



Consulting  
Engineers and  
Scientists

Revised August 5, 2022  
March 26, 2021  
Proposal 2101052

**Via email:** [rparker@wnewbury.org](mailto:rparker@wnewbury.org)

Mr. Rick Parker  
Town of West Newbury  
381 Main Street  
West Newbury, MA 01985

Dear Mr. Parker:

**Re: Proposed MVP Action Grant Tasks  
West Newbury MVP Action Grant  
West Newbury, Massachusetts**

GEI Consultants Inc. is pleased to present the Town of West Newbury Municipal Vulnerability Preparedness (MVP) Team with a suggested scope of work and task list to aid the Town in applying for an MVP Action Grant in 2023. It is our understanding that the Town of West Newbury is interested in evaluating the flood risk due to more frequent and extreme flooding events caused by climate change, and how this risk may affect residences, access to residences, and roadways. Specifically, we understand that the area of interest is along River Road and the lower portions of Coffin Street and Bridge Streets where they intersect with River Road. Additionally, the Town is concerned about erosion along the banks of the Merrimack River near River Road and the potential benefit of shoreline stabilization measures such as Living Shorelines.

The Town has asked for GEI's assistance in identifying task items and cost estimates for tasks that would support an MVP Action Grant addressing the flood risk and bank stability concerns summarized above. It is our understanding that these proposed tasks and cost estimates will help the Town determine the amount of funding to seek from an MVP Action Grant. Should the Town be awarded an MVP Action Grant in 2023, GEI will prepare a separate proposal in order to contract with the Town for these suggested tasks.

Our recommended tasks are based on our local knowledge of the Town of West Newbury, our correspondence with you via email, and our participation in the West Newbury MVP Team meetings on March 10, 2021 and May 10, 2022.

## **About GEI**

GEI is a consulting engineering firm specializing in geotechnical, environmental, water resources, and ecological services. GEI has an in-house staff of skilled and experienced environmental scientists, restoration ecologists, hydrologic and hydraulic modelers, and marine and geotechnical engineers with extensive coastal and riverine experience.

We are experts in resiliency and vulnerability studies in coastal and waterfront settings, utilizing robust coastal and riverine modeling to determine flood extents and erosion potential during increased storm conditions, future rates of precipitation, and projected sea level rise values.

GEI has significant experience in a wide range of Living Shoreline project types for a spectrum of spatial scales. GEI also has experience in combined approaches that couple structural elements with bioengineering techniques on the slope face and grading into a fully vegetated transition area at the top of the slope. GEI has found this technique to be a successful solution in challenging and dynamic coastal and riverine systems where Living Shorelines alone would not be sufficient in preventing erosion. We strive to assemble the most appropriate mix of Living Shoreline techniques for each given site.

We have included project sheets for key projects similar to what we are proposing for the Town of West Newbury and resumes for staff members that would be involved in this project.

### **Suggested MVP Action Grant Tasks**

We recommend that the following task items be included when considering an MVP Action Grant for the Town of West Newbury. Depending on funding availability, the Town of West Newbury could choose to undertake some or all of the suggested tasks as well as consider options for phasing the tasks over multiple grant awards.

#### ***Task 1: Community Engagement***

This task includes presentations at up to three public meetings, creation of public surveys to be utilized during the two community engagement events, and development of educational materials such as pamphlets, flyers, and/or website language. GEI has worked on many grant-funded municipal projects and is experienced in leading the public process to ensure all related parties are active participants in the project. The MVP program places a strong emphasis on community engagement and GEI would collaborate with the Town of West Newbury MVP Team to ensure that project goals are clearly communicated to the public and seek public input, as warranted, on important project milestones and decisions. Per our discussion on May 10, 2022, we assume that the West Newbury MVP committee will schedule, lead, and coordinate the public meetings that GEI will participate in. For the purposes of cost estimation, we assume there will be three community engagement presentations that GEI will participate in.

##### **Task 1.1: Public Meeting #1**

The first public meeting will be held at the beginning of the project to go over project goals, tasks, and a projected timeline for the project.

Deliverables: Memorandum with presentation slides, meeting materials, and meeting minutes.

