

Scope of Work
Horsley Whitten Group, Inc.
SHMCAP Preliminary Design
Squanacook River Dam – Groton, MA

November 2023

I. PROJECT INFORMATION AND APPROACH

STATEMENT OF QUALIFICATIONS

The Horsley Witten Group, Inc. (HW) completed three dam removal feasibility study and preliminary design projects for DER in 2020 during the first iteration of this program. As such, HW understands the requisite level of effort necessary for these feasibility/ preliminary design projects and have proposed a cost-effective approach for completing them efficiently. HW has been working with DER, and its predecessor the CZM Wetlands Restoration Program, on many exciting projects for over 20 years. HW's experience broadly covers the full range of ecological restoration and design work required for these projects including, among others, restoration planning, feasibility analysis, land surveying, hydrological analyses, resource area delineation, technical studies, alternatives analysis, engineering design, permitting, and construction administration.

HW is a forward-thinking engineering, planning, and environmental consulting firm providing sustainable design solutions for 35 years. Over that period, their success can be attributed to a combination of innovation, responsiveness, and client satisfaction. HW's dedicated staff of highly skilled professionals manages complex projects in New England and beyond. HW excels as a liaison between decision makers and the public, translating technical subjects into understandable concepts. HW's multidisciplinary-team approach integrates resilience, sustainable civil engineering, urban design, and landscape architecture.

HW's projects address critical environmental challenges including climate change, coastal resiliency, watershed health, and open space and natural resource protection. HW's services include civil engineering design, green infrastructure, water and natural resources study and restoration, smart growth planning and community design, code and ordinance review, and emergency preparedness. HW's clients include the U.S. EPA, NOAA, and the U.S. Department of Justice as well as more than 100 New England municipalities, several state agencies, tribal agencies, non-profit organizations, private organizations, and multiple universities and colleges. HW is a New England-based corporation headquartered in Sandwich, MA with regional offices in Boston, MA, Providence, RI, and Exeter, NH.

PERSONNEL

Based upon staff experience, delineation of primary staff responsibilities for the work outlined herein is indicated below.

Neal Price, Principal Scientist, PL 3

Neal will serve as the **Project Manager**, bringing 30 years of professional experience in the fields of hydrology and hydrogeology. Neal will be actively involved, managing all aspects of the project and will be the contact point for the client and stakeholders. The nature and extent of the work that he conducts at HW includes stream and wetlands restoration, groundwater and surface water modeling, watershed and drinking water protection studies, water supply investigations, sediment quality and dredging assessments, nutrient management, wastewater disposal feasibility studies, and estuarine hydrology

studies, as well as development review and permitting. Neal has conducted and managed dozens of wetlands/stream restoration projects at HW.

Richard A. Claytor, Jr., P.E., Principal Engineer, PL 4

Rich will serve as the **Principal In Charge**. Rich has 40 years of practical experience in civil and water resource management experience with specific expertise in stream restoration, stormwater management, hydrologic/hydraulic modeling, watershed protection and restoration implementation, and low impact development (LID) research and design. Rich has managed stream geomorphic assessment and design projects and authored a variety of publications on stream restoration design and implementation. Rich received the 2009 Clean Charles Award for his committed restoration work for the Charles River Watershed Association. He is also the proud recipient of the NEMO Lifetime Mensch Award, awarded to him in 2010 by the National Nonpoint Education for Municipal Officials (NEMO) Network for a lifetime of work contributing to the protection of our nation's water resources.

Michelle West, P.E., Project Manager / Senior Water Resources Engineer, PL 3

Michelle will serve as the **Project Water Resources Engineer**. She has 20 years of professional experience. With a background in both engineering and natural resources, she is passionate about using her skills to restore the natural world while improving the human experience. Her specific expertise is in stormwater management and policy; watershed planning; green infrastructure (GI) assessment, design, and implementation; stream, wetland, and other ecosystem restoration; and GIS mapping and modeling. Michelle was the Project Manager for our Fuller Brook and Ten Mile River restoration projects. She believes outreach and capacity building is vital to affecting change, and she has enjoyed working with state and local governments to update stormwater management manuals and regulations and leading dozens of workshops on topics ranging from stormwater 101 to hands-on erosion control trainings for contractors and regulators. Michelle received her Master's Degree in Environmental and Water Resources Engineering from the University of Michigan.

Geoff and Jonas will serve as HW's **Project Engineers**. They will conduct much of the survey, hydrologic and hydraulic modeling and design work.

