>			<b>\$27,300.00</b>	<b>\$0.00</b>	<b>\$27,300.00</b>
<b>Task 3: Trees at Senior Center</b>					
Sub-task 3.1: Plant Trees	Shade trees planted at the Senior Center	10/31/2019	\$11,300.00	\$0.00	\$11,300.00
<b>Total Task 3 Cost</b>			<b>\$11,300.00</b>	<b>\$0.00</b>	<b>\$11,300.00</b>
<b>Task 4: Public Outreach</b>					
Sub-task 4.1: Fish Monitoring	Fish Monitoring Education Materials	6/30/2020	\$6,310.00	\$0.00	\$6,310.00
Sub-task 4.2: Informational Materials and Web Content	Website Content, Up to 2 Fact Sheets, Up to Five Social Media Posts	6/30/2020	\$6,540.00	\$0.00	\$6,540.00
Sub-task 4.3: Outreach to Neighborhood	Event Materials	2/28/2020	\$2,165.00	\$0.00	\$2,165.00
<b>Total Task 4 Cost</b>			<b>\$15,015.00</b>	<b>\$0.00</b>	<b>\$15,015.00</b>
<b>Task 5: Management</b>					
Sub-task 5.1: Monthly Reports	Monthly Progress Reports	8/31/2019	\$3,960.00	\$0.00	\$3,960.00
Sub-task 5.2: Final Report	Final Report	6/30/2020	\$5,990.00	\$0.00	\$5,990.00
<b>Total Task 5 Cost</b>			<b>\$9,950.00</b>	<b>\$0.00</b>	<b>\$9,950.00</b>
<b>TOTAL PROJECT COST</b>			<b>\$324,000.00</b>	<b>\$108,000.00</b>	<b>\$432,000.00</b>

