

REQUEST FOR QUALIFICATIONS

Parker Mills Dam Consulting Services

Town of Wareham, MA





August 19, 2021

Mr. Derek Sullivan, Town Administrator
Town of Wareham, Town Hall
54 Marion Rd
Wareham, MA 02571

**RE: Parker Mills Dam Consulting Services
Wareham, Massachusetts
SLR# 20319.00001**

Dear Mr. Sullivan:

All of the firms responding to the Parker Mills Dam Consulting Services qualifications request are likely qualified in the field of dam removal. However, the SLR International Corporation (SLR) team of structural engineers, bridge scour experts, geotechnical engineers, and hydrogeologists are uniquely qualified to evaluate the complicated upstream and adjacent infrastructure impacts associated with the removal of the Parker Mills Dam. When reviewing our proposal, we ask that you consider the following:

- Our team brings expertise and a proven track record of success in dam removal projects throughout New England. SLR professionals have backgrounds in hydrology and hydraulics, engineering design, fisheries expertise, and wetland biology. Our staff also includes invasive species experts, fisheries biologists, and permitting specialists. We also integrate the creative innovation of our extensive in-house team of landscape architects.
- We have the ability to integrate dam removal with the natural site opportunities through careful analysis and planning so that your project is technically sound, environmentally sensitive, and aesthetically pleasing.
- Our team of experts have performed many dam removal projects which also included the design and construction of existing bridge scour countermeasures or new bridges when required, including the four new bridges associated with the five dam removals on Town Brook in Plymouth, MA.
- Our project understanding includes our own unique approach to this project based upon our experience on many constructed dam removal projects.

We look forward to the opportunity of working with the Town of Wareham on this project. We believe we have answered the Town's questions, and we believe SLR's level of effort will not exceed \$175,000. If we can provide you with any additional information, please do not hesitate to contact us. The personnel who will be assigned to represent SLR in its dealings with the town follows:

W. Andrew Greene, PE, US Manager of Water Resources Engineering / Project Manager

James Murac, PE, CFM, Senior Water Resources Engineer

Jenabay Sezen, MS, PE, Associate Water Resources Engineer

Taylor DelVecchio, MS, PE, Project Water Resource Engineer

Fernanda R. Mastroluca, Water Resource Engineer

Matthew Trueheart, MS, Water Resource Engineer

Michael R. Gagnon, PE, Principal Civil Engineer

Scott G. Bristol, LEP, PG, Principal Consultant

Matthew J. Sanford, MS, PWS, US Manager of Ecology

Mark Carabetta, PWS, CFM, Principal Environmental Scientist

Charles E. Teale, PS, LSP, LEP, Principal Geotechnical Engineer

Kishor Patel, PE, Principal Structural Engineer, Structural Lead

Joseph W. Kidd, MS, PE, Principal Geotechnical Engineer

Jeanine Armstrong Gouin, PE, is the firm's duly authorized representative. She is the firm's US Operations Manager, and she can be reached at the following:

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Cheshire, CT 06410

W. Andrew Greene is the firm's assigned Project Manager and primary proposal author. For questions or requests for additional information regarding the firm's submittal, he can be reached at agreene@slrconsulting.com or (203) 271-1773.

Sincerely,

SLR International Corporation



Jeanine Armstrong Gouin, PE
US Operations Manager



W. Andrew Greene, PE
US Manager of Water Resources Engineering

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Section 1



Project Understanding

Site History

Parker Mills Pond Dam was likely constructed in the “eighteenth century and certainly no later than the early nineteenth century for the purposes of providing power to the ‘Tihonet Lower Works’, a nail factory, owned and operated by the Wareham Iron Co.” according to the Phase I inspection report prepared by the Army Corps of Engineers and dated July 1981. The original dam at this location has likely been modified, raised, or even completely reconstructed over the intervening centuries. Wareham has a long history of iron manufacturing dating back to the earliest settlers in the area, making this site an important record of those industrial uses.

As is the case with many industrial sites in New England, once the manufacturing processes cease to operate, all that remains of the original Iron works are the original buildings, and the dam and impoundment created to provide a source of energy for manufacturing. The dam is often the last neglected and overlooked remnant of a historically industrial site.

Project Goals

The Parker Mills Pond Dam is falling into disrepair and was described as “in poor condition”, in three subsequent dam inspections from 2012, 2013, and 2014. It is no longer used in industrial processes and does not provide any appreciable flood control benefits to the community, therefore the removal of the dam is being contemplated by the Town of Wareham. The primary goals of the potential dam removal project would be to:

- Remove the long term maintenance and potential liability of failure of a “high hazard” dam;
- Improve the ecological function of the Wankico River by restoring fish passage, habitat and natural river processes through the Parker Mills Pond; and
- Stabilize and restore the historical and natural setting of the location in harmony with future potential re-uses for the Tremont Nail factory buildings.

Full or partial dam removal can achieve the stated goals, if implemented properly, while being economically feasible, however, other alternatives to dam removal will be evaluated as well. A key task in the feasibility study will be the evaluation of alternatives on behalf of the town of Wareham. Conventional alternatives include full dam removal, partial dam removal, downstream in-channel rock rapids, new fish ladders, and bypass channels. The project will seek to collect data, analyze the existing impoundment and dam, computationally assess the alternatives, and provide a summary of the feasibility and effectiveness of each one at meeting the project goals to inform future decision-making.



Site Constraints

The Wankinco River and its tributaries meander in a generally southerly direction from their headwaters in Myles Standish State Forest before flowing into the tidally influenced Wareham River, just downstream of the Parker Mills Pond dam. The Wareham River eventually flows to Buzzards Bay. The dam at this site (Parker Mills Pond Dam #MA00150) creates the both the small pond downstream of Route 28 (Cranberry Highway) and the larger impoundment which extends almost a mile upstream to Route 25. The dam obstructs fish passage, which at one time was mitigated through the construction of a fish ladder at the dam.

The dam removal feasibility study will take special care to consider potential impacts to upstream infrastructure and restoration of the former impoundment. The Route 28 bridge is located approximately 130 feet upstream of the dam and spans the impoundment. The bridge abutments are submerged by the water that is impounded by the dam at the elevation of flow over the spillways. Dam removal alternatives will carefully consider the potential scour to these newly exposed bridge abutments and the potential for stream channel elevations to head cut below the elevation of the abutment footings. It will be important that any dam removal scenario does not destabilize the Route 28 bridge and roadway, potentially causing failure.

While the crossing at Elm Street is referred to as a bridge, in reality the roadway runs along the top of the earthen embankment portion of the dam. Water is conveyed over the dam and under the roadway through two separate spillways which are also culverts constructed of stone masonry and concrete. It is our understanding that a separate design project is underway to replace the Elm Street bridges. Any future work to reopen Elm Street to traffic will need to be coordinated closely with the future plans for the dam. The Elm Street bridge will need to be sized in conjunction with the dam removal scenario to create a new stream channel capable of conveying a 1% chance design storm (100-year). This will likely be very different in size and shape from the existing spillway culverts.

Adjacent to the downstream face and crest of the dam are the Tremont Nail Co. buildings and parking lots. The buildings and parking are integral with the dam. The main building is less than 30 feet from the edge of the primary spillway on the downstream side of the dam. A third culvert under Elm Street historically brought water into the Tremont Nail Factory building at a lower level as part of historical mill operations. This former sluiceway conveyed water through the building to a raceway which flowed into the downstream channel below the primary spillway. The edge of the downstream channel is adjacent to the building foundation walls. Any dam removal scenario will have to consider possible changes to the saturation of the soil near foundation walls of the building. Dam removal alternatives will consider the structural and geotechnical aspects of the existing buildings to remain to prevent any possible movement of the building or destabilization of its foundation.

Additional upstream infrastructure consists of several tributary stream crossings of Tihonet Road to the west as well as the Route 25 bridges for Wankinco River and Harlow Brook at the upper reaches of the impoundment. Multiple tributaries flow into the impoundment, including Rose Brook, Harlow Brook, and several (at least three) other unnamed wetland and agricultural systems that enter the impoundment. It is unknown if any water intake structures, pumps, or well fields exist within the impoundment or within its hydraulic influence. Research will be completed to identify if any such structures exist, and how best they can be modified to function if the pond levels are drawn down. Impacts to groundwater aquifers and nearby wells will be evaluated to determine if any nearby facilities will be negatively impacted.

Project Approach

The SLR approach to dam removals blends art and science to evaluate a river's predam conditions, seek to restore a naturalized ecosystem, memorialize the historical significance of the site, and to best meet the future goals and needs of the community. Ecological success, including fish passage and stream/wetland restoration, is essential. The overall process to removing unneeded or abandoned dams is to characterize the project setting, prepare topographic and natural resource maps, study the watershed's hydrology and river morphology, perform hydraulic analysis, evaluate alternatives, and prepare construction documents. Public participation is often an active part of the process.

Fish Passage

Our approach to providing fish passage at Parker Mills Pond Dam will be similar to our work with many other removals of post-colonial mill dams throughout New England, and the Commonwealth of Massachusetts. A hydrologic and hydraulic analysis will be necessary to support the engineering design and regulatory permit applications in future phases of work. More importantly, the hydraulics will inform the type of channel designs contemplated in the feasibility assessment and conceptual level cost opinions. The hydrologic and hydraulic analysis is critical to understanding the potential changes to the river upstream of the dam in different scenarios and how these may impact upstream infrastructure.

A key task in the feasibility study will be the evaluation of alternatives on behalf of the town. Conventional alternatives include full removal, partial removal, downstream in-channel rock rapids, new fish ladders, and bypass channels. Fish ladders are feasible but do not resolve dam safety issues, nor do they achieve river continuity. As such, the focus is anticipated to be centered on dam removal or partial dam removal. With full dam removal, accumulated sediments from upstream of the dam would have to be removed or managed in order to re-establish the upstream channel within the former pond. Sediment management options include:

- Natural stabilization of sediments;
- Relocation of the sediment to the pond perimeter;
- Removal of sediments;
- Sediment stabilization in-situ; or
- A combination of the above measure

As part of the assessment process, the impounded sediments will be physically probed to evaluate sediment depths and to determine the existence and/or location of the channel thalweg or the original pre-dam channel. Upstream channel options include:

- Natural erosion along the pool thalweg;
- Creating a new channel to mimic the pre-dam channel; or
- Creating a new channel alignment and grade.

As part of the initial field investigations, SLR will conduct a geomorphic assessment and evaluate the preferred equilibrium, width, depth, gradient, pattern, and profile features to support creation of a natural channel.

Assessment of such channel parameters in the region, and the identification of a stable reference reach can help inform the design relative to Aquatic Organism Passage (AOP) through the post-removal project site.

An interesting alternative that has the potential to be feasible is a partial dam removal in conjunction with rock rapids and pools downstream of the dam. SLR has designed a number of these rock rapid type channels to provide fish passability where site constraints or full dam removal is not possible due to site constraints or the placement of nearby infrastructure which may not have existed before the construction of the dam but has since become reliant on the presence of the dam to maintain its own stability.

Based upon the height of the Parker Mills Pond Dam, there is a significant vertical rise in the elevation between the existing stream channel downstream of the dam and the Route 28 bridge inverts. The dam is also located approximately 130 feet downstream of the Route 28 Bridge, which would necessitate the construction of a steep channel slope between these two locations after dam removal. A rock rapids and pool bed form would allow a proposed channel to be constructed higher in elevation as compared to a natural stream channel. Construction of a post-dam removal natural channel through this section of the former impoundment may necessitate deep excavation beneath the Route 28 Bridge, causing possible scour to the bridge abutment footings. The rock rapids approach may also allow for a partial dam removal, starting downstream of the dam site.

Under a partial removal option, the spillway would be removed while constructing a section of rapids starting downstream of the dam within the existing confined channel walls. The rapids would intersect the spillway at approximately mid height or higher. A partial removal would include a grade control structure or would retain a portion of the abutments on either side of the spillway itself, which would hold the impounded sediments in place and a stream channel through the impoundment to be at or near the elevation of the existing pond bottom or slightly above to maintain some impoundment.

The advantages to a partial dam removal approach at this site include:

- The rock rapids would provide a vertical rise in channel elevation over a shorter distance, thus eliminating a channel that is set below the existing grade of the upstream Route 28 bridge abutment footings; and
- Partial dam removal will hold a significant volume of sediment in place, negating the need to remove as much sediment as a full dam removal.

Hydrology and Tidal Influence

Understanding a watershed's hydrology is critical to the success of river restoration and dam removal projects. The Wankico River changes names to the Agawam River at the dam, which was constructed at the historic head-of-tide. The Agawam River flows for approximately 3,000 feet before combining with the tidally influenced Wareham River estuary, which then empties into Buzzards Bay.

Being located at the head of tide, the site will be subject to coastal effects and tidal surges in addition to freshwater flows. Tidal data will be compiled from nearby National Oceanic and Atmospheric Administration (NOAA) operated tidal buoys as well as from the Federal Emergency Management Agency (FEMA) Flood Insurance Study (FIS). The currently effective Flood Insurance Rate Mapping (FIRM) does not appear to

account for the dams presence when depicting the 100-year flood elevations at the project site, therefore it is unclear if the FEMA data will be valid or accurate enough for use.

The site will also be subject to freshwater flows originating in the 19.9 square miles of watershed feeding the Wankico River. SLR will investigate the severe weather flood flows at the dam to be able to assess post-dam removal channel stability and the susceptibility of sediment to migration, as well as the more typical “normal” flows that could be expected on sunny days in spring and summer, which affect fish passage and habitat. Normally, the peak flows for the 2-, 10-, 25-, 50-, 100-, and 500-year events are evaluated, along with the seasonal and mean monthly average flows to assess fish passage.

Multiple sources and methods exist for developing hydrologic data. Developing a full rainfall runoff model may be too complex for such a large watershed; therefore we propose that existing peak flow data be compiled from many sources and assessed for validity.

The USGS StreamStats web application provides useful and easily accessible information for hydrology data such as peak flows, low flows, bankfull geometry, and watershed size. However, due to the unique geology found in eastern Massachusetts, the regression equations used in the application are often unable to provide reliable estimates of riverine peak flows or reliable delineations of contributing watersheds in eastern Massachusetts.

It is therefore proposed that a Bulletin 17C statistical analysis will be run using the HEC-SSP software package for two available gauges nearby on the Paskamanset and Mattapoissett Rivers, and the results will be transferred to the site and compared with the other available peak flow information. Low flow information will be obtained from the USGS Gauges and transferred to the site using the watershed transfer equation.

Hydraulic Modeling

Hydraulic modeling using the newly released version 6.0 of the United States Army Corps of Engineers (USACE) Hydraulic Engineering Center River Analysis System (HEC-RAS) is proposed. HEC-RAS enables evaluation of existing and future proposed conditions relative to water surface elevation, velocity, and shear stress throughout the study area to appropriately evaluate fish passage, sediment stability, and infrastructure scour susceptibility.

In many cases, FEMA utilizes HEC-RAS to evaluate riverine systems and as the basis for developing the FIRM mapping, and that modeling can be shared with anyone who chooses to request it from FEMA, and can be used as a basis for more updated/detailed modeling to be developed. However, due to the fact that the FIRM mapping appears to disregard the dam entirely, it is likely that such modeling would not be of sufficient validity to use for the subject dam removal analysis.