Geoff Glover, Staff Engineer, PL 2

Geoff has over 8 years of professional experience as a civil/environmental engineer specializing in site design, grading and drainage systems, and hydrologic modeling. He is a Professional Engineer and has his Title 5 Soil Evaluators license. He has worked on a variety of projects with a focus in stormwater management and watershed management planning. Geoff has also contributed significantly to many wetlands restoration projects at HW including dam removals and culvert replacements.

Jonas Procton, Project Engineer, PL 1

Jonas is a graduate of Tufts University with a Bachelor of Civil Engineering and a minor in Environmental Science and Policy with over 5 years of experience in modelling hydrologic and hydraulic systems, wetlands restoration, low impact design, and watershed assessment, as well as construction site inspections and stormwater management peer review assistance. Jonas has completed modeling and design for over a dozen wetlands restoration projects including dam removals, culvert replacements and similar stream-focused work. He has his Title 5 Soil Evaluators license and Engineering- In-Training certification.

Brian Massa, LSP and Environmental Engineer, PL 3

Brian will serve as HW's **Licensed Site Professional (LSP)** and also provide construction planning assistance. Bryan is a Senior Scientist and LSP at HW with over 20 years of experience in the environmental field. He has a B.S. in Environmental Engineering from Wentworth Institute of Technology. His experience has included the completion of Phase I and Phase II Environmental Site Assessments for due diligence purposes, remediation design and oversight, risk assessments, landfill construction oversight and monitoring, soil gas and indoor air assessment, and environmental chemistry. Notably with regards to this project, Bryan has completed two in-river remediation projects that each removed tens of thousands of cubic yards of contaminated sediments from the river channels. Those projects included components of dewatering, sediment control, bank stabilization and restoration that are common and standard for dam removals, culvert replacements, and other river restoration projects.

Amy M. Ball, PWS, CWS, Senior Wetlands Scientist, PL 3

Amy will serve as the **Wetlands Resources Specialist**, advising on permitting, wetlands, botanical, ecological, rare species, and wildlife habitat related components of the project. At HW, Amy manages projects requiring inland and coastal wetland resource area determinations, wildlife habitat assessments, impact mitigation, and regulatory compliance with nearly 30 years of experience. Amy prepares permit applications and written narratives for projects requiring federal, state, and local permits pursuant to laws, regulations, and policies governing water resource protection. Amy frequently appears before local conservation commissions and state and federal regulatory authorities as a project representative or reviewing consultant. Amy also currently serves as the President for the Massachusetts Association of Conservation Commissions (MACC), a non-profit organization whose mission is provide education and support for Conservation Commissions. She is also a Professional Wetland Scientist, a Certified Wetland Scientist (CWS) in the State of New Hampshire, and has significant project experience through New England.

Jenna Bernabe, GIS Manager, PL 2

Jenna will lead GIS components of the project. She has over 14 years of experience as a GIS professional and program manager. She has worked with private, public, and governmental agencies in developing GIS products and managing databases for the purposes of analytical modeling, watershed assessment, conceptual site layout, engineering design, and general land use planning. Jenna's expertise includes GIS database management, data format exchange, graphics production, data visualization, imagery analysis, mobile data collection and online mapping. She is proficient in the use of ESRI's ArcGIS suite of software including various extensions as well as ArcGIS Online, and the supporting features within Microsoft Excel and Access.

Dan MacKenzie, PLS, Senior Surveyor, PL 2

Dan will serve as the **Professional Land Surveyor** for the project and has over 25 years of professional experience in land surveying, engineering and GIS. Dan's extensive knowledge of surveying and mapping allow him to compliment any type of project, whether it be planning, engineering design, permitting or construction. Having worked on dozens of wetlands restoration projects during his time at HW, Dan has a sound understanding of the importance of surveying to the ultimate project goals. He has also worked in both the public and private sectors in the past and, has completed boundary surveys, subdivision plans, Land Court plans, ALTA title insurance and easement plans, plans for permitting, route surveying for utility installations, and topographic surveying for engineering design and plan review. Dan is also well versed with AutoCAD, ArcMap, GPS Pathfinder, and TDS Foresight surveying, mapping and GIS software packages.

PROJECT PURPOSE AND BACKGROUND

Through this project, HW will develop feasibility assessments and preliminary designs for the potential removal of the Squanacook River Dam in North Andover, MA. The primary goals of this initial feasibility project are:

- Identify the anticipated benefits and challenges to each specific dam removal in order to assess its overall feasibility and then rank it among other potential dam removal projects for further project advancement; and
- Create preliminary project designs that can then be further advanced during later project phases, assuming that the overall project feasibility and ranking proves suitable for further advancement.