	GRANT													Total Task (Grant)	
	Project Team Hours										Direct Costs				
	Principal in Charge		Sr Project Manager		Project Manager		Project Engineer		Engineer/Planner		Unit	Quantity	Unit Cost		Total
Hourly Rate	\$220.00		\$190.00		\$160.00		\$125.00		\$110.00		X	X	X	X	
	Hours	Total	Hours	Total	Hours	Total	Hours	Total	Hours	Total	mileage, copies, etc.				
<b>Task 1: Horn Pond Brook Restoration</b>															
Sub-task 1.1: Field Investigations		\$0.00	30	\$5,700.00		\$0.00	100	\$12,500.00	314	\$34,540.00	Mileage, lab costs	1	10000	\$10,000	\$62,740.00
Sub-task 1.2: Wetlands Delineation	4	\$880.00	8	\$1,520.00	15	\$2,400.00	15	\$1,875.00	30	\$3,300.00	Mileage	1	25	\$25	\$10,000.00
Sub-task 1.3: Site Survey	4	\$880.00	8	\$1,520.00	15	\$2,400.00	15	\$1,875.00	30	\$3,300.00	Mileage	1	25	\$25	\$10,000.00
Sub-task 1.4: Design		\$0.00		\$0.00	35	\$5,600.00	45	\$5,625.00	70	\$7,700.00	Subcontractor	1	20000	\$20,000	\$38,925.00
Sub-task 1.5: Design Drawings and Specifications	4	\$880.00	10	\$1,900.00	14	\$2,240.00	50	\$6,250.00	170	\$18,700.00				\$0	\$29,970.00
Sub-task 1.6: Permitting	5	\$1,100.00		\$0.00		\$0.00	80	\$10,000.00	240	\$26,400.00	Mileage, applications	1	2000	\$2,000	\$39,500.00
Sub-task 1.7: Construction	12	\$2,640.00	24	\$4,560.00	40	\$6,400.00	160	\$20,000.00	320	\$35,200.00	Mileage	1	500	\$500	\$69,300.00
<b>Total Task 1 Cost</b>	<b>29</b>	<b>\$6,380.00</b>	<b>80</b>	<b>\$15,200.00</b>	<b>119</b>	<b>\$19,040.00</b>	<b>465</b>	<b>\$58,125.00</b>	<b>1174</b>	<b>\$129,140.00</b>				<b>\$32,550</b>	<b>\$260,435.00</b>
<b>Task 2: Rain Garden</b>															
Sub-task 2.1: Construction		\$0.00	1	\$190.00		\$0.00	4	\$500.00	16	\$1,760.00	Materials and contractor	1	11300	\$11,300	\$13,750.00
Sub-task 2.2: Plantings		\$0.00	1	\$190.00		\$0.00	4	\$500.00	16	\$1,760.00	Plantings and contracto	1	11100	\$11,100	\$13,550.00
<b>Total Task 2 Cost</b>	<b>0</b>	<b>\$0.00</b>	<b>2</b>	<b>\$380.00</b>	<b>0</b>	<b>\$0.00</b>	<b>8</b>	<b>\$1,000.00</b>	<b>32</b>	<b>\$3,520.00</b>				<b>\$22,400</b>	<b>\$27,300.00</b>
<b>Task 3: Trees at Senior Center</b>															
Sub-task 3.1: Plant Trees		\$0.00		\$0.00	1	\$160.00	4	\$500.00	4	\$440.00	Materials and contractor	1	10200	\$10,200	\$11,300.00
<b>Total Task 3 Cost</b>	<b>0</b>	<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>	<b>1</b>	<b>\$160.00</b>	<b>4</b>	<b>\$500.00</b>	<b>4</b>	<b>\$440.00</b>				<b>\$10,200</b>	<b>\$11,300.00</b>
<b>Task 4: Public Outreach</b>															
Sub-task 4.1: Fish Monitoring	2	\$440.00		\$0.00	4	\$640.00	6	\$750.00	8	\$880.00	Mileage, subcontractor	1	3600	\$3,600	\$6,310.00
Sub-task 4.2: Informational Materials and Web Content	1	\$220.00	2	\$380.00	6	\$960.00	12	\$1,500.00	18	\$1,980.00	Mileage, subcontractor	1	1500	\$1,500	\$6,540.00
Sub-task 4.3: Outreach to Neighborhood		\$0.00		\$0.00	2	\$320.00	8	\$1,000.00	6	\$660.00	Postage, printing	1	185	\$185	\$2,165.00
<b>Total Task 4 Cost</b>	<b>3</b>	<b>\$660.00</b>	<b>2</b>	<b>\$380.00</b>	<b>12</b>	<b>\$1,920.00</b>	<b>26</b>	<b>\$3,250.00</b>	<b>32</b>	<b>\$3,520.00</b>				<b>\$5,285</b>	<b>\$15,015.00</b>
<b>Task 5: Management</b>															
Sub-task 5.1: Monthly Reports		\$0.00	4	\$760.00		\$0.00	8	\$1,000.00	20	\$2,200.00				\$0	\$3,960.00
Sub-task 5.2: Final Report	4	\$880.00	6	\$1,140.00	6	\$960.00	10	\$1,250.00	16	\$1,760.00				\$0	\$5,990.00
<b>Total Task 5 Cost</b>	<b>4</b>	<b>\$880.00</b>	<b>10</b>	<b>\$1,900.00</b>	<b>6</b>	<b>\$960.00</b>	<b>18</b>	<b>\$2,250.00</b>	<b>36</b>	<b>\$3,960.00</b>				<b>\$0</b>	<b>\$9,950.00</b>
<b>TOTAL PROJECT COST</b>															<b>\$324,000.00</b>