##### **Task 1.2: Public Meeting #2**

The second public meeting will be held after the completion of Task 4, the Vulnerability Study. During this meeting, results of the vulnerability study will be communicated as well as an updated timeline for the remainder of the project.

Deliverables: Memorandum with presentation slides, meeting materials, and meeting minutes.

**Task 1.3: Public Meeting #3**

The third public meeting will be held after the completion of the remaining tasks. Here, we will communicate the overall project goals, findings, and recommendations for adaptation options, as well as recommending next steps the community can take towards increasing resilience.

Deliverables: Memorandum with presentation slides, meeting materials, and meeting minutes.

**Task 2: Existing Conditions of Shoreline Survey**

Evaluate the condition of the existing shoreline, paying particular attention to areas with evidence of unstable banks, erosion, slumping, and document current land cover along the shore (such as vegetation, exposed soil or bedrock, and man-made stabilization such as rip rap retaining walls, log jams, live staking and other bio-engineering methods). Shoreline gradient (i.e., slope of bank), height of bank, presence of a fringing marsh, and distance of nearest structures to the shoreline will also be documented. We will also identify structures in the river such as docks, noting whether these structures appear to be permanent or temporary. The shoreline conditions will be documented using a combination of drone footage, field visits, GIS data compilation, and historical map and imagery review. As part of this task, GEI will also identify and inventory areas suitable for fully green living shoreline solutions, areas likely requiring a hybrid solution that combines vegetation with hard armoring, and areas likely requiring a hardened shoreline such as rip rap or a retaining wall. Documenting the existing conditions provides GEI with a strong foundation moving forward in the project and ensures that we understand conditions specific to West Newbury. Our field staff is trained and licensed in operating drones and watercraft to observe hard to access locations. Drone footage of real-time uses and operations of shorelines and slopes, such as the interactions with currents and waves, the launching of watercraft, and local boat traffic patterns, has proved beneficial in acquiring comprehensive knowledge of conditions and uses of waterfront locations.

Task 2 Deliverables: Technical memo of findings to include figures documenting shoreline conditions and digital files of drone footage.

**Task 3: Existing Conditions of Culverts Survey**

This task consists of evaluating the condition of existing culverts and other potential surface water conveyances (i.e., drainage ditches) in the area of interest. The purpose of the investigation would be to assess the capacity limits of existing culverts and identify areas where flow may be constricted, and/or where culvert conditions may contribute to current or future flooding. GEI field staff will visit the site during a rainfall event to observe how culverts perform during storm conditions.

Task 3 Deliverables: Technical memo of findings to include tables detailing existing conditions of culverts and a figure of culvert locations.

**Task 4: Vulnerability Study****Task 4.1: Merrimack River Flood Risk Analysis**

This task involves the creation of a hydraulic model of the Merrimack River to evaluate flood vulnerability during increased precipitation events and coastal storms and to identify areas with relatively higher velocities where the riverbanks may be at risk of erosion. We propose using the U.S. Army Corps of Engineers Hydraulic Engineering Center River Analysis System (HEC-RAS) software to perform this work. As part of our modeling effort we would include precipitation,