As such, HW will answer the important feasibility questions to the preliminary design level while streamlining field work and data analysis. Key feasibility items to be addressed include, but are not limited to, the following:

- Aquatic organism passage/ habitat/ ecology/ wetlands benefits;
- Flooding;
- Infrastructure;
- Rare species;
- Sediment release concerns;
- Sediment quality;
- Cultural/ historic factors;
- Recreation;
- Potential for public support/ opposition for dam removal;
- Site-specific dam removal design or implementation challenges;
- Anticipated level of permitting difficulty; and
- Costs.

II. SCOPE OF WORK

Task 1 Project Management & Coordination

HW will work closely with DER and Project Partners to provide open and frequent communication on project status and progress submissions including:

- A kickoff conference call meeting to discuss information availability and prepare for field activities; and
- Ongoing email and one-on-one phone calls as necessary.

❖ Task 1 Deliverables

- One kickoff meeting with meeting minutes submitted to DER.
- Emails as listed above.

Task 2 Data Review, Site Visit, and Data Collection

HW will collect necessary data to inform hydrologic and hydraulic (H&H) modeling and preliminary designs that are the ultimate deliverable for these projects. This task will include both compilation and assessment of existing data as well as the collection and assessment of necessary new field data as described in the following subtasks.

Task 2.1 Existing Information

HW will compile, review, and assess available existing data such as Mass GIS, LiDAR, FEMA, USGS, Town GIS, MassDEP hazardous materials information, utility information, and historical map data to assess feasibility considerations and to prepare a preliminary base plan for the project work areas. Any relevant information not readily available online will be supplied by Project Partners. HW will also have a telephone conversation with one to two Town contacts or other local sources of information (contacts to be provided by Project Partners) to discuss the potential dam removal, available local insights, and any potential complicating factors. HW will use this base plan to coordinate field survey and provide the most effective use of field personal time.

Task 2.2 Site Inspection

HW will conduct a Site Inspection of the project work areas to assess overall site conditions and constraints, streamline field activities, and inform potential restoration options. This inspection will be led by the HW Project Manager and coordinated to occur with a site meeting (if desired by DER and Project Partners).

Task 2.3 Wetlands Resource Areas Identification

Commensurate with the level of detail appropriate for this preliminary evaluation, qualified HW staff will identify the approximate boundaries of resource areas in the immediate vicinity of anticipated dam removal work areas jurisdictional under the Massachusetts Wetlands Protection Act and local Wetlands Bylaw. Field identification will be limited to the areas within direct probable construction impact, shortly upstream and shortly downstream of the dam. Potential indirect resource area impacts (e.g., from changes in impoundment extent) will be estimated based on available MassGIS data.

Resource areas anticipated to be encountered include Bordering Vegetated Wetland (BVW), Inland Bank, Bordering Land Subject to Flooding (BLSF), Land Under Waterbodies and Waterways, and Riverfront Area. HW will identify the approximate boundaries of BVW and the Mean Annual High Water (MAHW) line (equivalent to Ordinary High Water (OHW)) from which Riverfront Area is established. Approximate resource area boundaries will be drawn on the base-map by the field delineation staff and survey-located.

Task 2.4 Topographic & Bathymetric Survey

HW will collect targeted topographic and bathymetric data necessary to complete a preliminary H&H model evaluation of the project area, inform sediment management evaluations, and inform preliminary restoration designs. As discussed in the Approach section of this proposal, the proposed field survey level of effort is modest to provide sufficient data to develop preliminary designs and assess overall feasibility.

Generalized topographical survey will be collected and generated in the vicinity of the dam that includes details of the dam, walls, boulders, visible utilities, water features, resource area flagging, edge of tree line, hardscapes, and/or other relevant surface features. Bathymetric survey will be conducted as necessary to estimate the sediment volumes and inform the H&H modeling to a level suitable for the preliminary restoration designs. It will extend from below the dam upstream through the extent of the impoundment to map the longitudinal profile and cross-sectional bathymetric conditions.

Approximately 6 to 8 cross sections will be surveyed during this task with the spacing between sections and along each section to be dictated by field conditions and the preliminary level of current project modeling and design. Sediment depth probing will be conducted along each cross section, as well as spot probing at other key locations as field conditions dictate.

HW will utilize a combination of high accuracy RTK GPS and traditional Total Station equipment to conduct the survey using the NAVD88 vertical datum and NAD83 horizontal datum.