IN-KIND / CASH MATCH														Total Task (Match)	Total Project Cost
Project Team Hours										Direct Costs					
Principal in Charge		Sr Project Manager		Project Manager		Project Engineer		Engineer/Planner		Unit	Quantity	Unit Cost	Total		
\$220.00		\$190.00		\$160.00		\$125.00		\$110.00		X	X	X	X		
Hours	Total	Hours	Total	Hours	Total	Hours	Total	Hours	Total	mileage, copies, etc.					
10	\$2,200.00		\$0.00	60	\$9,600.00		\$0.00		\$0.00				\$0	\$11,800.00	\$74,540.00
	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00				\$0	\$0.00	\$10,000.00
	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00				\$0	\$0.00	\$10,000.00
10	\$2,200.00	20	\$3,800.00		\$0.00		\$0.00		\$0.00				\$0	\$6,000.00	\$44,925.00
	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00				\$0	\$0.00	\$29,970.00
	\$0.00	42	\$7,980.00	40	\$6,400.00		\$0.00		\$0.00	Mileage, applic	1	\$ 220	\$220	\$14,600.00	\$54,100.00
	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00	Contractor	1	\$ 75,600	\$75,600	\$75,600.00	\$144,900.00
<b>20</b>	<b>\$4,400.00</b>	<b>62</b>	<b>\$11,780.00</b>	<b>100</b>	<b>\$16,000.00</b>	<b>0</b>	<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>		<b>1</b>	<b>\$ 220</b>	<b>\$75,820</b>	<b>\$108,000.00</b>	<b>\$368,435.00</b>
	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00				\$0	\$0.00	\$13,750.00
	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00				\$0	\$0.00	\$13,550.00
<b>0</b>	<b>\$0.00</b>		<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>		<b>0</b>	<b>\$ -</b>	<b>\$0</b>	<b>\$0.00</b>	<b>\$27,300.00</b>
	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00				\$0	\$0.00	\$11,300.00
<b>0</b>	<b>\$0.00</b>		<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>		<b>0</b>	<b>\$ -</b>	<b>\$0</b>	<b>\$0.00</b>	<b>\$11,300.00</b>
	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00				\$0	\$0.00	\$6,310.00
	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00				\$0	\$0.00	\$6,540.00
	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00				\$0	\$0.00	\$2,165.00
<b>0</b>	<b>\$0.00</b>		<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>		<b>0</b>	<b>\$ -</b>	<b>\$0</b>	<b>\$0.00</b>	<b>\$15,015.00</b>
	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00				\$0	\$0.00	\$3,960.00
	\$0.00		\$0.00		\$0.00		\$0.00		\$0.00				\$0	\$0.00	\$5,990.00
<b>0</b>	<b>\$0.00</b>		<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>	<b>0</b>	<b>\$0.00</b>		<b>0</b>	<b>\$ -</b>	<b>\$0</b>	<b>\$0.00</b>	<b>\$9,950.00</b>
														<b>\$108,000.00</b>	<b>\$432,000.00</b>

## Attachment F: MVP Yearly Progress Report Template

# Executive Office of Energy and Environmental Affairs

Municipal Vulnerability Preparedness Program Yearly Progress Report

July 1, 2018-June 30, 2019 Reporting Period



Date: April 19, 2019

Municipality: Woburn

Local MVP Contact Name: John E. Corey, Jr. P.E.

- I. Please list your municipalities' top priority actions, in order of priority, identified through the MVP planning process.

### I.1 Highest Priorities

- Horn Pond Brook hydraulic improvements for flood control and fish migration.
- Address flooding at Four Corners at the intersection of Cambridge and Russell Streets.
  - Reduce flooding by adding flood storage and wetland creation/restoration in adjacent empty lot along Russell Street that the City is in the process of acquiring.
  - Repair culvert along Shaker Glen Brook
  - Floodproof businesses
  - Work with business to add green infrastructure, such as rain gardens or bioretention, as well as permeable surfaces
  - Repair drainage to allow emergency access to west side of the City during high intensity rain events
- Increase storage, drainage upgrades, drainage improvements, raise roads and add green infrastructure in areas that flood regularly; these areas include: Four corners, Olympia Avenue, Nashua/Draper Street, New Boston Street, Washington Street, Salem Street, and School Street.
- Improve stream crossings/culverts – increase capacity and clean regularly.
- Additional funding to DPW for road/drainage maintenance and upgrades.
- Add an additional emergency shelter in the City.
- Work with doctors, senior center, housing authority, grocery stores and shelters to pass along information on the RAVE system (state and local emergency notification system) to seniors, low income, commuting, non-English speaking residents.
- Remove hydraulic impediment along Horn Pond Brook for fish and vegetation improvements.