It is therefore proposed that a new hydraulic model be created. Input data such as bathymetric survey from within the pond and downstream of the dam will be compiled with LIDAR data for the floodplain areas as well as site observations made by engineering staff to develop new modeling, which will be calibrated based upon any records of flooding that may exist with the Town. It will then be utilized to evaluate the predicted effects of both freshwater flooding and tidal surges on the site relative to water surface elevation, velocity, and shear stress. The existing conditions will be established and used as a basis for comparison against any feasible full

or partial dam removal alternatives to identify any potential areas of concern and develop mitigative measures accordingly.

Post-Dam Impoundment Restoration

An important step in the dam removal process is understanding and predicting how the river will behave as it flows across the bottom of the former impoundment. SLR researched and developed a predictive model to assess post-dam removal channels and we have used it successfully in the recent removal of the Plymco Dam in Massachusetts (2014 and 2015) and Ed Bills Dam in Lyme, Connecticut (2015). This provides guidance as to whether or not to intervene and create a new channel across the impoundment or allow the river to heal by itself.

We would plan to probe and identify the pre-dam channel, and mapped pond bottom to assess where the post-dam channel is likely to be and if it is acceptable. If needed, landscaping and planting plans can be developed by our certified ecologists. After dam breach or removal, rivers respond by having an increased gradient due to the lower downstream water level. The response is predicted by reviewing stream processes such as scour and deposition potential, which are driven by the available level of energy, called specific stream power (SSP). This will be an integral part of our design analysis.

Sediment Management

Dams and their impoundments often trap and impound sediment. Even a minor release over a short period of time can cover downstream channel substrate in low-velocity zones. Our sediment management strategies include natural processes (allow erosion of clean material if it will not harm downstream areas); regulated slow release (gradual breach and water drawn down to encourage slow sediment release); limited sediment removal (remove hot spots or pre-form a channel across the pool bottom); relocation (move and relocate sediment, on site, within the footprint of the dry pool site); excavate and remove (usually reserved for contaminated material or excessive volumes); or stabilize in place.

Protection of Wetlands and Aquatic Life / Invasive Species Management

Inland wetlands and watercourses are regulated at the local, state, and federal levels. While dam removal is widely recognized as providing a positive benefit to aquatic communities and ecosystems, great care must be taken to ensure that: (1) the removal occurs in a manner that does not harm downstream aquatic life or riparian ecology; (2) the channel is designed appropriately to carry low and high flows that support fish passage while protecting against head cutting and erosion; and (3) long-term riparian corridor health is maintained through the prevention of widespread invasive species.

Reducing water levels is likely to influence adjacent wetlands, particularly those located on alluvial sediments deposited in the original elongated pool and adjacent areas with permeable soils. SLR ecologists will inspect wetlands and their vegetation, review wetland and soil maps, and search databases for rare or endangered species. Of special concern are the potential for invasive species and the need for invasive control plans.

Public Outreach

Public outreach is often an important element of dam removal projects. Our public outreach approach has

five elements: (1) collection of data; (2) understanding of the needs of the stakeholders and of the project; (3) acquiring knowledge of how to produce the maximum results with the available budget; (4) choosing the right communication tools; and (5) appropriately distributing findings and recommendations. Using these tools, the project team can implement comprehensive community relations programs and carry out specific short-term outreach activities.

We pride ourselves in presenting technical information, listening to project stakeholders and the public, and providing feedback in an understandable format. We prepare presentations that allow us to describe our technical work in language that the general public can understand. The team is experienced in preparing presentation materials including PowerPoint, Photo Shop, and artistic renderings.

Scope of Services

SLR International Corporation (SLR), formerly Milone & MacBroom, Inc., has a long history of experience with dam assessments, feasibility studies, repairs, and removals, as well as fish passage assessments and river and wetland restoration projects. We have been working with the Town of Plymouth for the last 15 plus years to remove five dams on Town Brook to create one of the most successful river restoration projects in the north-east.

Our team has undertaken numerous dam-related projects for municipalities, private landowners, and non-governmental organizations. For example, currently we are working with the Town of Union Vale, New York, in Dutchess County, on a similar effort to provide the town with the information necessary to decide whether to repair, remove, or replace a town-owned dam that is in poor condition and have recently completed similar assessments for dams in the towns of Acton, Braintree, Bridgewater, and West Boylston, Massachusetts.

Based on materials provided by the Town of Wareham and observations made during our initial site visit, it appears as though the Parker Mills Pond dam (MA #00150) is an earth embankment running under Elm Street, which has been closed to through traffic. The roadway and dam are located immediately upstream and to the north of the historic Tremont Nail Factory building. In addition to the earth embankment, the dam consists of three culverts to convey water over spillways to the downstream channel. One such culvert historically took water into the building for waterpower.

It is SLR's understanding that the town's primary goal is to conduct a study to determine the feasibility and cost of removing the dam. Our intention with this proposal is to provide the town with a feasibility study and conceptual design of a possible dam removal scenario. We will gather and evaluate the information necessary to present the information and potential impacts on nearby infrastructure if the town moves forward with the dam removal.

Another consultant has previously submitted design plans for repairing the dam; therefore, this study is intended to focus on the feasibility of dam removal such that work is not duplicated. SLR's team for this feasibility study will include Water Resource Engineers, Environmental Scientists, Dam Engineers, Structural Bridge Engineers, Geotechnical Engineers, Professional Wetland Scientists, and Landscape Architects.

We propose the following scope of services. The tasks are proposed based on information presented, a field visit by SLR, and our background and experience with similar dam removal feasibility studies.

Task 1 – Data Collection and Site Investigations

- 1.1 Project Management and Meetings – Provide ongoing coordination with the Town of Wareham and project stakeholders throughout the project, both formally and informally through phone calls, email, and written updates. Integrate outcome of coordination into work products.
 - Participate in an initial project kickoff meeting with the town and project partners to confirm project vision, goals, and objectives; establish a detailed project schedule; and set interim

submission dates. We assume this meeting will be held on site in Wareham as part of data collection efforts or can be held remotely via the Microsoft Teams video sharing platform.

- Arrange for periodic conference calls with the town and others as appropriate throughout the project. This scope assumes one conference call per month, which can be performed via remote platform.
 - Project team members will attend one project planning meeting following completion of data collection, hydrologic and hydraulic analysis, and upstream infrastructure evaluation and prior to the alternatives analysis. This scope assumes that two team members will participate in a remote meeting.
- 1.2 Review of Existing Resource Materials – Under this task, data, mapping, reports, and information will be collected and reviewed as available from the Massachusetts Division of Ecological Restoration (DER), the Massachusetts Division of Marine Fisheries (DMF), the Town of Wareham, utility providers, other project partners and stakeholders, and state agencies. This information may include dam inspection reports, bridge construction plans, past studies, watershed history, information regarding abutting property owners, information on historical diadromous fish runs and/or fisheries, threatened or endangered species, existing archeological or historical reports, mapping of the project area, aerial photographs, natural resource information, geologic data and mapping, hydrologic data and analysis, fisheries data, Federal Emergency Management Agency (FEMA) data, modeling, reporting, and sediment data. A resource listing will be developed. As part of data collection, Sanborn Fire Insurance maps will also be reviewed for the area in order to identify the industrial processes of the historic Tremont Nail Factory along this reach of the Wankinco River.
- 1.3 Identification of Wetlands and Resource Areas – An SLR wetland scientist will identify, characterize, and flag resource areas within the immediate vicinity of the dam subject to the provisions of the Rules and Regulations of the Massachusetts Wetlands Protection Act and Section 404 of the Clean Water Act. Wetlands will be delineated using the methodology provided in the United States Army Corps of Engineers (USACE) Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region. Resource area boundaries and flags will be collected using handheld Global Positioning System (GPS) and incorporated into project base mapping. This task includes establishment of data plots and completion of USACE wetland data forms. Wetland delineation will extend from approximately 300 feet downstream of the dam to just upstream of the Cranberry Highway Route 28 bridge. The delineation will include the portion of the impoundment between Route 28 and Elm Street at the dam. It will not include the larger impoundment, which extends almost a mile to Route 25. The wetland scientists will visually assess and characterize wetlands within the immediate project area. USACE transect forms will be completed, and a Geographic Information System (GIS) map depicting wetland community types will be prepared along with a brief wetland report for future use in Massachusetts Environmental Policy Act (MEPA) filing.
- 1.4 Topographic and Bathymetric Survey – Undertake topographic survey of the immediate dam area, appurtenances, the Elm Street and Route 28 bridges, and the impoundment between the dam and

Route 25. Survey will include up to 50 cross sections within the 1 mile of impounded river channel and visible utilities sufficient for feasibility assessment, including potential construction access and staging areas. The survey will be completed in horizontal datum NAD 83 and vertical datum NAVD 88. Additional survey may be warranted in future advanced phases of engineering design but is not believed to be essential for feasibility assessment.

- 1.5 Impoundment Investigation – Perform an assessment of the impoundment upstream of the dam by boat. This will include the small area of impoundment between Route 28 and the dam and the lower third of the Parker Mills Pond extending approximately 1,500 feet upstream of Route 28 where the impoundment necks down to approximately 200 feet in width. Photo document the condition of the banks, vegetation, flow control structures, intakes, discharges, tributaries, and infrastructure that are nearby or affected by the impoundment or its drawdown. Sediment probing will be completed in the impoundment to refusal sufficient for sediment depth mapping, quantifying the volume of mobile sediment above the dam, identifying the top of the impoundment, and as input for hydraulic and sediment transport modeling. Up to three composite sediment samples will be collected from inside the impoundment and taken to a laboratory for grain size analysis for use in evaluating sediment transport. Quantification of impounded sediment volume will be computed following field investigations.
- 1.6 Assessment of Site Features – Perform a visual inspection of the dam and areas surrounding the dam, Elm Street, and downstream channel. The site inspection will include the dam, the retaining walls, the surrounding riparian corridor, visible infrastructure, and adjacent properties.
 - Dam - At this site, the Elm Street crossing of the Wankinco River coincides with the dam embankment just upstream of the former Tremont Nail Factory. The dam consists of three culverts; the eastern culvert supplies water for a fish ladder, the middle culvert appears to take the main river flow, and the western culvert likely provided water into the Tremont Nail Factory for historical activities on the site. The culverts act as spillways to maintain water levels within the impoundment and release water to the downstream channel. These culverts will be evaluated as part of the dam and spillways.
 - Channel – One sediment sample of the tidally influenced, sandy channel downstream of the dam will be conducted to characterize the sediment in the channel bed. Geomorphic assessment of the channel immediately downstream of the dam is not possible due to the tidal influence, and assessment upstream beyond the influence of the impoundment may be difficult due to the influence of the dam and the proximity of the Tihonet Pond dam directly upstream. Assessment will be performed to the extent that natural segments of channel can be found. Bankfull width and depth will be field verified and compared to regional hydraulic geometry curves. The streambed and banks, riparian cover, and channel structure will be noted. Assess the construction of the dam and measure the spillway height, width, depth, and geometry. Measure and photo document low-flow controls and outlet works. Identify and record visible utilities or other barriers to construction access to the dam and spillway.

- 1.7 Project Base Mapping – Using MassGIS Light Detection and Ranging (LiDAR) data and field survey collected in Task 1.4, a base map will be compiled at a scale of 1"=40' with field topography with 1-foot contour intervals and LiDAR data with 2-foot contour intervals. Base mapping will include detail on the dam site, the High Street bridge, and the impoundment between. The LiDAR will extend from the downstream bridges at Elm Street through the impoundment approximately 1 mile to the bridge at Route 25.
- 1.8 Technical Memorandum – Summarize existing conditions in a brief technical memorandum. An initial assessment will be made of potential impacts of dam removal on adjacent infrastructure, utilities, and properties; potential stream morphology and habitat characteristics following restoration; potential impact of dam removal on adjacent resource areas; and potential extent of stream headcut following dam removal. This initial assessment will be examined further and quantified as the analysis and design proceeds.

Task 1 Deliverables

- Project base and bathymetric mapping in electronic (pdf) and AutoCAD (dwg) format
- USACE Wetland Determination Forms and GIS mapping depicting wetland community types
- Technical Memorandum (summarizing existing conditions, base mapping, and quantification of impounded sediment volume)

Task 2 – Hydrologic and Hydraulic Analysis

- 2.1 Hydrologic Assessment – The contributing watershed of the Wankinco River at the Parker Mills Pond Dam is approximately 20 square miles although this is subject to further verification. Under this task, the contributing watershed will be delineated using available MassGIS drainage basin shapefiles, United States Geological Survey (USGS) StreamStats data, and review of USGS quadrangle maps. USGS StreamStats will be run although it is anticipated that the results will be invalid due to the unique geology of eastern Massachusetts. FEMA flow information will be collected from the Flood Insurance Study (FIS). A Bulletin 17c assessment will be run using the Hydrologic Engineering Center – Statistical Software Package (HEC-SSP) software package for two available gauges nearby on the Paskamanset and Mattapoisett Rivers, and the results will be transferred to the site and compared with the other available peak-flow information. Low-flow information will be obtained from the USGS gauges and transferred to the site using the watershed transfer equation.
- 2.2 Existing Conditions Hydraulic Modeling – Develop an Existing Conditions hydraulic model using the USACE Hydrologic Engineering Center – River Analysis System (HEC-RAS) software. This will not involve converting a deprecated model such as HEC-2 to HEC-RAS as FEMA has not performed a detailed analysis of the river. If additional data is required, the model will be supplemented using available LiDAR data.
- 2.3 Proposed Conditions Modeling – Develop concept alternatives to the extent necessary to model proposed conditions and evaluate potential changes in velocity and water surface

elevation. Modeling will assess predicted water depths, velocities, shear, and water surface profiles over the range of flows assessed in Task 2.1. Modeling results will be evaluated relative to potential sediment transport, effect on water quality, and fish passage as well as aquatic habitat improvements. The analysis will inform the Feasibility Analysis.

- 2.4 Sediment Stability Assessment – Following characterization of channel bed material through grain size analysis and pebble counts as well as geomorphic assessment of the stream channel, utilize the results of proposed conditions HEC-RAS output to evaluate shear stress and compare against the resistance of the existing and anticipated postconstruction bed material. Results will also be compared to an upstream reference channel reach. Subsequently, the SAM module within HEC-RAS will be used to model sediment transport. Such an analysis will inform spillway removal design as well as channel design relative to long-term stability and control of downstream sediment transport. Sediment and channel stability surrounding physical structures that are to remain (such as walls) will be included in this assessment.
- 2.5 Technical Memorandum – Prepare draft and final technical memoranda to summarize the hydraulic and hydrologic assessment and key findings and data relative to preliminary design specifics.

Task 2 Deliverables

- Digital HEC-RAS Model Input and Output Files (editable non-pdf version)

Task 3 – Sediment Sampling and Analysis

Sediment sampling for chemical analysis will be completed under this task. Seven sediment samples will be collected. Five of the samples will be obtained from within the impoundment, one from the upper reaches of the impoundment to help identify background conditions, and one from downstream of the existing dam. The samples will be field prepared and submitted for analysis at a Commonwealth of Massachusetts certified testing laboratory. The results will be evaluated by SLR environmental professionals experienced in sediment characterization and management under the Massachusetts Sediment Management programs.

- 3.1 Review Existing Information – Review existing data, mapping, and information provided by the town for potential sources of sediment contamination in the upstream watershed to inform analysis and management.
- 3.2 Estimate Mobile Sediment – Based upon field data, observations, and computations developed as part of Task 1 and modeling under Task 2, estimate the total and mobile portion of impounded sediment to inform sample collection and design alternatives.
- 3.3 Sediment Testing Plan – Develop a sediment testing plan to assess sediment quality, including grain size distribution, and quantity following guidelines in 314 CMR 9.00. The plan will identify proposed locations and methods of investigations, and parameters to be tested.