HW will conduct the following site survey activities:

- Targeted topographic survey in the general vicinity of the dam.
- Survey locate top and bottom of dam, lateral extents, and other pertinent features.
- Identify likely construction access route to dam.
- Survey locate visible utilities, large boulders, edge of tree line, and other significant features within the construction zone that might constrain construction options within the construction disturbance zone (individual trees will not be located, other than outstanding specimen trees).
- Survey locate wetland resource area flags (where necessary) and representative bankfull width indicator locations.
- Survey generalized longitudinal profile along the stream in the vicinity of the dam upstream through the impoundment. The location of data collection points along the profile will be field-determined based upon observed changes in stream/impoundment morphology and sediment characteristics. Data point density is intended to be relatively sparse reflective of the preliminary project design level.
- Survey representative cross sections upstream and downstream of the dam and access road culvert, and across the stream and impoundments (Approximately 6 to 8 total assumed).
- Conduct sediment depth measurements along the profiles and cross sections within the impoundments to generate a generalized volumetric estimate of impounded sediment.
- Identify adjacent property lines and roadway right-of-way based on Town and/or MassGIS information. No Registry of Deeds property line research is included.
- Identify and photograph key infrastructure and utilities that may constrain the dam removal (field survey will be limited to those features visible at ground surface, or those subsurface features for which record plan or other documentation exists). Record plan utility information to be provided by the Town.
- While not requested by the RFP, we will make observations of stream hydraulic characteristics and take at least one representative flow measurement from the stream while we are conducting field work.

Task 2.5 Sediment Assessment

The quantity and quality of sediment impounded behind a dam is an important factor to consider during restoration planning. How sediment will be managed (e.g. passive downstream release versus physical dredging and removal) will be largely determined by the contaminant characteristics of those mobile sediments and the potential quantity and quality impacts to downstream resources from release of those sediments. Physical removal of accumulated sediment as part of a restoration plan will require permitting through the Massachusetts Department of Environmental Protection (MassDEP) and sediment testing in accordance with DEP's requirements. HW's work on this subtask will include limited sampling and laboratory analysis to identify the potential for contamination and identify targeted compounds for possible additional testing in the future.

In order to evaluate potential historical threats to water and sediment quality on site and better inform the selection of sediment sampling parameters, HW will conduct a limited due diligence review of publicly available environmental release records. This review will include a review of spills and tier classified sites from the Massachusetts Department of Environmental Protection (MassDEP), assembly of existing sediment quality data for the watershed (to be supplied by DER), and review of historical aerial photographs and Sanborn Fire Insurance Maps (if available). The budget for this task includes a

\$500 direct cost to purchase a summary of potential environmental release and historical mapping information from Environmental Data Resources, Inc. (EDR). These EDR reports provide a more comprehensive inventory of potential environmental risks than can be obtained through free, online records review. During the Task 2 Site Inspection, HW will also visually assess the presence, or likely presence of any hazardous substances or petroleum products under conditions that indicate an existing release, a past release, or a material threat of a release into structures or into the ground, groundwater, or surface water of the subject property.

The Department of Environmental Protection (MassDEP) Water Quality Certification regulations at 314 CMR 9.07 are the primary regulations governing sediment sampling and assessment requirements for upland reuse of dredged material. The regulations define how sampling should be conducted for projects with 10,000 cubic yards of dredging or less (one sample per 1,000 cy, allowing up to 3 samples to be composited into one). Projects with greater than 10,000 cubic yards require that an individual sampling plan be submitted and approved by MassDEP prior to sampling. This task includes a screening-level preliminary assessment of potential sediment quality issues that can then be used to inform restoration design options and sediment disposal options. Sampling and laboratory costs are based on the following assumptions, with a sampling plan to be determined through conversations with DER and project partners:

- One composite sample submitted to be constituted from three locations within the impoundment.
- One composite sample submitted to be constituted from three locations below the dam to identify existing background conditions.
- The plan for how any additional laboratory-submitted samples (if warranted and budget can be made available) will be composited will be determined in consultation with DER and based on field conditions. For example, composited samples could be submitted for different locations within the impoundment, different sediment depths within the impoundment, or from further upstream locations.

This task includes submitting two samples to a Massachusetts certified laboratory for analysis for the parameters shown in the table below, as required for potential future MassDEP Water Quality Certification. No parameters other than those listed in the table below are included in our proposed budget for this task. If warranted, more than two samples and/or additional parameters may be submitted for laboratory analysis pending project specific conditions and discussions with DER.