- Upgrade and increase drinking water management for increased population and drought. This could include redundant pumps, capital improvement plan, investment, and execution.
- Add additional requirements for new developments. These areas can contribute to stormwater retention and green infrastructure to reduce flooding. Avoid losing open space. Floodplain zoning should be for a 500-year storm.
- Develop a stormwater task force. Review and update stormwater ordinance as necessary to address stormwater quality and quantity and to promote stormwater management onsite.
- Maximize site-specific stormwater retention. Identify opportunities for enhanced stormwater retention.
- DPW preventative maintenance plan and stormwater management plan.

## I.2 Moderate Priorities

- Add backup generators to pump stations.
- Protect police station from flooding. Options include relocation of facility, dry floodproofing the lower level, moving generator to a higher elevation, and adding pumps to the basement to prevent flooding.
- Obtain a backup generator for the radio tower which services five communities. Add redundancies on water towers.
- Create stormwater storage areas in the Horn Pond forest.
- Widen and clear trails in the forest around Horn Pond as a buffer to isolate brush fires, as well as access for emergency vehicles.
- Evaluate opportunities for stormwater management on Sweetwater Brook.
- Coordinate and improve communications systems with EMS.
- Upgrade fire department station 3 equipment building and apparatus
- Create list of at-risk residents in case of power failure.
- Add curbside composting to decrease rats
- Manage open water to reduce insects
- Test, monitor, create plan to prevent toxic site erosion and discharge.
- Design parks to increase shade, and to reduce heat and stormwater. Create urban forest plan for public and private land.
- Replace trees damaged in storms.
- Add generators and cooling centers for elderly housing.
- Upgrade drainage and building elevations on older schools.

## I.3 Additional Priorities

- Regular inspections and proper maintenance on the Horn Pond Dam, as well as outreach to neighboring communities
- Assess condition of public trees, trimming branches and removing dead trees. Replant with new trees and inventory their condition.
- Implement billing/incentives for water conservation.
- Vulnerability assessment on Horn Pond
- Study floodplain performance.

- Provide incentives to look in on fragile residents more systematically. Consider more extensive training (less than EMS)
- Provide transportation for public housing and low-income residents to emergency shelters.
- Subsidize cooling and heating strategies with Eversource.
- Consider zero net energy, shelter-in-place housing standards for new developments. Consider emergency services in multi-family houses.
- Sand bagging and vegetated berms at the wastewater pump station.
- Keep up with wastewater transport system improvements and monitor for wastewater overflows at Horn Pond.
- Work with the regional transportation center to establish an evacuation route and alternative route plan.
- Come up with reasonable alternatives to reduce salt for deicing.
- Monitor sites for invasive species.

2. Has your Core Team reconvened since your Listening Session? If so, describe the process and any revisions or updates your team made to the original MVP Report? Please list your MVP Core Team members and note any new members.

The Core Team met on April 9, 2019 (after the Listening Session) to discuss the public comments, recommended actions, MVP Summary of Findings Report, and next steps. The Core Team finalized the recommended actions for inclusion in the Summary of Findings Report.

Core Team Members are:

Jay Corey, MVP Project Manager and City Engineer  
 Matt Barrett, Engineering Department  
 Len Burnham, Department of Public Works  
 Meghan Doherty, Board of Health  
 Robert F. Rufo, Police Department  
 Stephen Adgate, Fire Department  
 Tina Cassidy, Planning Office

3. Discuss any other work related to the MVP process or climate change resiliency in the municipality. In what ways has your municipality used the outcomes of your workshop in other planning efforts (e.g., updating existing local plans)?

In January 2019, the City filed applications for Natural Resources Damage Assessment funding for two projects to address harm to the environment from contamination at the IndustriPlex site in Woburn, and to increase resilience. One project involves the design, permitting, and construction of improved fish passage at the Horn Pond outlet, to facilitate up to 500,000 river herring reaching Horn Pond each year. After years of

decline, the Mystic River watershed hosts one of the state's largest fish runs, due to improved passage from new dams and fish ladders in Upper Mystic Lake in Medford (2012) and at Center Falls Dam in Winchester (2017).