3.4 Sediment Chemical Sampling – Collect seven sediment samples in accordance with the approved sediment testing plan. Samples will be collected by boat using clear Lexan tubing driven into the soft sediments. The tubing is contained within a steel housing to facilitate penetration of the tubing to the firmer, natural riverbed, if encountered. The samples will be composited vertically and placed into appropriately labeled laboratory containers. All samples will be placed on ice following sampling. The samples will be delivered to a Massachusetts certified environmental testing laboratory, and each sample will be analyzed for the following constituents:

- Heavy Metals (Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, and Zinc)
- Polyaromatic Hydrocarbons
- Polychlorinated biphenyls
- Extractable Petroleum Hydrocarbons (EPH)
- Organo-Chlorine Pesticides
- Total Organic Carbon
- Percent Water
- Grain Size (Sieve Nos. 4, 10, 40, 60, 200)

Lab detection limits will meet those found in 314 CMR 9.07(2)(b)(6).

3.5 Sediment Sampling Analysis Memorandum – Present the results of the sediment evaluation in a memorandum in draft format for partner comment prior to finalizing.

Task 3 Deliverables

- Draft and Final Sediment Sampling Plan
- Chain-of-Custody Forms
- Lab Results (pdf and Microsoft Excel formats)
- Draft and Final Sediment Sampling Analysis Memorandum

Task 4 – Upstream Infrastructure Evaluation

4.1 Cranberry Highway (Route 28) Bridge Investigation – The Route 28 bridge crosses the Parker Mills Pond just upstream of the dam. The bridge parapet wall has a date from 1924 stamped into the concrete. This bridge is in close proximity to the dam and will likely be impacted by changes to the dam and changes to impoundment water surface levels. Perform an investigation of this bridge over the main stem of river flow. This work may be conducted from a boat or with the use of waders depending on the depth of water. This investigation will be performed by a structural bridge engineer and a water resources engineer, with a focus on bridge scour. If any original design drawings of this bridge are available, the plans will be consulted prior to the investigation. Information relative to the existing utilities in Cranberry Highway (Route 28) will also be collected. Photograph and probe/measure the abutment, piers, and footings.

- 4.2 Tremont Nail Factory Investigation – Perform a structural review of the Mill Building as it relates to the dam and the downstream channel. The vertical stone masonry wall along the eastern face of the building and adjacent to the downstream channel will be investigated by the same team as Task 4.1. No invasive testing is proposed of the building materials. A visual investigation will be limited to the outside of the building on the east side and where it wraps around on the south side with the forked channel.
- 4.3 Additional Upstream Bridge or Infrastructure Investigations – The impoundment influences water surfaces for at least 1 mile upstream. The bridges at Route 25 on Wankinco River to the west and Harlow Brook to the east enter Parker Mills Pond as two distinct lobes near the limit of this influence. There are also two crossings under Tihonet Road to the west on Rose Brook and an unnamed stream. Field investigate these four stream crossings to evaluate foundation conditions and susceptibility to bridge scour as well as the opening size and shape. As part of this task, research the existing bridge plans from Massachusetts Department of Transportation (MassDOT) District 5 offices. Photograph and probe/measure the abutment, piers, and footings. A small cranberry bog located near Centre Cemetery will also be evaluated to determine if it withdraws water from Parker Mills Pond. The other cranberry bogs west of Tihonet Road or north of Route 25 will not be investigated as part of this task.
- 4.4 Geotechnical Borings – Conduct a subsurface exploration program at Elm Street near the dam abutments to establish subgrade conditions. The principal objective is to provide soils data including soil type and consistency and ledge and/or groundwater depth. These borings will not be undertaken until the dam removal conceptual design is far enough along to understand the possible post-dam-removal channel size, location, and possible Elm Street bridge replacement location. The program will include the following:
- A site visit by our Geotechnical Engineer prior to drilling to mark out boring locations and to investigate the site
 - A boring program to undertake two Type B drilled borings for a possible replacement of the Elm Street bridge. Two days of drilling are assumed.
 - Coordination of the services of the boring contractor to execute the program
 - Collection of continuous split spoon samples from the borings extending 25 to 35 feet below grade
 - Laboratory testing of the samples for grain size
 - If bedrock is encountered, core to a depth of 5 feet and establish rock quality designation (RQD).
 - It is assumed that a police detail will not be required for traffic control for the borings to be conducted in the roadway since the road is currently closed.
- 4.5 Technical Memorandum – Summarize infrastructure findings in a brief technical memorandum. This will elaborate on the initial assessment of potential impacts of dam removal on adjacent infrastructure, utilities, and properties and possible stream headcut following dam removal. It will also include an analysis by our Geotechnical Engineer of the results of the borings.

Task 4 Deliverables

- Technical Memorandum

Task 5 – Feasibility Report

5.1 Feasibility Study – Determine the feasibility of repairing, removing, or modifying the dam based on its current condition, sediment management options, fish passage needs, and the impacts on upstream infrastructure from changes to the impoundment water levels. The advantages and disadvantages will be evaluated for all three scenarios and will consider species, seasonal needs, swimming speeds, depth of flow, cover, and channel morphology. During the alternatives analysis, the following three scenarios will be considered:

- Full dam removal
- Partial dam removal
- Repair or reconstruct the dam to maintain the current pool elevation – This alternative would include the feasibility of a new fish ladder to improve fish passage or a bypass channel around the dam.

Among the factors to be considered in the alternative designs are the following:

- Cost opinions and benefits of no action, dam repair/reconstruction, full dam removal, and partial dam removal,
- Fish passage design(s) and restored river characteristics under variable flow conditions,
- Impacts on the Lincoln Athletic Association building and the High Street bridge culverts,
- Sediment management options

5.2 Concept Design – Prepare Concept Design sketches for full or partial dam removal alternatives identified in Task 5.1. The two preferred Concept Designs will be selected in consultation with the project team based on preliminary findings of the previous work phases. A dam repair design has previously been prepared by another consultant, and this alternative will not be advanced as part of this task.

5.3 Meeting – Upon completion of Task 5.1, SLR will coordinate a meeting with the town and the project partners to present the analysis. Copies of materials will be disseminated to the project partners, along with meeting minutes and a summary of comments to be implemented in the Final Feasibility Report.

5.4 Final Report – Prepare draft and final report of Feasibility Analysis and compile all task deliverables.

Task 5 Deliverables

- Draft and final copies of the Feasibility Study Report with Concept sketches

SCHEDULE

The scope of services will be initiated based on completion of a fully executed contract.

Section 2





Statement of Qualifications

FIRM OVERVIEW

In the United States, SLR International Corporation (SLR) has over 400 employees located throughout 34 offices. Our team represents a broad and diverse range of technical and environmental capabilities. SLR's professionals offer a blend of experience incorporating engineers, geologists, planners, remediation specialists, regulatory and compliance specialists, and environmental scientists. SLR has completed projects worldwide and continues to expand, serving a wide range of local, national, and international clientele including municipalities (ports, cities, counties, and utilities), industries (solid waste, wood products, chemical, oil and gas, waste management, and mining), and professional service sectors such as commercial real estate, capital finance, attorneys, and insurance.

SLR (formerly Milone & MacBroom, Inc.) staff have over 34 years of engineering experience providing a wide range of services on over 100 dams throughout New England and New York.

RELEVANT EXPERIENCE

Dam Removal Design and Plan Preparation

SLR has unique experience in the area of dam removal and dam modification and has been involved in over 100 projects in over 10 states with the completed removal of nearly 40 dams. Our staff has conducted feasibility analyses and dam removal and fish passage studies, created preliminary and final designs, and provided construction administration services





during the dam removal. We have aided the removal of concrete, masonry, earth, and timber dams for safety, fish passage, habitat improvements, and river restoration. Staff members are frequently invited to speak at regional and national conferences ranging from specific case studies to general river restoration techniques. The firm has planned and designed fish ladders and bypass channels around dams, as well as fish passage ramps at dams that must remain in place. The firm is a recipient of the “Outstanding Organization Award” from the Southern New England Chapter of the American Fisheries Society in recognition of our commitment to restoring fishery resources.

The firm’s design for the Holmes Playground Dam removal in Plymouth, MA, was recently completed in 2019. In 2018, SLR dam removal designs were constructed at Rome Dam in Jay, New York, and Blackledge Dam in Glastonbury, Connecticut, while 2017 saw the construction of East Burke Dam removal in East Burke, Vermont. In 2015 and 2016, SLR dam removal designs were constructed at Rattlesnake Brook Dam in Freetown, Massachusetts; the former Ed Bills Dam in Lyme, Connecticut; the Plymco, Off-Billington, and Water Street Dams on Town Brook in Plymouth, Massachusetts; West Fork Dams in Clarksburg, West Virginia; and Boquet Dam in Wilsborough, New York. In 2014, the Franconia Dam in Groton, Vermont, and the Kendrick Pond Dam in Pittsford, Vermont, were removed. In 2013, the Dufresne Pond Dam and Henry Bridge Dam were removed. In 2012, the team oversaw one of the largest dam removals on the East Coast – the Great Works dam removal in Old Town, Maine, on the Penobscot River. In 2011, we completed the Briggsville Dam removal on the Hoosic River in Clarksburg, Massachusetts, and the Wapping Road Dam removal on the Jones River in Kingston, Massachusetts. In all of these projects, the firm was the design engineer of record, having conducted survey through design and permitting, and concluding with construction-phase services and postconstruction monitoring. We have many more constructed dam removals to our credit spanning over the last three decades, including in Braintree, MA.

Fluvial Geomorphology

Team members have specialized experience in applying fluvial geomorphology principals to riverine assessments and restoration projects. The firm uses all three leading quantitative geomorphic analysis techniques and applies them for naturalistic channel design. Our application of Regime Theory, Regional Hydraulic Geometry, and Reference Reaches methods is reinforced by vigorous hydraulic analysis. The project team has performed watershed inventories, stream classification, river reach inspections, bankfull surveys, and identification of problem sites.

Hydrologic & Hydraulic Modeling

For decades, SLR has been a leader in flood analysis and mitigation planning. Team members have applied hydrologic modeling experience using HEC-1, HEC-HMS, TR-20, and WIN-TR-20 along with analysis of gauge data and regression equations. Riverine modeling is routinely conducted with HEC-RAS, HEC-GeoRAS, HEC-GeoHMS, and a variety of two-dimensional hydrodynamic models. The team was a HEC-RAS version 5.0 beta

tester, and we are now currently applying the new release on projects in the one- and two-dimensional modes. Our models are developed to meet the technical standards and permitting requirements necessary to comply with FEMA as well as other state and federal agencies.

Sediment Management

Sediment survey, characterization, and analysis have been a key element of many of our permitted and constructed fish passage projects. Integral to our staff are Charles (Eric) Teale and Scott Bristol, to assess contaminated soil and sediment.

They understand the complex regulations that pertain to sediment management and have led the sediment management efforts on many dam removal projects in New England. Team members developed technical papers adopted by ASCE on channel evolution and sediments post dam removal.



Wetland Biology

SLR has in-house wetland delineation, functional assessment, and field survey as well as wildlife and upland vegetation survey and analysis capabilities. Our certified wetland scientists and wildlife biologist have performed comprehensive surveys and field investigations on thousands of acres of undeveloped land, including vernal pool assessments, studies of threatened and endangered

species, microbenthic analysis, and functions and values evaluations. The project team has in-house wetland functional assessment and field survey capabilities utilizing a variety of assessment techniques and established protocols including HEP, HGM, WET, and others. These have been vetted by local, state, and federal review agencies as well as third-party specialists. Our functional assessments have taken place in a variety of environs including urban and rural, tidal and fresh water, and high and low quality.

Wildlife Habitat Studies

Habitat restoration studies for aquatic and upland components have been conducted on many of our projects, including numerous constructed projects with aquatic, upland vegetation, and wetland communities in addition to listed species. The firm's professional wetland scientists and ecologists have provided endangered, threatened, and listed flora and fauna species surveys and assessments on a variety of projects including river restoration and dam removal projects. As part of our work, we have prepared species management plans to help protect listed species including establishment of critical habitat preservation areas, habitat management, species relocation, and construction management plans.



Invasive Species Management

The firm’s wetland scientists are experts in invasive plant species management for both upland and wetland invasive species. Our scientists are well versed in management methods and tailor their management plans based on the project’s target plant species and short- and long-term budgets. Our scientists have completed multiyear monitoring events to determine invasive species management success on a variety of projects.



River & Stream Restoration

SLR has developed a unique niche in the conceptual planning and feasibility analysis for river restoration and naturalized stream channel restoration projects. Our work has included restoration master planning; bathymetric and upland survey; sediment characterization and management planning; wetland delineation, assessment, creation, enhancement, and restoration; pond dredging; fish habitat design; and dam repair. The project team has worked on dozens of stream corridor habitat restoration projects,

partnering with local municipalities, watershed management groups, and regulatory agencies on projects involving engineering analysis, design, and permitting of stream restoration and bank stabilization projects. Our approach to these types of projects considers natural river forms and processes from both physical and biological perspectives. The resulting projects address the restoration and stabilization concerns in addition to providing opportunities to protect or enhance the existing natural resources.

Bridge Design and Inspection

Our staff of structural, transportation, civil, environmental, and hydraulic engineers have provided bridge inspections and evaluations, permitting, design, and construction inspection of bridge rehabilitation and replacement projects. SLR has successfully designed bridge replacement and rehabilitation projects throughout our firm’s history. The firm has worked in an On-Call capacity to MassDOT providing hydrologic and hydraulic analyses in support of the Accelerated Bridge Replacement Program. Our bridge designs have ranged from large multibridge interstate projects to small local road crossings, many of which have been funded through State DOT and Federal Highway Administration (FHWA) bridge programs. In addition to our bridge work, we have designed countless culverts including precast concrete box and arch culverts. Our in-house capabilities also include bridge inventory and condition inspection, with licensed professionals having FHWA-sponsored program training entitled “Safety Inspections of In-Service Bridges.” The firm designed removal of three roadway/dam outlet structures along Town Brook in Plymouth, Massachusetts, which were replaced with three new bridges. SLR was responsible for design and permitting of the bridge replacements and dam removals in addition to supporting services, including construction administration.

Bridge Scour Analysis and Protection

SLR has performed scour analysis at many types of bridges under a range of field conditions, including scour analysis and protection for new bridges; routine bridge inspections and bridge repairs; plus bridges influenced by our dam removal, river restoration, and flood control projects.



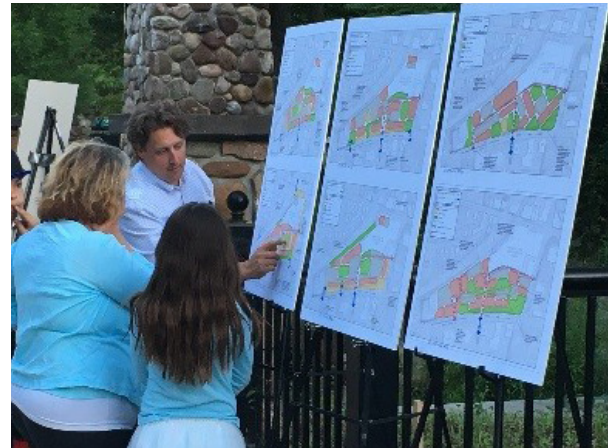
Bridge scour investigations range from visual inspections and plan review to detailed hydraulic studies and computer modeling in addition to structural design of scour countermeasures. The latter countermeasures have to consider geologic conditions, flood-flow velocities, shear stress, fish passage and habitat, and aesthetics and costs.