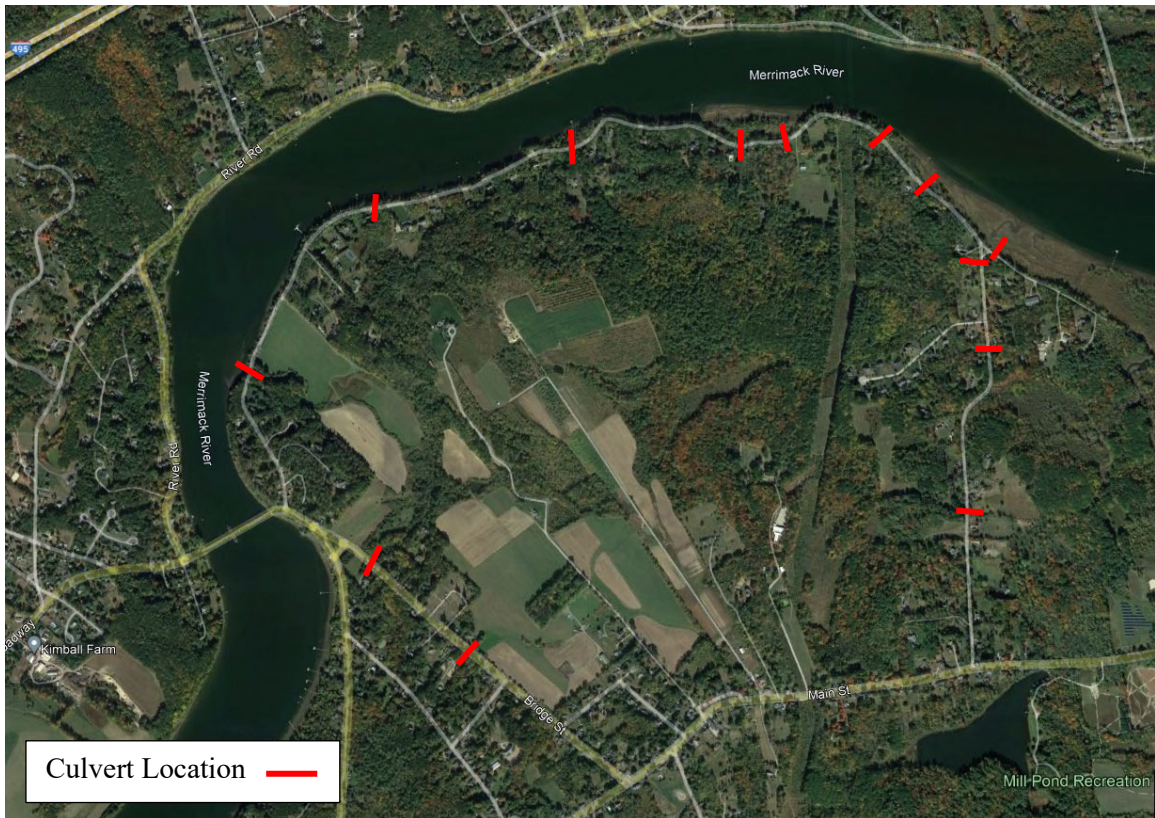
both historic amounts as well as future trends and predictions; tidal influences under existing average and storm tide cycles and future tide cycles given assumed sea level rise amounts based on the latest state guidance for the State of Massachusetts. This hydraulic model would provide information on anticipated future flood events, changes to average river flows, and sections of the river with the potential for high velocities that would potentially cause issues for river channel and shoreline stabilization. Areas identified as having higher river velocities will be compared with the shoreline survey completed in Task 2 to determine the focus for shoreline stabilization efforts and areas identified to have current and future flood risk based on the modeling efforts will be the focus for flood adaptation measures developed in Task 6.

Task 4.1 Deliverables: Technical memo of vulnerability study and figures of flood inundation boundaries.

**Task 4.2: River Road Flood Risk Analysis**

This task will include a hydrologic and hydraulic analysis of local streams and culverts that cross River Road, Coffin Street, or Bridge Street. Based on a review of aerial imagery, MassDEP Wetlands dataset, and USGS’ StreamStats web application we have identified at least 13 possible culvert crossings to be included in the analysis. The proposed culvert locations to be analyzed are shown in the figure below:

**Figure 1: Culvert Crossing Locations**



We will delineate the watersheds using the readily available online digital elevation data and assess the hydrologic characteristics using available GIS data. We intend to use the Soil Conservation Service (SCS) Runoff Curve Number (CN) Method to model infiltration. To calculate the weighted curve numbers, we will use Hydrologic Soil Group (HSG) data obtained

from the NRCS Web-Soil Survey online tool and land cover (forest, impervious, grassland, etc.) data from MassGIS' 2016 Land Cover/Land Use dataset. Our work will also include developing Unit hydrographs and time of concentration estimates for the watersheds using the SCS Unit hydrograph transform method.

GEI will use information obtained in Task 3, such as culvert length, diameter, material, and relative culvert and roadway elevations, to develop a HEC-HMS model to estimate culvert discharge and depths of flow for the 2-, 5-, 10-, 25-, 50- and 100-year annual recurrence 24-hour storm events.