The second project involves restoration of a 12-acre parcel, the "Shaker Glen Extension," adjacent to the existing 19.60-acre Shaker Glen conservation area at the intersection of Route 3 and Russell Street. The City is negotiating with the owner and is confident it will successfully acquire the land. It will evaluate the site, prepare design plans/permit applications, and construct improvements that will result in the creation of 75,000 ft<sup>2</sup> of wetlands habitat, and removal of 40,000 ft<sup>2</sup> of broken pavement and an abandoned basement. Stormwater will be diverted from Russell St into a 20,000 ft<sup>2</sup> treatment area which will discharge to the new constructed wetlands that provides additional pollutant removal. This will drain to Shaker Glen Brook through an improved culvert. The project will create additional wetlands for habitat, improve water quality, and alleviate flooding in Four Corners.

4. Please list any grants that your municipality has applied for, or received, to implement actions from your MVP report. Please note grant awards or applications that advanced priority actions.

The City has just submitted its Summary of Findings Report to become an MVP Certified Community and is filing an application for its first MVP Action Grant.

5. Please list any other steps that your municipality has taken towards implementing your priority actions.

In January 2019, the City filed applications for Natural Resources Damage Assessment funding for two projects to address harm to the environment from contamination at the IndustriPlex site in Woburn. These projects are priority actions under the City's MVP program.

6. Please list any potential next steps to advance priority actions during FY2020 (July 1, 2019 to June 30, 2020)?

The City of Woburn is applying for an MVP Action Grant to improve the Horn Pond Brook in anticipation of an enhanced river herring run (with the improved fish passage at Horn Pond's Scalley Dam) and to reduce flooding of adjacent buildings.

7. Please note any difficulties or challenges the community has identified through the MVP planning process or while seeking to implement priority actions and any steps the community has identified to address these challenges.

None has been identified yet.

8. Please identify any data needs or information gaps that the state could help fill.

None has been identified yet.



**OTHER PROFESSIONAL EXPERIENCE:**

1984 to 1999

Corey & Donahue, Inc., Engineers and Surveyors  
Woburn, MA 01801

Mr. Corey was a principal in the firm and provided engineering services in conjunction with the design, permitting and implementation of a wide range of civil/environmental projects including: Commercial/industrial site plans, residential subdivisions, utility and street designs, drainage/flood studies and facility design, irrigation facility design, Environmental Impact Studies, Chapter 131 Notice of Intent, Army Corps. of Engineers 404E Applications and Municipal Permits.

Access road, site grading, utility design, permit application preparation and construction observation for commercial sites including Rainin Instruments Mack Road Warehouse expansion in Woburn; Kids R Us Stores on Mishawum Road in Woburn and Fresh Pond Shopping Plaza in Cambridge; NTW Tire Stores on Mishawum Road in Woburn and Empire Street in Boston; Northern Bank and Trust buildings on Main Street and Elm Street in Woburn and Woburn National Bank building on Russell Street in Woburn.

Roadway, site grading, utility design, permit application preparation and construction observation for Industrial Subdivisions, including the 40 acre Captains Way Definitive Subdivision in Newburyport and the 15 acre Broadway Industrial Preliminary Subdivision in Dracut. Both projects included retention/detention basins for mitigation of post development drainage.

Roadway, site grading, utility design, permit application preparation and construction observation for Residential Subdivisions, including Christen Way in Woburn, Mahoney Estates in Woburn, Fuller Estates in Woburn, Capozzi Circle in Woburn, Carriage House in Beverly, Boyden Street in Beverly, Baystate Road in Reading, West Pines in North Reading, Ward Street in Woburn, Meadow lane Extension in Wilmington and Chardon Road in Winchester. Each of these subdivisions included detention basins or other runoff mitigating strategies in conjunction with their design.

Roadway, site grading, utility design, permit application preparation and construction observation for Residential Condominium Projects, including The Ledges in Peabody and Mawn Estates in Woburn.