Regulatory Permitting

Project team members have prepared environmental permit applications and associated documentation and analysis on a wide variety of projects in Massachusetts. Permits at the local, state, and federal levels have been obtained successfully for many unique and challenging projects. Project team members are well-versed in regulatory requirements and state and federal policies regarding stormwater management, environmental resources, wetlands, and floodplain management. The project team has obtained many regulatory review approvals on dam removal projects as well as wetland and stream restoration projects through the Army Corps of Engineers and countless local Inland Wetland Permits at the local level.

Public Outreach

Communicating with project stakeholders is one area that sets SLR apart from our competitors. Our engineers, scientists, planners, and landscape architects regularly present project results at stakeholder meetings and dedicated public information meetings. We understand that a project is only truly successful if the stakeholders support its implementation. To that end, we prepare presentations that allow us to describe our technical work in language that the general public can understand. The firm is experienced in preparing presentation materials, including PowerPoint and graphics. The project team can provide comprehensive outreach and moderation services to build consensus and obtain input from various constituencies.



SLR prides itself on our positive track record working with a wide array of project stakeholders. We regularly conduct outreach as project planning and conceptual design begins to relay project information, and we seek design input to create win-win scenarios for various parties to develop consensus on project goals and objectives, and to initiate future funding efforts. Our experience shows that this initial outreach and stakeholder involvement is critical for project success.

Photosimulations and artistic renderings are often accompanied with clear data presentations to illustrate existing and proposed conditions. Project sponsors often turn to our project team to explain project goals and objectives and communicate project need and the background for the preferred alternative. We regularly hold informational and workshop meetings during the conceptual design stage of a project to allow ample time for input and to generate stakeholder involvement that is a primary mechanism to reach consensus around a project. Public and/or stakeholder involvement is invited by way of publications and media relations, meeting facilitation, and the design and development of stakeholder involvement programs. Projects have included integral web linkage as well.



Mixed Use Development

SLR also provides specialty practices in civil engineering/site design, planning, landscape architecture, and environmental science, in support of mixed-use development. We have been successful in helping our clients achieve successful development and redevelopment projects including multiphase residential subdivision, retail centers, mixed-use developments, office and industrial parks, and educational facilities. From site analysis to downtown urban revitalizations to small-town community development, we provided our clients with the necessary services to plan and design every phase of their development projects.



Dam Removal Experience

The following table is a summary of constructed dam removals for which SLR was the engineer of record.

Structure	Completed	Waterbody	Location	Nearby Bridge
Remington Arms Dam	2020	Steele Creek	Ilion, NY	●
Mill Street Dam (Tel-Electric)	2019	W. Branch Housatonic River	Pittsfield, MA	●
Holmes Playground Dam	2019	Town Brook	Plymouth, MA	●
Blackledge Dam	2018	Blackledge River	Glastonbury, CT	●
Rome Dam	2018	Ausable River	Jay, NY	
East Burke Dam	2017	Passumpsic River	East Burke, VT	
Rattlesnake Dam	2016	Fall River	Freetown, MA	●
Hilliard's Pond Dam	2016	Hockanum River	Manchester, CT	
Two Licks Dam	2016	West Fork River	Clarksburg, WV	●
Highland Dam	2016	West Fork River	Clarksburg, WV	
West Milford Dam	2016	West Fork River	Clarksburg, WV	
Saw Mill Dam	2016	Boquet River	Willsboro, NY	
Ed Bills Dam	2015	Eight Mile River	Lyme, CT	●
Plymco Dam	2015	Town Brook	Plymouth, MA	●
Pond Lily Dam	2015	West River	New Haven, CT	●
Kendrick Pond Dam	2014	Sugar Hollow Brook	Pittsford, VT	
Franconia Paper Co. Dam	2014	Upper Wells River	Groton, VT	
Off-Billington Dam	2014	Town Brook	Plymouth, MA	●
Water Street Weir	2014	Town Brook	Plymouth, MA	●
Dufresne Pond Dam	2013	Batten Kill	Manchester, VT	
Henry Bridge Dam	2013	Walloomsac River	Bennington, VT	●
Hoffman Dam*	2012	Des Plaines River	Lyons, IL	
Fairbanks Dam*	2012	Des Plaines River	Lyons, IL	
Armitage Dam*	2012	Des Plaines River	Riverside, IL	
Great Works Dam	2012	Penobscot River	Old Town, ME	
Lower Hurricane Dam	2012	Kilburn Brook	Hartford, VT	
Briggsville Dam	2011	N. Branch Hoosic River	Clarksburg, MA	●
Wapping Road Dam	2011	Jones River	Kingston, MA	●
Fort Covington Dam	2009	Salmon River	Fort Covington, NY	
Zemko Dam	2007	Eight Mile River	Salem, CT	
Ballou Dam	2006	Yokum Brook	Becket, MA	
Carbonton Dam	2005	Deep River	Deep River, SC	
Lowell Mill Dam	2005	Little River	Kenley, NC	
South Batavia Dam	2005	Fox River	South Batavia, IL	
Chase Brass Dam	2004	Naugatuck River	Waterbury, CT	
Cuddebackville Dam	2004	Neversink River	Cuddebackville, NY	
Billington Dam	2002	Town Brook	Plymouth, MA	
Freight Street Dam	1999	Naugatuck River	Waterbury, CT	●
Union City Dam	1999	Naugatuck River	Naugatuck, CT	
Anaconda Dam	1999	Naugatuck River	Waterbury, CT	
Platts Mill Dam	1999	Naugatuck River	Waterbury, CT	●

*Final project conducted by the Army Corps of Engineers

Section 3



High Street Dam Removal and Fish Passage Feasibility Study

Bridgewater, MA

CLIENT

The Nature Conservancy
Boston, MA

Services Provided

- Survey & Mapping
- GIS Data Analysis
- Hydrologic & Hydraulic Analysis
- Floodplain Mapping
- Ecological Characterization
- Sediment Analysis
- Constructability & Cost Estimation

SLR was retained by The Nature Conservancy to conduct a feasibility analysis for the removal of a historic mill dam called the High Street Dam and restoration of the 2.5-mile impounded portion of the Town River in Bridgewater, Massachusetts. The dam is an 80-foot-long-by-8-foot-high earthen embankment and timber-faced stone masonry spillway.

The feasibility study evaluated alternatives on behalf of TNC and project partners. Conventional alternatives included partial removal, downstream in-channel rock rapids, new fish ladders, and bypass channels. Work included the collection of regional data, analysis of the existing impoundment and dam, assessment of restoration alternatives, and a summary of the feasibility and effectiveness of each one at meeting the project goals to inform future decision-making.

Goals of the dam removal and river restoration included:

- Addressing potential hazard of dam failure through removal or repair
- Improvement of fish passage to upstream of the dam
- Stabilization and mitigation of the impacts of dam removal on upstream infrastructure, structures, and water-dependent uses
- Sediment management and stabilization in the former impoundment
- Development of recreational use and access to the site
- Restoration of natural river processes



Tel-Electric Pond Dam #MA01970 (Mill Street) Dam Removal

Pittsfield, MA

CLIENT

Massachusetts Division of Ecological Restoration
Boston, MA

Services Provided

- Survey & Base Mapping
- Infrastructure Inspection
- Regulatory Permitting Assistance
- Engineering
- Hydrologic & Hydraulic Analysis
- Final Design
- Bidding Assistance

The Massachusetts Division of Ecological Restoration retained SLR to evaluate alternatives and design improvements for the removal of the Tel-Electric Pond (aka Mill Street) dam on the West Branch of the Housatonic River in Pittsfield, Massachusetts. In 2000, the Massachusetts Office of Dam Safety found the dam to be in overall Poor condition with significant operational or maintenance deficiencies. Three railroad bridges cross the river within 200 feet upstream of the dam.

The firm completed final design plans and construction documents that improve ecological conditions of the river, eliminate the public safety hazard associated with the aging dam, and help to encourage revitalization of the surrounding urban neighborhood. The design includes removal of the dam and appurtenances, sediment removal from the former impoundment, protection of surrounding bridges and infrastructure, protection of existing utilities and water main, construction of a new stream channel, reconstruction of a floodplain shelf, and restoration of the site.

This project began 2018 and was completed on schedule in 2019.



Quinapoxet Dam Removal

West Boylston, MA

CLIENT

Massachusetts Division of Ecological Restoration
Boston, MA

Services Provided

- Survey & Mapping
- Engineering
- Wetland Delineation
- Hydrologic & Hydraulic Analysis
- Sediment Analysis Management

SLR was retained by the Massachusetts Division of Ecological Restoration to conduct a feasibility study and provide hydraulic modeling for the removal of the Quinapoxet Dam. The dam is a 250-foot-long, 18-foot-high earthen embankment and stone masonry structure. The most visually compelling component of the dam is its 135-foot-long 9-foot-high stone masonry and concrete arched spillway.

Project goals included the fish passage and wildlife restoration, naturalization of riverine hydrology, sediment management, and protection of water quality. Preliminary design plans were prepared for three dam removal scenarios, without causing impact to the Massachusetts Water Resources Authority water supply operations connecting the Quabbin Reservoir to the Wachusett Reservoir.

The preferred alternative utilizes a steeper channel with pools and riffles, due to the need to climb in elevation at the dam site. Quinapoxet Dam is unique in that the spillway was constructed at essentially the upstream channel bed elevation and the downstream channel was lowered.



Plymco & Off-Billington Street Dam Removals

Plymouth, MA

CLIENT

Town of Plymouth
Plymouth, MA

Services Provided

- Survey & Mapping
- Water Resources Engineering
- Hydrologic & Hydraulic Analysis
- Engineering Design
- Permitting/MEPA Support
- Sediment Sampling
- Public Outreach
- Construction Phase Services
- Post-Construction

The Town of Plymouth retained SLR to evaluate alternatives and design improvements for two dams along with design of replacement bridges at each location. This project removed two dams over the Town Brook and replaced them with new arch bridges, allowing for restoration of the stream channel, removal of contaminated sediment, new fisheries and wildlife habitat features including pools and riffles, and wetland plantings. Construction was completed for the Off-Billington Dam removal in 2013 and 2014. The Plymco dam was removed in 2015. The firm provided the following services:

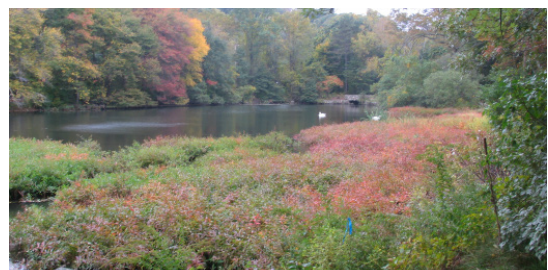
- Photogrammetric and bathymetric survey and base mapping
- Hydrologic and hydraulic analysis
- Sediment sampling, analysis, and management planning
- Completion of bridge type studies
- Preliminary and final design for construction of two new bridges over Town Brook
- Notice of Intent (NOI) filing and permit assistance through the Plymouth Conservation Commission
- State permitting, including MEPA assistance, filing of an Expanded Environmental Notification Form, Chapter 91 permit, and 401 Water Quality Certificate
- Federal permitting, including a 404 permit through the U.S. Army Corps of Engineers
- Section 106 consultation
- Preliminary and final design for dam removal and stream restoration
- Bidding assistance and construction observation



Pre Construction



Post Construction



Town Brook Restorations

Plymouth, MA

CLIENT

Town of Plymouth
Plymouth, MA

Services Provided

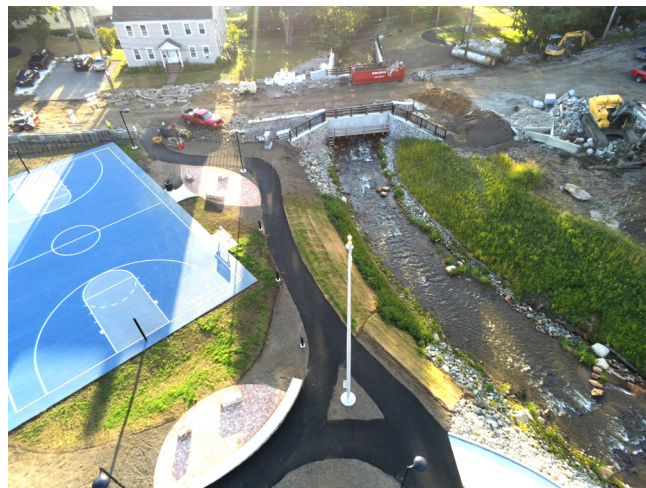
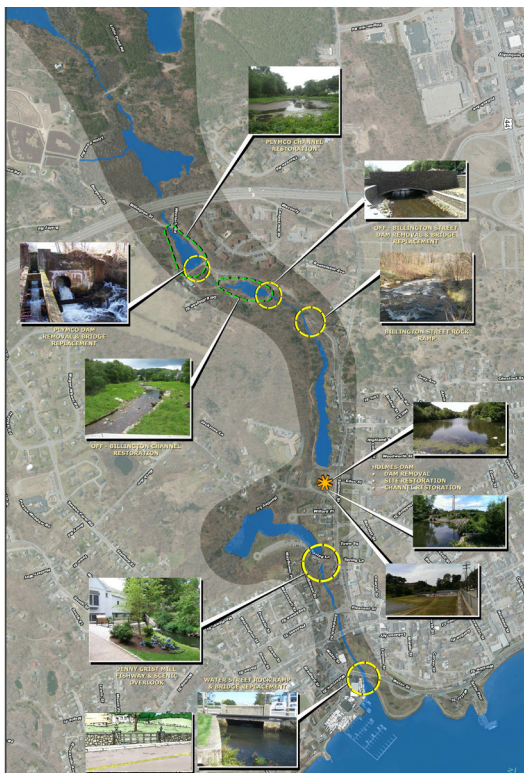
- Survey & Mapping
- Sediment Sampling
- Water Resources Engineering
- Hydrologic & Hydraulic Analysis
- Bridge Design
- Roadway & Utility Design
- Scour Countermeasures
- Park Design
- Fish Passage Design
- State & Local Permitting/MEPA Support
- Sediment Sampling
- Public Outreach
- Construction Phase Services

The Town of Plymouth selected SLR in the early 2000's to design the first dam removal in coastal Massachusetts on Town Brook, the stream the Pilgrims first settled beside to draw their drinking water from and to power the industry to come. The town prioritized the restoration of this historic watercourse. SLR's history with Plymouth and Town Brook spans two decades. The final piece and the last structure on Town Brook that impeded the migration of anadromous fish was the Holmes Dam which was removed in 2018. The Town Brook restoration projects have facilitated the ocean return of several hundred thousand river herring each spring to spawn in the Billington Sea. The removal of 5 Dams also alleviates the liability associated with the potential failure of aging unwanted infrastructure. To date, the firm has completed the following Town Brook projects:

- Billington Street Dam Removal – 2002
- Jenney Grist Mill Fish Ladder & Public Viewing Area – 2007
- Off-Billington Dam Removal and Bridge Replacement – 2013
- Water Street Dam Removal, Rock Ramp & Bridge Replacement – 2014
- Plymco Dam Removal and Bridge Replacement – 2015
- Holmes Dam Removal, Newfield Street Bridge Replacement and Park Improvements (Skate Park & Basketball Court) – 2018
- Jenney Pond Dredging, Dam Repairs, Fishway By-Pass channel and Pedestrian Bridge Replacement – Design 2021

Link to Town Brook drone video

<https://www.youtube.com/watch?v=Hxz9JCjH00M>



Holmes Playground Dam Removal & Stream Restoration

Plymouth, MA

CLIENT

Town of Plymouth
Plymouth, MA

Services Provided

- Survey & Mapping
- Civil Engineering/Site Design
- Environmental Assessment
- Site Remediation
- Water Resources Engineering
- Structural Engineering
- Hydraulic Analysis
- Permitting
- Landscape Architecture
- Construction Administration

The Town of Plymouth selected SLR to design the sixth and final restoration project on Town Brook: the removal of Holmes Dam and restoration of the stream and adjacent playground park. The firm's history with the brook spans more than a decade.