Precipitation estimates for the selected events will be obtained from the National Oceanic and Atmospheric (NOAA) Atlas 14 Precipitation Frequency Data Server.

Task 4.2 Deliverables: Technical memo of H&H analysis including information on each crossing's hydraulic capacity during selected storm events. The memo will also identify culvert crossings at risk of inundation during design storms.

#### ***Task 5: Conceptual Plans for Shoreline Stabilization***

In this task, GEI will evaluate concepts for shoreline stabilization for up to three areas where shoreline instability was observed during Task 2. In areas identified as suitable for green or hybrid shoreline protection, a range of possible solutions will be considered that utilize native or naturally occurring materials such as plantings and logs, along with stone and timber elements, as required. GEI will develop up to two conceptual approaches at each of the three sites identified, for six total concept design plans. Plans will be conceptual in nature to enable planning and budgeting for future phases of formal design, permitting, and construction. In addition to many Living Shorelines solutions that GEI has designed for waterfront communities within the Northeast and Mid-Atlantic, GEI has worked on shoreline stabilization projects with Living Shorelines elements along the Merrimack River and is familiar with the local riverine and shoreline environment.

Task 5 Deliverables: Technical memo summarizing concept plans and development and conceptual plans of shoreline stabilization measures.

#### ***Task 6: Conceptual Plans for Infrastructure Adaptation to Flooding***

GEI has had the opportunity to work on many municipal vulnerability and adaptation projects, utilizing both our modeling staff and waterfront design team. We strive to create designs to ensure that communities can continue to use their assets well into the future and during storm conditions. This task would evaluate concepts for increased resiliency of infrastructure elements at risk of future flooding. Options may include elevating roads, replacing/enlarging culverts, installing floodwalls, or other related measures. Plans generated as part of this effort will be conceptual in nature but suitable to enable planning and budgeting for future phases of formal design, permitting, and construction. We assume that we will develop two roadway design concepts, two floodwall design concepts, and two culvert design concepts.

Task 6 Deliverables: Technical memo summarizing concept plans and development and conceptual plans for up to three infrastructure categories (roads, culverts, seawalls, etc.) with up to two conceptual plans each.

### **Task 7: Project Management and Meetings**

This task encompasses time for regularly scheduled meetings with the project committee, project oversight, and MVP Action Grant invoicing requirements.

GEI will plan on attending the ongoing monthly meetings with the project committee under the assumption that the project will span 10 months for an estimate of 10 monthly meetings, including a project kickoff meeting at the beginning of the project and a project closing meeting at the completion of the project.

Additionally, GEI will assist the Town of West Newbury with project oversight to include required correspondence with granting authorities. We will draw on our staff's experience with state and federally funded projects to support an effective process of managing funding agency requirements.

This task will include preparation of monthly invoices that meet grant requirements for reimbursement.

Task 7 Deliverables: Monthly invoices

### **Project Team**

The key personnel for this project have been chosen based on their experience with flood vulnerability studies and shoreline stabilization projects. Leila Pike, P.E. will be the Project Manager and Lead Engineer responsible for the Flood Risk Analysis. Mike Sabulis, LSP will assist in Project Management and grant requirements. Lissa Robinson, P.E., will serve as senior advisor of the flood risk analysis. Dan Bannon, P.E., will be the senior designer leading the shoreline stabilization and infrastructure adaptation design. Barney Baker, P.E., will be the senior advisor on the shoreline stabilization and design aspects for this project. Marc Chmura, Amanda Barnett, Emily Jarret, and Dan Pelletier will assist with compiling data, performing analyses, field work, and preparing results. Brenda Pinkham will assist with report and figure preparation.