Preparation of Chapter 131 Notice of Intent, drainage computations and drainage design for private golf courses, including the Georgetown Club in Georgetown and The Ledgewood Country Club in Stow. Each of these golf courses included tributary drainage areas in excess of 250 acres. Preparation of irrigation supply study, design of irrigation and pumping equipment and Chapter 131 Notice of Intent for use of Horn Pond as a supply source for the Woburn Country Club Golf Course.

**OTHER PROFESSIONAL EXPERIENCE:**

1973 to 1984

Green International Affiliates, Inc.  
Medford, MA

Mr. Corey was employed by Green International Affiliates, Inc. beginning in 1973 as a junior engineer, eventually becoming a Project Manager for a wide range of Environmental and Highway Projects. Typical projects included the following:

Project responsibilities for the preparation of Flood Insurance Studies for fifteen western Massachusetts communities under the FEMA Program. Preparation of Flood Studies for the town of Billerica. Design of Hydraulic structures with velocity attenuation for the City of Chicopee with the Army Corps. of Engineers application. Design of drainage facilities and construction coordination for the City of Lawrence, the City of Somerville, the Boston Redevelopment Authority and various highway projects.

Project responsibilities for an Industrial Access Road serving The Gamewell Company in Medway and street reconstruction in the Cities of Chicopee and Lawrence.

Preparation of Water Supply and Distribution Facility Studies for the City of Chicopee, the City of Lawrence, the Town Wrentham and the Metropolitan District Commission.

Design of Water Storage Facilities in the City of Lawrence consisting of the replacement of a 130 foot standpipe within a masonry tower listed on the National Register of Historic Places, replacement of inlet/outlet hydraulic controls for the 40 MG low service reservoir, including the implementation of a continuous pump to demand program for the duration of the four-month replacement project. Design of a new 0.6 MG elevated storage facility and pump station for the Prospect Hill high service area and rehabilitation of the South Street elevated storage facilities.

Design of wastewater treatment Facilities and sewage collection systems for the Town of Hardwick, the Village of Wheelwright, the Greater Lawrence Sanitary District, the City of Rochester, the City of Peabody, the Boston Redevelopment Authority, the City of Lawrence and the Boston Water and Sewer Commission.

Preparation of various environmental studies, including a comprehensive report on the impacts of acid mine drainage from the University of Massachusetts Coal Storage and handling Facility and the design of implementation of acid collection and treatment facilities to mitigate adverse impacts and allow the University to retain coal as an energy source.

Preparation of solid waste studies including alternative disposal methods for the Town of Medway and preparation of a landfill closure plan for the Town of Medway and the Town of Wrentham.

Preparation of design of water supply and distribution facilities, including methods to protect permafrost from thawing and potable water from freezing for the community of Point Barrow, Alaska.



City of Woburn  
Massachusetts

City Hall  
10 Common Street  
Woburn, MA 01801

Tel: 781-897-5901  
[www.cityofwoburn.com](http://www.cityofwoburn.com)

**Scott D. Galvin**  
*Mayor*

April 19, 2019

Mia Mansfield, Director of Climate Adaptation and Resilience  
Executive Office of Energy and Environmental Affairs  
100 Cambridge Street, Suite 900  
Boston, MA 02114

RE: Woburn Municipal Vulnerability Preparedness (MVP) ENV 19 MVP 02

Dear Ms. Mansfield:

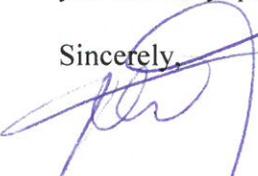
I am pleased to submit the City of Woburn's Municipal Vulnerability Preparedness (MVP) Action Grant Application to the Massachusetts Executive Office of Energy and Environmental Affairs.

Through this application, the City is addressing climate change vulnerabilities affecting infrastructure, housing, public safety, environment, and the elderly. We are requesting funding to support the restoration of Horn Pond Brook, where a improving river herring population passes on its way upstream to Horn Pond and where there is considerable flooding of adjacent roads and residences. We are also planning on installing green infrastructure in heavily-used areas to provide resilience under climate change and to increase public education about climate change and benefits of nature-based solutions. We will install a rain garden at Horn Pond to capture stormwater runoff at the parking lot of Woburn's water treatment plant, and shade trees at the City's Senior Center.