Laboratory Testing Parameters

Parameter	Reporting limit mg/kg (dry weight) – unless noted
Arsenic	1.0
Cadmium	0.2
Chromium	0.4
Copper	1.0
Lead	2.0
Mercury	0.02
Nickel	1.0
Zinc	1.0

Polycyclic Aromatic Hydrocarbons (PAHs) Priority 16	0.02
Total Organic Carbon	0.1%
Organochlorine Pesticides	0.002 & 0.13
Polychlorinated biphenyls (PCBs) with congeners	
Total Petroleum Hydrocarbons (TPH)	
Extractable Petroleum Hydrocarbons (EPH)	
% water	
Grain Size Distribution – wet sieve (ASTM D422)	Sieve Nos. 4, 10, 40, 60, 200

Upon receipt of the laboratory report, HW will review the data and prepare an analytical summary table for inclusion in a technical memorandum. Using DER’s standard sediment results table, analytical data from the sediments will be compared to the Massachusetts Contingency Plan (MCP) (310 CMR 40.0000) Sediment Benchmark Screening Levels, Threshold Effects Concentrations (TECs), and Probable Effects Concentrations (PECs). The Task 5 Technical Memorandum will include discussion of due diligence review, sampling, results, and sediment management alternatives (i.e., passive release versus mechanical removal).

❖ Task 2 Deliverables:

- Digital copies of written materials reviewed (native format);
- Field data and photos (native format),
- Due Diligence Report
- Laboratory reports
- Results summary table in DER’s spreadsheet template (native and pdf format);
- Shapefiles and other GIS data used to assess the site (except those already publicly available) (native format)

Task 3 Preliminary Hydrologic & Hydraulic Modeling

HW will conduct preliminary H&H modeling in the vicinity of the potential dam removal. Per the preliminary assessment level of the project, HW will take a modest approach to H&H modeling. HW will utilize the U.S. Army Corps of Engineer’s Hydraulic Engineering Center- River Analysis System (HEC-RAS) modeling software to evaluate flooding, fish passage, sediment migration, and other hydraulic factors.

HW will use one of two methods to conduct the hydrologic component of H&H modeling, based on best professional judgement, feasibility and discussion with DER and project partners:

- The U.S. Army Corps of Engineer’s HEC-HMS (Hydrologic Modeling System) to develop rainfall-runoff relationships using NRCS methods and Northeast Climate Center precipitation data for a range of flow conditions and storm return intervals (i.e., August median base-flow, sub-bankfull flows, 1-year, 2-year, 10-year, 25 year, and 100-year)
- Generate the hydrologic inputs to the HEC-RAS hydraulic model using the USGS Streamstats program, USGS regional equations, FEMA Flood Study discharges (where available), comparison to other USGS gauging stations, or a combination of each representing a best-professional judgement. Streamstats generates flow probability values for a wide range of flow conditions by comparing the subject stream and watershed to a variety of nearby gauged streams with similar watershed characteristics.

Model limits will be discussed with DER and based on site-specific characteristics. HW will utilize the results of the hydrologic evaluations to complete HEC-RAS hydraulic analyses upstream and downstream from the existing dam and develop hydraulic profiles along the stream channel under existing and proposed conditions to investigate channel velocities, channel stability, water surface elevations, and sediment transport potential. HW will use Task 2 field run cross-sectional data, and supplement with LIDAR derived cross-section for those areas beyond the field survey limits.

The existing conditions analysis will form the baseline for evaluating the effects of dam removal on critical variables such as the 100-year floodplain, sediment transport, erosivity, fish passage, and existing infrastructure. Anticipated climate change increases in precipitation, or other relevant hydrologic factors, will be discussed with Project Partners and incorporated in the H&H modeling, as appropriate and suitable to address the questions included in the Climate Change Adaptation and Resiliency Section of a MEPA's ENF form. In general, the following design/evaluation criteria will be assessed at the preliminary design level:

- Ensure that the 100-year flood event is not made worse for any key infrastructure upstream or downstream from the dam.
- Assess potential erosion and scour at key upstream and downstream infrastructure.
- Ensure that the upstream water surface elevations are no more than moderately higher than the downstream elevations during a range of storms to maintain a moderate hydraulic gradient for fish passage.
- Ensure that flow velocities through affected reach (impoundment area and breach zone) do not create a scour/erosion threat both during construction and following vegetative establishment.
- Assess fish passage performance using typical fish passage flows (5% and 95% exceedance flows by month) to ensure that flow velocities are within acceptable guidelines. Fish passage assessments will specifically target species of choice to be decided with Project Partners.