The final piece of the project and the last structure on Town Brook that impeded the migration of herring was the Holmes Playground Dam. Besides the benefit of providing fish passage, the removal of Holmes Dam eliminated any liability associated with the ownership of this high hazard dam. Construction occurred between 2018 and 2019 with a total cost of \$6 million and included the following elements:

- Removal of 15' high stone masonry and earth embankment dam;
- Daylighting of 250' of stream channel;
- Removal of 6,000 cubic yards of contaminated sediment
- 1,600 linear feet of reconstructed stream channel
- Newfield Street bridge - 24' wide, three-sided box culvert over Town Brook
- Reconstruction of Newfield Street and all utilities
- New skate park and post tensioned concrete basketball court
- New park walkways, benches, viewing areas and public access to Town Brook
- Extension of Town Brook trail



Water Street Bridge Replacement & Dam Removal

Plymouth, MA

CLIENT

Town of Plymouth
Plymouth, MA

Services Provided

- Engineering
- Fish Passage
- Hydraulic Modeling
- Regulatory Permitting
- Landscape Architecture
- Construction Phase Services

The Town of Plymouth retained SLR to design the replacement of an existing bridge, the removal of a small dam at the upstream face of the bridge, and channel modifications for safe fish passage to restore herring migration. The firm also assisted with restoration of tidal flow, roadway modifications, hydraulic modeling, permitting, landscape architecture, preparation of construction documents, cost opinions, shop drawing review, and on-site construction management services.

The Water Street bridge is located between the Pilgrim Memorial State Park and the Brewster Gardens Park, two focal points in the heart of the historic town center. The 15' single bridge span consisting of steel stringers supporting a reinforced concrete deck slab had deteriorated and was in poor condition. The town was concerned about the condition of the bridge due to its frequent use by tourist buses as well as it being a part of the route of the annual Thanksgiving Parade. The bridge was replaced with a new 15' wide three-sided precast concrete culvert. Architectural treatments and decorative railings were incorporated into the design in order to celebrate the rich local history.



The removal of the concrete dam eliminated an impediment to anadromous fish passage, and the construction of a grouted boulder ramp under the bridge facilitates fish migration during the lower tidal phases in Plymouth Harbor. The ramp passed over 100,000 herring its first year in service.



Existing Bridge



Completed Bridge

Ed Bills Pond Dam Removal

Lyme, CT

CLIENT

The Nature Conservancy

Services Provided

- Dam Inspection
- Dam Removal Alternatives Analysis
- Hydrologic & Hydraulic Analysis
- Ecological Assessment
- Regulatory Permitting
- Public Outreach
- Engineering Design
- Bidding Phase Support
- Construction Administration
- Construction Inspection

The Nature Conservancy in collaboration with American Rivers engaged SLR to evaluate the ecological impacts and benefits and design full removal of the Ed Bills Pond dam. Removal of this structure restored the East Branch Eightmile River and improved fish passage while maintaining the sustainable ecological function of the river corridor.

The main stem East Branch Eightmile River flows southwest for approximately 6 miles from a pond just north of Witch Meadow Road in Salem to the upstream end of the former Ed Bills Pond. The Eightmile River watershed is remarkable among Connecticut and Massachusetts watersheds for the intactness of the habitats, the naturally functioning hydrologic system, the presence of large, unfragmented forest blocks, high proportion of conservation land in the watershed, and minimal impairment due to invasive species.

The Ed Bills Pond dam extended 66 feet between stone walls on both the northern and southern banks. The structure was largely a stone masonry dam constructed partially on pre-existing bedrock ledges with a concrete cap that extended 6 feet across the top of the dam and extended at least 5 feet down.

Due to the depth, type, and quality of the sediment in the Ed Bills Dam impoundment, as well as the high conservation value of the existing ecosystem, SLR determined that full removal of the dam would require minimal sediment removal. Instead, a new channel was designed and constructed through the former impoundment. The project was constructed with oversight from SLR water resource specialists. The ecosystem is now a thriving diverse wetland and meandering channel through the former impoundment.



Hilliard's Pond Dam Removal & Bigelow Brook Restoration

Manchester, CT

CLIENT

Town of Manchester
Manchester, CT

Services Provided

- Geomorphic Assessment
- Hydrologic Assessment
- Hydraulic Modeling
- Wetland Delineation
- Ecological Assessment
- Contaminated Sediment Analysis and Management
- Dam Removal Design
- Regulatory Permitting
- Grant Compliance Assistance
- Construction Documents

The Town of Manchester received an Ecosystem Management and Habitat Restoration Grant from the Connecticut Department of Energy & Environmental Protection (DEEP) to remove remnants of the Historic Hilliards Pond Dam to restore Bigelow Brook. The Town retained SLR to undertake ecological assessment, alternatives analysis, contaminated sediment assessment, complete design plans, and prepare regulatory permits.

The restoration project includes the removal of the former dam, stabilization of eroding banks and historically impounded sediment, channel realignment, enhancement of fishery habitat for coldwater and diadromous fish species, and establishment of floodplain connectivity. Regulated resource areas include all activities below the brook's ordinary high water mark, bordering state floodplain wetlands, and FEMA designated 1% annual chance flood zone and floodway.

Regulatory permits were procured, including a United States Army Corps of Engineers Individual Permit, a CTDEEP 401 Water Quality Certificate, nonconsumptive diversion permit, a Flood Management Certificate, and a local inland wetland and watercourse permit.



Rattlesnake Brook Dam Removal & Fish Passage

Freetown, MA

CLIENT

City of Fall River
Fall River, MA

Services Provided

- Survey & Mapping
- Engineering
- Wetland Delineation
- Ecological Assessment
- Hydrologic & Hydraulic Analysis
- Sediment Analysis Management
- MEPA Permitting
- Public Outreach
- FEMA LOMR
- Permitting
- Final Design
- Construction Phase Services

The City of Fall River retained SLR to evaluate alternatives and design improvements for the Rattlesnake Brook Dam removal and fish passage restoration project in Freetown, Massachusetts. The Rattlesnake Brook dam was an approximately 400-foot-long earthen embankment dam with two formal spillways located to the east and west of the earthen dam.

The firm completed final design plans and construction documents that allowed for restoration of the stream channel, removal of contaminated sediment, and new fisheries and wildlife habitat. Dam removal restored fish passage along approximately 2.5 miles of stream channel on the main stem of Rattlesnake Brook, enhanced the security of the rebuilt Narrows Road, and established a native riparian wetland community.

Post dam removal, a Letter of Map Revision (LOMR) application was filed with FEMA to remap the floodway and floodplain.



Ballou Dam Removal

Becket, MA

CLIENT

Massachusetts Division of
Ecological Restoration
Boston, MA

Services Provided

- Survey
- Water Resources Engineering
- Hydraulic Modeling
- Sediment Management
- Regulatory Permitting / MEPA
- Construction Administration

SLR conducted feasibility studies, prepared construction plans, and inspected construction for the removal of Ballou Dam on Yokum Brook. Factors considered in the alternative design were:

- Identified potential costs and benefits of full dam removal versus partial removal with a rock ramp over the remaining sill
- Fish passage design and restored river characteristics under variable flow conditions
- Possible cost effective water supply options for the town to meet current fire suppression needs
- Potential implications for the retaining wall structural stability under partial and full dam removal

The presence of sediment deposits upstream of Ballou Dam required assessment, particularly in the context of dam removal alternatives.

The firm assisted in obtaining environmental permits from local commissions, the Commonwealth of Massachusetts, and the Army Corps of Engineers. The restoration improvements were designed, along with development of a sediment management plan, technical specifications, and assistance with bid documents.

The Ballou Dam was removed to restore habitat and fish movement in Yokum Brook, which is a tributary to the West Branch of the Westfield River. Completion of this project eliminated a barrier to Atlantic salmon migration and resident trout movement, and restored continuity to the natural step-pool habitats.



Wapping Road Dam Removal

Kingston, MA

CLIENT

Massachusetts Division of Ecological Restoration / Jones River Watershed Association

Services Provided

- Survey & Mapping
- Water Resources Engineering
- Hydrologic & Hydraulic Analysis
- Wetland Delineation
- Geomorphic Assessment
- Regulatory Permitting
- Public Outreach
- Construction-Phase Services

The Massachusetts Division of Ecological Restrtaion in collaboration with the Jones River Watershed Association (JRWA) and local, state, and federal partners retained SLR to evaluate the feasibility of removing the Wapping Road dam located on the Jones River. The initial assessment concluded that dam removal was not only feasible, but met project goals and objectives. Subsequently, the firm provided the following services:

- New aerial flight and photogrammetric mapping
- Evaluation of aquatic habitat, shoreline vegetation habitat
- Assessment of geomorphic characteristics of the channel and upstream impoundment
- Analysis of the structural integrity of the dam, retaining walls, and upstream state highway bridge
- Completion of extensive hydrologic and hydraulic evaluation, including standard bridge scour analysis and assessment of sediment transport
- Development and implementation of a sediment sampling program and management plan, fully coordinated with Mass DEP and in accordance with 310 CMR and 314 CMR
- Water drawdown assessment and wetlands delineation
- Development of an invasive species management plan
- Regulatory permitting assistance, including Section 404, ENF and NOI filing, Chapter 253 Dam Safety, Chapter 91 Waterways, Section 401, Water Quality Certification, Application for Beneficial Use of Solid Waste Permit, and Massachusetts Historic Commission Consultation
- Preliminary and final design plans and specifications
- Constuction Administration and Inspection



Neponset River Restoration

Milton & Boston, MA

CLIENT

Massachusetts Division of Ecological Restoration
Boston, MA

Services Provided

- Survey
- Engineering
- Fish Passage Design
- Hydraulic Modeling
- Environmental Assessment
- Sediment Assessment
- NEPA & MEPA Permitting
- Construction Administration
- Public Outreach

SLR was retained by the Massachusetts Division of Ecological Restoration to evaluate restoration alternatives and design of a large scale river restoration project on the Neponset River. The project involved potential alteration or removal of two early industrial run-of-the-river dams and replacement or alteration of several utility crossings. All of these structures blocked fish passage and transported sediment into the river. The river runs through an urban, densely developed corridor, with many vehicular and railroad bridge crossings.

The firm's services included survey, multiple field investigations and assessments, a three mile long riparian corridor assessment, sediment probing and field measurements, evaluation of conceptual fish passage alternatives, hydraulic modeling, development of preliminary design plans, cost estimates, and presentation of potential restoration options at several advisory committee and public meetings.

Additionally, the firm prepared an Environmental Assessment under the National Environmental Policy Act (NEPA) and Massachusetts Environmental Policy Act (MEPA), along with a comprehensive Environmental Restoration Assessment and assistance with permitting.

Public outreach and coordination among project stakeholders was a key component of this project. As such, a technical advisory committee was formed, including representation by various state and federal agencies, the watershed association, the City of Boston, the Town of Milton, and numerous community organizations.



Existing Conditions



Photo Simulation

Briggsville Dam Removal

Clarksburg, MA

CLIENT

Massachusetts Division
of Ecological Restoration
Boston, MA

Services Provided

- Dam Removal Design
- Engineering Design
- Bridge Scour Analysis
- Hydraulic Analysis
- Sediment Transport Analysis
- Permitting
- Construction Administration
- Postconstruction Survey

Following third-party review by SLR of the preliminary design for the Briggsville Dam removal, the Massachusetts Division of Ecological Restoration retained SLR Consulting to advance the analysis and redesign the project to consider bridge scour and sediment transport. The firm also provided hydraulic modeling, permitting support, and construction-phase services.

Cross Road Bridge, located 800 feet upstream of the former Briggsville Dam is a simply supported single span with prestressed concrete beams sitting on vertical concrete abutments, in good condition. The bridge span is 80 feet and the waterway height is 12 feet. A bridge scour analysis (HEC-18) was conducted for existing and proposed conditions to determine if the structure would be impacted by dam removal. Scour countermeasures were designed to safeguard the structure. The hydraulic analysis also included a HEC-RAS sediment transport model to gain an understanding of how sediment dynamics would change following dam removal. The analysis informed a design to restore connectivity in the river, protect nearby infrastructure, and improve public safety.

Design plans and technical specifications for permitting and deconstruction were developed, detailing dam removal phasing and water control, bridge scour protection, river restoration, and habitat improvements. The project team assisted in the bid process and performed construction oversight, including construction administration, on-site client representation, and postconstruction survey and monitoring.



Blackledge Dam Removal

Glastonbury, CT

CLIENT

Town of Glastonbury
Glastonbury, CT

Services Provided

- Survey & Mapping
- GIS Data Analysis
- Hydrologic & Hydraulic Analysis
- Floodplain Mapping
- Ecological Characterization
- Sediment Analysis
- Constructability & Cost Estimation
- Construction Plans & Specifications
- Construction Administration

The Blackledge Dam was an eight foot tall by 185-foot long stone masonry dam at the former site of an up-and-down sawmill that was constructed in the late 1700s. The mill fell into disuse and was reportedly moved to Old Sturbridge Village in Massachusetts.

SLR was retained by the Town of Glastonbury to conduct a feasibility analysis and prepare construction plans and specifications for the removal of this historic dam, and the restoration of its former impoundment located on the Blackledge River, near the town border with Hebron. The impoundment behind the dam was approximately one quarter of a mile long, and up to 8 feet deep.

In order to evaluate the impacts of dam removal on the ecology and flooding characteristics of the impoundment, sediment was sampled and characterized, survey of the dam and impoundment was performed, and the information was used to build a hydraulic model of the dam. Removal of the dam was evaluated with respect to sediment and bank stability, flood impacts, and fish passability. The design was then advanced to preliminary and final design, specifications were developed for the project, and it was advertised through a public competitive bid.

Goals of the dam removal and river restoration included:

- Address potential hazard of dam failure through removal or repair
- Improvement of fish passage to upstream of the dam
- Stabilization and mitigation of the impacts of dam removal on upstream channel.
- Sediment management and stabilization in the former impoundment
- Development of recreational use and access to the site
- Restore natural river processes.



Great Works Dam Removal

Old Town, ME

CLIENT

Penobscot River Restoration Trust
Augusta, ME

Services Provided

- Survey & Mapping
- Engineering
- Fish Passage Design
- Hydraulic Modeling
- Permitting
- Utility Coordination
- Public Outreach
- Construction Phase Services

SLR was retained by the Penobscot River Restoration Trust in association with the Natural Resources Council of Maine to assist with a critical piece of fish passage restoration on the Penobscot River with the removal of the Great Works Dam. The Great Works dam was built in the late 1800s. Construction for the removal is the first of its kind for this landmark Penobscot River Restoration project, a river which had been dammed for over 170 years.