### **Cost Estimate and Schedule**

Based on GEI's expertise in executing the tasks described above, we have developed the following cost estimate ranges:

<b>Task</b>	<b>Cost Estimate</b>
<b>Task 1: Community Engagement</b>	\$18,000
<b>Task 2: Existing Conditions of Shoreline Survey</b>	\$12,000
<b>Task 3: Existing Conditions of Culverts Survey</b>	\$8,000
<b>Task 4: Merrimack River Flood Risk Analysis</b>	\$55,000
<b>Task 5: Conceptual Plans for Shoreline Stabilization</b>	\$43,000
<b>Task 6: Conceptual Plans for Infrastructure Adaptation to Flooding</b>	\$36,000
<b>Task 7: Project Management and Meetings</b>	\$21,000
<b>Total:</b>	<b>\$193,000</b>

These costs are subject to change if revisions to the Scope of Work are made after conversations with the Town of West Newbury and/or after the grant is awarded.

If the Town of West Newbury is awarded an MVP Action Grant, we anticipate a project start in mid-September 2023 with a project completion by the end of June 2024. We have attached a project schedule which is subject to change based on the actual project start date and any revisions to scope of work between now and when the contract begins.

### **Limitations**

These suggested tasks for an MVP Action Grant for the Town of West Newbury and the accompanying cost estimates were prepared for the use of the Town of West Newbury, exclusively, including its submission for MVP Grants. The opinions, cost estimates, and conclusion presented in this letter are based solely on the information exchanged through emails and during the MVP Team Meetings on March 10, 2021 and May 10, 2022. Additional information regarding the project area that was not available to us may result in a modification of tasks and cost estimates.

If the grant is awarded to the Town, we will prepare a separate scope of work and cost estimate which will include a Standard Professional Services Agreement.

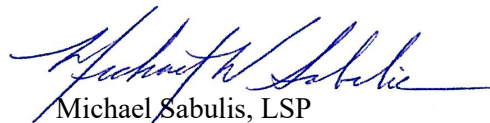
We appreciate this opportunity to support the Town of West Newbury in acquiring MVP Action Grants. We are happy to discuss the options above, provide additional tasks that you would like to include, and/or revise tasks as shown. Please reach out should you have any questions.

Sincerely,

GEI CONSULTANTS, INC.



Leila A. Pike, P.E.  
Civil Engineer/Project Manager



Michael Sabulis, LSP  
Senior Project Manager

LAP/MWS:bdp

Attachment: Project Schedule

B:\Working\WEST NEWBURY, TOWN OF\Proposals\2101052 Shoreline Vulnerability Study\Rev July 2022\REVISED West Newbury Scope and Cost Estimate\_2022-08-05.docx

**PROJECT SCHEDULE**  
**West Newbury MVP Action Grant**  
**West Newbury, Massachusetts**

GEI TASK	Weeks																																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38		
	18-Sep	25-Sep	2-Oct	9-Oct	16-Oct	23-Oct	30-Oct	6-Nov	13-Nov	20-Nov	27-Nov	4-Dec	11-Dec	18-Dec	25-Dec	1-Jan	8-Jan	15-Jan	22-Jan	29-Jan	5-Feb	12-Feb	19-Feb	26-Feb	4-Mar	11-Mar	18-Mar	25-Mar	1-Apr	8-Apr	15-Apr	22-Apr	29-Apr	6-May	13-May	20-May	27-May	3-Jun		
1. Public Meetings			Meeting															Meeting																			Meeting			
2. Existing Conditions of Shoreline Survey		Active	Active	Active	Active	Active																																		
3. Existing Conditions of Culvert Survey		Active	Active	Active	Active	Active																																		
4. Vulnerability Study		Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active																						
5. Conceptual Plans for Shoreline Stabilization																			Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active		
6. Conceptual Plans for Infrastructure Adaptation to Flooding																			Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active	Active		
7. Final Report																																					Active	Active	Active	Active
8. Project Management/Monthly Meetings	Meeting	Active	Active	Active	Meeting	Active	Active	Active	Meeting	Active	Active	Active	Meeting	Active	Active	Active	Meeting	Active	Active	Active	Meeting	Active	Active	Active	Meeting	Active	Active	Active	Meeting	Active	Active	Active	Meeting	Active	Active	Active	Meeting	Active		

**LEGEND**  
 GEI Active Time   
 Meetings

**NOTES:**  
 1. Assumes an award date of August 5, 2022. Schedule may shift based on actual project award date.  
 2. Progress meetings subject to change based on client and project needs.