Our project cost is \$432,000. We are requesting an MVP Action Grant of \$324,000 and are committed to providing a match of \$108,000, or 25% of total cost. The matching funds are in cash, which is currently available for appropriation. The City commits to submitting monthly progress reports and a final project report. All funds associated the project, including awarded grant funds and match contributions, will be expended on or before June 30, 2020. The City acknowledges that a portion of funding under this grant will be provided on a reimbursement basis.

Thank you for your consideration of the City of Woburn MVP Action Grant Application. We appreciate the Commonwealth's commitment to the City's climate change resilience. Please do not hesitate to contact me if you have any questions.

Sincerely,

  
Scott D. Galvin  
Mayor



# City of Woburn

## Engineering Department

Woburn City Hall \* 10 Common Street \* Woburn, MA 01801  
Telephone (781) 897-5880

April 18, 2019

John E. Corey, Jr., PE  
City Engineer  
jcorey@cityofwoburn.com

Greg Rheaume  
Assistant City Engineer  
grheaume@cityofwoburn.com

Matthew S. Barrett, GISP  
GIS Coordinator  
mbarrett@cityofwoburn.com

Alexander Candiloro  
Engineering Intern

Max T. Marshall  
Engineering Intern

Peter Lynch  
Engineering Intern

Mia Mansfield  
Director of Climate Adaptation and Resilience  
Executive Office of Energy & Environmental  
Affairs 100 Cambridge Street, Suite 900  
Boston, MA 02114

RE: Woburn Municipal Vulnerability Preparedness (MVP) ENV 19  
MVP 02

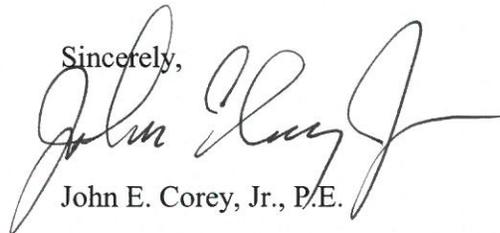
Dear Ms. Mansfield:

On behalf of the City of Woburn and the Engineering Department, I am pleased to serve as the Project Manager for Woburn's application for the Commonwealth's Municipal Vulnerability Preparedness (MVP) Action Grant program. My office is concerned about the climate change impact of increased precipitation intensity and associated flood damage to critical infrastructure, public and private property and public safety.

The MVP Action Grant process provides us with a perfect opportunity to address a regional flooding issue in Woburn that adversely impacts the Town of Winchester. We are also improving water quality with the installation of a bio-retention filter along Horn Pond.

Thank you for your consideration in this matter.

Sincerely,



John E. Corey, Jr., P.E.



**City of Woburn, Massachusetts**  
**Planning Board**

City Hall, 10 Common Street  
Woburn, MA 01801

Tina Cassidy,  
Planning Director

Dan Orr,  
Grant Writer/Planner

Phone: 781-897-5817

Karen Smith, Planner

April 18, 2019

Ms. Mia Mansfield  
Director of Climate Adaptation and Resilience  
Executive Office of Energy & Environmental Affairs 100 Cambridge Street, Suite 900  
Boston, MA 02114

RE: Woburn Municipal Vulnerability Preparedness (MVP) Grant ENV 19 MVP 02

Dear Ms. Mansfield:

On behalf of the City of Woburn's Planning Board/Redevelopment Authority Office I am pleased to express my support for Woburn's Municipal Vulnerability Preparedness Action Grant Application. The work proposed by the grant will greatly assist my department's efforts and responsibilities which include managing the process of updating the City's Hazard Mitigation Plan along with more typical Planning Board-related activities such as review of proposed subdivisions and commercial development projects and their associated drainage impacts.

Thank you for your serious consideration of the City of Woburn's application for MVP Action Grant funding.