The firm conducted the initial feasibility assessment, hydraulic modeling, alternatives analysis, and preliminary design. The team was integral in the regulatory permitting process at the local, state and federal levels. Following initial design efforts, we developed final design plans and specifications, and provided construction phase services and oversight.

The Penobscot River Restoration restored access to nearly 1,000 miles of historic fish habitat, benefitting populations of Atlantic salmon, American shad, alewife, blueback herring, and other migratory fish.



Victory Theatre Renovation and Expansion

Holyoke, MA

CLIENT

Massachusetts International Festival of the Arts (MIFA)

Durkee Brown Viveiros & Werenfel Architects (DBVW)

Services Provided

- Survey & Mapping
- Civil Engineering
- Site Design
- Traffic Engineering
- Landscape Architecture
- Environmental Site Assessments
- Hazardous Building Material Assessment
- Permitting
- Geotechnical Engineering

SLR worked in concert with both DBVW Architects and MIFA to secure all required permits and prepare design documents for the renovation and expansion of the existing historic Victory Theatre on the corner of Chestnut and Suffolk Street in the city center. The existing 15,000 square foot theater will be completely renovated and reconstructed, inside and out, and expanded by almost 6,000 square feet to allow for modern stage performances and to accommodate new theater offices, actor/performer areas, and a new loading dock.

SLR provided a myriad of services to complete this project, including: site civil and landscape architectural design, traffic engineering, geotechnical engineering and foundation design support for the building expansion, Phase I and Phase II Environmental Site Assessments, coordination of survey and detailed ground penetrating radar (GPR) of undocumented historic utilities, as well as a full characterization of hazardous materials (lead & asbestos) and the preparation of remediation/demolition specifications.



Old Mill Commons

Unionville, CT

CLIENT

Housewright Development
Durham, CT

Services Provided

- Survey
- Civil Engineering/Site Design
- Remediation Planning
- Landscape Architecture
- Permitting

SLR provided planning and design services for an 8 acre development in the Village of Unionville. The developer proposed an urban redevelopment project replacing this Brownfield site and abandoned factory with two mill style apartment buildings and a quadrangle of brick and shingle townhomes. The design team developed traditional neighborhood designs that captured the historical mill style architecture of the community and woven new, but historically themed architectural style development into the existing fabric of Unionville. In an effort to minimize impact on the land, the design team made use of previously disturbed land and avoided any wetland impacts.

The development was based upon design guidelines that promote the appearance of relatively narrow, shade tree-lined streets with sidewalks in which the majority of parking is delegated to the rear, through alleyways, or underneath residential structures. It is the intent of this design style to enhance the emerging pedestrian-friendly character of Unionville center as a sustainable community.



United Hospital Redevelopment

Port Chester, NY

CLIENT

Rose Associates
New York, NY

Services Provided

- Survey
- Civil Engineering
- Landscape Architecture
- Water & Sewer Distribution
- Transportation Engineering

The project site is located to the north of the intersection between Boston Post Road and High Street in the Village of Port Chester in Westchester County, New York. The ±15.5 acre tract of land is nearly fully developed and contains the former United Hospital building complex at 406 Boston Post Road, an apartment building at 999 High Street, and extensive surface parking areas.

The proposed project consists of one building with assisted living units; four buildings containing non-age-restricted multifamily housing units; one building containing a hotel; street-side retail that will be interspersed throughout the buildings; and an amenities center building called the “jewel box.” Proposed on-site amenities will include a fitness center, pool, bike storage, and bike share facilities. In addition to surface parking areas and street-side parking, parking garages will be built at the basement level beneath each of the proposed buildings and beneath some of the courtyard areas, which will dramatically reduce the need for surface area parking. A ±35,000-square-foot area will be programmed for active public use but owned and maintained by the Developer.



The project is in process of seeking land use approvals. SLR has prepared detailed site plans showing layouts of the buildings, roads, and utility infrastructure to support the applications. SLR will also have developed designs for the reconstruction of a portion of High Street and has completed monitoring of off-site sewage flows to measure infiltration and inflow.



Section 4



W. ANDREW GREENE, PE

US Manager of Water Resources Engineering



YEARS OF EXPERIENCE

- 26 With This Firm
- 5 With Other Firms

EDUCATION

- BS, Civil Engineering
Lafayette College

TECHNICAL REGISTRATIONS

Professional Engineer - DE, CT, GA,
IL, MA, NH, NY, OR, PA, VT, WA, WV

AFFILIATIONS

- American Society of Civil
Engineers (ASCE)

Mr. Greene has over 30 years of experience in project management, design and construction review with an emphasis on coastal riverine settings, dam repair, removal and fish passage projects. He also has experience in the design of sanitary sewage systems and community subsurface sewage disposal systems including pump stations, force mains, gravity sewers, site development projects and recreational facilities.

SELECTED PROJECT EXPERIENCE

- **Quinapoxet Dam Removal and Stream Restoration | West Boylston, MA**
Project Manager for removal of a dam amidst a sensitive environment, including the Massachusetts Water Resources Authority's Quabbin Reservoir aqueduct and the downstream Wachusett Reservoir.
- **Holmes Dam Removal | Plymouth, MA**
Project Manager for the design and permitting of the final project and last migration structure on Town Brook. Project work elements included survey, hydraulic modeling, sediment analysis, alternatives assessment, power line relocation coordination, regulatory permitting, and engineering design.
- **Rattlesnake Brook Dam Removal and Restoration | Fall River, MA**
Project Manager for removal of a dam and restoration of the stream channel to restore fish passage and establish a native riparian corridor along 2.5 miles on the main stem of Rattlesnake Brook. Project work elements included survey, wetland delineation, hydrologic and hydraulic modeling, sediment analysis and management assessment, MEPA permitting, and public outreach.
- **Water Street Bridge Replacement and Dam Removal | Plymouth, MA**
Project Manager responsible for the preparation of construction drawings and bidding assistance for the removal of a concrete weir in the upstream face of the bridge opening and construction of a new bridge with a rock ramp under the bridge to enable fish passage on Town Brook near the historic Plymouth harbor waterfront and public parks.
- **Off Billington Street Bridge Replacement and Dam Removal | Plymouth, MA**
Project Manager responsible for the preparation of construction drawings, bidding assistance and construction phase services for the removal of a dam, construction of a new bridge, and 500 feet of constructed stream channel through the former impoundment on Town Brook. This project is the second of four dam removals on Town Brook which have all been completed by SLR in order to restore herring migration.



JEANINE ARMSTRONG GOUIN, PE

US Operations Manager, EMPA



YEARS OF EXPERIENCE

- 27 With This Firm
- 7 With Other Firms

EDUCATION

- BS, Civil Engineering (Magna Cum Laude)
University of Connecticut

TECHNICAL REGISTRATIONS

- Professional Engineer - CT

AFFILIATIONS

- American Society Civil Engineers, Member
- Advisory Board Member, University of Connecticut School of Environmental & Civil Engineering
- Board of Trustees, University of Connecticut

Ms. Gouin is the US Operations Manager for Environmental Management, Permits & Approvals. She brings over 30 years of experience, 26 of which have been with SLR. She has an extensive background in stream restoration, flood mitigation, watershed analysis, environmental regulations, and impact analysis.

SELECTED PROJECT EXPERIENCE

- **Holmes Dam Removal | Plymouth, MA**
Principal-in-Charge for the design and permitting of the final project and last migration structure on Town Brook. Project work elements included survey, hydraulic modeling, sediment analysis, alternatives assessment, power line relocation coordination, regulatory permitting, and engineering design.
- **Rattlesnake Brook Dam Removal & Restoration | Fall River, MA**
Principal-in-Charge and technical contributor for removal of a dam and restoration of the stream channel to restore fish passage and establish a native riparian corridor along 2.5 miles on the main stem of Rattlesnake Brook. Project work elements included survey, wetland delineation, hydrologic and hydraulic modeling, sediment analysis and management assessment, MEPA permitting, and public outreach.
- **Quinapoxet Dam Removal & Stream Restoration | West Boylston, MA**
Principal-in-Charge and technical contributor for removal of a dam amidst a sensitive environment, including the Massachusetts Water Resources Authority's Quabbin Reservoir aqueduct and the downstream Wachusett Reservoir.
- **Wapping Road Dam Removal, Jones River | Kingston, MA**
Project Manager for the preliminary feasibility assessment through final design of this dam removal, including sediment management, hydraulic modeling, design of scour countermeasures, and regulatory permitting assistance.
- **Off-Billington & Plymco Street Dam Removals | Plymouth, MA**
Conducted feasibility assessment, engineering design, and assisted with regulatory permitting for removal of two dams and construction of two replacement bridges on Town Brook.
- **Neponset River Restoration | Boston / Milton, MA**
Project Manager for the design of fish passage and habitat improvements through the removal of two dams on the Neponset River in Boston and Milton, Massachusetts, and restoration of stream segments between the dams. The project included field survey, hydraulic modeling, and a sediment stability analysis.



JAMES MURAC, PE, CFM

Senior Water Resources Engineer



YEARS OF EXPERIENCE

- 15 With This Firm
- 2 With Other Firms

EDUCATION

- BS, Civil Engineering
University of Connecticut
Dean's List, School of Engineering
A.S.C.E. - Treasurer

TECHNICAL REGISTRATIONS

- Professional Engineer - CT
- Certified Floodplain Manager (CFM)
- UAS Remote Pilot Certified
- USFWS Stream Simulation

AFFILIATIONS

- Association of State Floodplain Managers

Mr. Murac is a Senior Water Resources Engineer at SLR who has been with the firm since 2005, and has experience developing and leading most facets of Water Resource Engineering, including large-scale dam removals, post-disaster assessment and flood mitigation, community flooding mitigation analysis, coastal resiliency and dredging, water-related infrastructure, major stormwater flooding and drainage-system analyses, and bridge scour analyses drainage design plans in the Northeast. Mr. Murac specializes in geomorphological and bio-engineering designs for riverine systems, as well as sediment analyses and bank stability assessments in the sediment-rich streams and rivers in the mountains of New England and upstate New York. He also has been a technical lead in many open channel and closed-conduit hydraulic analysis, design, and modeling, which encompasses stormwater flood control analyses, FHWA bridge scour techniques, advanced hydraulics and two-dimensional modeling, and assessment of tidally influenced systems.

SELECTED PROJECT EXPERIENCE

- **Quinapoxet Dam Removal Feasibility Study | West Boylston, MA**
Performed hydrologic, hydraulic, and geomorphic assessment of the existing river, banks, and impoundment in support of a dam removal feasibility study. Developed three river restoration alternatives, which considered fish passage and other aquatic organism passage (AOP) concerns. The dam is a 250-foot-long, 18-foot-high earthen embankment and stone masonry structure, and sits at the discharge of a 9-foot diameter underground water transmission main which is part of the water supply system for the City of Boston.
- **Briggsville Dam Removal | North Adams, MA**
Performed HEC-RAS hydraulic analysis of dam removal, prepared final design and construction documents including project plans, specifications, estimate, and bid forms for the removal of the dam and the resulting site/river channel restoration. Site work included the removal of a 150-foot-long by 10-foot-high concrete dam, temporary water control, and 11,000 cubic yards of sediment removal over 1,000 feet of channel.
- **Billington Street & Plymco Dam Removals | Plymouth, MA**
Prepared a feasibility analysis, preliminary design, prepared applications, and obtained permits for a dual-dam removal river restoration project. The project included the draining and stabilization of 1.6-acre and 1.2-acre impoundments and the creation of 1,500 feet of naturalized stream channel. This included performing hydraulic modeling of Town Brook in existing and postdam removal conditions using HEC-RAS to mitigate the changing water surfaces upstream at varying flood flows, analyzing sediments in the existing dam impoundments, determining safety and potential contamination to determine dredging volumes and disposal uses, and assisting with the preparation of an engineering report.



JENABAY SEZEN, MS, PE

Associate Water Resources Engineer



YEARS OF EXPERIENCE

- 9 With This Firm

EDUCATION

- MS, Water Resources & Environmental Engineering
Villanova University
- BS, Environmental Engineering (Cum Laude)
University of Connecticut

TECHNICAL REGISTRATIONS

- Professional Engineer - CT
- 40-Hour HAZWOPER Training
- 8-Hour HAZWOPER Refresher
- UAS Remote Pilot Certified

Ms. Sezen is an Associate Water Resources Engineer. She has expertise in water resources, infrastructure, and environmentally related projects including local and state environmental permitting. Her project experience includes water quality, watershed and floodplain management, stormwater management, Phase I Environmental Site Assessment, and stream channel restorations.

SELECTED PROJECT EXPERIENCE

- **High Street Dam Removal & Fish Passage Feasibility Study | Bridgewater, MA**
Completed proposed conditions hydraulic modeling of a dam removal and channel regrading alternative. Hydraulic modeling was carried out in order to predict water depths, velocities, shear, and water surface profiles over a range of flows. Also assisted with conversion of a FEMA HEC-2 model into a Duplicate Effective HEC-RAS model and creation of an updated existing conditions hydraulic model. Modeling results were incorporated into a Feasibility Analysis report which recommended replacement of downstream roadway bridge.
- **Tel-Electric Dam Removal | Pittsfield, MA**
Completed hydraulic modeling and design services for the removal of the Tel-Electric Dam in order to improve ecological conditions of the river and eliminate a public safety hazard. The project also involved the protection of existing infrastructure, including three railroad bridges immediately upstream of the dam. Reviewed and revised a hydraulic model prepared by another consulting firm to include survey from numerous sources as well as data from ground penetrating radar. Modeled proposed dam removal alternatives with different proposed slopes and channel widths. Evaluated water surface elevations, depths, and velocities throughout the project area to determine placement of bank treatments and in-stream features such as riffle grade control structures and boulder clusters. Created engineering design plans through final design.
- **Charles River Restoration Project – Watertown Dam Removal Feasibility Study | Watertown, MA**
Studied the feasibility of removing the Watertown Dam to improve fish passage, habitat, and water quality while avoiding impacts to existing physical infrastructure. Conducted pebble counts in the Charles River to evaluate sediment stability. Located storm drainage outfalls discharging into the impoundment using a hand-held GPS for mapping purposes and measured pipe inverts in relation to the river water surface elevation. Performed an Unmanned Aerial Survey (UAS) flight to capture imagery in a grid-style pattern over the project area. UAS photogrammetric data was used to generate a high-resolution aerial orthophoto of the project area. Compared FEMA peak flow information with a Bulletin 17B assessment of a nearby stream gauge.

TAYLOR M. DELVECCHIO, MS, PE

Project Water Resource Engineer



YEARS OF EXPERIENCE

- <1 With This Firm
- 4 With Other Firms

EDUCATION

- MS, Civil Engineering with concentration in Water Resources Engineering
Villanova University
- BS, Civil and Environmental Engineering
Villanova University
Summa Cum Laude

TECHNICAL REGISTRATIONS

- Professional Engineer – PA

PUBLICATIONS AND PRESENTATIONS

- Presenter, Mid-Atlantic Stream Restoration Conference, Baltimore, MD
A Two-Dimensional Hydraulic Model of a Combined Sewer Outfall into the Tacony Creek, Philadelphia, Pennsylvania 2019

Ms. DelVecchio is a Project Water Resource Engineer at SLR. She has worked on assortment of riverine projects focusing on natural channel restoration, infrastructure protection, bank restoration, floodplain reconnection, dam removal, fish passage, and flood mitigation. She also has extensive experience in the design of green stormwater infrastructure, applied in both ultra-urban and suburban settings, to mitigate flooding, improve water quality, and eliminate combined sewer overflows. Ms. DelVecchio utilizes hydrologic and hydraulic modeling software to inform project designs, tailored to meet to goals of specific watershed and site conditions. She has extensive experience applying 1D and 2D hydraulic models to restoration projects. She has performed tasks at all project stages including data collection, modeling, design, permitting, cost estimating, and construction support.