Overall, the model will be used to quantify the potential effects of dam removal on stream banks, sediment movement in the impoundment and existing channel, and facilitate channel and fish passage design.

❖ Task 3 Deliverables:

- The results of Tasks 3 will be summarized in the Task 5 technical memorandum.
- All H&H models and data will be made available to Project Partners in native and PDF formats,
- Model output summary tables in PDF and Excel formats.

Task 4 Basemapping and Preliminary Design Plan Development

Upon completion of the survey, HW will prepare a survey base map and existing conditions plan for the project area that includes limits of topographic and bathymetric surveys, topographic contours at a two-foot contour interval, bathymetric contours as appropriate per the level of survey, the dam, impoundment, streambed longitudinal profile, and cross sections, approximate resource areas in the vicinity of the dam, property lines from Town/MassGIS sources, visible utilities, and other major site features. Buffer zones to all resource areas will be included in the plans. HW will also utilize existing engineering drawings, GIS, LiDAR, and FEMA data to prepare the base map(s). Information will be presented in a standard NAVD88 vertical and Mass State Plane horizontal datums.

HW will provide preliminary design plans to the approximately 30% completion level for the dam removal. The design will include the extents of the recommended dam breach, access and staging, erosion and sediment control (ESC), a longitudinal profile, relevant cross sections, and stream bank stabilization/restoration measures, as appropriate, in the immediate vicinity of disturbance. Plans will include appropriate-level detail for dam removal with considerations for erosion control, construction staging, dewatering, temporary facilities, demolition, stabilization measures, proposed infrastructure protection, and other applicable proposed measures necessary to prepare an accurate probable cost for the project. Design drawings will include at least the following elements:

- Title sheet/drawing index;
- General notes, symbols, and legend;
- Existing conditions, infrastructure, utilities, control points, longitudinal profile, regulatory boundaries;
- Proposed conditions with sediment and erosion control measures, demolition elements, general access and staging areas, proposed infrastructure protection where needed, proposed streambank restoration, longitudinal profile, roadway and stream cross sections; and
- Relevant generalized details.

A conference call or virtual meeting will be held with Project Partners to discuss draft design deliverables.

❖ Task 4 Deliverables:

- Draft and final existing conditions and preliminary design level design plans to the approximately 30% design level including a plotted and labeled longitudinal profile and cross-sections in pdf and CAD formats.
- One round of comments per submission is assumed.
- One virtual meeting to discuss draft designs.

Task 5 Technical Memorandum & Cost Estimate

A succinct technical memorandum will be prepared summarizing information from previous tasks and recommended habitat restoration approaches. In addition, the proposed project will be assessed using the online Resilient Massachusetts Action Team (RMAT) Climate Resilience Design Standards Tool in accordance with Massachusetts Environmental Policy Act (MEPA) protocols for climate resiliency. The technical memorandum will summarize and address at least the following:

- Existing information;
- Field data collection including surveying, wetlands resources, sediment characterization, bathymetry, and mapping;
- Rare species presence and possible management approaches, as possible based upon MassGIS mapping of estimated and priority habitats and site observations;
- Description of the site conditions and issues that are currently impairing river and riparian ecosystem function;
- Due diligence and sediment quality assessment;
- Estimated volume of mobile sediment and description of sediment management;
- Hydrologic and hydraulic modeling;
- RMAT design tool assessment;

- Analysis of the type and extent of anticipated upstream effects following dam removal, specifically to upstream resource areas;
- Description of surrounding infrastructure concerns and constraints (i.e., culverts, bridges, retaining walls, utilities, buildings, etc.) and associated restoration challenges;
- Brief description of any known historic resources, as possible based upon MassGIS mapping and information provided by Project Partners or other local contacts;
- Potential constraints on dam removal;
- Evaluation of potential restoration alternatives;
- Description of the proposed conceptual design plans;
- Anticipated future permitting needs (state and federal); and
- Next steps necessary to complete all phases of the future project including a feasible project timeline and planning level cost estimates for anticipated future phases.
- Photos, figures and tables as necessary to support the above information

A conference call will be held with Project Partners to discuss draft Preliminary Designs, Preliminary Design Memorandum, and cost estimate, and to solicit feedback.

❖ **Task 5 Deliverables:**

- Draft and final technical memorandum (Word and PDF formats),
- Engineer’s preliminary cost estimate (Excel and pdf format),
- Output report generated from the RMA Climate Resilience and Design Standards tool,
- Estimated volume of mobile sediment impounded behind the dam in pdf format.