Respectfully,

Tina P. Cassidy  
Planning Board Director/WRA Administrator

cc: Mr. Jay Corey, City Engineer  
file



*City of Woburn  
Conservation Commission*

*City Hall  
10 Common Street  
Woburn, Massachusetts 01801-4139*

*(781)897-5933*

April 18, 2019

Mia Mansfield  
Director of Climate Adaptation and Resilience  
Executive Office Energy & Environmental Affairs  
100 Cambridge Street, Suite 900  
Boston, MA 02114

RE: Woburn Municipal Vulnerability Preparedness (MVP) ENV 19 MVP 02

Dear Ms. Mansfield:

On behalf of the Woburn Conservation Commission, I am pleased to support Woburn's Municipal Vulnerability Preparedness project to improve Horn Pond Brook and the bio-retention area for Horn Pond. This work will support my commission's efforts to protect the interests of the Woburn Wetlands Ordinance (Title VII) and the Massachusetts Wetlands Protection Act (M.G.L. Chapter 131, Section 40) within the City of Woburn, particularly stream flooding and water quality. Impacts of climate change can adversely affect the ability of Resource Areas to provide flood control, erosion control, storm damage prevention and other important functions and values.

Thank you for your consideration of the City of Woburn's MVP Action Grant application.

Sincerely,

Duane P. Cleak, Chairman  
Woburn Conservation Commission



CITY OF WOBURN, MASSACHUSETTS

*Recreation Commission*

10 Common Street  
Woburn, MA 01801  
(781) 897-5806

April 19, 2019

Mia Mansfield  
Director of Climate Adaptation and Resilience  
Executive Office of Energy and Environmental Affairs  
100 Cambridge Street, Suite 900  
Boston, MA 02114

RE: Woburn Municipal Vulnerability Preparedness (MVP) ENV 19 MVP 02

Dear Ms. Mansfield,

On behalf of the Woburn Recreation Department, I am pleased to support Woburn's Municipal Vulnerability Preparedness Action Grant application. This work will support my department's efforts to protect the children who participate in the Recreation Department's summer programs against extreme heat by planting of additional shade trees in strategic locations within our many city parks. This will provide necessary cool areas for the children on these hot summer days and will help offset the use of the Senior Center as a cooling center during times of extreme heat.

Thank you for considering the City of Woburn's MVP Action Grant application.

Very Truly Yours,

---

Rory Lindstrom, Recreation Director  
City of Woburn



Mia Mansfield, Director of Climate Adaptation and Resilience  
Executive Office of Energy and Environmental Affairs  
100 Cambridge Street, Suite 900  
Boston, MA 02114

April 17, 2019

Dear Ms. Mansfield,

We are delighted to support the City of Woburn's MVP action grant proposal to alleviate stormwater flooding, decrease heat island effects, improve water quality, and support habitat restoration for anadromous river herring in Horn Pond. We have long partnered with Woburn on this project and strongly support its progress. Our letter specifically speaks to the value of this project to river herring.

The Mystic River watershed is an important spawning ground for anadromous river herring, with more than 600,000 adult alewife and blueback herring migrating annually. A fish ladder installation downstream at Upper Mystic Lake in 2012 increased the effective freshwater habitat for the species by more than 60%. As a result, the migrating population increased by more than 100% since 2012, according to the Massachusetts Division of Marine Fisheries.

River herring are listed by both NOAA and the Mass Wildlife Conservation plan as species of concern. They play a crucial role in the freshwater, estuarine and marine ecosystems. They are part of a multi-ecosystem food web, connecting resources in the ocean to predators upstream. While overharvesting in the ocean has been a central cause of population decline, the inaccessibility of inland freshwater habitats limits population recovery rates for these species.

Horn Pond, which is upstream from the Mystic Lakes, is the next largest target of this regional habitat restoration (102 acres). Though some herring are able to make it to Horn Pond, thanks to recent temporary improvements to a small overflow channel, most do not get past the dam. The region expects money from a Natural Resource Damages (NRD) settlement in 2021 for improvements to the Aberjona River watershed, which includes Horn Pond. This project will significantly advance this important habitat work.

Sincerely,

A handwritten signature in black ink that reads "Julie Wormser". The signature is fluid and cursive, with a long, sweeping underline that extends to the right.

Julie Wormser  
Deputy Director