SELECTED PROJECT EXPERIENCE

- **Quinapoxet Dam Removal | West Boylston, MA**
Developed a comprehensive turbidity monitoring plan to ensure erosion and control measures were properly implemented during the removal of a dam upstream of the Wachusett Reservoir, a primary drinking water source for the city of Boston. Turbidity management plan consisted of continuous turbidity monitoring with buoy-based data loggers and live data web tracking for compliance.
- **Barber Pond Dam Removal | Bloomfield, CT**
Analyzed the watershed hydrology using USGS gauges and FEMA flood studies in order to develop a 1D HEC-RAS hydraulic model to aid in the design of the dam removal. Conducted initial site assessment and sediment sampling within the pond to determine the volume and quality of impounded sediment to inform the goals and extent the channel restoration upstream of the dam. Coordinated with CT DEEP, CTDOT, and local stakeholders to meet project goals.
- **Tingue Dam Bypass Channel | Seymour, CT**
Prepared and coordinated the construction bidding documents with CT DEEP and prospective contractors for the modifications to a bypass channel to aid in the migration of diadromous fish within the Naugatuck River.
- **Bull Run Channel and Bank Stabilization | Margaretville, NY**
Prepared construction documentation and assisted in the design for a river restoration project to stabilize a severely eroded bank and channel. Design consisted of a floodplain bench and channel widening to reduce shear stresses and velocities during flood events and the installation of horizontally drilled drainage pipes to alleviate further bank slope failure.



MATTHEW TRUEHEART, MS

Water Resource Engineer



YEARS OF EXPERIENCE

- 2 With This Firm
- 1 With Other Firms

EDUCATION

- MS, Civil and Environmental Engineering
University of Vermont
- BS, Environmental Earth Sciences
Dartmouth College

TECHNICAL REGISTRATIONS

- FHWA-NHI-135095 Two-Dimensional Hydraulic Modeling of Rivers at Highway Encroachments

Mr. Trueheart is responsible for supporting all aspects of Water Resource Engineering projects, particularly projects involving flooding mitigation and analysis, stream restoration, culvert design, and stormwater management. His experience includes analyzing waterways and stream crossings using hydraulic and hydrologic modeling software.

SELECTED PROJECT EXPERIENCE

- **Furnace Pond Dam Analysis | Union Vale, NY**
Project Engineer to conduct an Engineering Assessment for Furnace Pond Dam, which entailed field survey, field inspection, hydraulic and structural analysis, and a report including recommendations for dam repair.
- **FallKill Dam | Poughkeepsie, NY**
Evaluated alternatives and designed improvements to the auxiliary spillway and primary spillway parapet wall to bring the dam up to current safety standards and guidelines. Conducted field investigations and hydrologic and hydraulic analyses to inform designed upgrades. Results of these studies contributed to geotechnical analyses and design of stabilizing retrofits to the stone masonry structure.
- **McKinney Pond Dam | Union Vale, NY**
Assessment of concrete and masonry dam that failed due to piping flows underneath the structure. Field investigations included determination of the failure mechanism, establishing the extent of the failure, and evaluation of the remaining structure. Conceptual alternatives included repair, replacement, or removal of the dam.
- **Samp Mortar Reservoir Dam | Fairfield, CT**
Evaluation of existing nonoperational outlet works, and analysis of repair and replacement alternatives for malfunctioning low level bypass valve in the concrete gravity dam. Helped to supervise team of divers in underwater investigation of inlet works and installation of bulkhead over bypass inlet to facilitate dewatering of valve chamber.
- **Local Flood Analysis | Stamford, NY**
Assisted in the development and provided engineering review of a hydrologic model for the Rexmere Lakes Dams, which was used to perform a dam breach analysis. The resulting flood hydrographs were used as input to a hydraulic model to determine the extent and severity of flooding downstream.

FERNANDA R. MASTROLUCA

Water Resource Engineer



YEARS OF EXPERIENCE

- 2 With This Firm
- >1 With Other Firms

EDUCATION

- BS, Environmental Engineering
University of Connecticut
- BA, Geography
University of Connecticut

TECHNICAL REGISTRATIONS

- Lead Observer Certified, North Atlantic Aquatic Connectivity Collaborative (NAACC)
- Environmental Health and Safety Management Certificate, Three Rivers Community College
- Comprehensive Stream Stabilization & Restoration Workshop, StormCon

AFFILIATIONS

- Gamma Theta Upsilon, the International Geography Honors Society
- Epsilon Pi Tau International Honor Society for Technology, Science, and Engineering
- Phi Theta Kappa International Honor Society
- National Society of Leadership and Success

Ms. Mastroluca is a Water Resource Engineer at SLR. She has worked on an assortment of projects involving flooding mitigation and analysis, stream restoration, culvert design, and stormwater management. Her experience includes analyzing waterways and stream crossings using hydraulic and hydrologic modeling software. She has extensive software skills utilizing HEC-HMS and AutoCAD Civil 3D, and is also familiar with ArcGIS, HEC-RAS, and Inventor.

SELECTED PROJECT EXPERIENCE

- **Quinapoxet Dam Removal and Stream Restoration | West Boylston, MA**
Assisted in preparing preliminary design plans and cost analysis and estimates for the removal of this 250-foot-long, 18-foot-high earthen embankment and stone masonry dam. This structure sits at the discharge of a 9-foot diameter underground water transmission main which is part of the water supply system for the City of Boston.
- **High Street Dam Removal | Bridgewater, MA**
Assisted in preparing final design plans and aided in preparing supporting figures for chapter 91, chapter 253 and MEPA permit applications.
- **Tel-Electric Dam Removal | Pittsfield, MA**
Prepared follow-up as-built construction plans documenting the completed dam removal. Completed the Dam Safety Approval form; Certification of Completion form; and Hazard Class Change to be submitted to the Office of Dam Safety – Hazard Reclassification.
- **River Street Dam Removal | Acton, MA**
Part of the design team for this dam removal project. This project includes removing the River Street dam to comply with the Dam Safety Order mandate, as well as ensuring bed and bank stability, and improve ecological and recreational value of stream corridor once the dam is removed. Prepared feasibility and preliminary design plans, and cost estimate. Collected data to aid in hydraulic modeling and scour analysis of the railroad bridge upstream of the River Street dam. Completed computation of volumetric quantities for regulatory permitting.
- **Monatiquot River Fishway Project | Braintree, MA**
Developed preliminary, final, and construction plans, specifications and cost analysis and estimate for this fishway project. The project involves the design of a safe, timely, and effective upstream fish passage at the Rock Falls barrier on the Monatiquot River.



MICHAEL R. GAGNON, PE

Principal Civil Engineer



YEARS OF EXPERIENCE

- 10 With This Firm
- 27 With Other Firms

EDUCATION

- BS, Civil Engineering
Roger Williams University

TECHNICAL REGISTRATIONS

- Professional Engineer - MA, CT, NH
- National Council of Examiners for Engineering and Surveying (NCEES) Certification

AFFILIATIONS

- American Society of Civil Engineers (ASCE)
- Boston Society of Civil Engineers Section (BSCES)

Mr. Gagnon brings over 30 years of diverse project experience with the preparation of feasibility studies, engineering reports, construction drawings, regulatory permits, technical specifications, and cost estimates. Mr. Gagnon has been responsible for engineering services associated with many transportation, land development, and water resource projects throughout southern New England from inception through construction. He has expertise in stormwater management design and hydraulic modeling. He has vast knowledge of local, state, and federal land use and environmental regulations, with several years of project development experience and coordination with local and state agencies including MassDOT, MassDEP, CTDEEP, local planning boards, and conservation commissions. Mr. Gagnon has managed many small- to medium-sized projects that include technical and fiscal responsibilities, client communications, supervision of support staff, and coordination with outside consultants.

SELECTED PROJECT EXPERIENCE

- **MassDOT Bridge Rehabilitation & Hydrologic and Hydraulic Analysis | Taunton, West Stockbridge, West Bridgewater, & Westfield, MA**
Senior Project Engineer responsible for hydrologic and hydraulic analysis and report preparation associated with four MassDOT bridge rehabilitation projects in various towns of the Commonwealth. Data collection and site investigations were conducted to document existing conditions, sediment samples for sieve analysis and subsequent scour analysis, obtaining previous hydraulic models and reports as prepared for the National Flood Insurance Program (NFIP), bridge drawings, FEMA mapping, and GIS information. The United States Army Corps of Engineers (USACE) Hydrologic Engineering Center River Analysis System software was used to produce flood simulation models at the bridge sites consisting of an effective Flood Insurance Study (FIS) model, an existing conditions model to update the FIS model as required, floodway analysis, scour analysis to evaluate stability of the channel at the substructure, and a proposed conditions model. Hydraulic reports were prepared in accordance with the requirements of the MassDOT LRFD Bridge Manual.
- **Massabesic Lake Dam | Manchester, NH**
Prepared a wetland permit application and supporting documentation with the New Hampshire Department of Environmental Services Wetlands Bureau for the rehabilitation of a high-hazard dam owned by the Manchester Water Works. Massabesic Lake provides water supply for the City of Manchester and several surrounding Towns.

CHARLES E. TEALE, PE, LSP, LEP

Principal Geotechnical Engineer, New Hampshire Office Manager



YEARS OF EXPERIENCE

- 3 With This Firm
- 32 With Other Firms

EDUCATION

- Degree of Engineer in Civil Engineering
George Washington University
- ME, Civil Engineering
Rensselaer Polytechnic Institute
- BS, Civil Engineering
Clarkson College of Technology

TECHNICAL REGISTRATIONS

- Professional Engineer - CT, MA, ME, NH, VT
- Licensed Site Professional - MA

Charles Teale, PE, LSP, LEP has extensive expertise in subsoil investigations and foundation design including field investigations for geotechnical and dam projects which have included slope stability analysis and design, detailed dam investigation studies, vertical and horizontal bearing capacity analysis for both shallow and deep foundation systems, seepage analysis and subdrainage design, implementation of geotechnical problems by solution on computers, soil laboratory testing, testing of soil improvement methods and field inspections and testing. Prepared numerous analyses and designs for new dams and repairs to existing dams. He was the FERC approved Independent Consultant for the first Part 12 inspection of the Congdon Dam in Montville, Connecticut, the second, third and fourth Part 12 inspections of the Sebec Dam in Sebec, Maine, and the first and second Part 12 inspections for the Pittsfield Dam in Pittsfield, New Hampshire. Mr. Teale has been involved with over 100 dam engineering projects. These projects have varied extensively in size and complexity and have included stone masonry, concrete, earth embankment, and arch dams. Services have covered all aspects of impoundment structure projects and related appurtenant structures. He has 33 years of demonstrable dam engineering experience which includes dams located in Connecticut, New Hampshire, Rhode Island, Massachusetts, Vermont, and New York.

SELECTED PROJECT EXPERIENCE

- **Russell Pond Dam | Plymouth, MA**
Performed Phase II engineering of this approximately 110-foot-long earth embankment dam. The upstream side of the dam consists of stone and mortar walls to the left and right of the drop inlet spillway. Flow discharges through a 30-inch steel pipe and is then conveyed through either a 12-inch-diameter cast iron pipe that discharges to the downstream channel or through a 30-inch-diameter concrete diversion pipe that discharges to Hedges Pond. Based on the hydrologic and hydraulic analyses, the spillway cannot safely pass the design flood with the dam overtopped 1.8± feet. Overtopping of the earth embankment crest would likely cause erosion of the downstream slope and could result in a breach of the dam. An armored downstream surface was designed as the preferred rehabilitation approach.
- **Boulder Hill Pond Dam | Monson, MA**
This 15.5-foot-high concrete dam is in poor condition with efflorescence and seepage through the downstream side. With a storage capacity of about 40 acre-feet and a drainage area of about 1 mile, the 100 year inflow design storm is 161 cubic feet per second. The existing spillways have the capacity to safely pass the spillway design flood (SDF), however, the stability of the concrete dam is questionable. In order to increase the factor of safety against sliding and overturning a ballast system of strategically placed riprap dead weight was designed to counteract the driving hydrostatic forces. Additional repairs will be necessary to the low-level outlet pipe.



JOSEPH W. KIDD, MS, PE

Principal Geotechnical Engineer



YEARS OF EXPERIENCE

- 3 With This Firm
- 25 With Other Firms

EDUCATION

- MS, Geotechnical Engineering
University of Connecticut
- BS, Civil Engineering
University of Connecticut

TECHNICAL REGISTRATIONS

- Professional Engineer - CT, MA,
NY, VT
- DFI / FQA Certification for
Dynamic Pile Testing

Mr. Kidd is a Principal Geotechnical Engineer with over 25 years of experience on a variety of projects involving state and local highways and bridges, retaining walls, deep foundations, geotechnical and construction drilling, and geotechnical instrumentation and testing, as well as environmental projects. He has a background in soil mechanics, foundation design, geotechnical instrumentation, and deep foundation design installation, monitoring, and testing. He has specialized technical expertise with driven piles, deep foundations, and construction instrumentation and monitoring. He is familiar with state and federal highway programs involving project reviews and funding by the Federal-Aid Program.

SELECTED PROJECT EXPERIENCE

- **Holmes Dam Removal | Plymouth, MA**
Provided geotechnical engineering assistance for the design and permitting of the final project and last migration structure on Town Brook. Project work elements included survey, hydraulic modeling, sediment analysis, alternatives assessment, power line relocation coordination, regulatory permitting, and engineering design.
- **Boulder Hill Pond Dam | Monson, MA**
Provided geotechnical engineering services for this 15.5-foot-high concrete dam, which is in poor condition with efflorescence and seepage through the downstream side. In order to increase the factor of safety against sliding and overturning, a ballast system of strategically placed riprap dead weight was designed to counteract the driving hydrostatic forces. Additional repairs will be necessary to the low-level outlet pipe.
- **Quinebaug Rail Trail Slope Stability Assessment | Southbridge, MA**
Performed subsurface explorations and performed geotechnical analyses to evaluate the stability of an existing slope between the rail trail and river.
- **Johnson Creek Living Shoreline | Bridgeport, CT**
Performed subsurface explorations and provided geotechnical design and construction recommendations for a proposed elevated pedestrian walkway along the shoreline.

KISHOR PATEL, PE

Principal Structural Engineer, Structural Lead



YEARS OF EXPERIENCE

- 22 With This Firm

EDUCATION

- MS, Structural Engineering (In Progress) University of Connecticut
- BS, Civil Engineering Concordia University

TECHNICAL REGISTRATIONS

- Professional Engineer - CT, FL, MA, ME, NH, NJ, NY, RI, SC, TN, VT, WA
- FHWA-Safety Inspection of In-Service Bridges
- 2012 Domestic Scan on ABC Connections Findings & Recommendations
- Contech Engineered Solutions ABC Bridge Concepts

AFFILIATIONS

- Ordre des Ingenieurs du Quebec (No. E03435)

As Principal Structural Engineer and Structural Lead, Mr. Patel is responsible for overseeing/managing structural projects and design of bridges, retaining walls, greenhouses, fish ladders, and small dams. He conducts the structural analysis for various projects, as well as prepares plans and profiles for site, grading, utilities, and sediment and erosion control. He has also been involved in many structural inspections for foundations, bridges, abutments, dams, and buildings.