HW will address one round of comments per submission with one draft and final provided. All deliverables available in native and pdf formats. HW will conduct one conference call with Project Partners to discuss draft deliverables and solicit feedback.

Proposal Elements and Assumptions:

- Reimbursable expenses (copies, printing, travel mileage, survey staking materials, etc.) are included in the fee estimate as noted in the Scope of Services. Additional reimbursable expenses can be provided at our standard rates.
- Field work will need to be coordinated with weather conditions (i.e. snow, rain).
- This Scope of Work includes attendance at only the number of meetings listed under each task. Meetings and/or conference calls are assumed to be virtual/remote unless arranged to coincide with field visits. Additional meetings, if necessary, will be provided at hourly rates as approved.
- Sediment sampling, field survey, and other tasks are budgeted as detailed in the Scope of Work. Additional field, analytical, design, or reporting services can be supplied for additional fee at client request.
- HW will not be responsible for the location of underground utilities not visible or identified in the field during the survey or within the as-builts provided by the Town. HW will include appropriate caveats on the plans.
- HW assumes that the project site is not in the vicinity of a hazardous waste site. If any site assessment and remediation services are required, HW has fully qualified staff and would be pleased to offer any services necessary as a negotiated contract amendment to this scope of services.

- One set of revisions to the plans and/or specifications, as applicable, are assumed at each stage of the plan development process.

III. SCHEDULE

The Scope of Services will be initiated based on completion of a fully executed contract between the Horsley Witten Group, Inc. and DER following issuance of Notice to Proceed, anticipated in September 2023.

**All draft deliverables will be submitted no later than May 17, 2024;
and final deliverables no later than June 30, 2024.**

PROPOSED PROJECT SCHEDULE - Dam Removal Feasibility & Preliminary Design								
Tasks		Sep/Oct 23	Nov/Dec 23	Jan/ Feb 24	Mar 24	Apr 24	May 24	Jun 24
Task 1. Project Management	Calls & Emails	[Gantt bar from Sep/Oct 23 to Jun 24]						
	Virtual Kickoff	★						
Task 2. Data Collection	Existing Information	[Gantt bar from Sep/Oct 23 to Nov/Dec 23]						
	Site Visit/Field Data Collection		[Gantt bar from Nov/Dec 23 to Jan/ Feb 24]					
	Due Dilligence/ Sed Sampling		[Gantt bar from Nov/Dec 23 to Jan/ Feb 24]					
	Sed Management				[Gantt bar from Mar 24 to Apr 24]			
Task 3. H&H	H&H Model Develop			[Gantt bar from Jan/ Feb 24 to Mar 24]				
	Analysis/ Summary			[Gantt bar from Jan/ Feb 24 to Mar 24]				
Task 4. Basemap & Preliminary Design	Basemap			[Gantt bar from Jan/ Feb 24 to Mar 24]				
	Preliminary Design				[Gantt bar from Mar 24 to Apr 24]		[Gantt bar from May 24 to Jun 24]	
	Virtual Meeting					★		
Task 5. Technical Memorandum	RMAT				[Gantt bar from Apr 24 to May 24]			
	Future Phases Planning				[Gantt bar from Apr 24 to May 24]			
	Cost Estimate	[Gantt bar from Sep/Oct 23 to Nov/Dec 23]					[Gantt bar from May 24 to Jun 24]	
	Technical Memeorandum				[Gantt bar from Mar 24 to Apr 24]		[Gantt bar from May 24 to Jun 24]	
	Virtual Meeting						★	

Note: Assumes Notice to Proceed September 15, 2023

IV. PAYMENT AND BUDGET

In keeping with established **Ecological restoration Technical Service Master Agreement** contract and per the terms of RFR DER 2019-01 for the MA Dept of Fish and Game, Division of Ecological Restoration. Reimbursement will be on a time and material basis not to exceed **\$48,130.00** according to the budget in Table 1 below.

Variance up to 10% between tasks and subtasks is allowed. This means that no greater than 10% of each sub-task may be shifted to other sub-tasks under the same task and no greater than 10% of any task can be shifted to other tasks. For example:

Task or Sub Task	Amount of Task or Sub-Task	Amount allowed to be shifted
Task 1	\$1500	\$150 can be shifted to Task 2
Task 2	\$2500	\$250 can be shifted to Task 1
Sub Task 2.1	\$500	\$50 can be shifted from this sub-task to subtask 2.2

Sub Task 2.2	\$2000	\$200 can shifted from this sub-task to subtask 2.1
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If during the course of the contract a Task or Sub-Task will not be completed – the funds for that Task or Sub-Task cannot be shifted to cover another Task without a Contract Amendment. 10% of those funds can be shifted **with** prior DER approval.