SELECTED PROJECT EXPERIENCE

- **Water Street Bridge over Town Brook | Plymouth, MA**
Project Manager responsible for overseeing the preliminary and final design of the replacement of a single-span three-sided box culvert structure. Responsibilities included the supervision of one engineer and one CAD operator during the design and preparation of final contract documents.
- **Off-Billington Street & Plymco Dam Removals | Plymouth, MA**
Project Manager responsible for overseeing the overall structure design of two bridges due to dam removal. Both bridges utilize precast concrete arches founded on spread footings.
- **Holmes Playground Dam Removal, Town Brook Restoration, and Newfield Street Bridge | Plymouth, MA**
Project Manager responsible for the design of the Newfield Street Bridge as part of the removal of Holmes Dam and restoration of the stream and adjacent playground park on Town Brook.
- **Ballou Dam Removal Yokum Brook | Becket, MA**
Provided construction documents for dam removal for this award-winning project.
- **Blacks Road Bridge over Honeypot Brook (Local Bridge Program) | Cheshire, CT**
Provided design services for the reconstruction of the Blacks Road Bridge (No. 025-018) over Honeypot Brook in Cheshire, Connecticut. The project involved the design of the bridge replacement and roadway modifications, hydraulic modeling, environmental permitting, stream channel modifications, landscape architecture, preparation of construction cost opinions, preparation of construction documents, shop drawing review, construction administration, and on-site project representation services.

MARK CARABETTA, PWS, CFM

Principal Environmental Scientist, New York Office Manager



YEARS OF EXPERIENCE

- 27 With This Firm
- 12 With Other Firms

EDUCATION

- MA, Botany
Connecticut College
- BS, Natural Resources
Management & Engineering
University of Connecticut
- AS, Electrical Engineering
Greater New Haven State
Technical College

TECHNICAL REGISTRATIONS

- Professional Wetland Scientist (PWS)
- Certified Floodplain Manager (CFM)

AFFILIATIONS

- Association of State Floodplain Managers
- Society of Wetland Scientists
- CT Association of Wetland Scientists (Founding Member & Past President)
- New York Flora Association
- New York State Floodplain & Stormwater Managers Association
- Society for Ecological Restoration
- New York State Wetlands Forum

Mr. Carabetta is a Principal Environmental Scientist who has developed and led numerous projects and studies relating to rivers and wetlands across the eastern United States and Canada. These include hydrologic and hydraulic modeling and analyses, geomorphic assessments, flood mitigation analyses, ecological assessments, design of channel restoration and aquatic organism passage projects, and regulatory permitting. He is a Professional Wetland Scientist and Certified Floodplain Manager with over 26 years of experience.

SELECTED PROJECT EXPERIENCE

- **Billington Street Dam Removal | Plymouth, MA**
Assisted in the preparation of an Environmental Impact Report, permit applications, and design plans for the removal of the Billington Street Dam.
- **Acushnet River Fish Passage Feasibility Study | Acushnet, MA**
Contributed to an alternatives analysis, feasibility study, and conceptual design for dam removal to restore anadromous fish runs in the Acushnet River.
- **Cuddebackville Dam Removal | Cuddebackville, NY**
Performed sediment studies of the impounded materials associated with the potential removal of two dams. One of the dams was subsequently removed.
- **Woodstock Culvert Replacement | Woodstock, NY**
Project Manager for the design of improvements to roadway, culvert, and bridge infrastructure at three locations. The first two sites involve the replacement of undersized culverts that overtopped during Tropical Storm Irene, resulting in damage and inundation of Town roadways. The third project calls for raising the road elevation as well as the installation of culverts to prevent the road from being inundated during high flow events on the nearby Saw Kill. The project included all aspects of design, including hydrologic and hydraulic analysis, selection of structure types, environmental permitting, final design, bidding assistance, and construction phase services. The project was funded through the Governor's Office of Storm Recovery.
- **Windham Culvert Replacement | Windham, NY**
Project Manager for the design of improvements to town infrastructure at two locations within the town of Windham, New York. The first involved replacement of a series of culverts along County Route 56, which were damaged by flooding during Tropical Storm Irene. The second involved a hydraulic, geotechnical and structural assessment of a retaining wall along Mad Brook.



MATTHEW J. SANFORD, PWS

US Manager of Ecology



YEARS OF EXPERIENCE

- 20 With This Firm
- 1 With Other Firms

EDUCATION

- MS, Wetland Biology
Southern Connecticut State University
- BS, Natural Resource Management (Magna Cum Laude)
University of Connecticut

TECHNICAL REGISTRATIONS

- Certified ACOE Wetland Delineator
- Registered Soil Scientist
- Professional Wetland Scientist

AFFILIATIONS

- Board of Directors of the Connecticut Association of Wetland Scientists (CAWS) - Former President, Former Vice President
- Society of Wetland Scientists
- Association of Massachusetts Wetland Scientists
- Connecticut Entomological Society

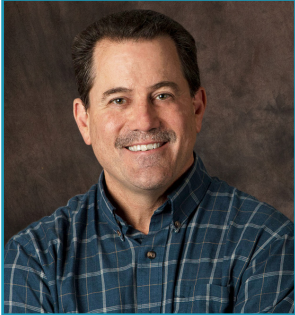
Mr. Sanford is the firm's Manager of Ecology with experience in the areas of natural resources and specific expertise in vegetation management, invasive species control, GPS resource mapping, GIS modeling, biological inventories, water quality monitoring, watershed planning, vernal pool surveys; wetland delineation, assessment, and functions; inland wetland and tidal wetland impact mitigation; and peer review services. Mr. Sanford's project experience includes computer modeling and design in ArcGIS and TR-20. He is a Professional Wetland Scientist (PWS) and is a registered soil scientist. He has expertise in United States Army Corps of Engineer (USACE) wetland delineations and has conducted USACE delineations in New York, Connecticut, Vermont, and Massachusetts. Mr. Sanford served as Vice President and President of the Connecticut Association of Wetland Scientists (CAWS).

SELECTED PROJECT EXPERIENCE

- **Town Brook - Holmes Dam Removal | Plymouth, MA**
Delineated bordering vegetated wetlands upstream of the Holmes Dam Impoundment. Completed vegetation surveys within the wetlands and uplands bordering impoundment. Developed a list of functions and values for the bordering vegetated wetlands and open water areas. Assisted in the design development for channel restoration and planting plans.
- **Acushnet Dam Removal | Acushnet, MA**
Evaluated the feasibility for restoring anadromous fish runs to the lower portion of the Acushnet River. Completed evaluation of dam removal alternatives and assessed potential impacts from dam removal to the existing wetlands and cranberry farms at two dam sites along the Acushnet River.
- **Jones River Dam Removal | Kingston, MA**
Completed wetland delineation; vegetative community mapping along the 1.5 mile reach of the river to document possible changes to wetland; and upland riparian vegetation communities if the dam was removed. Detailed report and graphical figures were prepared.
- **Rattlesnake Brook Restoration | Freetown, MA**
Delineated bordering vegetated wetlands upstream and downstream of the Bleachery Impoundment. Completed vegetation surveys within the wetlands and uplands on site. Developed a list of functions and values for the bordering vegetated wetlands. Completed sediment sampling within channel. Assisted in the design development for channel restoration.

SCOTT G. BRISTOL, LEP, PG

Principal Consultant



YEARS OF EXPERIENCE

- 14 With This Firm
- 18 With Other Firms

EDUCATION

- BS, Geology / Geophysics
University of Connecticut

TECHNICAL REGISTRATIONS

- Professional Geologist - NY
- Environmental Professional - CT
- Hazmat Operations Emergency Responder
- HAZWOPER Trained

AFFILIATIONS

- Environmental Professionals of Connecticut
- Brownfield Coalition of the Northeast Advisory Council
- Connecticut Environmental Forum
- Member: East Hampton (CT) Brownfields Redevelopment Agency
- Chairman: CT AWWA Chapter, Residuals Committee

Mr. Bristol is a Licensed Environmental Professional who has 32 years of experience including Phase I Environmental Site Assessments; Phase II and III Site Investigations; and remedial action planning, estimating, and performance. His experience also includes real estate restoration and redevelopment, regulatory negotiations, and regulatory interpretation and his focus is on brownfield site reuse/redevelopment. He is a volunteer member of his local Brownfields Redevelopment Agency and has served as both Chairman and Vice-Chairman. He is also a long-time member of Environmental Professionals of Connecticut and the Connecticut Environmental Forum. He has worked closely with national and regional commercial companies and local and state government agencies. Mr. Bristol is an accomplished Project Manager with a proven ability to effectively organize and lead project teams.

SELECTED PROJECT EXPERIENCE

Project team member responsible for the development of sediment sampling plans associated with the design of various dredging and/or dam removal projects throughout Massachusetts. Coordinated the sampling and data collection activities and then provided an analysis of the contaminant data with respect to 401 Water Quality Certification requirements and ecological effects thresholds. Additional evaluations were typically made regarding the applicability of the provisions of the Massachusetts Contingency Plan and the effect of the noted chemical constituents upon the overall project design. Example projects include:

- Rattlesnake Brook Dam Removal
- Charles River (Watertown) Dam Removal
- Holmes Dam Removal
- High Street Dam Removal
- Quinapoxet Dam Removal
- Rockport Mill Pond Restoration
- Hamilton Reservoir Dredging Design
- Off-Billington Street Dam Removal
- Plymco Dam Removal
- **Neponset River Sediment Analysis & Riverbank Restoration | Boston, MA**
Responsible for the collection of sediment samples to support the plans for dam removal and river restoration. Sediments were determined to be contaminated with PCBs, PAHs, and heavy metals. Plans were developed and cost estimates prepared for selective removal of sediments and the capping-in-place of riverbank materials in accordance with state and federal requirements.
- **Wapping Road Dam, Jones River Sediment Analysis | Kingston, MA**
Responsible for the analysis of contaminant data associated with sediment located behind a dam. Data were evaluated with respect to 401 Water Quality Certification requirements and ecological effects thresholds. Additional evaluations were made regarding the applicability of the provisions of the Massachusetts Contingency Plan due to the fact that some sediment would become exposed subsequent to removal and therefore become regulated as soil.



Section 5



References

- 01 Massachusetts Division of Ecological Restoration**
Name: Mr. Kris Houle, Ecological Restoration Engineer
Address: 251 Causeway Street, Suite 400, Boston, MA 02114
Phone: (617) 626-1543
Email: kris.houle@mass.gov
- Name:** Mr. Nick Wildman, Priority Project Coordinator
Address: 251 Causeway Street, Suite 400, Boston, MA 02114
Phone: (617) 626-1527
Email: nick.wildman@mass.gov
- 02 Massachusetts Water Resource Authority**
Name: Mr. John Gregoire, Program Manager
Address: Charlestown Navy Yard, 100 First Avenue, Building 39, Boston, MA 02129
Phone: (617) 242-6000
Email: John.Gregoire@mwra.com
- 03 Town of Plymouth, Massachusetts**
Name: Mr. David Gould
Address: 26 Court Street, Plymouth, MA 02360
Phone: (508) 747-1620 x10127
Email: dgould@townhall.plymouth.ma.us

Section 6



DESCRIPTION OF APPLICANT BUSINESS/ORGANIZATION

Check appropriate box(es):


The named organizational entity submitting this proposal is:

- Corporation Partnership Proprietorship
 Minority Owned Woman Owned

SIGNATURES:

This page must be signed by a(n) individual(s) with authority to commit the proposing entity to a binding agreement. Corporations must attach required certification:

COMPANY NAME: SLR International Corporation

AUTHORIZED SIGNATURE: 

PRINT NAME OF AUTHORIZED OFFICIAL: Jeanine Armstrong Gouin

ADDRESS: 99 Realty Drive, Cheshire, CT 06410

TELEPHONE #: (203) 271-1773 FAX NUMBER: (203) 272-9733 EMAIL: jgouin@slrconsulting.com

DATE: 8/6/2021

FEDERAL TAX ID #: 91-2059735

DUNS #: 003590994

If a corporation, a notarized attestation of the signature(s) is required, or in the case of corporate seal affixed, that the signature is the signature of an officer authorized to bind the corporation to a contractual agreement.



I, Jeanine Armstrong Gouin, Co-Secretary of SLR International Corporation, a Corporation existing under the laws of the State of Washington, DO HEREBY CERTIFY that the following is a true, correct and accurate representation of a Resolution dated December 21, 2020, duly adopted by unanimous written consent of the Board of Directors of SLR International Corporation in lieu of a special meeting: that each of Jeanine Gouin and Stephen Dietzko is a duly elected, qualified, and acting officer of the Company and that each is authorized to execute and deliver on behalf of the Company, each document to which it is a party and all other agreements, documents and certificates to be delivered by the Company pursuant thereto.

I further CERTIFY that the Resolution has not been modified, rescinded or revoked since the date on which it was enacted, and it is at present in full force and effect.

IN WITNESS WHEREFORE, the undersigned has affixed his/her signature and the Corporate Seal of the Corporation, this 6th day of August 2021.



(Corporate Seal)



Signed: Jeanine Armstrong Gouin, Co-Secretary

STATE TAXES CERTIFICATION CLAUSE

I certify under the penalties of perjury that I, to my best knowledge and belief, have filed all state tax returns and paid all state taxes under law.

SLR International Corporation

* Signature of individual or

Corporate Name (Mandatory)

By:



Jason French, U.S. Regional Finance Manager
Corporate Officer

(Mandatory, if applicable)

91-2059735

Federal Identification Tax ID

* Approval of a contract or other agreement will not be granted unless the applicant signs this certification clause.

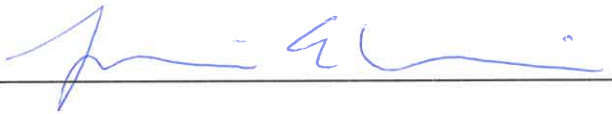
** This request is made under the authority of Mass. G.L. 62C s. 49.A.

HOLD HARMLESS AND INDEMNITY CLAUSE

SLR International Corporation, its officers and members all,
Legal Name of Proposer's Business Entity

through the signing of this document by an authorized party or agent, indemnify, hold harmless and defend the Town of Wareham and its agents and employees from all suits and actions, including attorneys' fees and all costs of litigations and judgment of every name and description brought against the Town as a result of loss, damage or injury to person or property by reason of any act by SLR International Corporation, its agents, servants or employees.

Legal Name of Proposer's Business Entity


Authorized Signature

Jeanine Armstrong Gouin, U.S. Operations Manager Name and Title (Print or Type)

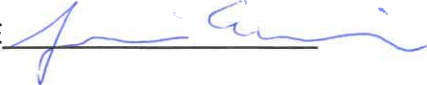
8/6/2021 Date



CERTIFICATE OF NON-COLLUSION

The undersigned certifies under penalties of perjury that this bid or proposal has been made and submitted in good faith and without collusion or fraud with any other person. As used in this certification the word "person" shall mean any natural person, business, partnership, corporation, union, committee, club or other organization, entity, or group of individuals.

FIRM SLR International Corporation

SIGNATURE 

ADDRESS 99 Realty Drive

NAME (print) Jeanine Armstrong Gouin

Cheshire, CT 06410

TITLE U.S. Operations Manager

TELEPHONE (203) 271-1773

DATE 8/6/2021

Corporate Seal





www.slrconsulting.com