Variance greater than detailed above requires pre-approval by DER.

Invoices for services will be submitted monthly or at the completion of each task or subtask. The date a complete invoice and associated deliverables are received by the Commonwealth is considered the invoice date¹. An accounting of expenses by task and subtask, including a breakdown of hours and costs of personnel, copies of receipts and applicable deliverables must be submitted with each invoice. Invoices should clearly state the start and end of the billing period.

Final invoices for this scope of work must be received by July 31, 2024.

Where work is completed earlier than June 30 2024- final invoices should be submitted within 30 days of the final deliverables.

Work requested outside the scope of work defined above will not be completed without prior written approval from DER, including definition of the scope, schedule, and budget for additional tasks as/if required.

¹ A complete invoice includes all required documentation of expenses and receipt of associated deliverables.

Table 1- Project Budget

Horsley Witten Group, Inc.									Subtotal	Direct Expenses	Subcontractor	Total Cost
Project Staff												
Claytor PL4	Price/Ball/Massa/West PL3	Mackenzie/Bernabe PL2	Glover PL2	Procton PL1	Survey Crew	Admin						
	\$ 210.00	\$ 190.00	\$ 125.00	\$ 125.00	\$ 115.00	\$ 170.00	\$ 60.00					
Task 1: Project Management	Hours	Hours	Hours	Hours	Hours	Hours	Hours					
Kickoff Call		2	2		2			\$ 860.00				
email updates and ongoing communication		6	2		2		1.0	\$ 1,680.00				
Task 1 Subtotal:	0	8	4	0	4	0	1	\$ 2,540.00	\$ -	\$ -	\$ 2,540.00	
Task 2: Data Collection	Hours	Hours	Hours	Hours	Hours	Hours	Hours					
Existing Information		4.0	10.0		6.0			\$ 2,700.00				
Site Inspection		6.0						\$ 1,140.00				
Targeted Resource Delineation			10.0					\$ 1,250.00				
Targeted Topography/Bathymetry		1.0		2.0	6.0	24.0		\$ 5,210.00				
Sediment Probing/ Volume Est.		1.0		2.0	8.0			\$ 1,360.00				
Sed Quality Due Dilligence		2.0			8.0			\$ 1,300.00				
Limited Sediment Sampling		1.0			8.0			\$ 1,110.00				
Sediment Quality Summary Tables		1.0			4.0			\$ 650.00				
Task 2 Subtotal:	0.0	16.0	20.0	4.0	40.0	24.0	0.0	\$14,720.00	\$ 840.00	\$ -	\$15,560.00	
Task 3: H&H Modeling	Hours	Hours	Hours	Hours	Hours	Hours	Hours					
Hydrology Eval & Build H&H Model		4.0		3.0	30.0			\$ 4,585.00				
Analysis (incl climate change)	1.0	8.0		1.0	18.0			\$ 3,925.00				
Reporting		4.0		1.0	10.0			\$ 2,035.00				
								\$ -				
Task 3 Subtotal:	1	16	0	5	58	0	0	\$10,545.00	\$ 3,550.00	\$ -	\$14,095.00	
Task 4: Basemap & Preliminary Design	Hours	Hours	Hours	Hours	Hours	Hours	Hours					
Base Map		1.0	1.0	1.0	8.0			\$ 1,360.00				
Plans, Profiles, Sections	1.0	6.0	1.0	1.0	40.0			\$ 6,200.00				
Virtual Meeting		2.0			2.0			\$ 610.00				
Task 4 Subtotal:	1	9	2	3	50	0	0	\$ 8,170.00	\$ 100.00	\$ -	\$ 8,270.00	
Task 5: Technical Memo & Cost Estimate	Hours	Hours	Hours	Hours	Hours	Hours	Hours					
Technical Memorandum	1.0	8.0		2.0	18.0		3.0	\$ 4,230.00				
Cost Estimates	0.5	2.0		1.0	8.0			\$ 1,530.00				
RMAT/ Future Phases Planning		2		1	6			\$ 1,195.00				
Virtual Meeting		2.0			2.0			\$ 610.00				
Task 4 Subtotal:	1.5	14	0	3	34	0	3	\$ 7,565.00	\$ 100.00	\$ -	\$ 7,665.00	

\$ 48,130.00